

PLASTICS ENGINEERING

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EVOLUTION

NEW POLYOLEFINS MEET
GREEN DESIGN CHALLENGES

PLUS

AUSTRALIAN PLASTICS CONFAB
PROMOTES CIRCULAR ECONOMY

*Presenters See Rules,
Fees As Growth Incentives*

 **INSPIRING
PLASTICS
PROFESSIONALS**



NEW POLYOLEFINS MEET DEMANDING USE AND SUSTAINABILITY NEEDS

High-performing grades of recycled and virgin resins combine to boost the circularity of products in diverse markets.

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FLEXIBLE AND RECYCLABLE

Industry turns to monomaterial packaging for circular economy needs.

GET YOUR OWN!

Plastics Engineering keeps plastics industry professionals informed of the latest news and in-depth reporting on state-of-the-art and emerging technologies that impact the R&D and processing of plastics products. This is the magazine every plastics industry professional NEEDS to read.

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GREENLIGHT INNOVATIONS



BY PEGGY MALNATI

SPE Auto TPO conference highlights ongoing shift to sustainability in global vehicle development

SPE's 23rd TPO Global Automotive Engineered Polyolefins Conference (Auto TPO), organized by the society's Detroit Section, which covers rigid and elastomeric thermoplastic polyolefins (polypropylene, TPOs), thermoplastic elastomers (TPEs) and thermoplastic vulcanizates (TPVs) for ground transportation, drew 615 to the Detroit Marriott in Troy, Mich., Oct. 2 to 5. The theme was Sustainable Mobility, a subject that was well represented across technical sessions, keynotes, tutorials and sponsor displays covering materials as well as how the move to electrification is impacting materials selection.

The technical program consisted of 62 presentations in three parallel tracks spread across seven sessions: Exterior Trim & Structural Applications; Process Enabling Technologies; Sustainable Materials & Parts; Polyolefin Elastomers and Vulcanizates; Materials Development; Performance Additives & Colorants; and Innovations in Automotive Interiors.

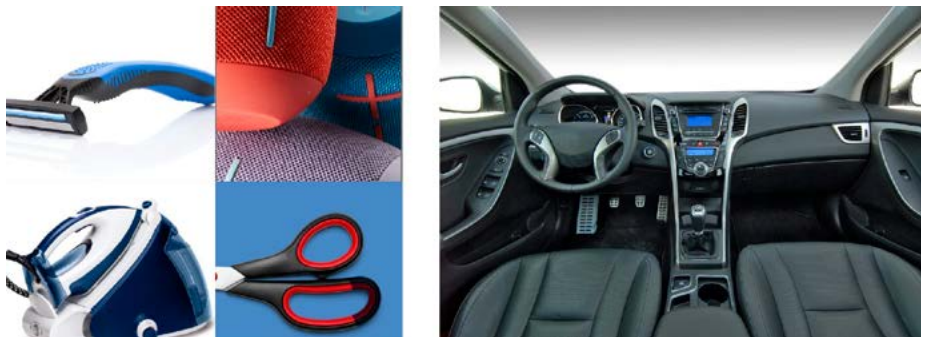
A tradition at the conference is to hold tutorials on the Sunday afternoon before the main show begins, as attendees arrive and exhibitors set up displays. No conference registration is required, and no fees are charged to attend the tutorials, which are free as a service to the industry. This year's topics were presented by Mike Balow, CEO of Auxin Consulting LLC, who

spoke on TPOs for Automotive: The History and Developments in the Past 5 Years, and by Pravin Sitaram, director of product innovation and sustainability, advanced materials and technology at Haartz Corp., whose topic was TPOs in Automotive Interior Soft-Trim Applications—An Overview.

Five keynote speakers made presentations. On Day 1 (Monday Oct. 3), Joel Morales, vice president of polyolefins, Americas, at Chemical Market Analytics by OPIS, a Dow Jones company, spoke on the topic of Global Polypropylene: New Capacity to Outpace Post-COVID Demand. He was followed by Jim Hillier, senior director, advanced polymer

The 2022 Auto TPO conference, the show's first physical event since 2019, attracted 615 attendees. Courtesy of Marc Richardson/SPE Detroit Section

solutions, LyondellBasell Industries, who discussed Challenges, Opportunities and Our Role in Sustainable Mobility. On Day 2, Saquib Toor, board member, Alterra Holdings Co. and founder and managing member of Beaconhouse Capital Management LLC, spoke about Mergers and Acquisitions of TPO and Olefin Based Compounders in North America. He was followed by Massimo Pavin, founder and CEO of Sirmax Group, whose topic was Supplying the Automotive Industry with High-Performing, Circular Compounds. On the last



Avient Corp. has taken bio-monomer-based technology developed for the consumer TPE market and reformulated it to meet growing demand for sustainable materials in automotive. Nine new grades, all styrene block copolymers, in two product lines were introduced at the show. Courtesy of Avient Corp.



All 16 grades of Geon's Resilience R PP come in black or grey and are UL94 HB approved. In addition to glass and glass/mineral reinforcement, there are several mineral-filled formulations containing either talc, mica, calcium carbonate or barium sulfate, as well as a neat grade. Potential applications include instrument panel carriers like that shown here. Courtesy of Geon Performance Solutions

day, Drew Winter, principal analyst, cockpit of the future, at Wards Intelligence gave a keynote on How Smart Surfaces, Sustainable Materials Are Transforming Vehicle Interiors. He was followed by a featured presentation titled How Positive Plastics Education Is Making a Difference by Eve Vitale, chief executive of the SPE Foundation.

Greener Transport

A number of green automotive materials were introduced at the event. Christopher Engel, advanced R&D engineer at Avient Corp., gave a talk about novel developments in biobased TPEs, which originally were developed for consumer applications and are now being formulated for automotive. Called reSound BIO TPEs, two new product lines were introduced. The 7900 Series consists of four grades that all contain 35 percent biobased monomer and range in hardness from 30 to 70 Shore A. The 2800 series has five grades—four that are 50 to 60 percent bio-derived and a fifth grade that is 75 percent bio-derived. These grades also range from 30 to 70 Shore A hardness. All but the 75 percent grade are designed for PP overmolding; the last grade also bonds to PE. The company says that all grades offer excellent colorability—comparable to prime—and can be paired with sustainable or traditional color options. Avient says that by overmolding with bio-derived TPEs, producers reduce their carbon footprint and improve life-cycle analysis (LCA) results without sacrificing performance versus comparable conventional TPEs.

Geon Performance Solutions introduced a large line of sustainable products at the show.

Called Resilience R, the family consists of 16 grades of neat, glass-reinforced and mineral-filled PP with 10 to 30 percent post-industrial recycled (PIR) content in homopolymer, copolymer and impact-modified formulations although, as a custom compounder, Geon can customize products to meet specific application needs. The company claims that



Monolith uses 100 percent renewable electricity to produce "green" carbon black and clean hydrogen, which can be converted to clean ammonia. Target applications include molded parts for auto interiors and underhood. The process reportedly reduces greenhouse gas emissions 90 percent. Courtesy of Monolith

no sacrifice in performance is seen versus comparable prime grades and that the mechanically recycled PIR content is obtained from secure sources that undergo rigorous quality checks for lot-to-lot consistency. It also says that switching to the new grades reduces manufacturing's carbon footprint and supports the circular economy by diverting material from landfills. In addition to automotive, the company says other markets

interested in these grades include appliance, sporting goods and housewares.

Yet another interesting technology presented at the conference was "green" carbon black. Monolith Inc., of Lincoln, Neb., uses 100 percent renewable electricity to crack methane via pyrolysis—without combustion—to produce carbon black and clean hydrogen, which can be converted to clean ammonia. Target applications include tires, hose, belts, seals and gaskets, as well as molded parts for interiors and underhood. Compared with traditional carbon black production methods, the company says its process reduces greenhouse gas emissions 90 percent. When biogenic or recycled sources of methane are used, the process could become carbon negative.

Removeable Roof Panels

A presentation and exhibit at the conference featured a concept from Magna Exteriors involving removeable thermoplastic roof panels. The concept incorporates technology that Magna has used for over a decade on its all-thermoplastic liftgate panels: an injection molded short- or long-glass-reinforced PP structural inner panel bonded to a painted, injection molded TPO exterior panel.

After benchmarking sheet molding compound roof panels on a current production SUV, the team conducted a virtual design and development process, including materials selection, bonding methods, and structural and thermal analyses. This was followed by the production of panels that were subjected to a variety of punishing industry tests to prove concept feasibility, including functional fit; roof sag (no damage after applying 1,000 pounds/4,450 Newtons with maximum allowable deflection of 13.68 millimeters—permanent set was measured at 0.02 millimeters); roof solar test (no delamination, permanent deformation, aesthetic damage, functional defects or latch binding/sticking after three cycles to 105°C); dent resistance (after a 25.4 millimeter spherical indenter permanent set was measured at <0.1



Another concept for the roof panels is to include solar cells that charge while driving and, once stopped, could be used to power a variety of devices. Courtesy of Magna Exteriors



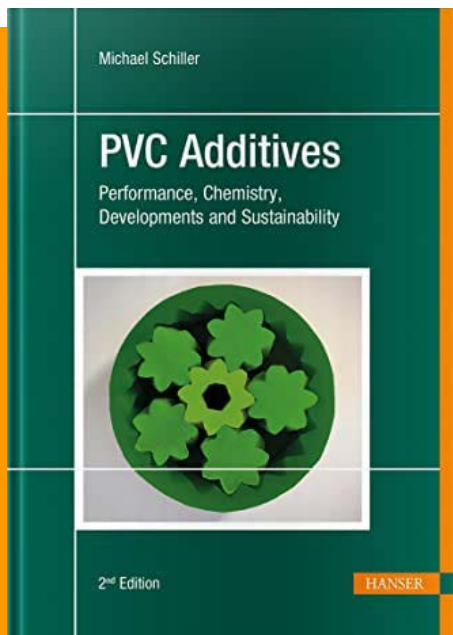
Among the functions that could be included in Magna's removable roof panels are LED hazard-warning lights that could be placed behind a vehicle on the road or on top of its roof. The backside of the panels could also include a light to facilitate repairs, such as changing a flat tire. Courtesy of Magna Exteriors

millimeter); and sound transmission loss. As the concept evolved, the company purchased an SUV on which the panels were mounted and used at enthusiast events and the Auto TPO show.

Magna has developed both two- and four-door versions of the removable roof system with a variety of interior panel options, including USB charge ports and interior

lights. The company is working on decorative lighting that can be triggered via smartphone as a driver approaches the vehicle. The company also has worked on a variety of exterior panel options, including painted/ opaque, transparent or tinted transparent, plus multifunctional roofs, e.g., solar cells that charge while a vehicle is driven and can be removed to power a variety of devices at a campsite, or a large hazard-warning light that

could be removed and placed on the ground behind a disabled vehicle or on top of its roof to warn approaching drivers. The latter could have a light on the back to illuminate the workspace and make it easier to change flat tires. Functional panels would be mounted to a common interior panel. The company says that the technology shown in the roof panel concept is commercial-ready. ■



BOOK REVIEW

PVC Additives: Performance, Chemistry, Developments and Sustainability; 2nd edition, by Michael Schiller

Since the first edition of this book was published in 2015, the industry has seen an ongoing shift towards more sustainable additives. The second edition includes updates to these chemistries as well as historical information and discussion of PVC additives.

The author, Michael Schiller, has advanced degrees in organic chemistry and photochemistry, and more than 20 years leading R&D at PVC additive manufacturers. His passion for PVC, as well as his humor, shine through the text.

PVC formulation and processing are intertwined, and the book tackles some of the potential causes of and solutions for common processing problems, such as black specks, photochemical degradation and plate-out. The author takes a deep dive into the "uncharted territory" of plate-out, including a literature review and discussion of tests to investigate the effectiveness of various

additives on the condition. Effects such as photobleeding and the influence of fillers on PVC weathering are also investigated.

Other sections are written for those new to the industry, including discussions of test methods and a list of typical formulations for various applications.

The second edition includes a new section on plasticizers based on renewable resources, written by industry experts Peter Frenkel and Bharat I. Chaudhary. It discusses renewable feedstocks and describes the different types of biobased plasticizers.

Although written from a chemist's perspective, the text is accessible for anyone in the PVC industry who needs to be knowledgeable about these subjects. The book is thus useful to read as a primer or to have as a reference when formulating PVC compounds or troubleshooting problems in processing or applications. ■

—Jennifer Markarian

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