AUTOMOTIVE PLASTICS News

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

December 2008 - Volume 38, Issue 2

38th-Annual Innovation Awards Gala: A Bright Spot in a Year of Turmoil

Often described as the ***"Academy Awards of the Plastics Industry,"*** this year's 2008 SPE Automotive Division's Innovation Awards Gala was "an exceptionally bright spot in a year of turmoil for our industry," said Maria Ciliberti, global director of automotive for Ticona Engineering Polymers and the 2008 SPE Automotive Innovation Awards program chair as well as SPE Automotive Division chair-elect.

In spite of tough economic times, the attendance at this year's gala hit record levels, surpassing that of the previous two years. Held November 20th at Burton Manor in Livonia, Michigan, automotive engineers, business executives, parts suppliers, materials suppliers, media and even governmental representatives were in strong force. The consistent success and wide attendance for this event make the Innovation Awards Gala one of the best networking opportunities in the North American automotive community.

Awards Chair Maria Ciliberti (right) presented the Grand Award Trophy to: (L to R) Michael Dziatczak, Pam Graham & Dave Hill, for the Twin-Sheet Blow-Molded Fuel System that was implemented on the 2007 MY BMW® 7 Series Sedans.

While 2008 was a year with fewer than usual new vehicle launches, SPE Automotive received almost 50 nominations for consideration. "Competition was intense in every category as many of the nominations represented the first-of-their kind products resulting in vehicle trademarked features, material patents, design patents, process patents and even licensed rights to practice," noted Ciliberti.

"This year's nominees provide us with confidence that innovation and creativity are as much alive today as in the past. It is our hope that the 2008 Innovation Awards Gala helps to dispel the myth that today's automakers, especially the domestics, are not innovating and introducing new technologies on their vehicles," noted Ciliberti.

Continued Page 5

Treasurer's Report

John Fialka

The SPE Automotive Division is in a strong position due to successful year. The bank account balance is in good standing with $131K in checking and $27K in savings for a total balance of $158K. The final financial results for the 2008 ACCE Program are: income $135, expenses $99K, scholarship $7 and net proceeds $28.6K. The Automotive Division continues to support educational out reach programs like the Plastivan and has donated $18K this year.

The taxes were completed and submitted to the IRS. A summary of the taxes are: $401K revenue; $375 expenses; excess $118K and net assets of $118K. The Board has appointed an audit team to review the 2008-2009 budget and 2007-2008 books.

Automotive Division Meeting Schedule and Special-Events Calendar

Division Board of Directors Meeting ACC, Troy, MI	February 2, 2009 5:00 pm
Division Board of Directors Meeting ACC, Troy, MI	April 6, 2009 5:00 pm
AutoEPCON Best Western Sterling Inn	April 28, 2009 All Day Event
Division Planning Meeting Location TBD	June 2009
ANTEC 2009 McCormick Place West, Chicago	June 22 - 24, 2009
9th-Annual SPE Automotive Composites Conference & Exposition, MSU Management Education Center, Troy, MI	September 15-17, 2009
39th-Annual SPE Automotive Innovation Awards Program & Gala	November 2009

Automotive Division Board of Directors meetings are open to all SPE members, and are usually held at the **American Chemistry Council (ACC)** in Troy, MI. Call Tom Pickett at (586) 492.2454 for more information.

www.speautomotive.com

Chairman's Message

Tom Pickett

The 38th-annual SPE Automotive Innovation Awards Gala sponsored by the Automotive Division of the Society of Plastics Engineers (SPE) International took place on November 20, 2008 at the Burton Manor in Livonia, Michigan. The event honors the people, companies and innovative parts in the automotive plastics industry. Over 650 people attended. It was a great event.

Congratulations to **Frank Macher** for receiving the *Lifetime Achievement Award*. Also, congratulations to the **FreedomCAR Fuel Partnership** for receiving the *Executive Leadership Team Award*. In addition congratulations to **Paul Mascarenas** and the Ford Flex Team on receiving the *Vehicle Engineering Team Award*. Finally, congratulations to all the Innovation Awards Program Category Winners and Finalists.

I thank Maria Ciliberti for the outstanding job she did as Chair of the 2008 Innovations Awards Gala. It involves a lot of hard work and behind the scene planning to organize such an event. I also thank all the volunteers that helped Maria to make this a successful event. Each played an important role. I would be remiss if I did not recognize some key contributors. These include Kevin Pageau, Mark Lapain, Teri Chouinard, Peggy Malnati, Roeland Polet, Monica Prokopyshen, Nippani Rao, Suzanne Cole, Ed Garnham, Bonnie Bennyhoff, and Fred Deans.

At the 2008 Innovation Awards Program Tom Pickett, Automotive Division Chair for 2008-09, presented the Past-Chair Award to outgoing Division Chair Brian Grosser.

In addition, thank you to all the Category Captains, student ushers, judges and attendees. Maria and her team had the OEM Materials Engineering leaders participate as category captains. Each Category Captain did an outstanding job. Last but not least I thank each of the sponsors that provided the financial support to make such an event possible.

I like to remind everyone of the 4th Annual AutoEPCON that will take place on Tuesday, April 28, 2009 at the Best Western Sterling Inn in Sterling Heights, Michigan. It is a one day technical conference and exhibit on the latest in automotive engineering materials, design and processing. It is a joint event between the SPE Automotive Division and the SPE Detroit Section. It is a must attend one day technical conference and exhibition for those that want to learn about the latest technology in automotive engineering materials, design and processing.

Nippani Rao is the 2009 AutoEPCON Conference Chair. If you or your company is interested in presenting at the 2009 AutoEPCON, being a sponsor or want to attend, please note the conference flyer within this newsletter.

I appreciate your support of SPE events. If you like to become involved in the Automotive Division, I invite you to our next Automotive Board of Directors Meeting on Monday, February 2, 2009 5:00PM at the American Chemistry Council (ACC) 1800 Crooks Road Troy, MI 48084. I look forward to seeing you at the great events we have planned for the year!

For a calendar of this year's event, please refer to the website **www.speautomotive.com** or call Tom Pickett at 586-492-2454.

Design and Development with

Automotive Engineering Plastics

AUTO EPCON

One Day Technical Conference & Exhibition

Date of Conference: Tuesday April 28, 2009

Best Western Sterling Inn, Sterling Heights, MI

Call for Technical Presentations

Deadline for Abstracts
February 20, 2009

Deadline for Presentations
April 3, 2009

No Paper Required

Contact Information:

Technical Presentations:
Dr. Norm Kakarala, Inteva Products
248-655-8483
nkakarala@intevaproducts.com

Sponsorship:
Gary Kogowski, ENTEC Polymers
248-797-7433
gkogowski@entecresins.com

Registration:
Pat Levine, SPE
248-244-8993
p.levine@yahoo.com
Fax: 248-244-8925

Program Chair:
Nippani Rao, Chrysler (retired)
248-444-1753
nippanirao@aol.com

Program Scope: The **Automotive Division** and **Detroit Section** of the Society of Plastics Engineers (SPE®) International invite you to attend a 1-day technical conference & exhibition showcasing innovative developments in the Design, Materials, Processing, & Use of Engineering Plastics for the Global Automotive Industry.

Who Should Attend: This conference is specifically designed to inform, update and educate the OEM & supplier communities about advances in both thermoset & thermoplastic engineering polymers. Learn how these widely-used materials can help improve performance & productivity, while reducing cost and mass.

Presentations: Hear Technical Presentations on the Newest Advances in Engineering Materials related to:

> Design Engineering
> Materials Development
> Processing & Enabling Technologies
> New Applications & More

Exhibits: See Exhibits from Engineering Plastics Suppliers, Molders, Compounders, Additives & Reinforcement Suppliers, Design & Engineering Firms, & Machinery Suppliers. Experts will show you how to apply the latest technologies to your next program.

Conference Includes:

Full Day of Technical Presentations, Plenary & Keynote Presentations on Automotive Business Trends, Lunch & Coffee Breaks, and Exhibits of Advanced Technologies.

Innovation Awards Program

Continued from Page 1

Ford dominated the show during the 38th Annual Awards program and took home 4 category winner trophies. General Motors earned 2 category trophies while the German OEMs, BMW and Daimler, together, won 3 categories.

The Category Award winners and honorees included the following:

The Grand Award winner - the most prestigious award of the evening - went to the winner of the Process, Assembly and Enabling Technologies category, that is, Twin Sheet Blow Molding used to manufacture the fuel tank on the 2009 BMW 7 Series. The Blue-Ribbon judges felt this nomination was the most innovative in this year's entire competition.

In the **Body Exterior** category, the Integrated Rocker Molding/Running Board System used on the 2008 Ford Escape was the winner. For Body Interior, the category winner was the Integrated Floor Shifter and Front Console found on the 2009 Ford Flex CUV.

This year's **Chassis/Hardware/Powertrain** category winner was the Oil Pan Module with an integrated windage tray found on the 2009 4-cylinder diesel Daimler C Class vehicle. In the **Environmental** category, the award went to Soy Foam Automotive Seat Cushions used on the Ford Mustang.

For the Materials category, the winner was TPE for Slush Molding of IP Skins found on the Saab 9-7X SUV from General Motors. In the **Performance and Customization** category the winner went to the Hood Assembly with Dual-Weave Carbon Fiber Composite found on the Chevrolet Corvette ZR1 Sports Car from General Motors.

For the **Safety** category, the winner was Polystyrene Foam for Head-Impact Protection used on the Ford Focus Compact Car.

And the latest inductee to the **Hall of Fame** went to the Use of Urethane Foam Seat Cushioning introduced for the first time on then, Chrysler Corporation's 1957 DeSoto and Chrysler 300 (2 door hard top model).

Additional information on all of these winners can be found later in this newsletter.

Gala and Afterglow Sponsor

2008 Innovation Awards Program

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The **Lifetime Achievement Award** went to Frank Macher whose 40+ year career includes various roles within Ford, its plastics division (later known as Visteon and Automotive Components Holding), Federal-Mogul and Collins Aikman. His leadership resulted in numerous plastic innovations including many industry firsts.

The **Executive Leadership Award** went to the FreedomCAR and Fuel Partnership for its leadership in sponsoring research for "leapfrog" technologies with plastics and composites in automotive applications and the next generation of vehicle transportation.

In addition to these long standing awards, SPE Automotive was inspired to create a new award for the 2008. Having received nominations for 10 different parts used on a single vehicle, SPE Automotive established the **Vehicle Engineering Team Award,** which went to the 2009 Ford Flex CUV team.

SPE's Automotive Innovation Awards program is the largest competition of its kind in the world and the oldest recognition event in the automotive and plastics industries. Dozens of teams made up of OEMs, tier suppliers, and polymer producers submit nominations describing their part, system, or complete vehicle module and why it merits the claim as Year's Most Innovative Use of Plastics.

This annual event typically draws over 600 OEM engineers, automotive and plastics industry executives, and media. As is customary, funds raised from the event are used for SPE educational efforts and technical seminars, which help to secure the role of plastics in the advancement of the automobile.

For more information about the SPE Automotive Innovation Awards Gala, visit the Automotive Division website at **www.speautomotive.com/inno.htm**, or contact the group at +1.248.244.8993.

SPE Honors Frand Macher with Lifetime Achievement Award

The Automotive Division of the Society of Plastics Engineers International honored Frank Macher, currently chief-executive officer and managing partner of FMAC & Associates, LLC of Ann Arbor, Mich., with its prestigious **Lifetime Achievement Award** at the 38th-annual SPE Automotive Innovation Awards Gala, November 20, 2008.

Macher, a recognized expert in strategic and business planning, advanced technologies, product development, and manufacturing processes and operations, was selected to be this year's award recipient due to his long and distinguished career in the automotive industry managing businesses with strong plastic-component operations. has more than 45 years' experience in the automotive industry - 30 of it with Ford Motor Co., primarily in manufacturing.

The Lifetime Achievement Award recognizes the technical achievements of automotive industry executives whose work - in research, design, and/or engineering, etc. - has led to significant integration of polymeric materials on vehicles. First given in 2000, past winners include:

- **J.T. Battenberg III**, former chairman and chief-executive officer of Delphi;
- **Bernard Robertson**, then executive vice-president of DaimlerChrysler;
- **Robert Schaad**, chairman of Husky;
- **Tom Moore**, retired vice-president, Liberty and Technical Affairs at DaimlerChrysler;
- **Mr. Shigeki Suzuki**, general manager - Materials Division at Toyota Motor Company;
- **Barbara A. Sanders**, then director - Advanced Development & Engineering Processes at Delphi Thermal Systems; and
- **Josh Madden**, retired General Motors Corp. and Volkswagen of America.

Prior to founding his current company, Macher was chief-executive officer (CEO) and president of Collins & Aikman Corp. (C&A), a $4-billion USD supplier of automotive interiors. Having taken responsibility after the company declared bankruptcy, Macher was recognized by Automotive News magazine in 2006 as their "Supplier All-Star" of the year for his ability to keep C&A operating despite its cash challenges.

Before joining C&A, Macher was CEO and chairman of the board of Federal Mogul Corp., a $6-billion USD publicly traded company in the automotive powertrain and aftermarket sectors. While at Federal Mogul, Macher restructured the company in an asbestos-related Chapter 11 bankruptcy, which allowed for a massive operational turnaround for the company with $600-million USD in cost savings.

Previous to his term at Federal Mogul, Macher held the position of president and CEO at ITT Automotive, a $6-billion USD subsidiary of ITT Industries. There, he led the divestitures of the TEVES brake and control business for $1.9-billion USD and the Rotating Electrical Group for $1.7-billion USD. These divestitures provided ITT with a major

Bud Marx, long-time friend, presented the Lifetime Achievement Award to Frank Macher, chief-executive officer and managing partner of FMAC & Associates, LLC

cash infusion that allowed the company to successfully grow its core fluids, connectors, and defense businesses, creating substantial shareholder value.

The majority of Macher's long and distinguished career was spent at Ford Motor Co., where he held many key executive positions, including vice-president, Automotive Components Group, an $11-billion USD operation and the predecessor to Visteon. During his tenure at the Automotive Components Group, Macher expanded the company's electronics operations on a global basis. He also established five joint ventures in China, including Yan Fang, now a $2-billion USD entity partnered with Shanghai Automotive Industrial Corporation.

In addition, Macher developed a joint venture with Halla Climate Control, which now is a $2-billion USD developer of low-cost heating/ventilation/air conditioning (HVAC) systems for the automotive industry. Among other key positions Macher held during his three decades at Ford was director-Corporate Quality, chief engineer-Interiors, and general manager of two divisions.

During the early days of Macher's career, he was involved in many automotive plastics innovations, including the first:

- Polyethylene fender liner on the Lincoln Town Car (early 1970s);
- Two-shot, rear tail lens molding process (developed with Farrell Corp. and fellow Ford employee, Larry Westin) around 1972;
- All-plastic, one-piece instrument panel on the 1975 model year (MY) Cougar passenger car;
- Electron-beam (E-Beam) cured paint for plastic instrument panels around 1975 (with Ford employee, Norm Brennan);
- Blow-molded polyethylene fuel tank on the 1979 MY Mustang sports car; and
- Tubular cross-car beam designs (working in conjunction with Ford's William Caldwell) that provided stiffness, structure, and reduced noise/vibration/harshness (NVH) for modular instrument panel systems, which could now be plugged into the vehicle as a single assembly for just-in-time (JIT) sequencing operations.

Macher is a former board member for Decoma International, Federal Mogul, and Collins & Aikman. He has also served on the Massachusetts Institute of Technology (MIT) Leaders for Manufacturing Board, Stanford Industrial Manufacturing Advisors, and Kettering University Board of Trustees. He is currently a board member of Tenneco Corp., where he also serves on the Audit Committee. Macher has lectured in the MBA programs at Harvard University, Dartmouth College, and currently guest-lectures annually at Georgetown University. He holds a BS degree in Mechanical Engineering from Kettering University, and an MBA from Michigan State University.

Chris Boese, Ford Motor Co., made a spectacular entrance at the 2008 Innovation Awards Program. Presenting the Environmental category award , Chris was delivered to the stage carrying soybeans and riding in the bucket of a John Deere tractor, driven by fellow Ford employee Mike Masserant.

2008 SPE Automotive Division Grand Award Winner

"Most Innovative Use of Plastics"

Twin-Sheet Blow-Molded Fuel System on the 2007 MY BMW® 7 Series Sedans

The Grand Award Winning Team: Dave Hill, Pam Graham & Michael Dziatczak

Process / Assembly / Enabling Technologies and Grand Award Winner

Twin-Sheet Blow-Molded Fuel System

OEM:	BMW AG
Model:	BMW® 7 Series Sedans
Tier Supplier:	Inergy Automotive Systems & Continental
Material Supplier:	LyondellBasell, Kurrary, Mitsui, & Ticona
Material:	High-Density Polyethylene (HDPE)
Process:	Twin-Sheet Blow Molding

Twin-sheet blow molding offers the advantages of an extrusion blow-molded fuel system with the design flexibility of a half-shell process. Sheets extrude between a central core and the mold. Core actions attach the components during initial sheet forming. The empty core is withdrawn and the mold is closed to join the formed sheets. Fuel tanks formed via this process meet the strictest PZEV emissions requirements, while also providing higher tank capacity, lower emissions, weight and cost reductions, and elimination of post-mold operations.

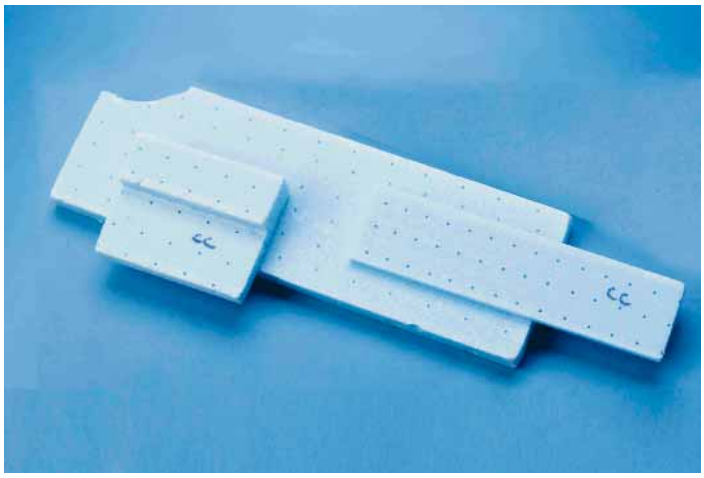
AUTOMOTIVE SPE INNOVATION AWARDS COMPETITION & GALA

HONORING THE BEST IN AUTOMOTIVE PLASTICS

Despite the difficult times in the industry, over 700 people attended the 2008 Gala. Representatives from the major OEMs, Suppliers, and Media were on hand to honor the latest innovations in automotive plastics.

"Most Innovative Use of Plastics" Trophy

2008 Innovation Awards Competition Category Winners



Safety Category Winner

Polystyrene Foam for Head-Impact Protection

OEM:	Ford Motor Co.
Model:	Ford Focus® Compact Car
Tier Supplier:	Grupo Antolin North America
Material Supplier:	Dow Automotive
Material:	Polystyrene Foam Sheet
Process:	Wire-Cut Foam Blocks

This was the best-in-class, low-cost energy-absorption (EA) countermeasure based on zero tooling, piece price, and time to market. Foamed styrene is extruded into blocks and then wire cut into complex shapes, providing significant weight (25% lighter), cost, and timing benefits vs. competitive products.

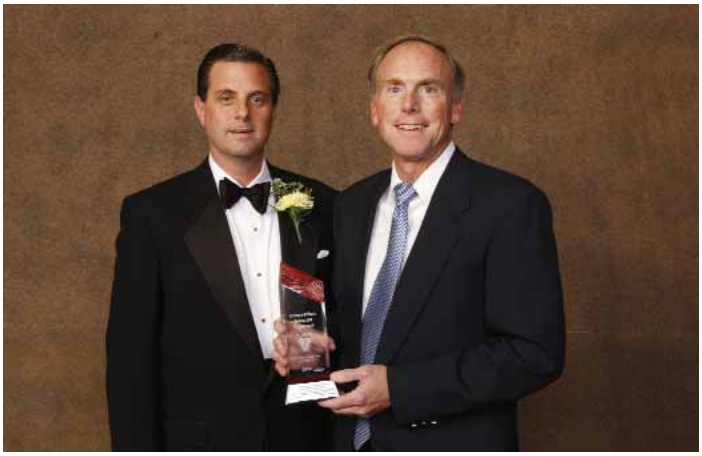
Randy Visintainer and SPE Award Presenter, Kevin Pageau

Performance & Customization Category Winner

Hood Assembly with Dual-Weave Carbon Fiber

OEM:	General Motors Corp.
Model:	Chevrolet® Corvette® ZR1 Sports Car
Tier Supplier:	Plasan Carbon Composites
Material Suppliers:	ETS & ACG
Material:	Epoxy/Carbon Fiber Composite
Process:	Autoclave/Vacuum Bagged / Hand-Layup Prepreg

This unique signature hood for was designed for high visual impact by using the auto industry's first see-through, bonded polycarbonate "window" and special stabilized, fully exposed, visible carbon fiber weave (meeting Class A-underside requirements) on the underside of the hood. The assembly also offers significant mass reduction vs. SMC or metal, and meets FMVSS frontal crash requirements.



SPE Award Presenter, Dan Vivian and Tadge Juechter

2008 Innovation Awards Competition Category Winners

Body Interior Category Winner

Integrated Floor Shifter / Front Console

OEM:	Ford Motor Co.
Model:	Ford® Flex® CUV
Tier Supplier:	Automotive Component Holdings
Material Supplier:	Nova Chemical
Material:	Recycled styrene maleic anhydride (SMA) & long-glass PP
Process:	Injection Molding

This modular floor console and shifter assembly uses an all plastic (recycled injection molded SMA) structure to support a floor-based shifter and eliminate use of metal bracketry previously used to secure the shifter to the vehicle floor pan. The integrated system simplifies online assembly and improves package space, thus improving stowage and craftsmanship. It also reduces cost ($7 USD plus assembly labor) and weight (5 lb/2.3 kg) vs. earlier designs.

Marcy Fisher and SPE Award Presenter, Doug Pickett

Chassis/Hardware Category Winner

Oil Pan Module

OEM:	Daimler AG
Model:	C Class
Tier Supplier:	G. Bruss GmbH
Material Supplier:	DuPont Automotive
Material:	Glass-Reinforced Nylon 6/6
Process:	Injection Molding, Vibration Welding

This is the first modular plastic oil pan module adopted for passenger cars. It integrates an uppershell of diecast aluminum and a multifunctional lower shell injection molded reinforced nylon 6/6. It integrates the oil pan with windage tray and oil deflector, reducing oil vapor around the crankshaft (improving horsepower 5%), lowering air entrapment in the oil, and decreasing friction for longer bearing life. The component is 2.4 lb lighter and 20-25% less costly than an aluminium design and use of integrated oil baffles improves flow and reduces sloshing of oil.

Nuri Tiraki, Gunter Zoll and SPE Award Presenter, John Snider

AUTOMOTIVE INNOVATION AWARDS COMPETITION & GALA

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AUTOMOTIVE INNOVATION AWARDS COMPETITION & GALA
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VIP Reception

The VIP cocktail reception (reserved for program sponsors and senior level automotive executives) was one of the absolute best networking opportunities in town, according to several supplier executives in attendance. This year's VIP reception featured a lighted Ford Flex and a string quartet, which created a very conducive environment for everyone to interact with program sponsors and VIPs.

2008 Innovation Awards Competition Category Winners

Body Exterior Category Winner

Integranted Rocker Molding/Running Board System

OEM:	Ford Motor Co.
Model:	Ford Escape® SUV
Tier Supplier:	ABC Group
Material Supplier:	Salflex Polymers Ltd.
Material:	30% glass-reinforced PP
Process:	Blow molding

For the first time, rocker moldings, end features, and running board/step area are combined in a single blow-molded component that is foam-sealed to the body side for improved craftsmanship, fit, and finish. The component also reduces weight (8.6 lb/3.9 kg), lowers piece-price and assembly costs ($5 USD/vehicle), provides improved stone-chip resistance, and reduces assembly time.

Materials Category Winner

TPE for Slush Mold of IP Skins

OEM:	General Motors Corp.
Model:	Saab® 9-7X SUV
Tier Supplier:	Inteva Products
Material Supplier:	Inteva Products
Material:	TPO/TPE
Process:	Slush Molding

This patented application represents the first use of a TPO/TPE slush-molded IP manufactured in North America. The low-cost polyolefin-blend material for thin skins is produced on the same equipment as the vinyl and urethane it replaces while providing equivalent or better performance at 20% lower weight and without VOC emissions or fogging. A unique additive imparts high powder-packing density and superior powder flow.

SPE Award Presenter, Jeff Webb and Frank Dalessandro

Pat Stewart, Judy Clark and SPE Award Presenter, Monica Prokopyshen

Hall of Fame Inductee

First Use of Urethane Foam Seat Cushioning

OEM:	Chrysler Corporation
Vehicle:	1957MY DeSoto & Chrysler 300 2 Door Hardtop
System Supplier:	Reynolds Chemical Products
Material Supplier:	Union Carbide (Now Bayer MaterialScience)
Material:	PUR

To considered for the Hall of Fame Award, a part must have been in continuous service in some form for 15 years or more and preferably have been widely adapted within the automotive or ground-transportation industry. This year's winning nomination is believed to represent the earliest use of polyurethane foam in automotive seating and was featured on the rear seat of the 1957MY Desoto and Chrysler 300 2-door hardtops by then Chrysler Corp.

Produced by Reynolds Chemical Products of Ann Arbor, Mich. using flexible slab-stock urethane foam supplied by then Union Carbide (whose urethane business was subsequently acquired by Bayer MaterialScience), the urethane seat topper replaced cotton batting and latex-rubber sponge products. As such, it provided a 50-60% weight and 10-20% piece-cost savings plus lower manufacturing and assembly costs while also increasing seat comfort, durability, flexibility, and breathability for consumers. Flame-retardant materials were used for safety.

Natural (latex) rubber foam had been the cushioning material of choice for automotive seating from the early 1930s through the late 1950s. However, it had processing as well as other challenges. The complicated, multistep process began with material blending, and then metering the latex rubber into the tool. The tool was next sealed and a vacuum was pulled to expand the material. Then the tool temperature was dropped to -30C in order to "freeze" the material. After it had solidified, carbon dioxide gas was passed through the latex foam to raise the temperature in the mold to 115°C/230°F, at which point the mold was opened and the material was stripped from the tool.

Post-mold operations included washing the latex rubber to remove impurities, squeezing excess water out, and then passing it through a series of dryers to remove any remaining moisture. This was followed by cutting parts from a larger block of foam - all before seats could be built. Given the challenges of working with these materials, a highly skilled (and therefore more costly) labor force was required, which added to costs for the final product. Additionally, latex rubber had a distinct odor and provoked allergic reactions in some individuals.

In contrast, polyurethane foam had a much shorter molding cycle of 10-12 minutes with little post-mold cure requirements. Demolding was also fast and the parts could be handled right away. Furthermore, urethane foam parts were lighter than those made from latex foam rubber, achieving densities of 1-4 lb/ft^3 vs. 5-8 lb/ft^3 for the older technology. And urethane was non-allergenic and odorless once cured. Just like latex rubber, it could be welted, stitched, pulled/stretched, sewn, nailed, and cut using conventional tools.

John Reynolds, Materials Development specialist at Chrysler LLC (and no relation to the original urethane molder of the same name) said, "Predictions were made in 1957 that polyurethane foam would capture a large share of the automotive cushioning market in the future, and history has proven those predictions to be true. This extremely versatile and resilient material has stood the test of time."

Nippani Rao, supervisor - SPE Automotive Division board member who helped select this year's Hall of Fame winner added, "Flexible urethane foam not only has had a remarkable impact on automotive seating over the last 50 years, but it has similarly transformed the furniture, aerospace, industrial, and consumer markets as well. I see no reason for this not to continue for the next 50 years, if not longer."

Asad Ali, Ron Blair, Ash Galbreath, John Reynolds, Mark Weierstall, SPE Award Presenter Dave Reed, and Brian Hennings.


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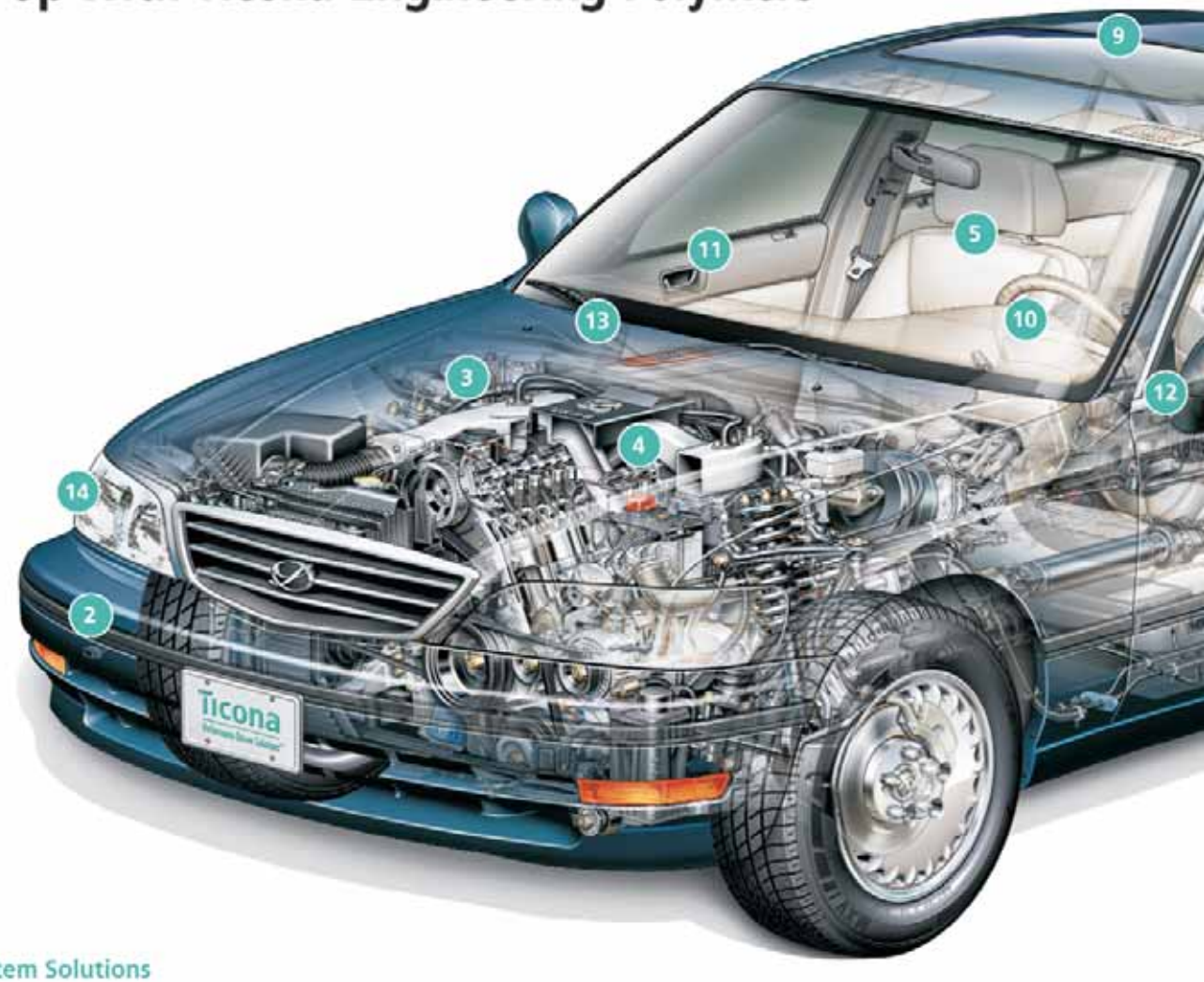

Integrated System Solutions

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2 Front End Modules
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3 Electrical
Celanex® PBT, Fortron® PPS, Vectra® LCP, Hostaform®/Celcon® acetal copolymer

4 Power Distribution
Celstran® LFRT, Celanex® PBT, Vectra® LCP, Fortron® PPS

5 Cockpit Environment
Celanex® PBT, Vandar® PBT, Riteflex® TPC-ET, Hostaform®/Celcon® acetal copolymer

6 Underbody Skid Plates
Celanex® PBT, Celstran® LFRT

7 Advanced Fuel Delivery
Hostaform®/Celcon® acetal copolymer, Fortron® PPS, Celanex® PBT, Riteflex® TPC-ET

8 Seating & Restraint
Hostaform®/Celcon® acetal copolymer, Celstran® LFRT, Riteflex® TPC-ET, Celanex® PBT, Vandar® PBT

9 Multi-functional Roof
Hostaform®/Celcon® acetal copolymer, Celanex® PBT, Fortron® PPS, Celstran® LFRT

10 Instrument Panels
Celstran® LFRT

11 Speaker Grilles, Knobs, Handles and Levers
Hostaform®/Celcon® acetal copolymer, Celstran® LFRT, Celanex® PBT

12 Mirror Housings
Hostaform®/Celcon® acetal copolymer, Celanex® PBT, Celstran® LFRT

13 Wiper Plenums
Hostaform®/Celcon® acetal copolymer, Celanex® PBT, Celstran® LFRT

14 Lighting Housings
Celanex® PBT, Vectra® LCP, Fortron® PPS

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- Broad temperature use range
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Celstran® and Compel® Long Fiber Reinforced Thermoplastics
- High stiffness
- Exceptional toughness
- Long-term dimensional stability
- Wide temperature use range
- Scalable electrical properties

Fortron® Polyphenylene Sulfide
- High continuous use temperature
- Resistance to auto fuels and fluids
- Inherent flame resistance
- High strength and dimensional stability

Impet® Thermoplastic Polyester
- Outstanding physical properties
- Superior thermal and chemical resistance
- Toughness
- Rigidity
- Dimensional stability
- Wide temperature use range

Riteflex® Thermoplastic Polyester Elastomer
- Excellent toughness and fatigue resistance
- Outstanding chemical resistance
- Good low temperature impact
- Wide temperature use range

Vandar® Thermoplastic Alloy
- Excellent chemical resistance, ductility and stiffness
- High impact strength at low temperatures

Vectra® Liquid Crystal Polymer
- Superior thermal characteristics and dimensional stability
- High strength and modulus
- Broad chemical resistance
- Low mold shrinkage
- Excellent electrical properties
- Inherent flame resistance

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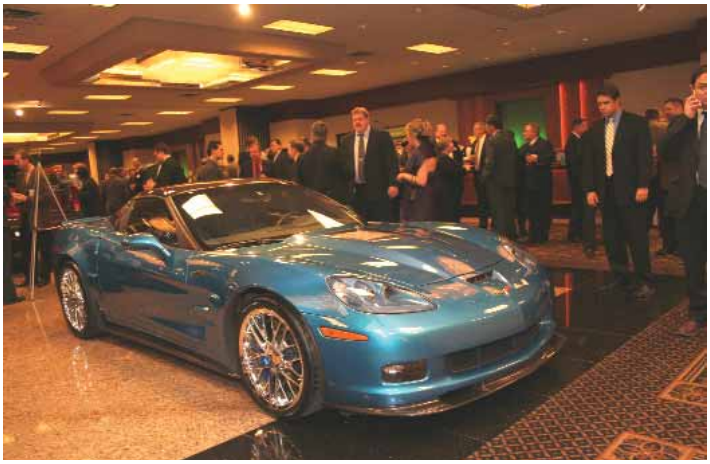
Part Display Reception

Another highlight of the event was a spectacular display of vehicles including the 2008 Ford Flex (*Vehicle Engineering Team Award* vehicle), the new Chevrolet Corvette ZR1, the Dodge Viper, and numerous other vehicles from General Motors, Ford Motor Company, Chrysler LLC, and Hyundai. The vehicles were on display in the reception area with all 45 of the component and applications nominated for the 2008 Innovation Awards Program competition.

With over 400 people at the Display Reception, this was another great networking opportunity to meet with OEMs, Tier 1 suppliers, molders and material suppliers, and view the latest innovations in automotive plastics.



Executive Leadership Team Award

The Automotive Division of the Society of Plastics Engineers International honored the FreedomCAR and Fuel Partnership (FC&FP) with its Executive Leadership Team Award at the 38th-annual SPE Automotive Innovation Awards Competition & Gala.

The award recognizes the Partnership's leadership in sponsoring research on 'leapfrog' technologies in plastics and composites for automotive applications and its work in helping develop technologies for the next generation of vehicle transportation. The honor was accepted by a team representing the U.S. Department of Energy (DOE) and the United States Council for Automotive Research LLC (USCAR), through which the three U.S. automakers - Chrysler LLC, Ford Motor Co. and General Motors Corp. - participate in the FC&FP.

Suzanne Cole, president, Cole & Associates and past chair of the SPE Automotive Division said, "The U.S. government is committed to promoting the transformation of the transportation sector via development of lightweight, efficient and sustainable vehicles and an infrastructure to support them. Through USCAR, the Detroit automakers are advancing collaborative automotive research, which includes polymer composites technology, for future vehicle architectures. We, on the SPE Automotive Division Board of Directors, believe that plastics and composite materials will be key enablers for the development of safe and sustainable transportation, and we applaud the efforts of the FC&FP for ushering in polymer-based technologies for advanced-propulsion systems and lightweight, durable, safe vehicle structures."

Maria Ciliberti, Global Automotive director, Ticona, and also the SPE Automotive Innovation Awards chair for 2008 added, "We selected FC&FP as the recipient of our 2008 Executive Leadership Team Award for the group's vision in making plastics and composites top research priorities within the materials arena. From lightweight, durable, sustainable materials for clean-sheet vehicle architectures to membrane separators for advanced batteries, and plastics for building the hydrogen infrastructure needed for a safe and convenient fuel-delivery system, plastics and polymer composites have already proven to be enabling technologies for alternative powertrains, ranging from gas-electric hybrids to advanced battery and hydrogen vehicle technologies."
Key areas of research by the FC&FP include the following:

Lightweight Structures / Low-Cost Carbon Fiber - Current FC&FP composite materials efforts are focused in the development of large carbon fiber-reinforced composite structures, a technology offering the highest stiffness-to-weight ratio of any structural materials used in the automotive industry. One of the first tasks is to delineate the structural performance requirements and identify the best manufacturing technologies for producing composite components. The goal associated with this work is to achieve 60% or greater mass reduction vs. comparable steel body structures. This represents a major effort being carried out through several DOE projects aimed at reducing the cost of carbon fiber (a goal of producing fiber at US$7-11/kg) and optimizing carbon fiber surface characteristics for compatibility with resins commonly used in the auto industry.

Lithium-Ion (Li-ion) Batteries - Research over the last decade at DOE national laboratories and through USCAR's U.S. Advanced Battery Consortium has led to the development of solid-state, thin-film lithium and lithium-ion batteries. The batteries have important applications in batteries for plug-in electric and hybrid (gas-electric) vehicles.

Hydrogen Fuel / Fuel-Cell Vehicles (FCVs) - One of the most promising and greenest alternative power sources for ground transportation is the hydrogen fuel cell, whose only by-product is water. Plastics play many important roles in FCV technology - from the bi-polar plate where energy is stored to composite fuel tanks providing on-vehicle hydrogen storage to lightweight vehicle structures that help a given tank of fuel propel a vehicle further.

Those named on the FC&FP award include:

- Joseph A. Carpenter, Jr., Technology Development manager for the U.S. DOE's Lightweighting Materials effort, part of the FreedomCAR and Fuels Partnership;
- Charles David (Dave) Warren, program manager - Transportation Composites at Oak Ridge National Laboratory and field technical manager - Composites in the Automotive Lightweighting Materials effort, a part of the FreedomCAR Initiative of the DOE's Office of Vehicle Technologies;
- Libby Berger, staff researcher - Materials & Processes Laboratory, R&D Center, General Motors Corp. and a member of the Automotive Composites Consortium's Processing Group, and Materials Group, of which she is a past chair;
- Dan Houston, technical specialist, Ford Motor Co. and chair - USCAR Advanced Composites Consortium Materials Work Group; and
- Khaled Shahwan, engineering specialist - Experimental & Computational Mechanics Department, Scientific Laboratories, Chrysler LLC and chair - USCAR Automotive Composites Consortium (ACC) Composites Energy Management Group.

Accepting the award at the SPE Automotive Innovation Awards Gala on behalf of USCAR was Chrysler's Freedom CAR director and member of the USCAR Leadership Group, Ann Schlenker, Chrysler LLC director of Advance Vehicle Engineering & Alliances.Accepting the Award on behalf of the Department of Energy is Patrick Davis, acting program manager, Vehicle Technologies, Energy Efficiency & Renewable Energy, U.S. DOE.

Continues Cole, "A national energy portfolio that includes significant use of hybrid powertrains, advanced battery technology including plug-in hybrids, hydrogen fuel, and fuel-cell applications will make lasting contributions to America's future mobility needs and reduce climate-change impacts through the significant reduction of $C0_2$. The DOE's funding and fuel-validation programs are extremely important technology-development efforts and therefore we felt worthy of recognition."

Ann Schlenker, Chrysler LLC director of Advance Vehicle Engineering & Alliances addresses to audience at the Innovation Awards Program.

Established as the FreedomCAR Partnership in 2002 and expanded to include fuel companies in 2003, the FreedomCAR and Fuel Partnership is a public-private partnership between the U.S. DOE; five major energy producers - BP America, Chevron Corp., ConocoPhillips, ExxonMobil Corp., and Shell Hydrogen LLC; USCAR, whose members include Chrysler LLC, Ford Motor Co. and General Motors Corp.; and now, two major utilities: DTE Energy and Southern California Edison.

Founded in 1992, USCAR is the umbrella organization for collaborative research among Chrysler, Ford and GM. The goal of USCAR is to further strengthen the technology base of the U.S. auto industry through cooperative research and development.

The Executive Leadership Team: SPE Presenter, Suzanne Cole, Dave Warren, Dan Houston, Patrick Davis, Joseph Carpenter, Ann Schlenker, Khaled Shahwan, and Libby Berger.

Vehicle Engineering Team Award

SPE Awards Program Chair, Maria Ciliberti presents the Vehicle Engineering Team Award to Ford's Paul Mascarenas.

The Automotive Division of the Society of Plastics Engineers International presented Ford Motor Company with its Vehicle Engineering Team Award for the automaker's significant use of innovative plastics content on the new Flex™ cross-over utility vehicle (CUV).

The Vehicle Engineering Team Award recognizes the technical achievements of teams comprised of automotive designers and engineers, tier integrators, materials suppliers, toolmakers, and others whose work - in research, design, engineering, and/or manufacturing - has led to significant integration of polymeric materials on a notable vehicle.

The Ford Flex CUV features a number of innovative plastics applications, many of them industry-firsts, such as:

- Capless Refueling System with Mis-Fuel Inhibitor (MFI) - North America's first plastic capless refueling system with a mis-fuel inhibitor features an injection-molded, ultrasonically welded unit of polyphthalamide (PPA).
- Satin-Chrome Decklid Appliqué - This appearance-enhancing decorative part is the largest satin-chromed appliqué in production - 30-50% larger than appliqués used previously.
- Injection-Molded Crushable Armrest with Decorative Grab Handle - This injection-molded ABS substrate with vinyl skin and urethane foam-in-place design provides consumers with the 360-degree grab surface on the inner door panel while providing the durable, crafted bright-accent appearance favored by design studios.
- Integrated Refrigerator / Rear-Floor Console - An industry first, this unit combines a rear-floor console with a compressor-driven refrigerator (with cooling-time up to 30% faster than a traditional home appliance).
- Integrated Floor Shifter / Front Console with a Recycled SMA Structure - This modular floor console and shifter assembly uses an all plastic (recycled, injection-molded SMA) structure to support a floor-based shifter and eliminate use of metal bracketry previously used to secure the shifter to the vehicle floor pan.
- Integrated Roof Shade / Auxiliary AC Duct / Headliner Reinforcement - This integrated headliner system arrives at the assembly plant already carrying an auxiliary air-conditioning duct, headliner stiffener, headliner attachment base, moon-roof opening stiffening rings, and dual sun-shade carrier.
- Rear-Footwell Ambient Lighting - An entirely new feature, footwell ambient lighting provides interior vehicle illumination of rear footwells along with front and rear cup holder and rear heating/ventilation/air-conditioning (HVAC) controls.
- Long-Glass Polypropylene Overhead Console - This is a unique use of injection-molded long-glass fiber-PP materials in an above-the-beltline, Class A interior part with light texturing and in light colors.
- Integrally Molded Energy Absorption Features - The patent-pending injection-molded, high-impact PP door-trim substrate's design features integrally molded, energy-absorbing rib structures.
- Expanded-Polypropylene Head Restraint Core - This patent-pending safety application is the first time expanded-polypropylene (EPP) foam head-restraint insert that has been used to meet FMVSS-202a static requirements in a headrest.
- Acrylic Appliqués with SecureCode™ Invisible Keypad - This industry-first application combines a high-gloss, molded-in-black-color B-pillar appliqué (traditionally done in painted metal) with a nearly invisible, semi-transparent keyless entry system.

Speaking about the award, Paul Mascarenas, vice-president, Engineering said, "We are delighted that Ford Motor Company has been recognized in this way by this Society of Plastics Engineers award. The whole team worked tirelessly to bring innovative thinking to the Flex project and this honor for the entire engineering team is recognition of the hard work that has gone in to the Flex."

ANTEC 2009

The SPE Annual Technical Conference (ANTEC) will take place at McCormick Place West Chicago, IL from June 22 -24, 2009. It will co-locate with the 2009 NPE (National Plastics Exibition).

SPE received over 720 technical paper submissions. This represents an increase of nearly 200 papers from 2008. The Automotive Division technical program committee (Norm Kakarala, Tom Pickett, Suresh Shah, Jay Raisoni, Mike Shoemaker, and Josh Madden) reviewed and selected 12 papers. The papers are organized into two sessions: one session on Materials Developments and a second session on Application Developments. The Automotive Sessions are scheduled for Tuesday June 23rd.

The preliminary program will be finalized by mid-January. Please check the SPE website for the latest updates on what promises to be the most exciting ANTEC in some time!

Correction

In the last newsletter in the "Outdoor Weathering Benefits of Mold-in-Color Acrylic" article, the wrong photo was used in Figure 6 . Below is the correct photo.

Figure 6
Image of Entire 6 Year Old Police Car Rear Deck Assembly

Membership Matters

Below we welcome some of our newest members of the SPE Automotive Division:

William Schreiber		David Davenport	ExxonMobil Chemical	Jane Urban	PolyOne Corp.
Dietrich Scherzer	BASF SE	Becky Renkert	Renkert Oil LLC	Roberto Fretta	OMG Srl
David Grooms	Quantum Leap Packaging	JD Schwartz		Alan Heller	Heller
Doug Hakela	Weyerhaeuser	Robbin Dean		Paul Mills	
Suzanne Hofford	Innegrity	Martin Angell		Bill Bodiford	
Toby Jacobson	Net Shape Intl	Weiting Tang	Dept of Chemical Engineering	Diana Bush	
Makto Kibaatashi	Toray CFA	Robert Schreiber		David White	
Werner Probst	Nolax Collano AG	Ben Czajka	Inteva	Jovita Tjahjadi	
Brad Armstrong	Decoma International	Dwight Warnez	D&W Moulds	Stephanie Masse	
Bernhard Aumer	BASF SE	Ruth Carpenter	Society of Plastics Engineers	Jay Ghosh	CIBA Corporation
Steven Bahr	Cyclics Corporation	Jim Clark		Cary Colton	Square D Company
Alexander Saveski	Johnson Controls Inc.	Guillermo Orihuela	ORYMO	Sergio Rovira	Criser S A De C V
Diethard Schneider	ContiTech	Joshua Anthony		Roger Greenberg	Bro-Texco
Ryan Newman		Cory Wainwright	Ferris State University	Richard Oles	PSG Plastic Service Group
Rahim Laljee	Thomas & Betts	Beth Manganaro		Patrick Apsey	Henkel
Paul Bristow	AZDEL, Inc.	Melinda Reyes	Ciba	Steve Cowen	LyondellBasell Industries
David Oscar Vella		Gary Arnold		Seungah Kim	Inwoo Coporation
Shaun Murray	Continental Pty Ltd	Chris Koranda	Navistar, INC	Matt Osborne	Invista
Jacob Philpott		Brian Czopek		Michael Rigney	Chase Plastics
Ostin Tan	ExxonMobil Chemical	Rene Loy	IMS Gear Georgia		

Board of Directors Meeting Minutes

Jay Raisoni

Minutes from the December 8, 2008 SPE - Automotive Division Board Meeting

Attendance: Gary Kogowski, Jay Raisoni , Dave Reed, Nippani Rao , John Fialka , Mike Masserant, Brian Grosser , Al Muray, Tom Pickett, Jake Axel, Peggy Malnati, Maria Ciliberti , Ed Garnham, Teri Chouinard, Josh Madden , Norm Kakarala , Mike Whitens, Johanne Wilson, Suresh Shah & Kevin Pageau

1. Meeting Called to Order: Chairman Tom Pickett called the meeting to order at 5:30 PM following social and dinner.

2. Chair's Message: Tom Pickett welcomed everyone and announced the meeting's agenda (attached). Tom reviewed the chair's goals / objectives (attached). Tom's objectives are to run concise & organized BOD meetings. Tom will seek representations from more companies. Another goal is continued improvement of key events specifically Composites Conference, Innovation Awards, and Engineering Plastics Conference. Other goals are to grow membership, to win the Pinnacle Award and to have fun.

3. New Item: The motion to "Give Back Rebate Check to SPE National Hardship Fund" was sponsored and carried forward. The result will be approximately $2,210 for the Hardship Divisions & Sections Fund.

4. Treasurer's Report: John Fialka, Treasurer's update to the group:
Taxes Complete Nov 2008;
Financial Report & Taxes sent to National
2007 - 2008 Financial Report Completed;
2008 - 2009 Budget Complete

- Total Revenue $401,000
- Total Expenses $375,000
- Net Assets $110,000
- 2008 ACCE net proceeds $28,700
- Preliminary 2008 Innovation Awards total revenues of $162,000, net positive proceeds from the event expected.

John was asked to present detailed highlights of income and expenses using Quicken format ; Gary Kogowski is to send a sample of Detroit Section financial report.

5. 2008 Innovations Award Gala Review: Maria Ciliberti, Chair for the event reviewed the positives and negatives of the recent IAG event. The event was a success by all measures, with attendance of 700 people that surpassed the past years' attendance in today's tough economic times, had sponsorship total of $162,000 that likely would allow break even. There were a few issues with the service and venues that Maria is going to address with Burton Manor to improve the event. The event went on a little longer and it was decided at Maria's debriefing meeting earlier to request the main speaker before hand to limit their remarks to 10 minutes. The members at the debriefing meeting also agreed to make extra efforts under Maria's leadership to have stronger participation from all OEMs, particularly transplants.

6. Technical Program Chairman's Report (attached): Norm Kakarala outlined the following technical events planned for the next year.

- 4th Annual AutoEPCON Apr. 28, 2009 - Best Western Sterling Inn; Co-Chairs: Nippani Rao & TBD
  Concurrent Sessions on Materials & Applications
- 9th Annual ACCE Sept. 15-17, 2009
- 11th Annual TPO Conference Oct. 4-7, 2009
- SPE ANTEC 2009 with NPE in Chicago, IL June 22-26, 2009 - 11 Completed Papers out of 15 abstracts - Two Sessions

Paper Review Committee: Jay Raisoni, Suresh Shah, Tom Pickett, Mike Shoemaker, Josh Madden, and Norm Kakarala

7. Newsletter Report: Teri Chouinard, Sponsorship chair for the Newsletter outlined how she plans to maintain the current sponsors and grow sponsorship by contacting plastic businesses often, touting value of the sponsorship and offering more value thro' color printing, larger size ads.

8. Membership report: Johanne Wilson, lead a group discussion of various ideas to increase membership. The motion was put forth and carried to have Johanne draft a promotion to offer up to $50 incentive to recent hires/ graduates to join SPE.

9. Education Report: Monica Prokopyshen thanked Yvonne & Bonnie for organizing the Ferris State and CCS student participants and discussed ways to thank Ferris State student volunteers for their extra efforts at IAG. She also is listing the schools in Plastivan visit program.

10. Councilor's Report: Nippani Rao, Councilor reviewed the highlights from October17-18 meeting he attended in Southbury, CT. See the detail Councilor's Report in this newsletter.

11. Meeting Adjourned - Tom concluded the meeting by restating the Chair's objectives. Mark thanked everyone for coming. Meeting adjourned at 8:30.

12. Next Meeting. February 2, 2009; Tom Pickett, Chair, will send out the reminder.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Councilor's Report

Nippani Rao

I attended the SPE International Council meeting in Southbury, CT, October 17-18, 2008, and the following summarizes the highlights.

Elections

Council elected the following as Society officers for the 2009-2010 term, which begins at ANTEC (June 22-24):

President-elect - Ken Braney
Senior Vice President - Russell Broome
Vice President - Brent Strong

In addition, the Council elected a Chair for the Council Committee of the whole, Helen Basso for 2009-2010

Budget

The Council approved the 2009 calender-year Budget. Details of the budget are available on the SPE web site. The income for 2009 is $ 4,840,000 and expenses of $ 4,787,500 with a net income of $52,500. The budget reflects reduced expenses to match expected lower income due to lower membership and weaker economy.

- The new Web2.0 is occurring
- Membership costs will go up $125 to $129 for renew and $140 to $144 for new and $30 to $35 for students.
- Rebates cut by 1/3rd. Strong Divisions and Sections discussed giving back to bolster growth.

Bylaws & Policies

A number of changes in Bylaws were approved to reflect the changes in the SPE organization. Key changes are:

- SPE foundation is under SPE umbrella, to save costs.
- Election date changes, due to changes in Council meetings (from 3 to 2).
- Electronic voting permitted. Enables International participation.
- Governance Downsizing. From 9EC VP's to 6.
- Alterations in SIG's and Student chapters
- New Code of Ethics, to protect against law suits.
- SPE headquarters will stay in the USA

2009 Operating Plan

President-elect Paul Anderson gave his thoughts on the operating plan:

- Increased emphasis on Generation X and Y in SPE membership and activities
- Need improved recruiting and retention ideas.
- Develop corporate outreach.
- Virtual conferences will be developed.

SPE Foundation

Gail Bristol reviewed the status.

- Scholarships of $138,500 to 33 students in 2008
- Over a million in balance. Plus $83K by September
- New name is Foundation Board.
- Environmental Responsibility award will begin in 2010.

SPE Awards

SPE award ceremony will take place at a luncheon between the two Council meetings on Sunday. SPE will present the rest of the awards on Monday.

Virtual Conference Demo

SPE Senior Event manager Lesley Kyle explained the virtual conference that SPE will be hosting in March 2009. This will be a two-day conference using live and recorded presentations, a "cyber lounge" and a virtual trade show. The cyber lounge will be a chat room environment. This event is expected to be attractive in a down economy and expected to attract X and Y generation individuals.

Divisions Committee

Councilor Dale Grove reported on the activities of the Divisions Committee. The Divisions Committee recommends that the New Technology Committee approve the merger of the Radiation Processing of Polymers of Europe and the Radiation Processing of Polymers North America SIGs. The new group will be called Radiation Processing of Polymers SIG.

The next Council meeting will be at ANTEC in Chicago

Education Report

Monica Prokopyshen

Funding for education programs comes from the support of members, sponsors and participants of our conferences and Innovations Award Program.

This fiscal year the automotive division is sponsoring the Plastivan®, Explorathon®, and student program for the Innovations Award Gala. Students from Ferris State University and the College for Creative Studies (CCS) attended November's Innovation Awards Gala. Thanks to the following Ferris State students for their professional, high quality contributions to this year's gala: Ali Witucki, Kelly Stillson, Matt Sweeny, Joe Jernstadt, Darren Defever and Jared Korreckt.

In addition, a number of scholarships are awarded through our conference programs and the division supports the ANTEC student fund.

Together with the American Chemistry Council, Plastics Division, and Detroit Section we co-sponsored the CCS Junior Auto Design Studio project. This year, students were challenged to design vehicles for cities with populations of over 1 million inhabitants, considering carbon footprint, vehicle efficiency, mass and design flexibility. Quarter scale clay models were developed for single commuters, families and commercial users in Mubai, Cairo, Moscow, New York City and Chongqing. Read more about the unique challenges and varied solutions to this problem in our next issue.

The SPE AD sponsors the well-received and much requested Plastivan® educational outreach program, managed of the National Plastics Center and Museum. The portable polymer chemistry laboratory and hands-on lessons are brought directly to schools and students in grades 3 through 12. Marjorie Weiner is the instructor for the fourteen schools and over 1800 students sponsored by our division for the 2008-2009 school year. This year's schools represent Clinton Township, Farmington Hills, Port Huron, Troy, Commerce Township, Claire, Beverly Hills, Southfield, Birmingham and Pontiac municipalities.

Explorathon is an annual event open to high school students in Southeast Michigan designed to spur interest in careers in maths, sciences, technology and engineering. The SPE AD has participated in this event for over nine years, offering hands-on workshops. This day-long event is open to both regular and home-schooled students. Anywhere from 500 to 900 students attend Explorathon, which takes place during Easter break-this year April 1, 2009 at Detroit Country Day school.

Student at the Explorathon learn about plastics!

If you are interested in volunteering or supporting any of these education activities, signing up for a Plastivan visit, or wish to find out more information, please contact us as via the automotive division web site: **www.speautomotive.com**

An In-Depth Study of Texture Characteristics and Their Affect on Texture Performance

P. Maniscalchi
Mold-Tech

Introduction

Over the past five years automotive interiors have become increasingly important to both designers and customers. Automobile manufacturers have started to shift their focus from the vehicles exterior to its interior design. The reason for this shift in perspective is the realization that consumers are spending more time in their vehicles than ever before. One of the key paradigm shifts to interior design is in the area of textured surfaces. This drive toward improving the automotive interior environment has led to the creation of more complex and attractive textures. A texture can add to the overall harmony of an interior, it can also distract from the harmony when they do not perform functionally.

The two main functionality tests for any textured part are scratch and mar, and gloss level measurement testing. If a textured part fails one or both of these tests, it can have negative ramifications to the vehicles interior harmony. When a textured part fails a scratch and mar susceptibility test, the original equipment manufacturer, or OEM, is open for potential consumer complaints and warranty issues. If a texture fails gloss level measurement testing, the parts can look cheap and 'plasticy'. The key for designers today is to choose textures that are both pleasing and robust.

In order for interior designers to choose grains that look and perform well, it is important to understand why textured parts fail functionality testing. To do this, research was performed to identify which texture characteristics cause a texture to fail or pass functionality testing. The research allows texture designers to develop textures that marry aesthetics with function.

The Root of the Problem

Research was performed to explore the specific characteristics which affect mar and gloss on textured, hard plastic, injection molded parts. The root of this research lies within finding the answer to four questions related to performance:

1. What, if any, are the characteristics of a texture which will lead to it failing a mar susceptibility test?
2. What, if any, are the characteristics of a texture which will lead to it failing a gloss test?
3. What, if any, are the characteristics of a texture which will lead to it passing a mar susceptibility test?
4. What, if any, are the characteristics of a texture which will lead to it passing a gloss test?

In order to thoroughly answer these four questions 19 different textures were analyzed. The textures come from the three main texture families: animals, stipples and geometrics. Fifty polypropylene plaques were molded from each texture with two different gloss treatments being utilized. The first gloss treatment was a low gloss treatment and the second gloss treatment was a medium gloss treatment. The purpose of the different gloss treatments was to evaluate the effect that a gloss shift has on the mar of a hard plastic part. The final result was a total of 100 molded plaques per texture or a total of 1,900 molded plaques.

Textured plaques were randomly selected for evaluation in three categories: 3-dimensional scan, Taber scratch and mar test and gloss level testing. For the 3-dimensional scan, one plaque was selected from each texture to be analyzed. The plaques which were analyzed with the 3-dimensional scanner were molded using only one of the gloss levels, for a total of 19 plaques. Five plaques of each texture, with each gloss treatment, were selected randomly to be analyzed for mar testing which resulted in a total of 190 plaques being analyzed for mar performance. One plaque from each texture, with each gloss treatment was used for both measured and perceived gloss level testing, for a total of 38 plaques. The measured gloss level test was performed using a Bryk gloss meter at the 60° angle setting. A total of 247, of the 1,900 molded plaques, were analyzed for this study.

Performance Evaluation

Scratch and mar are terms that are often used synonymously, yet they have very different meanings. Both scratch and mar are classified as damage to a part, however, it is the severity of the damage where the difference in definitions lies. A scratch is considered a deep low density damage in the material. The severity of the scratch is typically dependant on the ability of the viewer to perceive the damage. Each OEM has their own guidelines as to how materials are scratched as well as what constitutes an acceptable or unacceptable scratch.

Mar differs from scratching in that mar is considered superficial damage. Mar is associated with shallow surface scratches, which cause a gloss shift in the damaged area. As with scratch testing, each OEM has developed their own criterion for how a material is tested and what constitutes a successful mar test. Although marring does not typically cause significant physical damage to the part, it does relate to the overall perceived quality of the part. Many experts and consumers agree that marring is more important to

Continued Page 32

Technical Article - Texture Characteristics and Their Affect on Texture Performance

Continued from Page 31

avoid than scratching, because it is expected for a hard plastic part to scratch when excess force is applied. However, because mar can occur with little force being applied, the perception is that a part which mars readily is of low quality.

The other performance test for textured, molded parts is gloss evaluation. Gloss is an attribute of a surface which will cause it to have a shiny or matte appearance. A part will appear glossy by the amount of light which reflects off it. There are two types of gloss evaluations which are typically performed on automotive injection molded parts: measured and perceived.

Measured gloss is a quantifiable measurement using a 60° gloss meter. The gloss meter is a calibrated tool which directs a light source at a specific angle onto a test surface, while simultaneously reading the amount of light that is being reflected back (1). In the automotive industry the light source is generated under controlled conditions in a calibrated light booth. The standard lighting is D65 daylight lighting because it simulates idealized daylight (2). Since perceived measurements are subjective and can be influenced by many factors, a measured reading is most accurate (1). Perceived gloss evaluation, however, is the key measurement as it is what the consumer will view as the glossiness of the part.

There are numerous factors which can affect the glossiness of a textured plastic part. The main factors which will affect a part's gloss level are the molding parameters of the injection molding machine, the type of resin the part is molded in, the color of the part, the type of steel the mold is made from and the finish on the steel prior to molding parts (3). The two factors which affect the finish on the steel are the textured surface and the finish applied to the mold's surface by the texture company (3).

Relating Scratch/Mar and Gloss Evaluation to the Textured Part

The relationship between scratch and mar testing, gloss evaluation and the textured surface is critical to the overall harmony of an automotive interior. Textured plastic parts will enhance and compliment the overall appearance of an automotive interior when properly executed. When textures are visually appealing but fail to perform, however, they can detract from the interior's harmony. It is typically the OEM craftsmanship professional who is responsible for ensuring that the textured parts meet the original design intent while at the same time meeting the required gloss target and maintaining a minimal susceptibility for mar. If one of the performance facets fails, the harmony of the interior is compromised.

There are literally an unlimited amount of textures and texture styles available for the automotive designer to choose from. Textures which look and feel like sandpaper are called stipples. The depth of stipple textures ranges from .0005" to .005" deep. Technical textures are geometric in nature and usually have a linear orientation. The depth of technical textures ranges from .001" to .012". The most common automotive textures are called leather, or animal, textures. Leather textures resemble animal hides and range from .002" to .007" in depth. Typically, leather textures have a grain direction and distinguishing characteristics, similar to a piece of animal hide. In the past, leather textures were two dimensional in nature which did not resemble a real piece of leather, however, with current technology, texture companies are now producing textures for hard plastic parts which look and feel like real leather.

Each type of texture can be manipulated to produce a new texture with different characteristics. By changing the depth, size or spacing of the texture's characteristics, the designer can affect the texture's visual appearance exponentially. Any change to the texture's characteristics, however visually appealing it may be, can have an impact on the texture's overall performance.

Mar Testing and Evaluation

For this research study five plaques of each texture and gloss level were used in the evaluation of mar on the textured surface. While five plaques of each texture with each gloss level were selected for testing, only one of each category was used in the evaluation. Five plaques were chosen, however, to ensure that the mar testing was accurately performed. The Taber Scratch and Mar Testing unit was used to mar the plaques, which eliminated human error or subjectivity. The plaques were marred using weights of 5, 7, and 10 Newtons. The visual review was performed by evaluating the marring caused by the 10 Newton weight (Figure 1). After the plaques were marred they were visually evaluated and one plaque from each plate and gloss level was selected for further evaluation.

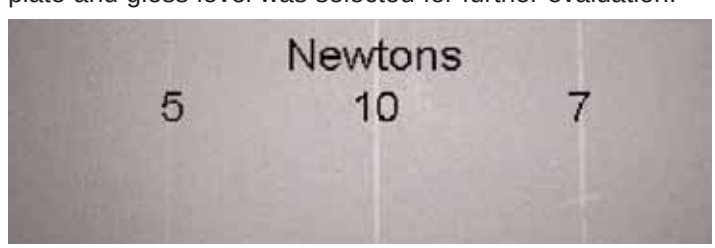

Figure 1: Example of marred surface

Gloss Evaluation

To evaluate the gloss of each texture one plaque from each texture, with both gloss levels, was randomly picked for gloss level evaluation. The first gloss evaluation that was performed utilized a Bryk 60° gloss meter. The gloss meter reads the amount of light being reflected from a surface at the specified angle of 60°. The other type of gloss evaluation is called perceived. Perceived gloss is

considered to be the most important gloss evaluation as it is how the consumer views the gloss level of the textured parts. All of the visual gloss evaluation was performed in a light booth under D65 lighting. The light booth is designed for optimum visual evaluation of interior automotive parts to the SAE J361 specification.

For the gloss study, the plaques were independently evaluated by qualified OEM personnel. The samples were placed in a light booth, under D65 lighting and, using the Bryk gloss meter, gloss readings were read off each of the different textures. A minimum of three readings were taken on each textured surface and the average was recorded.

Texture Characteristics

In order to understand the minute characteristics of each texture one sample of each texture was scanned using a 3-dimensional scanner. The scanner allows the user to break the texture down into individual characteristics. The texture characteristics which were deemed to be relevant to the textures functionality are the average depth of the texture, the average number of peaks per 10 linear millimeters (Pc), the shape of the peaks and the randomness of the peaks height and spacing.

Categorizing Texture Characteristics

The first category used to classify the textures is the average depth (Rz). The textures were categorized as shallow (<.002"), medium (>.002"-.0035") and deep (>.0035"). Peak-count (Pc) was evaluated using a 3-dimensional scanner. Three main Pc categories were observed: <20 Pc per 10 linear mm, 20-35 Pc per 10 linear mm and >35 Pc per 10 linear mm. The shape of the peaks were categorized as sharp or round. Finally, the textures were categorized by the randomness of the heights and spacing of the textures peaks using two categories: random and non-random. The shape of the texture's peaks were also evaluated visually using a 3-dimensional topographic profile image produced using a 3-dimensional scanner.

Data Summary

Data analysis shows definitively the textures that are prone to marring and the ones which were prone to being low or high in gloss. Stipple textures were the poorest performers for marring, however, they achieved the low gloss levels that many automotive designers desire. Animal textures varied as to their performance overall. They tended to perform well in mar testing, however, their gloss levels varied greatly. Geometric textures consistently performed well for marring, however, their gloss levels were higher on average than the other texture families.

Questions Relating to Marring

Upon analyzing the data, the textures character flaws relating to mar become evident. Analysis of the data shows that textures with high mar susceptibility typically have one or more of the following characteristics: high peak counts (>35 Pc per 10 mm, linear), even peak heights (non-random), sharp peaks and/or shallower depths (<.002"). There are a few reasons these textures tend to fail mar testing more readily than others.

When a textured part is marred the result is an area of damage which affects the part's gloss. Subsequently, this gloss shift changes the appearance of the part and the viewer's eye is drawn to the damaged area. Textures with high peak counts (Pc's) have more peaks in a given area than do textures with low Pc's. When textures with high Pc's are damaged, the result is that more surface area is affected which leads to more visible damage. A texture with sharp peaks shows mar more readily because the damage flattens the peak and, therefore, the damage is more pronounced. Finally, shallower textures do not hide mar as readily as deeper textures because damage affects not only the top most surface but also, depending on the amount of pressure being applied, the damage also gets down into the texture.

Therefore, when marring occurs the impact is greater on shallower textures because a larger surface area is being affected. If a texture is .002" deep and the marring is .001" deep, the result is that 50% of the surface depth in the marred area is damaged. Conversely, when a texture that is .004" deep is damaged by a .001" deep mar, the result is that only 25% of the surface depth is affected. Stipple textures are typically the textures which fall into this shallow category.

Analysis of the data shows that textures with low mar ratings typically have one or more of the following characteristics: round peaks, mid-range peak counts (20-35 Pc per 10 mm, linear), random peak heights and/or deeper depths (>.002"). There are a few reasons these textures tend to pass mar testing more readily than other textures.

As discussed earlier, mar occurs due to damage occurring on a part which causes light to reflect more in the damaged area. Mar appears as a change in the glossiness in the area affected and not as physical damage. When a texture has a low Pc, there are less characters being damaged and therefore the mar is less evident. Textures with round peaks are also less affected by mar because marring tends to round the peaks in the area affected. If the peaks are already rounded the result is little, if any, visible damage. Finally, the deeper the grain is the, less overall surface area is being affected by marring.

Questions Relating to Gloss

The second set of research questions deal with gloss level performance. Analysis of the data reveals that textures with high perceived gloss levels typically have one or more of the following characteristics: round peaks, low peak counts (20

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Pc per 10 mm, linear), deeper depths (>.002") and or non-random peak variations. There are a few reasons these textures tend to high gloss levels.

The first reason these textures have high gloss levels is due to their low Pc. Gloss is a measure of how much light is being reflected off a surface. Textures that have high Pc's have more part surface and therefore trap more light, thus limiting the amount of light being reflected. Textures with low Pc's naturally reflect more light then they trap. Textures with round, non-random peaks also tend to fail gloss level testing. Round peaks have a wider surface area which reflects more light than a peak that is sharp. Peaks that are non-random tend to have characters which fall on the same plane. Textures that have both round and non-random peaks create a situation where not only does the light reflect due to the surface area of the peak, but it actually reflects more light due to all of the characters of the texture falling on the same plane. This round, non-random peak condition occurs primarily in geometric textures.

The final question for this research study relates to textures that have low gloss levels. Analysis of the data reveals that textures with low perceived gloss levels typically have one or more of the following characteristics: sharp peaks, random peak heights, high peak-counts (>35 Pc per 10 mm, linear) with shallower depths (<.002") or mid-level peak-counts (20-35 Pc per 10 linear mm) with deep depths (>.0035"). There are a few reasons these textures tend to have low gloss levels.

First, textures with random peak heights reflect light at different levels and angles. This leads to more light being trapped in the textures surface, or being scattered at different angles which results in a lower gloss reading. Textures with sharp peak characteristics have less surface area in which light can be reflected. This combination of random peak heights and sharp characters is the optimum condition for achieving loss gloss textures.

Finally, textures with mid-level Pc's, 20-35 Pc per 10 linear mm, have less surface area in which to trap light than textures with high Pc's, >35 Pc per 10 linear mm. In order for these mid-level Pc textures to have lower gloss levels their depths must be deep enough to trap more light. These deeper depths also add more surface area which aids in trapping light on the parts surface.

Recommendations

According to the data collected, in order for a texture to pass both mar and gloss testing it must incorporate certain unique texture characteristics. First, the ideal texture will have to have random peaks. Random peaks will allow the texture to reflect light at different angles, resulting in lower gloss levels. Random peaks will also result in less marring on the parts surface due to less surface area being affected. Another characteristic of an ideal texture is a mid-level Pc. Textures with low Pc's are less susceptible to marring but reflect more light. Textures with high Pc's are lower in gloss, however, they are highly susceptible to marring. It is for these reasons that the mid-level Pc is recommended.

The ideal texture should have a depth in the mid to deep range. Shallow textures, perform poorly for gloss and are highly susceptible to marring. Textures are less susceptible to marring at deeper depths as the damage will affect less surface area than shallower textures. This increased surface area results in a texture low in gloss with good mar resistance. Finally, the ideal texture should have rounded peaks. Round peaks allow the texture to resist marring and, when coupled with the other ideal characteristics, they can still achieve low gloss levels.

Conclusion

Since textures are usually picked for their aesthetic qualities designers should choose textures based on analysis to identify the characteristics of that texture and show how the texture is likely to perform in its environment. This does not mean that because a texture looks nice but has character flaws it should not be used in a vehicle. It simply means that the texture may need to have some slight modifications done to it in order for it to perform well within its environment.

If a designer or engineer is adamant about using a texture with character flaws, they should be made aware of the potential consequences for using that texture. Textures with performance flaws should be used in areas of the vehicle that are in low impact areas or as accent pieces. Doing this will reduce the likelihood that the part will get marred and minimize its visibility in the vehicle.

The data gathered in this study should not be considered as absolute. There are many other variables that must be evaluated when considering a textures mar resistance and perceived gloss appearance, such as the parts material and color. If a texture's characteristics are considered early on in its development it will have a much greater chance of success.

As in any project, up front planning gives us the best opportunity for a successful outcome. This is especially true for automotive interiors. While the mold texturing concept has been around for more than a 100 years, it has only been within the last 7 that designers have started to use it as a tool for interior harmony. More and more we are seeing the trend go from boring 2-D textures to beautiful 3-D textures which have the look and feel of real leather. By using this research, and a little imagination, today's designers have the ability to create some extraordinary interiors that are beautiful, functional and on budget.

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