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18th ANNUAL

TPOs Driving Tomorrow's Innovations October 2-5, 2016

Welcome to the 2016 SPE Global TPO Conference

hank you for attending the 18th-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 show and wish you a very successful event.

AUTO-TPO.COM

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 more than 900 guests from around the world.
- We have our largest technical program ever (over 70 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 that even now are shaping 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 2016 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.

Sincerely,

Dr. Sassan Tarahomi Conference Co-Chair International Automotive Components (IAC) Group **David Okonski** Conference Co-Chair General Motors Co.



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Conference Executive Chair Betsy Jackson, General Motors Co.

Conference Operation / Sponsorship Co-Chairs Dr. Sassan Tarahomi,

International Automotive Components (IAC) Group David Okonski, General Motors Co.

Technical Program Co-Chairs

Dr. Norm Kakarala, retired-Inteva Products LLC David Okonski, General Motors Co.

Interior Soft Trim: Skins & Foams Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products, LLC

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

Surface Enhancements

Dr. Rose Ryntz, IAC Group Jeff B. Crist, Ford Motor Co. Jim Keller, United Paint & Chemicals Corporation Process Enabling Technologies Kurt Anthony, Washington Penn Plastics Co., Inc. Dr. Suresh Shah, retired-Delphi Corp.

Modeling for Performance Prediction David Helmer, General Motors Co. Li Lu, Ford Motor Co. Hanno Van Raalte, Autodesk, Inc.

Rigid Polyolefin Compounds

Mike Balow, Asahi Kasei Plastics North America, Inc. Ermanno Ruccolo, Mitsui Plastics, Inc. Advances in Automotive Polyolefins Neil Fuenmayor, LyondellBasell Industries Martha Katz, Ford Motor Co.

Session Co-Chairs

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

Sustainability & Bio-Based Materials Susan Kozora, IAC Group Dr. Alper Kiziltas, Ford Motor Co.

TPOs for Vehicle NVH Control Jim Hemphill, Dow Elastomers Joel Myers, Hyundai America Technical Center, Inc. (HATCI)



Other Committee & Staff

Day of Conference Staff Support Rob Philp, A. Schulman Inc. Ed Bearse, Advanced Plastic Consultants LLC Students from SPE Chapters

Advertising/PR

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

Website

Marc Bahm, BASF Corp. 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, A. Schulman Inc.

APP Richard Umemoto, Magna

Signs/Posters Dr. Sassan Tarahomi, IAC Group Jill Gorter, JPI Creative Suzanne Lee, That Color

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, IAC Group Bill Windscheif, Advanced Innovative Solutions

Keynote Speakers Bill Windscheif, Advanced Innovative Solutions Nippani Rao, RAO Associates

OEM Participation

Neil Fuenmayor, LyondellBasell Industries Tom Pickett, General Motors Co. John Haubert, FCA US LLC Scott Aramian, Advanced Composites Inc.

USB Drives / Online Access

Sanjay Patel, Borealis AG Neil Fuenmayor, LyondellBasell Industries

Scholarships

Ermanno Ruccolo, Mitsui Plastics, Inc. Sanjay Patel, Borealis AG Dr. Sassan Tarahomi, IAC Group Dr. Norm Kakarala, retired-Inteva Products LLC Bill Windscheif, Advanced Innovative Solutions David Okonski, General Motors Co.

Plaques / Awards / Part Competition Nippani Rao, RAO Associates Dr. Suresh Shah, retired-Delphi Corp.

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

E-touches / Proceedings Book

Dr. Laura Shereda, Asahi Kasei Plastics North America, Inc. Jill Gorter, JPI Creative Jim Alexander, Maple Press

Conference Feedback Dirk Zinkweg, The Dow Chemical Co.

University Students Dr. Sassan Tarahomi, IAC Group

2016 Keynote Speakers



Betsy Jackson Director, Exterior trim, Global Technical Leader for Wipers, Glass, Sunroofs, and Trim General Motors North America

A Perspective on How TPO is Helping the Automotive Industry Meet Today's Challenges

The global Automotive Industry continues to evolve rapidly. The industry itself is experiencing remarkable alterations in future customer usage and requirements. In the future, OEMs need TPO innovation from all sectors of our plastics industry – material suppliers, parts suppliers, painters, texture houses, etc. I will touch on GM's perspective of the immediate challenges we are facing and then discuss some of the successful processes we developed for incorporating innovative TPO ideas in our current product offerings."

Jackson began her career in GM in Industrial Engineering at Pontiac Motor Division. She held project engineer positions in Human Factors Engineering and was Engineering Group Manager of Interior Systems for Minivans. She has been Director of Exterior Systems, Body Product and Manufacturing Systems and Body Validation for North American Product Development and held an internal consulting position supporting the Globalization of GM Engineering. Currently she is Director, Exterior trim, GMNA and the Global Technical Leader for Wipers, Glass, Sunroofs, and Trim.

Jackson earned a Bachelor of Science Degree in Industrial and Operations Engineering and a Master of Science in Industrial and Operations Engineering from the University of Michigan. She attended Harvard Graduate School and acquired her Master's in Business Administration Degree.



Rob L. Morgan Senior Vice President Advanced Composites North America

A Compounds Perspective: Market Growth, Customer Satisfaction, New Applications / Technology and the Dreaded Raw Materials Issues

Having spent 27 years in the plastic automotive industry, with the last 21 years at Advanced Composites NA, Rob Morgan appreciates how change impacts the industry. "There is a constant balancing act to provide customers with the right product for their needs, especially with the rapid changes in technology.

In his role, Morgan leads all commercial activities for Advanced Composites including sales, marketing development and purchasing. During his tenure, Advanced Composites has grown from a small specialty compounder to one of the largest suppliers on PP compounding products to the NA automotive market. Morgan began his Advanced Composite career leading business development and establishing their first business with the Detroit 3 OEMs. In 2012, Morgan became a global team leader for the Mitsui Chemical network of PP compounding facilities with the express purpose to expand our business relationships with the Detroit 3 to all regions. As a global leader, Morgan interacts with customers and raw material suppliers in China, Thailand, Europe, India, Japan and Brazil.

Prior to joining Advanced Composites, Morgan held serval sales/ marketing positions at Monsanto Chemical and the General Electric Co. Morgan holds a Bachelor's degree in Business from the University of Cincinnati.

2016 Keynote Speakers



Heinrich Lingnau Sr. Vice President/GM Europe, Middle East & Africa A. Schulman

Driving our Customers' Success – Next Generation Material Solutions for the Automotive Industry

Lingnau notes, "Today's global plastics industry customers require innovative solutions to address current market challenges, such as the increasing need for weight reduction, eco-friendliness and paint replacement." He will share examples of how plastic materials can offer a multitude of solutions to meet current market challenges without compromising the luxurious feel, quality and performance of the final result.

Heinrich Lingnau serves as A. Schulman's Senior Vice President and General Manager, EMEA, with responsibility for the Company's operations in the region of Europe, Middle East and Africa. Mr. Lingnau, who has served in this capacity since 2013, joined A. Schulman in 1999 as a regional business leader in engineered plastics before transitioning into various management-level positions within the Company's European operations. Prior to joining A. Schulman, he spent 11 years at DuPont where his positions included product management and market development for various business units in Europe. Mr. Lingnau received a degree in mechanical engineering with a focus on plastic technology from the University of Aachen/Germany. Tom Pilette Global Vice President, Product & Process Development Magna Exteriors

Past, Present and Future: Focus on Expanding the Use of these Materials, Considering "Car of the Future and Globalization Megatrends"

Tom Pilette was named Global Vice President Product & Process Development of Magna Exteriors (an operating unit of Magna International) in November 2008. As Global Vice President Pilette oversees the expansion and development of exterior core products, processes and materials. Through research, development and innovation initiatives, Pilette is responsible for establishing and maintaining Magna Exteriors' competitive position in their core markets as well as supporting growth with new customers and in new regions around the world.

Pilette held the previous position of Group General Manager, Modularity Group for Magna Exteriors, formerly Decoma International. Over his career of 20 years at Magna, Pilette has held a number of positions including Director of Sales, Divisional Assistant General Manager and Lead Program Manager for the Exteriors Group.

Throughout his 30 year automotive career, Pilette has gained extensive product development and manufacturing experience focusing in the areas of body structures and energy management systems.

2016 Keynote Speakers ·····





Laurie Harbour President, Harbour Results, Inc.,

Automotive Manufacturing Forecast: What Does the Future Hold for the Plastics Industry?

Laurie Harbour will share an in-depth look at the current and future state of the automotive manufacturing industry, including key market trends that are driving complexity into the entire supply chain. Additionally, she will share research findings and insights on plastics industry best practices. Harbour notes that, "the manufacturing industry is changing at a rapid pace, and it is important to view these changes comprehensively, understanding how each piece of the puzzle fits together, to better prepare for the future.

Laurie Harbour is President and CEO of Harbour Results, Inc. and a trusted advisor to the North American manufacturing industry. She monitors, researches and analyzes the manufacturing value stream identifying strengths and weaknesses, gaps and risks, and business and operational opportunities in an effort to help the industry transform to be more successful in the global marketplace.

Prior to joining Harbour Results, Inc., Harbour founded Harbour-Felax Group and was Vice President and company officer at Harbour Consulting. She has vast experience with global automotive manufacturer, tier-one suppliers and the defense industry and provided analysis and counsel in operations improvement, product and process development, competitive research and benchmarking. Additionally, Harbour was responsible for development and management of The Harbour Report, the landmark study of labor efficiency for automotive OEMs.

Harbour earned a BA from the University of Michigan-Dearborn in Operations Management and Human Resources.

SUNDAY, OCTOBER 2, 2016

12:00 PM	Exhibition Set-up Starts, Registration from 3:00 PM
3:00 PM	AUTOMOTIVE COATINGS TUTORIAL: Jim Keller, United Paint and Chemicals Corporation
4:00 PM	AUTOMOTIVE MATERIAL APPROVAL PROCESS OVERVIEW: Susan Kozora, IAC Group
5:00 PM	EVENING RECEPTION: Sponsored by Trinseo Automotive

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 Technical Program Co-Chair David Okonski, General Motors Corp. phone: +1.281.870.6659 dokonski@auto-tpo.com

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> 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

MONDAY, OCTOBER 3, 2016

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WELCOME REMARKS: Conference Co-Cha	WELCOME REMARKS: Conference Co-Chairperson, Dr. Sassan Tarahomi, IAC Group				
KEYNOTE: A Perspective on How TPO is He Betsy Jackson, Director, Exterior Trim, Genera	KEYNOTE: A Perspective on How TPO is Helping the Automotive Industry Meet Today's Challenges Betsy Jackson , <i>Director</i> , <i>Exterior Trim</i> , <i>General Motors N.A</i> .				
KEYNOTE: A Compounder's Perspective: Market Growth, Customer Satisfaction, New Applications/ Technology and the Dreaded Raw Material Issues Rob Morgan , <i>Sr. Vice President, Advanced Composites, N.A.</i>					
TECHNICAL PROGRAM HIGHLIGHTS: Nor	TECHNICAL PROGRAM HIGHLIGHTS: Norm Kakarala / David Okonski – Lunch Sponsor and Reception Sponsor Remarks				
BREAK: Sponsored by International Au	atomotive Components				
CONFERENCE HALL- I	CONFERENCE HALL-II	CONFERENCE HALL-III			
INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC	LIGHTWEIGHTING POLYOLEFIN PARTS John Haubert, FCA US LLC Normand Miron, Washington Penn Plastics	SURFACE ENHANCEMENTS Dr. Rose Ryntz, IAC Group Jeff B. Crist, Ford Motor Co. Jim Keller, United Paint & Chemicals Corp.			
Trends in Automotive Interiors Ken Gassman, Inteva Products LLC	Effect of Short-Shot and Core-Back Foam- ing on TPO Performance and Appearance Jason Fincher, Advanced Composites	Surface Aesthetics in IM Plastics – The Trifecta of Processing, Material, and Tooling Eileen McCotter Gallihugh , <i>IAC Group</i>			
Supply Chain Dynamics and Future Tech- nologies in Auto Interior TPOs and TPEs Bob Eller, <i>Robert Eller Associates LLC</i>	Progress on Formulating and Processing New Light-Weight Automotive Materials Russell Goering , <i>Addcomp N.A</i> .	Specialized Color Effects Providing Value for Automotive Applications Perry Banta , LyondellBasell			
Advances in Automotive Door Trim Applications Pravin Sitaram , Haartz Corporation	Comparing Current and Emerging Mass Saving Approaches for Polyolefin Resins Charles Buehler, LyondellBasell	Future Market Trends and Technology are Driving Color! Nancy Lockhart, Axalta Coating Systems			
LUNCH: Sponsored by Sumitomo Chen	nical				
Investigation into Dent Recovery Performance of TPE Skins Kevin Lyons, Inteva Products LLC	Fibremod Carbon - An Economic Light Weight Solution for the Automotive Industry Michael Tranninger, <i>Borealis Polyolefin GmbH</i>	Improve Sunscreen Resistance of Automotive Interior Soft Feel Coatings Joe Zhou, Eastman Chemical Co.			
Innovative Automotive Solutions with New Kraton Polymer Technologies Dr. Marcus Greger, Kraton Polymers LLC	Research of Carbon Fiber Non-Woven Fabric Reinforced Thermoplastics Composites Through Press Molding Masaya Matsushita, Yuho Toyobo	There is More to Scratch Resistance Than Scratch Suresh Swaminathan, <i>Croda</i>			
Performance Driven Flexible Olefinic Materials Dr. Charlie Yang , LyondellBasell	Empowering Lightweight Innovation through Advanced LGF Concentrate Technology Norwin van Riel, Trinseo	Quantitative Evaluation of Scratch Performance of Soft Polymers Using the ASTM/ISO Scratch Test Shuang Xiao, Texas A&M University			
BREAK: Sponsored by Formosa Plastics	Corporation				
INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC	PROCESS ENABLING TECHNOLOGIES Kurt Anthony, Washington Penn Plastic Co., Inc. Dr. Suresh Shah	SURFACE ENHANCEMENTS Dr. Rose Ryntz, IAC Group Jeff B. Crist, Ford Motor Co. Jim Keller, United Paint & Chemicals Corp.			
A Method for Fiber Modification to Improve Filtration Efficiency in Automotive Air Filters Xiangu Jin, Yukang Xu, <i>Donghua University</i>	Use of Core Retraction to Achieve Low Density PP Foams Thomas Ellingham, <i>University of Wisconsin - Madison</i>	Surface Mechanical and Scratch Resistance Characterization of Polyurethane Coatings Under Accelerating Weathering Dr. LiPiin Sung , <i>NIST (Nat. Inst. Std.Tech</i>)			
Softell Textile: An Innovative Approach for Automotive Interior Trim Sunit Shah, Michael Buedinger, LyondellBasell	Weight Reduction Without Losing Mechanical Performance Dr. Juergen Giesow, <i>Arburg</i>	The Science Behind ASTM D7869 Accelerated Weathering Protocol Mark Nichols, Ford Motor Co.			
PP for Injection Molded Foamed Parts with Excellent Surface Appearance Georg Grestenberger , Borealis Polyolefin GmbH	Analysis of the Foam Injection Molding Process Using a Chemical Blowing Agent Syed Rehmathullah, <i>Autodesk, Inc</i> .	Discussion of Differences and Correlation Between Accelerated Ageing Test and Natural Weathering Exposure Test Susan Zhou , <i>Suzhou Zhoubo Chemical Eng.</i> <i>Technology Co., Ltd</i>			
New Soft Foam Structures for Auto Interior Trim with Improved Technical Features and Benefits Jesse Baldwin, Toray Plastics (America), Inc.	Foamcore Blow Molded Structural Components for Automotive Applications Steve Sopher , JSP Corporation	Stronger Natural-Filled PP Powered by a New Silane Enables Light Weighting of Structural Automotive Components Scott Miller, Dow Corning Corporation			
	 WELCOME REMARKS: Conference Co-Cha KEYNOTE: A Perspective on How TPO is He Betsy Jackson, Director, Exterior Trim, General KEYNOTE: A Compounder's Perspective: M Technology and the Dreaded Raw Material TECHNICAL PROGRAM HIGHLIGHTS: Nor BREAK: Sponsored by International Au CONFERENCE HALL-1 INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC Trends in Automotive Interiors Ken Gassman, Inteva Products LLC Supply Chain Dynamics and Future Tech- nologies in Auto Interior TPOs and TPEs Bob Eller, Robert Eller Associates LLC Advances in Automotive Door Trim Applications Pravin Sitaram, Haartz Corporation LUNCH: Sponsored by Sumitomo Chern Investigation into Dent Recovery Performance of TPE Skins Kevin Lyons, Inteva Products LLC Innovative Automotive Solutions with New Kraton Polymer Technologies Dr. Marcus Greger, Kraton Polymers LLC Performance Driven Flexible Olefinic Materials Dr. Charlie Yang, LyondellBasell BREAK: Sponsored by Formosa Plastics INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC A Method for Fiber Modification to Improve Filtration Efficiency in Automotive Air Filters Xiangu Jin, Yukang Xu, Donghua University Softel/ Textile: An Innovative Approach for Automotive Interior Trim Sunit Shah, Michael Buedinger, LyondellBasell PP for Injection Molded Foamed Parts with Excellent Surface Appearance Georg Grestenberger, Borealis Polyolefin GmbH New Soft Foam Structures for Auto Interior Trim with Improve Technical Features and Benefits Jesse Baldwin, Toray Plastics (America), Inc. 	WELCOME REMARKS: Conference Co-Chairperson, Dr. Sassan Tarahomi, IAC Group KEYNOTE: A Perspective on How TPO is Helping the Automotive Industry Meet Today's C Betsy Jackson, Director, Exterior Trim, General Motors N.A. KEYNOTE: A Compounder's Perspective: Market Growth, Customer Satisfaction, New App Technology and the Dreaded Raw Material Issues Rob Morgan, Sr. Vice President, Advanced TECHNICAL PROGRAM HIGHLIGHTS: Norm Kakarala / David Okonski - Lunch Sponsore BREAK: Sponsored by International Automotive Components CONFERENCE HALL-1 International Automotive Components CONFERENCE HALL-1 ILIGHTWEIGHTING POLYOLEFIN PARTS John Hauber, FC 40 SLIC Robest Eller, Robert Eller, Robert Eller Associates LIC Normand Miron, Washington Penn Plastics Supply Chain Dynamics and Future Tech- nologies in Automotive Door Trim Applications Progress on Formulating and Processing New Light-Weight Automotive Materials LUNCH: Sponsored by Sumitomo Chemical Investigation into Dent Recovery Performance of TPE Skins Comparing Current and Emerging Mass Saving Approaches for Polyolefin Resins Charles Buehler, LyondellBasell Innovative Automotive Solutions with New Kraton Polymer Technologies Fibremod Carbon - An Economic Light Weight Solution for the Automotive Industry Weight Solution for the Automotive Industry Weight Ray Advanced LGF Concentrate Technology Innovative Automotive Solutions with New Kraton Polymer Technologies Fibremod Carbon - An Economic Light Weight Research of Carbon Tiber Non-Woven Fabric Reinforced Thermoplastics <t< td=""></t<>			

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TUESDAY, OCTOBER 4, 2016

7:30 AM	REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by Mitsubishi Chemical Performance Polymers				
8:00 AM	WELCOME REMARKS: Conference Co-Chairperson, David Okonski, General Motors				
8:15 AM	KEYNOTE: Driving our Customers' Success – Next Generation Material Solutions for the Automotive Industry Heinrich Lingnau, Sr. V.P. / G.M. Europe, Middle East & Africa, A. Schulman				
8:45 AM	KEYNOTE: TPO – Past, Present and Future: Focus on Expanding the use of These Materials, Considering "Car of the Future and Globalization Megatrends." Tom Pilette , <i>Global Vice President Product & Process Development, Magna Exteriors</i>				
9:15 AM	Lunch Sponsor and Reception Sponsor Re	marks			
9:30 AM	Awards: Winners of the 2016 TPO Parts Co	mpetition, Recognition Awards			
9:45 AM	BREAK: Sponsored by SPE Detroit Sect	tion			
	CONFERENCE HALL- I	CONFERENCE HALL-II	CONFERENCE HALL-III		
	PROCESS ENABLING TECHNOLOGIES Kurt Anthony,Washington Penn Plastic Co., Inc. Dr. Suresh Shah	MODELING FOR PERFORMANCE PREDICTION David Helmer, General Motors Li Lu, Ford Motor Co. Hanno Van Raalte, Autodesk, Inc.	SURFACE ENHANCEMENTS Dr. Rose Ryntz, IAC Group Jeff B. Crist, Ford Motor Co. Jim Keller, United Paint & Chemicals Corp.		
10:15 AM	Low-Cost Gas Assisted Processing of Poly- propylene+Graphene Nanocomposites Thomas Ellingham , University of Wisconsin- Madison	A Simulation Validation Study - The Influence of TPO Composition on Predicted Part Warpage David Okonski, <i>GM</i> Syed Rehmathullah, <i>Autodesk, Inc.</i>	CO ₂ Cleaning for Surfaces, Pre-Treatment, & Coating Applications: Jon Wikstrom, Cool Clean Technologies		
10:45 AM	High Volume Aluminum Tooling for Polyolefins – Best Practices and Lessons Learned Darcy King, John Caccese Unique Tool & Gauge Inc.	Using Mid-Stage Validation to Increase Confidence in Simulation of TPOs Megan Lobdell, Hubert Lobo <i>Datapoint Labs</i>	Adhesion to Painted Automotive Exterior TPO Parts, Past to Present Michael Pollock, <i>Phibrochem</i>		
11:15 AM	Techniques and Options for Improved Twin- screw Compounding of Reinforced Polyolefins Paul Andersen , <i>Coperion Corporation</i>	Numerical Prediction of Shape Deviation Due to Welding of Injection Molded TPO Parts Hui Wang, Li Lu, Jane Zhou Ford Motor Company	Primerless Painting of Exterior Parts with Carbon Nanotube Technology Dr. Marie Hurtgen , <i>Nanocy SA</i>		
11:45 AM	How to Optimize Compression Molding Process Parameters with Simulation Tools Adam Miller, <i>Moldex 3D</i>	Tiger Striping in a Plastic Injection Molded Part: Experimental and Simulation Li Qi, Ken Kwasnik, J. Kloberdanz, D. Zeng, Ford Motor Company	A New Long-Glass-Fiber-Reinforced Polypropylene with Improved Surface Appearance Koichi Saito, Hiroki Sano, Japan Polypropylene Corporation tRichard Tuttle, COMUSA Inc.		
12:15 PM	LUNCH: Sponsored by Washington Per	nn Plastic Co., Inc.			
	RIGID POLYOLEFIN COMPOUNDS Mike Balow, Asahi Kasei Plastics North America Inc. Ermanno Ruccolo,Mitsui Plastics, Inc.	MODELING FOR PERFORMANCE PREDICTION David Helmer, General Motors Li Lu, Ford Motor Co. Hanno Van Raalte, Autodesk, Inc.	ADVANCES IN AUTOMOTIVE POLYOLEFINS Neil Fuenmayor, LyondellBasell Martha Katz, Ford Motor Company		
1:30 PM	A Review of Reinforcement for Polyolefins: Stiffness/ Toughness/ Flow and Other Important Considerations Michael Balow, <i>Asahi Kasei Plastics N.A. Inc</i> .	Analytic Prediction of Thickness Change and Residual Stresses on Safety Plastic™ Produced by Thermoforming Process Hector Hernandez, Ford Motor Co.	Advanced UV Stabilization Solutions Enabling TPO to Meet Automotive Needs Dr. Jian-Yang Cho, <i>Cytec Solvay Group</i>		
2:00 PM	Emissions of Polypropylene Compounds Dr. Laura Shereda, <i>Asahi Kasei Plastics N.A. Inc.</i>	The Investigation of Fatigue Failure for TPO Materials Zhengpan Qi, Danielle Zeng, Bhavani Thota, L. Doan, Li Lu, Zuming Su <i>Ford Motor Company</i>	High Performance Stabilization Systems for PP and PP-based TPO Automotive Applications Heejung Kwon, Songwon Industrial Co., Itd		
2:30 PM	Comprehensive, In-Process and Full-Cabin Analysis of VOC Emissions Yan Li, Syft Technologies	Weld Strength Prediction for Injection Molded Parts Jeff Higgins, Doug Kenik, Hanno Van Raalte, Autodesk, Inc.	Superior Weathering Solution for PO Based Automotive Parts using Advanced Hindered Amine Light Stabilizers Yota Tsuneizumi , ADEKA Corporation.		
3:00 PM	Comprehensive, High Throughput Analysis of VOC Emissions from Automotive Components Yan Li, Syft Technologies	How to Improve Product Quality with the Latest Process Simulation Technology Anthony Wen-Hsien Yang, Lye Wang, Moldex	Performance Comparison of Mineral- filled TPOs Maziyar Bolourchi, IMERYS		

3:00 PM BREAK: Sponsored by Cimbar Performance Materials

TUESDAY, OCTOBER 4, 2016 CONTINUED

	RIGID POLYOLEFIN COMPOUNDS	ADHESIVES & COATINGS FOR TPOS	ADVANCES IN AUTOMOTIVE
	Mike Balow, Asahi Kasei Plastics	Hoa Pham, Freudenberg	POLYOLEFINS
	North America Inc.	Performance Materials	Neil Fuenmayor, LyondellBasell
	Ermanno Ruccolo,Mitsui Plastics, Inc.	Dr. Pravin Sitaram, Haartz Corporation	Martha Katz, Ford Motor Company
4:00 PM	Using Hollow Glass Microsphere Master- batches to Optimize Formulations at the Injection Molding Press Stephen Amos, <i>3M Company</i>	Interior Trim Lamination Development Helmut Doyen, Sika Corporation	HTP1s: A Novel Talc Additive for Smart Polymer Processing Piergiovanni Ercoli Malacari, IMI Fabi SPA
4:30 PM	Opportunities for Lightweight Reinforced	A New Adhesive for Automotive	Case Studies of Additives' Impact on Part
	Polyolefins Utilizing Mixed Morphology Clays	Interior Lamination	Performance
	Daniel Berg, <i>BYK USA Inc</i> .	David Speth, <i>Evans Adhesives</i>	David Fortener , Inteva Products
5:00 PM	Anisotropic Analysis of Short Fiber Filled	IR Heating for Successful Lamination	Expanded Uses of Leading-Edge Impact
	PP for Structural Applications	George Cozzarin, Radiant Energy	Modifiers for TPOs
	Rodrigo Orozco, Asahi Kasei Plastics N.A. Inc.	Systems, Inc.	Jeff Munro, The Dow Chemical Company
5:30 PM	Green Materials with Improved Air Quality Inside the Passenger Cars Zhongfu (Jerry) Luo & Dr. Bo Yang , <i>Kingfa Sci. & Tech. (USA) Inc.</i>	Achieving Weight Reduction – Thin-Wall and Low Density Exterior Applications Dr. Linda Havermans, <i>SABIC</i>	The Use of Post-Consumer Materials to Produce TPO Quality Resins for Automotive Applications Mike Montpetit , <i>Buckeye Polymers</i>
6:00 PM	APPETIZER AND STROLL THROUGH EXHIBITOR AREA: Sponsored by Platinum, Gold and Exhibitor Sponsors		

WEDNESDAY, OCTOBER 5, 2016

7:30 AM	REGISTRATION & CONTINENTAL BREAKFAST: Sponsored by SPE Detroit Section				
8:00 AM	INTRODUCTION OF KEYNOTE SPEAKER: Conference Co-Chairperson, Dr. Sassan Tarahomi, IAC Group				
8:15 AM	KEYNOTE: Automotive Manufacturing Forecast: What Does the Future Hold for the Plastics Industry? Laurie Harbour, President & CEO, Harbour Results Inc.				
8:45 AM	BREAK: Sponsored by SPE Detroit Section				
	INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC	ADHESIVES & COATINGS FOR TPOS Hoa Pham, Freudenberg Performance Materials Dr. Pravin Sitaram, Haartz Corporation	SUSTAINABILITY & BIOBASED MATERIALS Susan Kozora, IAC Group Dr. Alper Kiziltas, Ford Motor Co.		
9:15 AM	New Developments in Chemical Foaming Agents Improve TPO Properties in Injection Molding Peter Schroeck , <i>Reedy Chemical Foam</i>	Polyolefin Hot Melt Adhesive Technology in Automotive Interior Composites Sebastien Meliot, Jowat Adhesives	The Growth of Sustainability in Industry Carrie Majeske, Ford Motor Co., Eric Simon, World Wildlife Fund		
9:45 AM	Benefits and Challenges for Polypropylene Composites for Automotive Interiors Markus Kralicek, Borealis Polyolefin GmbH	Improved Performance for Automotive Tex- tiles Using Surface Modification Technology Chris Hagler, <i>Gouston Technologies</i>	Biobased Headlamp Housing For Automotive Lighting Ayse Ademuwagun, Varroc Lighting System		
10:15 AM	A New PP Based Composite Melt-Blown Superfine Fiber Filter for Automobile Air Conditioning Systems Zijian Dai , Donghua University	Evaluation of Coating Performance Based on ASTM 7027 James Chrisman, Texas A&M University	Effect of Low Temperature Heat Treatment on Bamboo Fiber Reinforced Composites Amy Langhorst , Ford Motor Company		
10:45 AM	45 AM BREAK: Sponsored by SPE Detroit Section				
	INTERIOR SOFT TRIM: SKINS, FOAMS & COMPONENTS Robert Eller, Robert Eller Associates LLC Dr. Sam He, Inteva Products LLC	TPOs FOR VEHICLE NVH CONTROL Jim Hemphill, Dow Elastomers Joel Myers, Hyundai America (HACTI)	SUSTAINABILITY & BIOBASED MATERIALS Susan Kozora, IAC Group Dr. Alper Kiziltas, Ford Motor Co.		
11:00 AM	New Halogen-Free Flame Retardant Thermoplastic Elastomer (New HFFR-TPE) Ryosuke Kurokawa, <i>Sumitomo Chemical Co. Ltd.</i>	Why TPOs are the Right Choice of Materi- als for Automotive NVH Reduction Sassan Tarahomi, IAC Group	The Use of Micron-size Tire Rubbers as Reinforcement Fillers in the Recycled Thermoplastic Polyolefins Haikun Xu , <i>Entech, Inc</i>		
11:30 AM	Automotive Interior: Technology Triumphs to Deliver Lighter, Better, Safer Sameer Mehta, Junjun Li, Asahi Kasei Plastics, North America Inc.	Adding Value to an Injection Molded TPO Front of Dash Barrier Meagan Marko , <i>Cascade Engineering /</i> <i>Noble Polymers</i>	Natural Fiber Filled Polyolefin Filaments for 3 D Printing Robert Joyce , Innovative Plastics and Molding.		
12:00 PM	Property Study on Needle Punched Automotive Carpets Made from Recycled Polyester Fibers Yuxiao Wang, Donghua University	Bonding Properties Between TPVs and Cured Rubber for Automotive Profiles Noriyoshi Ono, JSR Corporation	Origin and Control of VOC and Odors in Polyolefin Biocomposites Dr. Damien Maillard , National Research Council of Canada.		

12:30 PM BOXED LUNCH: Sponsored by Trinseo Automotive Conference Conludes

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Interior Soft Trim: Skins, Foams & Components

Session Co-Chairs

Robert Eller, Robert Eller Associates LLC **Dr. Sam He,** Inteva Products LLC

Trends in Automotive Interiors

Kenneth Gassman Inteva Products LLC

In today's automotive industry, OEMs and suppliers are working hard to set themselves apart. During this talk, we will discuss how vehicle interiors are influenced by everything from nature to fashion and how manufacturers and suppliers are addressing these trends.



The vehicle's interior is becoming an outlet for personalization and creativity. It is helpful to look outside the automotive industry to stay on top of trends, apply uncommon expertise, and develop new product and process ideas.

Supply Chain Dynamics and Future Technologies in Auto Interior TPOs and TPEs

Robert Eller Robert Eller Associates LLC

This talk we will examine the forces driving material substitution and process evolution in auto interiors. In particular, the competition between TPO and other TPEs especially styrene block copolymers (SBCs)



and thermoplastic vulcanizates (TPVs) will be examined. In addition to the well-known driving forces (lightweighting, scratch/mar protection, cost savings, etc), the future prospects for process consolidation, parts integration, foaming and the innovation process will be examined."

Advances in Automotive Door Trim Applications

Pravin Sitaram The Haartz Corporation

Automotive Interiors is a constantly evolving field in terms of material development. Softness creates an inherent feeling of luxury, and with OEMs aiming to increase this image in all vehicle levels, the material function is being challenged to meet



opposing objectives...soft yet dent resistant. The Haartz Corporation has engineered a range of new door trim soft TPO laminates based on the relationship between the foil and foam layers to resist indentation and improve recovery.

Investigation into Dent Recovery Performance of TPE Skins

Kevin Lyons Inteva Products LLC

The indentation recovery of skins is an important property for interior applications. This paper will investigate the factors that affect the dent recovery performance of TPE bilaminate skins. Physical and mechanical properties will



be reported and discussed in conjunction with laminate structure and manufacturing considerations. The paper will also attempt to develop a more efficient test method based on creep/recovery tests and correlate the results to standard indentation test method results (VDA 237-101) and resin properties.

Interior Soft Trim: Skins, Foams & Components ...

Innovative Automotive Solutions with New Kraton Polymer Technologies

Dr. Marcus Greger Kraton Polymers LLC

Kraton Polymers has developed new polymer systems that address the needs of interior and exterior applications in the automotive market. This discussion will introduce how newest Kraton®



polymers will address light weighting in automotive interiors, improved long term aging performance of soft skin applications, cost effectively expanding the use of soft skins in interior applications and use of Kraton[®] technologies in TPO/PP systems to enhance performance properties of these systems.

Performance Driven Flexible Olefinic Materials

Dr. Charlie Yang LyondellBasell

Flexible olefinic materials demonstrate many benefits for instrument panel and door panel cover layers, including soft touch, grain formation, low density, low VOC, and excellent recyclability.



They also provide flexibility, easy processability and other functional requirements for exterior applications which demand excellent low temperature impact at reasonable cost. A background of these materials is presented, followed by a focus on unique LyondellBasell technologies which expand flexible olefinic material performance levels as demonstrated by successful applications.

A Method for Fiber Modification to Improve Filtration Efficiency in Automotive Air Filters

Yukang Xu*, Shang Zhu, Chen Huang, Xiangyu Jin* Donghua University, Shanghai, China

Higher filtration efficiency in automotive air filters is very desirable for occupant healthy and better engine performance. In this article,



triboelectrification effect and filtration efficiency of various filters made of mixed fibers, namely the mixture of PTFE-PP, are investigated. According to the results, it is found that both triboelectrification and filtration efficiency in filters containing inorganic-powder-modified PTFE split fibers are more significant (approximately 10%–20%) than that in filters with general fibers.

Softell Textile: An Innovative Approach for Automotive Interior Trim

Sunit Shah*, Neil Fuenmayor, Michael Buedinger, Martin Lux LyondellBasell

In addition to weight and cost savings, surface aesthetics, durability and color harmony continue to be



key drivers for automotive interiors. This paper introduces Softell Textile, an innovative material technology for upper interior trim applications that enable the use of a single substrate to provide the aesthetics, haptics, and performance of a textile fabric-wrapped substrate. Also reviewed will be comparisons and advantages of Softell Textile to traditional approaches used for automotive interior trim.

Interior Soft Trim: Skins, Foams & Components

Polypropylenes for Injection Moulded, Foamed Parts with Excellent Surface Appearance

Georg Grestenberger*, Susanne Kahlen, Daniela Mileva, Michael Jerabek Borealis Polyolefin GmbH

In this work a polypropylene compound was developed that can be processed into foamed



automotive parts with excellent surface appearance and mechanical properties. As there are no standardized methods available to describe the properties of foamed parts, one part of this study focused on the development of test standards including a unique foaming mold. These tools were used to systematically investigate the fundamentals of foaming and tailor materials that meets stringent OEM requirements when foamed.

New Soft Foam Structures for Automotive Interior Trim with Improved Technical Features and Benefits

Jesse Baldwin*, Paul Sieradzki Toray Plastics

After launching the second generation of ToraSoft[®], Toray continues to be innovative in developing foam structures that bring new features and benefits not previously attained with TPO/



foam bilaminates. These features include very specific foam skin layers with engineered properties for improved TPO & chemical compatibility, adhesion, and strength. Additionally, this technology improves the sustainability effort of using TPO/foam bilaminates for interior trim. Toray will present some of their new foam developments detailing these concepts. New Developments in Chemical Foaming Agents Improve TPO Properties in Injection Molded Foaming Applications

Peter Schroeck*, Randy Minton Reedy Chemical Foam Michael Hayden Asahi Kasei Plastics North America

The author will present data on how a new generation of



chemical foam agent technology in conjunction with next generation TPO technology improves the physical and appearance properties while reducing the mass of injection molded foamed TPO applications. Particular attention will be discussed on how the synergistic benefit of the next generation technologies accomplish this property improvement

Benefits and Challenges for Polypropylene Composites for Automotive Interiors

Markus Kralicek Borealis Polyolefin AG

Borealis, a leading supplier of innovative polyolefin plastic materials for engineering applications in the automotive industry, will present its latest polypropylene innovation in the area of composite application technology. In cooperation with



leading Tier 1 suppliers, Borealis has introduced portfolio of PP solutions for composite sheets/tapes and high performance fibre reinforced compounds for over molding. Based on the experience from number of pilot projects, this presentation will demonstrate the potential benefits and challenges for polypropylene composites inside automotive.

Interior Soft Trim: Skins, Foams & Components

A New PP Based Composite Melt-Blown Superfine Fiber Filter for Automobile Air Conditioning System

Zijian Dai*, Xiangyu Jin, Qinfei Ke, Donghua University, Shanghai, China



Automotive air conditioning filters are the most widely used in conventional air conditioning system today. However, single function,

short saturated absorption time and difficult treatment of abandoned adsorbent make them less effective. A multifunctional composite filter combined polypropylenebased melt-blown felt and activated carbon fibers were designed with MnO2 nanoparticles and corona discharge technology in the melt-blown superfine fibers. The new filter possessed abilities of filtration, absorption and catalysis simultaneously.

New Halogen-Free Flame Retardant TPEs

Ryosuke Kurokawa Sumitomo Chemical Co., Ltd.

New halogen free flame retardant thermoplastic elastomers (HFFR-TPEs) with UL-94 flammability rating equivalent to V-0 and oxygen index over 30 percent were developed. The HFFR-TPEs have excellent



flame retardancy while exhibiting significantly lower toxic gas compared to similar halogen flame retardant material. It is easier to mold and can be used for a wide range of applications such as wire covering materials, electronic parts, architecture gasket, etc."

Automotive Interior: Technology Triumphs to Deliver Lighter, Better, Safer

Sameer Mehta*, Junjun Li Asahi Kasei Plastics North America

Automotive engineers and designers have been challenged for years to constantly deliver improvements in automotive applications without compromising fit, form and function. Some innovations are driven by consumer expectations, while some are defined by market imposed needs, including safety, regulatory and performance. The myriad design needs are often in conflict with performance limitations of existing technology. The paper will talk about





current design challenges and material innovations to enable lighter, better, safer automotive applications.

The Property Study on Needle-Punched Automotive Carpets Made from Recycled Polyester Fibers

Yuxiao Wang*, Dan Wang, Lei Zhang, Jing Li, Xiangyu Jin Donghua University, Shanghai, China

The new fibers were made from recycled polyester fabrics by melt spinning. The property of various recycled polyester fibers were



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Lightweighting Polyolefin Parts

Session Co-Chairs

John Haubert, FCA US LLC Normand Miron, Washington Penn Plastics

Effect of Short-Shot and Core-Back Foaming on TPO Performance and Appearance

Jason Fincher Advanced Composites

Weight reduction continues to be an emphasis for automotive TPO compounds. One method for reducing weight is short-shot foaming where chemical foaming agent is utilized to assist filling and



packing the tool. This work considers weight reduction and mechanical property changes that arise from short-shot and core-back foaming. Additionally, the potential benefits of TPO compounds designed specifically for injection foaming are addressed.

Progress on Formulating and Processing New Light-Weight Automotive Materials

Russell Goering*, Louis Martin Addcomp North America

Lightweighting is tremendously important to the automotive community due to fuel efficiency and reduced environmental impact needs. One of the most promising lightweighting technologies in



plastic composite materials is the addition of glass bubbles. This technology offers uniformity of distribution, reduced processing sensitivity, and a potential for good retention of physical properties. Unique formulations, modified feeding strategies, and different screw designs improve the ability of processors to make light-weight polyolefins and polyolefin composites using glass bubbles.

Comparing Current and Emerging Mass Saving Approaches for Polyolefin Resins

Charles Buehler*, Neil Fuenmayor, Dr. Dieter Langenfelder LyondellBasell



Light weighting of vehicle components is a key global approach used to assist meeting fuel efficiencies and CO2 emission mandates. With

polyolefins, lower density innovations and part wall thickness reduction have allowed for successful mass savings. Physical Foaming (PF) and Chemical Foaming (CFA) technologies are also being employed. This paper will discuss these mass savings methods as well as benefits and concerns of each for effective decision making. Material development criteria to optimize performances will be explored.

Fibremod Carbon – An Economic Light Weight Solution for the Automotive Industry

Michael Tranninger*, Jerabek Michael, Gennaro Signorelli Borealis Polyolefin GmbH

Borealis, a leading provider of innovative solutions developed based on its Fibremod[™] technology revolutionary carbon fibre reinforced polypropylene grades. Borealis'



leading-edge Fibremod[™] technology portfolio is now enlarged by Fibremod[™] Carbon, a carbon fibre reinforced polypropylene. This innovative engineering Fibremod[™] Carbon portfolio will help the automotive industry to reap the benefits of carbon fibre reinforced plastics such as outstanding density to weight ratio allowing significant weight reduction and increased functionalization and modularization of components.

Lightweighting Polyolefin Parts

Research of Carbon Fiber Non-Woven Fabric Reinforced Thermoplastics Composites Through Press Molding

Masaya Matsushita*, Yoichiro Ogura, Akihiko Imajo, Hiroyuki Hamada Yuho Toyobo

The carbon fiber non-woven fabric which could omit the process to impregnate matrix resin to carbon fiber and could mold by a short process only for press molding was paid attention. In this research, it was examined the influence of the molding conditions on the mechanical properties during the heat press molding. Moreover, during the cold press molding, it was examined the springback phenomenon rate on heating process and the mechanical properties.

Empowering Light Weight Innovation through Advanced LGF Concentrate Technology

Norwin van Riel Trinseo

Trinseo automotive will introduce an advanced high glass content LGF PP concentrate which can be diluted with tailor-made Trinseo neat PP resins. This LGF PP system approach provides a very cost efficient, easy



processable and high quality solution for multiple semi structural interior components. A successful validation case study will be shared.



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Session Co-Chairs

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

Surface Aesthetics in IM Plastics – The Trifecta Result of Processing, Material, and Tooling

Eileen McCotter Gallihugh IAC Group

Automotive part appearance defects in Injection Molding lead to scrap, decreased equipment efficiencies, product rejections, and costly downtime throughout the industry. These challenges can be amplified



when utilizing TPO materials without the right information for design and processing. This session shows examples of various surface defects in injection molded TPO such as ghosting, tiger striping, streaking, blushing, and splay. The root causes of these surface defects will be explored along with potential solutions including changes in processing, equipment, and material selection.

Specialized Color Effects Providing Value for Automotive Applications

Perry Banta*, Neil Fuenmayor LyondellBasell

Molded-in-color thermoplastic polyolefins (TPOs) with specialized color effects such as metallic

appearance have been used in the auto industry for many years. LyondellBasell has developed many technical advances that provide value to the automotive community via secondary step elimination and complexity reduction, delivering beneficial weight reduction, while offering OEMs visual effect enhancement and styling flexibility for their product line. Current commercial successes and exciting new options available for future enhancements will be reviewed.

Future Market Trends and Technology are Driving Color!

Nancy Lockhart Axalta Coating Systems

Over the past 10 years, the market has been heavily populated with neutral color spaces that have complimented the global automotive market. Color science and technology are pushing color to more chromatic and



interesting color spaces. Will the automotive landscape look more brilliant in the future? Stay informed as Nancy reviews the color development cycle, upcoming automotive trends and market influences. A look back at historical colors and the future trends will showcase this journey of automotive color technology.

Improve Sunscreen Resistance of Automotive Interior Soft Feel Coatings

Jianhui (Joe) Zhou Eastman Chemical Co.

Soft feel coatings are commonly applied to many plastic parts to improve comfort and aesthetic value. A critical unmet need for this application is sunscreen resistance. This work introduced a TMCD glycol (2,2,4,4-tetramethyl-1,



3-cyclobutanediol) based polyester polyol into a typical soft feel coating formulation. The development focus is to increase stain and chemical resistance, including sunscreen resistance, while maintaining its soft touch feeling. Substrates used for the testing include flexible PVC sheets and rigid substrates such as PC/ABS etc.

There is More to Scratch Resistance than Scratch

Suresh Swaminathan*, Adam Maltby Croda

The drive to use plastics in automotive applications is increasing. Plastics intrinsically have poor scratch resistance than the materials they replace. This



presentation discusses how slip additives can be used to boost scratch performance and why there is more to assessing and improving scratch resistance than simply measuring scratch visibility. Croda will demonstrate how different additives migrate, their effects on visible bloom and how the stability impacts on organoleptics and color properties.

Quantitative Evaluation of Scratch Performance of Soft Polymers Using the ASTM/ISO Scratch Test

Shuang Xiao*, Hung-Jue Sue Texas A&M University

The scratch behavior of a series of model soft polymers (cast polyurethane elastomers) is investigated according to the ASTM D7027/ISO 19252 scratch test methodology. It is found that the



ASTM/ISO standard scratch test can be used to quantitatively differentiate the scratch performance of soft polymers. These model systems exhibit entirely different deformation and damage phenomena, which are found to correlate well with coefficient of friction, quasi-static tensile true stress-strain as well as dynamic mechanical behavior. Surface Mechanical and Scratch Resistance Characterization of Polyurethane Coatings under Accelerating Weathering

Dr. LiPiin Sung*, Ching-Hsuan Chang, Yu-Lun Cheng NIST

Current test methods for monitoring performance of protective coatings focus on chemical properties, optical properties such as color and gloss measurements, or invasive tests



such as abrasion, cross cut adhesion. In this presentation, a scientifically-based performance protocol using indentation methodology for characterization and quantification of surface performance properties will be demonstrated via two different case studies.

The Science Behind ASTM D7869 Accelerated Weathering Protocol

Mark Nichols Ford Motor Company

A recently developed accelerated weathering protocol, ASTM D7869, provides significantly improved correlation between accelerated weathering and natural weathering in south Florida. The improved trustworthiness of the protocol is due



to a high fidelity match between sunlight and the output of the light source in the weathering chamber. In addition, the water cycles in the new protocol allow the samples to approach saturation, as those samples do during nightly dew events in south Florida. In addition to superior accuracy, ASTM D7869 is 40% faster than SAE J2527.

Discussion of Differences and Correlation Between Accelerated Weathering Ageing Test and Natural Weathering Exposure Test

Susan Zhou Suzhou Zhoubo Chemical Engineering Technology Co., Ltd, China



Automotive weathering performance over lifetime is important. During whole lifetime, vehicles will be experiencing different weather

conditions. Based upon OEM's specifications, there are two designed weathering stability tests: accelerated weathering ageing test (short term test) and natural weathering exposure test (long term test). This paper analyzes the real testing data to show the difference of two testing methods, and to discuss the correlation between the short term test and long term testing methods.

Stronger Natural-Filled PP Powered by a New Silane Enables Light Weighting of Structural Automotive Components

Scott Miller Dow Corning Corporation

New technology has been developed that significantly improves the performance of polypropylene (PP) natural fiber composites. This breakthrough allows for improved natural fiber PP composites,



including the grafting of reactive silane to the PP chains, while minimizing polymer degradation, and increasing mechanical & long term aging performance to reach that of glass fibers reinforced PP. The presentation will show a comparison with MAgPP and glass fibers, including part density reduction and improvements in mechanical performance and long-term aging under various fluids and conditions.

CO₂ Cleaning for Surfaces, Pre-Treatment, & Coating Applications

Jon Wikstrom Cool Clean Technologies

 CO_2 cleaning for surface technology covers industrial surface treatment and finishing – cleaning and pretreatment to coatings and finishes. Automated CO_2 spray technologies have been used to meet a wide range of cleaning and surface preparation



applications. CO₂ cleaning offers benefits of particle and residue removal in a non-condensing spray. This paper summarizes the technology, how it has been applied to cleaning of automotive parts, O&M cost factors, and explains advantages over traditional cleaning technologies.

Adhesion to Painted Automotive Exterior TPO Parts, Past to Present

Michael Pollock PhibroChem

The automotive industry has been closely linked to the plastics industry and has helped drive much technical advancement. One plastic of profound interest for exterior parts is Thermo Plastic Olefin (TPO). The need for decorating has also



driven suppliers to find technology to achieve better coating performance. This paper presents why adhesion promoter modified polyolefin resins remain the most robust choice in providing the balance of adhesion, ease of application and performance needed in the automotive industry today.

Primerless Painting of Exterior Parts with Carbon Nanotube Technology

Dr. Marie Hurtgen*, Alicia Rul, Michael Claes Nanocy SA

Electrostatic painting is commonly used in the automotive industry to reduce paint usage. The grounding of the part to be painted (e.g. bumper) is generally ensured by a conductive

primer. A cost effective alternative consists in using an electrically conductive carbon nanotubes-containing plastic, allowing the suppression of the conductive primer and the reduction of VOC emissions. This paper shows the primerless painting of CNT-reinforced TPO and ABS/PC for exterior parts with high paint transfer efficiency.



A New Long-Glass-Fiber-Reinforced Polypropylene with Improved Surface Appearance

Koichi Saito*, Hiroki Sano, Japan Polypropylene Corporation Richard Tuttle COMUSA Inc.

Long-glass-fiber-reinforced polypropylene (LGF-PP) has replaced

metal or GMT as substrate material of automobile module parts because of its excellent rigidity and impact resistance. In this presentation, LGF-PP "Funcster" will be introduced with good physical and aesthetic quality. This aesthetic quality open the window for an interior parts application.

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Process Enabling Technologies

Session Co-Chairs

Kurt Anthony, Washington Penn Plastic Co., Inc. Dr. Suresh Shah

Use of Core Retraction to Achieve Low Density Foams in Microcellular Injection Molded Polypropylene Parts

Thomas Ellingham*, Hrishikesh Kharbas, Lih-Sheng Turng UW-Madison

Core retraction was used with the MIM process to foam thick polypropylene (PP) parts with high density reductions of 30% and 55%. The lowest densities were achieved



Weight Reduction of Plastic Components by Using Modern Technologies That Allow for Optimizing Part Performance

Dr. Juergen Giesow ARBURG

With the continued focus on the increased cost of energy there is an excellent opportunity to increase energy efficiency through weight reduction of injection molded components. 'Light weighting' of parts while maintaining, or even



improving, their performance in their respective application fields, such as automotive and aerospace fuel efficiency, is now a focal point in the injection molding industry.

Analysis of the Foam Injection Molding Process Using a Chemical Blowing Agent

Syed Rehmathullah*, Sejin Han, Franco Costa, Edwin Klompen Autodesk, Inc.

This paper details the analysis of the foam injection molding process which uses a foaming gas generated from a chemical blowing agent.



The analysis is done using a numerical simulation program developed in this study. The simulation analyzes the injection molding process with the calculation of bubble nucleation and growth. Experiments were conducted to validate the simulation results. The experiments performed include viscosity measurement and molding experiments. The experimental and simulation results compare reasonably well.

Foamcore Blow Molded Structural Components for Automotive Applications

Steven Sopher JSP Corportion

JSP has developed and optimized a blow molding process that combines traditional blow molding with an injection molded particle foam core. This process; called Foamcore, utilizes traditional blow molding equipment



combined with a particle foam injection unit to produce a composite blow molded part with a solid foam core. JSP's Foamcore technology allows for simpler designs, higher strength to weight ratios, lower part weight, all while using existing tooling with minor modifications.
Process Enabling Technologies

Low-cost Gas Assisted Processing of Polypropylene+Graphene Nanocomposites

Thomas Ellingham UW-Madison

Polypropylene (PP) and graphene nanoparticles (GNPs) were mixed in a twin-screw extruder equipped with a CO_2 injection unit to produce nanocomposites with a 0.5% by weight loading. The addition of CO_2 into the melt allowed for foaming



to occur within the barrel of the extruder and upon die exit. Samples processed with CO₂ showed increased exfoliation and dispersion. This low-cost gas assisted processing (LGAP) method is introduced as an alternative to supercritical fluid assisted extrusion.

High Volume Aluminum Tooling for Polyolefins - Best Practices and Lessons Learned

John Caccese*, Darcy King Unique Tool & Gauge Inc.

For many, although not all automotive applications where rigid polyolefins are utilized, aluminum tooling for higher volume production runs offers the potential for operation on reduced clamp tonnage molding



machines, along with dramatic cycle time reductions of up to 50% or more versus traditional P-20 steel. This presentation discusses applications where aluminum tooling works best, typical development times versus steel tooling, best practices and lessons learned over the course of several years of production usage.

Techniques and Options for Improved Twin-screw Compounding of Reinforced Polyolefins

Paul Andersen Coperion Corporation

Application requirements for polyolefin compounds continue to push the performance envelope with respect to improved mechanical properties, aesthetic properties, processing characteristics and as always, cost. In order to attain required



properties compound formulations can be very complex, but invariably will require fiber reinforcement and/or mineral filler. This paper will review basic requirements for compounding reinforced polyolefins as well highlight recent innovations in Co-rotating Twin-screw technology that have enhanced product quality and productivity for these materials.

How to Optimize Compression Molding Process Parameters with Simulation Tools

Adam Miller*, Joe Wang, C-W.Wang, W.C.Tsai, S-B.Sun, C-H.Hsu Moldex3d

In this fast changing world, quality of the product as well as time to market are among many factors crucial in optimizing profits. Traditional trial



and error method is time consuming and cost wasting. Having a successful simulation is the key to solving the above mentioned issues. However, one aspect that is often ignored in simulation is the accuracy of material properties. Herein, we will carry out a novel viscosity characterization method for composite material systems, and use them in the subsequent compression molding simulation in order to find out the optimal processing conditions.



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Modeling for Performance Prediction

Session Co-Chairs

David Helmer, General Motors Li Lu, Ford Motor Co. Hanno Van Raalte, Autodesk, Inc.

A Simulation Validation Study – The Influence of TPO Composition on Predicted Part Warpage

David Okonski*, General Motors Syed Rehmathullah Autodesk, Inc.

The use of thermoplastic polyolefins (TPOs) in the automotive industry is extensive and growing. This study begins with an investigation of the influence of TPO composition on



as-molded part warp through experimental moldings of several TPO blends of varied composition. Furthermore, a validation study of the predicted part deflection will be done using Autodesk Moldflow injection molding simulation software; results to provide insight as to mesh-type and any considerations needed when characterizing TPO materials.

Using Mid-stage Validation to Increase Confidence in Simulation of TPOs

Hubert Lobo*, Megan Lobdell Datapoint Labs Technical Center for Materials



Finite element analysis of plastics contains assumptions and uncertainties that can affect simulation accuracy. It is useful

to quantify these effects prior to using simulation for reallife applications. In one study, a quasi-static three-point bending experiment of a standardized parallel ribbed plate is performed and simulated, using Abaqus. In a second study, a dynamic dart impact experiment is validated using LS-DYNA.

Numerical Prediction of Shape Deviation Due to Welding of Injection Molded TPO Parts

Li Lu*, Jane Zhou, Hui Wang Ford Motor Company

This paper presents a general CAE simulation methodology to simulate welding process and to predict the warpage and shape deviation from nominal in finished automotive plastic component. A case study was



conducted on TPO (thermoplastic polyolefin) automotive glove box bin and door sub-assembly, which are joined using Infra-Red (IR) or vibration welding process.

Tiger Striping in a Plastic Injection Molded Part: Experimental and Simulation

Adam Miller*, Anthony Yang, Jye Wang, Moldex3D Li Qi, Ken Kwasnik, Li Lu, Jeffrey Kloberdanz, Danielle Zeng Ford Motor Company



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 a strong correlation between the flow-induced stress distribution and the tiger striping observed in the experiment.

Modeling for Performance Prediction

Analytic Prediction of Thickness Change and Residual Stresses on Safety Plastic[™] Produced by Thermoforming Process

Hector Hernandez Ford Motor Company

This paper presents methodologies for using LS DYNA (non-linear finite element solver) to model the thermoforming process on Safety Plastic[®] cones (countermeasure for absorbing energy under Interior Head Impact FMVSS201u). Due to



the nature of the thermoformed TPO parts the virgin material sheets suffer thickness reduction and residual stresses generated during the manufacturing process, the present paper shows the methodology to predict the final thickness distribution and residual stresses by a CAE simulation.

The Investigation of Fatigue Failure for TPO Materials

Zhengpan Qi*, Danielle Zeng, Bhavani Thota, Linh Doan, Li Lu, Zuming Su Ford Motor Company



Thermoplastic polyolefin (TPOs)

are widely used in automobile industry applications. The mechanical properties of TPOs are temperature and strainrate dependent. In this paper, the material failure mechanism under cyclic loadings is investigated. A critical frequencyload map is proposed to identify the failure modes. To reduce experimental effort, a modified viscoplasticity model is proposed to calculate the energy dissipate and temperature increase during fatigue testing to predict such critical frequency-load map.

Weld Strength Prediction for Injection Molded Part

Jeff Higgins*, Doug Kenik, Hanno Van Raalte Autodesk, Inc.

This presentation will review weld lines, their causes and the risk they introduce into plastic parts. An overview of the



theory and validation of the simulation approach will be given. Finally, we will demonstrate a practical workflow on how to use Autodesk Moldflow Insight and Helius PFA software to predict the weld line strength of injection molded parts.

How to Improve Product Quality with the Latest Process Simulation Technology

Adam Miller", Joe Wang, Chen-Chieh Wang, Shih-Po Sun, Hsien-Sen Chiu, Jimmy C. Chien, Anthony Wen-Hsien Yang Moldex3d



We will show how the latest simulation helps resolve critical product quality issues, including dimensional or appearance problems. While part design and manufacturing are becoming more challenging, process and simulation tools are also improving. Through better understanding of complex material flow to the dynamic control of tool temperature, the gap between reality and simulation is being steadily bridged. We will learn how incorporating the viscoelasticity properties of polymer melt could improve the simulation of appearance and dimensional accuracy.



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Rigid Polyolefin Compounds

Session Co-Chairs

Mike Balow, Asahi Kasei Plastics North America Inc. Ermanno Ruccolo, Mitsui Plastics, Inc.

A Review of Reinforcement for Polyolefins: Stiffness/Toughness/ Flow and other Important Considerations

Michael Balow Asahi Kasei Plastics North America



This presentation will be a review of commercial and developmental materials used as Reinforcements or Polyolefins. A survey of the natural minerals used, key synthetic

reinforcements, Bio based reinforcements will be covered. The presentation will cover the relative cost, and implications to properties, as well as recent developments regarding emerging applications. Microscopy of the polymer interfaces will also be discussed.

Emissions of Polypropylene Compounds

Dr. Laura Shereda Asahi Kasei Plastics North America

Due to changes in fuel economy requirements and moving towards sustainability, emissions of plastic automotive components are under



ever increasing scrutiny. This paper will describe the current situation of plastic emissions and routes Asahi is taking to improve emissions of polypropylene materials.

Comprehensive, In-Process and Full-Cabin Analysis of VOC Emissions

Yan Li*, Diandree Padayachee, Vaughan Langford, Daniel Milligan Syft Technologies

With increasing pressure reduce harmful VOC emissions in motor vehicle passenger cabins, more



frequent component testing will be required to ensure conformance. Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) is an industry-proven analytical technique that instantly and directly analyzes harmful and regulated VOCs in air. This presentation will introduce SIFT-MS and its automotive component testing applications, including high-throughput testing using an integrated autosampler. SIFT-MS provides a very economical solution for screening automotive components.

Comprehensive, High-Throughput Analysis of VOC Emissions from Automotive Components

Yan Li*, Diandree Padayachee, Vaughan Langford, Daniel Milligan Syft Technologies

With increasing pressure reduce harmful VOC emissions in motor vehicle passenger cabins, more frequent component testing will be



required to ensure conformance. Selected Ion Flow Tube Mass Spectrometry (SIFT-MS) is an industry-proven analytical technique that instantly and directly analyzes harmful and regulated VOCs in air. This presentation will introduce SIFT-MS and its automotive component testing applications, including high-throughput testing using an integrated autosampler. SIFT-MS provides a very economical solution for screening automotive components.

Rigid Polyolefin Compounds

Using Hollow Glass Microsphere Masterbatches to Optimize Formulations at the Injection Molding Press

Stephen Amos*, Mark Williams, Andrea Charif 3M Company



Hollow Glass Microspheres or Glass Bubbles are an accepted light weighting technology for injection molded plastics used in

transportation applications. The benefits of using hollow microspheres go beyond lightweighting and include dimensional stability, cycle time reduction and reduced sink and warpage. Often times there is a need to balance weight reduction with changes in physical properties Using a high concentration masterbatch of these materials, at the press, can speed the optimization of a light weight resin formulation.

Opportunities for Lightweight Reinforced Polyolefins Utilizing Mixed Morphology Clays

Daniel Berg BYK USA Inc.

The CAFE Standards are the driving force for polyolefin compounds innovation. Improving material strength and reducing overall part weight is a primary strategy getting significant focus. Mineral fillers contribute to composite compound



weight and density. However, mixed morphology clays offer ultra high surface area and aspect ratio to reduce mineral content. Density is further reduced while maintaining material property performance. This technology offers reduced scratch and mar, increased cycle time, improved dimensional stability and processing.

Anisotropic Fatigue Analysis of Short Fiber Filled PP for Structural Applications

Rodrigo Orozco Asahi Kasei Plastics

Short fiber filled engineering plastics are currently used in applications that are require to meet more demanding specifications, including fatigue. Anisotropic fatigue analysis of short fiber filled thermoplastics



is an innovative solution to obtain an accurate prediction of the fatigue life of a component with Computer Aided Engineering (CAE) tools. This study presents a correlation of CAE results vs. experimental quasi-static and fatigue analysis results; and depicts the method for completing anisotropic fatigue analysis with commercial CAE tools.

Green Materials with Improved Air Quality Inside the Passenger Cars

Zhongfu (Jerry) Luo*, Dr. Bo Yang Kingfa Sci & Tech

Requirement for lower VOC emissions from automobile interior components is getting more stringent with awareness of health effects caused by the VOCs. The odor evaluation results are greatly



dependent on the subjective judgment, so the training from OEMs is critical. Controlling VOC and odor of plastic compounds requires a continuous optimization process in raw material selection, recipe modification and processing parameter settings. The well controlled "green" materials have significantly lower VOC and odor, compared to the original formula.



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Advances in Automotive Polyolefins

Session Co-Chairs

Neil Fuenmayor, LyondellBasell **Martha Katz,** Ford Motor Company

A Review of Advanced UV Stabilization Solutions Enabling TPO to Meet Automotive Needs

Jian-Yang Cho*, Jerry Eng, Dr. Andrea Landuzzi, Brent Sanders Cytec Solvay Group

New developments in additive technologies are accelerating the creation of new opportunities for polyolefins in Automotive. Due to



their versatility and ability to acquire new properties through formulation development, the application scope of TPO has expanded in automotive interior and exterior designs. On the aesthetic front, to create metallic appearances and brighter and more dazzling colors, aluminum effect pigments has grown in popularity. This paper will examine the enabling UV technology that drives tomorrow's innovation.

High Performance Stabilization Systems for PP and PP-based TPO Automotive Applications

Heejung Kwon*, K. Keck, J. Kim, B. Iyer, T. Schmutz Songwon Industrial Co., Ltd

Exterior and interior automotive parts based on polypropylene (PP) thermoplastic polyolefin (TPO) compounds exposed to sunlight and elevated temperatures during service life must be stabilized to



suppress the deleterious effects of prolonged UV and heat exposure, respectively. The need for improved weatherability, color stability, gloss retention, reduced VOC and FOG, as well as, other secondary effects must also be weighed against the cost effectiveness of the TPO compound.

Superior Weathering Solution for PO Based Automotive Parts Using Advanced Hindered Amine Light Stabilizers

Yota Tsuneizumi Adeka Corporation

Plastic automotive parts which are exposed to sunlight must be protected to suppress the deleterious effects of prolonged exposure to ultraviolet light. Hindered amine light stabilizers (HALS) are typically



utilized to prevent this degradation from UV radiation. This paper describes the features of the advanced N-H,N-Me, and NO-Alkyl type HALS and the appropriate usage of these HALS for a number of desired improvements of automotive parts including soft skin application.

Performance Comparison of Mineral-filled TPOs

Maziyar Bolourchi Imerys

The performance of mineral additives, primarily talc, mica and Wollastonite investigated/compared along with glass fiber and calcium carbonate in automotive TPOs. The performance of each additive has been obtained



at its optimum melt compounding conditions to maximize end performance. Properties investigated include stiffness/ impact, heat distortion temperature (HDT), color, shrinkage, scratch resistance and melt flow rate.

Advances in Automotive Polyolefins

HTP1s: a Novel Talc Additive for Smart Polymer Processing

Piergiovanni Ercoli Malacari IMI Fabi Spa

In polymer modification, when high flowability and dust free behavior are requested for additives, the new talc additive HTP1s can be the answer. Where ever talc is considered as functional additive for polymers, the advantage of this novel product



is that its bulk handling is visibly improved, with strong advantages for dosing, and blending with other additives (i.e. in pre-mixes). The paper will show main HTP1s features.

Case Studies of Additives' Impact on Part Performance

David Fortener*, Sam He Inteva Products LLC

Additives for thermoplastic materials are critical for achieving desired plastic/polymer processing, material properties, and part performance. However, due to the complicity of



the engineered plastic system, the compatibility among the additives and miscibility between additives and polymer/ plastic domain could also be challenges. Those challenges not only influence to material processing and properties, but also impact on product functions and performance. This paper, through case studies, discuss how to understand the challenges and potential solutions.

Expanded Uses of Leading-Edge Impact Modifiers for TPOs

Jeff Munro*, Jim Hemphill, Russell Barry The Dow Chemical Company

This paper outlines what makes an impact modifier effective and why Polyolefin Elastomers have become the impact modifier of choice for TPOs. One can further enhance



TPO performance with modifiers having unique molecular designs to address the latest challenges highlighted by Tier 1 and OEMs including improvements in lightweighting, paintability, and use of alternative filler systems. This paper will also include a look at a novel propylene-based olefin block copolymer providing new TPO performance characteristics.

The use of Post-Consumer Materials to Produce TPO Quality Resins for Automotive Applications

Mike Monpetit Buckeye Polymers

The industry for the harvesting and collection of post- consumer resins (PCR) to yield specific streams of plastic materials has expanded tremendously in the past several years. Buckeye Polymers has several years of refining the olefinic portions



of the PCR stream to yield input feedstreams for production of families of high impact polypropylene copolymers and TPO's. The resulting products meet the part performance requirements for use in various automotive applications ranging from functional black plastic parts to fascias and are currently used for these applications within the industry.



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Adhesives & Coatings for TPOs

Session Co-Chairs

Hoa Pham, Freudenberg Performance Materials Dr. Pravin Sitaram, Haartz Corporatio

Interior Trim Lamination Development

Helmut Doyen Sika Corporation

The lamination of automotive interior has always been a challenge for the adhesive industry. Design and substrate changes of interior parts and the changes of OEM specifications required adhesive



developments following the trend. The presentation shows with some examples how adhesive technology was developed from the VW Beetle in the 50's to PP lamination with TPO skin without substrate pretreatment today and what the vision is for the future.

A New Adhesive for Automotive Interior Lamination

David Speth*, Jeff Swoboda Evans Adhesives Andres Sustic, Scot Wakefield, John Passmore Rextac;



Our team has recently developed a completely thermoplastic

laminating adhesive for interior cover stock-to-substrate assembly. This new adhesive is designed to allow OEM and Tier manufacturers to use polypropylene and TPO substrates without corona or flame treatment in place of ABS and ABS/ polycarbonate blends for interior structures. It also allows manufacturers to avoid the work-in-process inventory and post lamination cure time delays necessary when moisture reactive olefin or urethane adhesives are used. In this presentation we will describe our initial results.

Infrared Heating for Successful Lamination

George Cozzarin*, Joshua Miller Radiant Energy Systems, Inc.

A challenge in press lamination of PP parts to TPO skin for automotive interiors is the uniformity of heating the laminating adhesive on the back side of the TPO for a strong



and consistent bond. Typically the molded PP part and the skin are secured in lower and upper molds, the heater bank moves in to heat the parts to the desired temperature, then retracts and the two components are pressed together for the lamination.

Achieving Weight Reduction – Thin-Wall and Low Density Exterior Applications

Dr. Linda Havermans SABIC

Automotive industry is challenged to reduce weight to improve fuel efficiency and reduce emissions. Adding ribs and other features – can make possible weight-out in semi-structural plastic parts.



Reducing weight is much more difficult in non-structural parts produced from PP compounds, like bumper fascias. For exterior applications, the trends are towards low density and thin-wall applications. This paper highlights innovative approaches (with examples) to achieve weight savings with minimal tradeoffs for each of these trends and a combination of both.

Adhesives & Coatings for TPOs

PO Hotmelt Adhesive Technology in Automotive Interior Components

Sebastien Meliot Jowat Adhesives

TPO soft trim materials, PP based substrates and polyolefin based hot melt adhesives are an ideal match in terms of material costs savings, weight reduction and recyclability. This is well known. But additional to this, new products and processes can



offer a new dimension of manufacturing efficiency, quality improvement and scrap reduction as well as shortened prototype phases and earlier reliable tooling cost calculations. How these outstanding benefits can be achieved by using the VACFLOW technology in combination with a matching high performance Polyolefin Hot melt will be presented.

Improved Performance for Automotive Textiles using Surface Modification Technology

Chris Hagler Gouston Technologies, Inc.

Textile fibers and composites are an integral part of today's automobile technologies. The key to providing the optimum value from the converted fibers lies in the ability to modify the fiber surface to provide the target functional properties.



Goulston Technologies uses surface modification via topical treatments to achieve enhanced OEM performance requirements in odor control and antimicrobial protection of the textile surfaces.

Evaluation of Coating Performance Based on an ASTM7027/ISO19252 Standard

James Chrisman*, Dr. Hung-Jue Sue, Dr. Masaya Kotaki, Mukund Shastry Texas A&M University

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Scratch and mar performance of polymeric coatings and films is still commonly graded based on the



results of pencil hardness testing methods. In this work, the ASTM D7027 / ISO19252 method is investigated as an alternative, in which most of the deficiencies of the pencil hardness tests are overcome by controlling load range, testing rate, and scratch tip geometry.



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Sustainability & Biobased Materials

Session Co-Chairs

Susan Kozora, IAC Group Dr. Alper Kiziltas, Ford Motor Co.

Growing Importance of More Sustainabile Materials for the Automotive Industry

Carrie Majeske*, Ford Motor Co., Eric Simon, World Wildlife Fund

Sustainability can be defined as a balance of social, environmental and economic parameters allowing for an indefinite and healthy existence. Beyond demonstrated leadership in using plant-based materials, Ford has been also reducing its use of energy, water and waste. The WWF Biofeedstock Alliance increases awareness of the environmental/ social performance of bio-feedstocks, and uses science to guide the responsible selection of materials.



Biobased Headlamp Housing for Automotive Lighting

Ayse Ademuwagun Varroc Lighting

Miscanthus or switchgrass fibers are bio-sourced and renewable materials that can be used as fillers in various polymer matrices. Carbonization and oxidative acid treatments make these bio-material more compatible with polypropylene matrix with polypropylene matrix. These bio-carbons would replace talc to reduce the part weight by 8-20%, would reduce carbon footprint and improvesustainability of automotive industry. In this study, headlamp housings parts made with bio PP were compared and tested against talc PP performance.

Effect of Low Temperature Heat Treatment on Bamboo Fiber Reinforced Composites

Amy Langhorst*, James Burkholder, Alper Kiziltas, Ellen C. Lee, Deborah Mielewski Ford Motor Company

The use of sustainable composites is becoming increasingly favorable



in the auto industry. This study investigated the effect of low temperature heat treatment of bamboo fibers on the properties of recycled polypropylene (rPP) + recycled polyamide-6 (rPA6) + bamboo composites. Samples were produced via extrusion and injection molding. The resulting properties were investigated on a macroscopic and microscopic scale. The composite properties were compared to physical requirements for under-the-hood automotive components.

The Use of Micron-size Tire Rubbers as Reinforcement Fillers in the Twin Screw Extruder Compounding of Recycled Thermoplastic Polyolefins to Improve Elastomeric Properties

Haikun Xu*, Lavon Detweiler Entech, Inc

In this study, micron-size rubber powders (MRPs) were fabricated from recycled truck tires in large volume, and used as fillers for the twin screw extruder (TSE) compounding of recycled TPOs. TPO was chosen as



the base resin for compounding because of its excellent reprocessibility, good compatibility with the micron-size tire rubbers, and reasonable low cost. The physical and mechanical properties (hardness, MFI, tensile, Izod impact, etc) were tested to study the overall performance of the compounds for automotive and commodity applications.

Sustainability & Biobased Materials

Natural Fiber Filled Polyolefin Filaments for 3 D Printing

Robert Joyce Innovative Plastics and Modeling

Polyolefin and natural fibers compositions are very difficult to generate filaments and 3 D print. This presentation will discuss biopolymer technology for alternative polyolefin natural fiber compositions that have



been 3 D printed for various commercial applications. He will explain the advantages of the biopolymer compositions he has produced, showing a comparison to the ABSand PLA filaments. Robert will provide material data with samples showing the unique characteristics of FibreTuff biopolymers for 3 D printing.

Origin and Control of VOC and Odors in Polyolefin Biocomposites

Dr. Damien Maillard*, Karen Stoeffler National Research Council Canada

In this presentation, NRC will explain the mechanisms of formation of VOC in polyolefin biocomposites, and will relate them to the processing and service life conditions. A case



study will be presented in which the VOC produced during the exposure of polyolefin biocomposites to humidity, temperature and light, were identified and quantified. Various approaches to control and reduce the VOC and odors emissions in these materials will also be presented.



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TPOs for Vehicle NVH Control

Session Co-Chairs

Jim Hemphill, Dow Elastomers Joel Myers, Hyundai America (HACTI)

Why TPOs are the Right Choice of Materials for Automotive NVH Reduction

Sassan Tarahomi IAC Group

Vehicles produced today have much quieter cabin because the customer demands it. TPOs have the unique combination of material and processing properties to enable designers to create the most



desirable vehicle without sacrificing any NVH performance. This paper addresses why TPOs are becoming very popular for vehicle NVH control. A survey of several TPO material along with part design guideline, processing requirement and vehicle NVH performance requirement are reviewed in this paper.

Adding Value to an Injection Molded TPO Front of Dash Barrier

Meagan Marko*, Mike Campbell Cascade Engineering, Noble Polymers

This paper will focus on injection molded TPO barrier layer and the value that can be realized by exploiting this technology. The precision and flexibility of injection



molding offers many opportunities to increase value proposition. This technology is further strengthened by material design as the TPO barrier properties are fine tuned to meet the most stringent part objectives. Examples of the value provided by tool/part design coupled with customized material enhancements will be showcased.

Bonding Properties Between TPVs and Cured Rubber for Automotive Profiles

Noriyoshi Ono*, Masato Kobayashi, Kentaro Kanae JSR Corporation



Thermoplastic vulcanizates (i.e.TPVs) are a special class of thermoplastic elastomer and has been widely used in many industrial applications

especially for environmental friendliness and cost reduction.

When using TPVs for automotive profiles, it is required for the TPVs to have high bonding strength with cured rubber and to have an understanding of the bonding properties between TPVs and the cured rubber. This paper discusses cured rubber formulations and the TPVs properties which influence bonding properties."



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