

Automotive Plastics News

Today, Tomorrow - Together

October 2005 Volume 35, Issue 1



35th Anniversary Innovation Awards Gala

"License To Thrill"

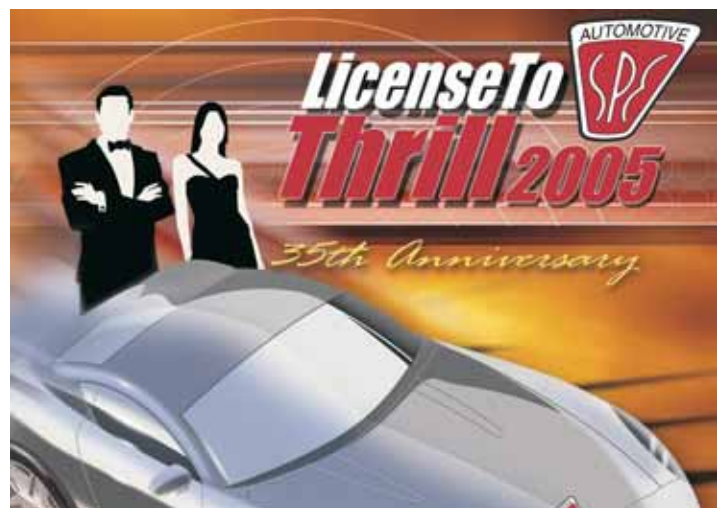
Suzanne Cole, Awards Chairman

In today's frantic auto industry, pressure is on the entire supply chain to innovate faster, design faster, launch faster and produce thrilling vehicles that are fun to drive, look great, have impeccable quality at an appealing price, all in a race to sell more vehicles worldwide. Performance, customization and personalization are emerging as key trends within the automotive industry in the race to win more customers and market share worldwide with vehicle that THRILL. Our theme for the 2005 Innovation Awards Gala is "License to Thrill".

The automotive industry is on the brink of a revolution, and the plastics industry is poised to play a major role. In North America and globally, new technology and partnerships are enabling improvements in safety, breakthroughs in fuel delivery, structural support and comfort as well as savings in energy efficiency.

Helping drive this revolution is the innovative use of plastics and plastic composites. The automotive plastics industry is beginning to accelerate the development of innovative break-through products that deliver superior value to customers and help the automotive industry set new standards in design, safety and environmental performance.

In this our 35th Anniversary year we have received a record number of nominations. We have been overwhelmed with several cutting edge innovations, which break new ground for the plastics industry. Some of the trends that have emerged from our nominations and subsequent judging include larger plastic parts, more sophisticated design and processes, and breakthrough applications in under the hood and chassis components never seen before in the auto industry.



Vehicles and Parts On Display

In concert with the nominated parts, which are guaranteed to thrill, the "License to Thrill" gala will feature the latest vehicle introductions from Toyota, DaimlerChrysler, Aston Martin, GM, Porsche and others including the Dodge Charger Targa SEMA vehicle, Aston Martin DB-9, the newly introduced Pontiac Solstice, Dodge Powerwagon, Corvette C-6, performance and customized vehicles displaying the latest technologies and plastic materials that could vie as the next James Bond 007 vehicle.

Bond Attire Requested!

Keeping in step with the evening's theme we urge you to wear your best "Bond" attire! Photographers will be roving the cocktail reception, taking pictures of our guests in their best attire. We may even have an opportunity for you to have your photo taken in a Bond vehicle.

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Treasurer's Report

Brian Grosser

Total cash for the SPE Automotive Division stands currently at \$120,264.00. This is fictitiously high as we have not yet paid out all of the expenses for the 2005 Composites Conference and we are already receiving sponsorship funds for this year's Awards Night.

The Composites conference was a huge success both technically and financially. We had more sponsors and more paid registrations than last year. I will report final numbers in the next newsletter.

The 2005 Golf Outing made \$705 this year. We had a low turnout but still made a positive contribution to our cash flow.

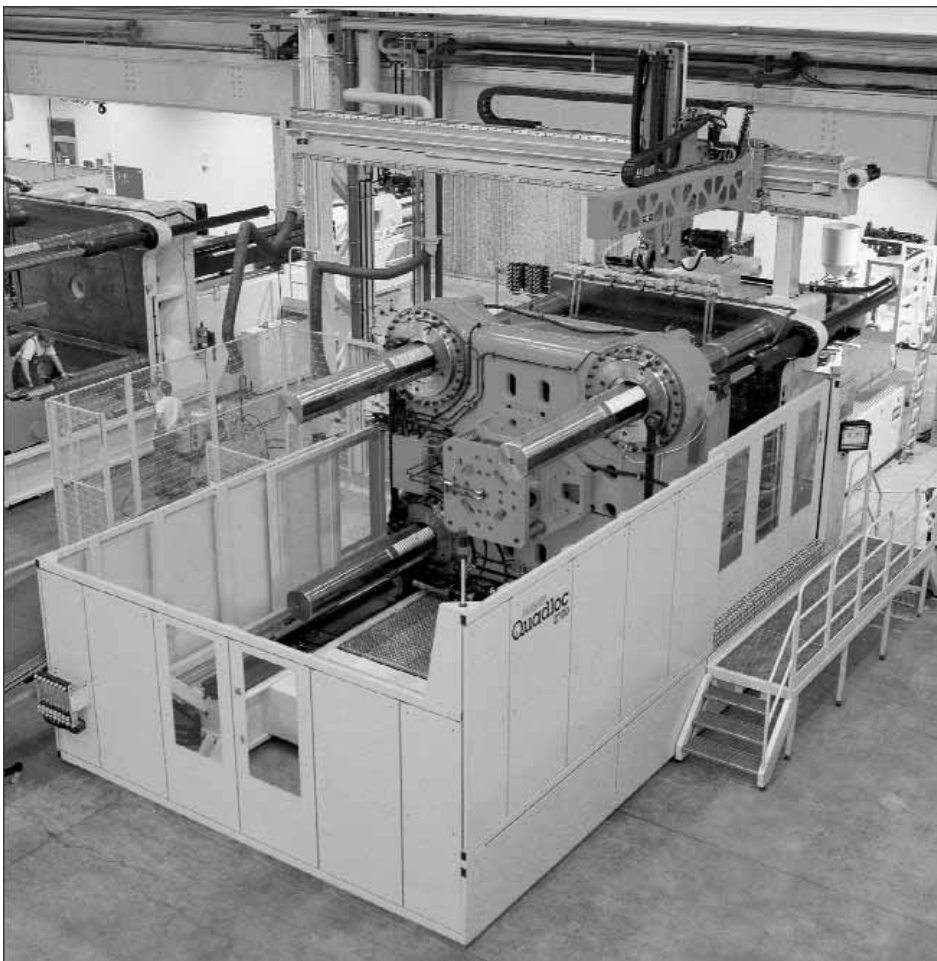
I am currently running a long term financial analysis to check the financial health of our society and will report back the results in future newsletters.

Automotive Division Meeting Schedule and Special Events Calendar

Innovation Awards Program Burton Manor, Livonia, MI	November 16, 2005
Division BOD Meeting APC, Troy, MI	December 5, 2005
Division BOD Meeting APC, Troy, MI	February 6, 2006
Division BOD Meeting APC, Troy, MI	April 3, 2006
ANTEC 2006 Charlotte Convention Center Charlotte, NC	May 7-11, 2006
Division BOD Planning Meeting APC, Troy, MI	June 2006 (exact date TBD)

Automotive Division Board of Directors meetings are open to all SPE members.
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Chairman's Message

Norm Kakarala

One of my privileges is to observe the strength and robustness we have in the committee system we follow in the Automotive Division to execute our programs. The Automotive Division Board empowers the committee Chairs to formulate the plans for more efficient and effective way to organize and run the events. The committee chairs recruit members of the committee and have enormous responsibility to plan and execute activities of the committee. More often the committees need to raise funds through sponsorship from the automotive related companies to cover the cost of the programs and other educational activities. In large measure, the extent of success of our programs hinges on the effectiveness of different committees. I thank the committee chairs and the committee volunteers for carrying the mantle in growing the division activities.

The first major event this year is the Fifth SPE Automotive Composites Conference and Exposition (ACCE) jointly sponsored by the Automotive Division and the Composites Division. Brian Grosser and Peggy Malnati with support from many Automotive Division Board Members did a superb job of organizing this event. They exceeded in all the metrics (details covered in the adjoining article) and set new records for papers, exhibits, attendees and others. Thanks to Fred Deans and the past chairs for blazing the trail on this conference; the event ran like it was on autopilot.

The SPE Detroit Section covered the topic of innovation in their September meeting featuring Jay Baker of BASF and Dr. Jeffrey Helms of Ford. Both speakers emphasized differences between invention (rooted in discovery) and innovation (first implementation of new idea) and how their companies nurture and promote the innovation process. They applauded the SPE Automotive Division for recognizing teams with awards each year for innovations in different categories of automotive plastics applications.

Suzanne Cole, Chair of the 2005 SPE Innovation Awards Program initiated a new concept this year to assign major responsibilities to Category Captains to scout, recruit, sort, work with the Bird-Dog committee of Board members and industry veterans in selecting finalists and finally assist the Blue Ribbon Committee consisting of academics, retired industry executives, editors, and consultants for selection of winner in that category. October is a busy month in

reviewing all the nominations and completing the selection process.

The Innovations Awards program will be on Wednesday November 16th at Burton Manor in Livonia, MI. Please join us for the gala event and we need your help in promoting the event with your contacts and recruiting sponsorship from your company and companies you work with. Hope we can count on your help to extend the success of this renowned program.

Both the Detroit Section Board and the Automotive Division Board have approved to launch a joint meeting in April 2006 on Automotive Materials. Tom Pickett of GM and Nippani Rao of DaimlerChrysler are co-chairing and working with a committee of volunteers from both the Boards to design the program and recruit sponsors for the meeting.

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35th Anniversary Innovation Awards Gala

continued from page 1

Raffle for the Automotive Division Scholarship Fund

On display during the evening will be movie posters and photos from several of the more popular James Bond movies. You can purchase a raffle ticket for \$10 at the registration desk (in the foyer of Burton Manor) for a chance to win one of several Bond posters or a framed picture of a "Bond girl".

VIP Cocktail Reception

Our VIP cocktail reception, sponsored by Ticona will be a spectacular event! Please remember that this event is restricted to Sponsors and VIPs only. (Please make sure you have the proper credentials, as access will be denied to those who do not). Not only will we honor our Lifetime and Executive Leadership Award recipients we will have a special guest who will attend. Back by popular demand is The Flint Symphony string quartet, which will entertain our VIP guests during the VIP cocktail reception and dinner.

A formal reception line will take place from 5:30 - 6:15 to ensure all VIPs and sponsors an opportunity to meet and talk with our Executive Award Recipients. In addition to our executive award recipients, in attendance will be many top-level executives from Toyota, DaimlerChrysler, General Motors, Ford, and several tier one suppliers.

New Afterglow Announced

If you would like to continue networking after the event plan on attending the Afterglow! New this year, the Afterglow will be held in the VIP Cocktail Reception room from 9:00 PM to 11:00 PM. Coffee, aperitifs and select deserts will be served. All are invited to attend!

One of the compelling reasons for our near sold out status is the outstanding caliber of our Executive Award Recipients. Our Executive Leadership and Lifetime Achievement Award Recipients are industry "All Stars". The two executives are extremely deserving, hard hitting leaders who stand out within the global automotive industry, their achievements are unparalleled and both have demonstrated their support of plastics in vehicle applications worldwide.

The 2005 Innovation Awards Black Tie Gala on Wednesday November 16 at Burton Manor in Livonia, Michigan is quickly approaching! See page 7 of this newsletter for more information and the ticket reservation form.

A sold out crowd is expected again this year.

Lifetime Leadership Award Recipient

Mr. Shigeki Suzuki, general manager of the Materials Engineering Division of Toyota Motor Corporation in Japan, is this year's Lifetime Achievement Award winner for the organization's 35th-annual Innovation Awards Gala. Mr. Suzuki has developed and/or managed development of new polymeric materials for automotive applications throughout his career and will receive his award for November 16th at Burton Manor in Livonia, Mich. The Lifetime Achievement Award recognizes automotive industry executives who have made a lasting contribution to advancing plastics usage in passenger vehicles.

Mr. Suzuki was selected as this year's Lifetime Achievement Award because of his extensive involvement in developing or managing development of a wide variety of polymeric materials for passenger vehicles at Toyota. Prior to his current assignment as manager of the Materials Engineering Division, he has held general manager positions in the company's Paint & Finishing Design Department, Organic Materials Department, and Production Engineering Department for the Tahara Manufacturing Plant, which produces plastic components for the Lexus® vehicle line. He has a strong background in the design, development, and evaluation of rubber, plastic, and paint materials.



Shigeki Suzuki
Toyota Motor Corporation

Graduating with a bachelor of engineering degree from the Department of Engineering, Chemistry Synthesis Section, at Nagoya University, Mr. Suzuki joined Toyota, where he has worked for over 25 years. He holds numerous patents and has been a long-time contributing author in technical journals and at industry conferences. He is a member of The Society of Polymer Science - Japan, The Catalysis Society of Japan, the Japan Society of Colored Materials, the Japanese Society of Tribology, and the Japan Petroleum Institute.

The Lifetime Achievement Award that Mr. Suzuki will receive was started 4 years ago. It is considered to be the more technical of the two awards and is given to a business executive who has been a leader in plastics research, engineering, or other work that led to integration of polymeric materials in global vehicle launches. The first winner of this award was J.T. Battenberg III, chairman and CEO of Delphi. Bernard Robertson, executive vice-

president of DaimlerChrysler was the second to receive the award, followed by Robert Schaad, chairman of Husky in its third year. Last year, Tom Moore, retired vice-president, Liberty and Technical Affairs at DaimlerChrysler was the award's recipient.

A second tribute started last year is the Executive Leadership Award, which is given to a senior-level executive who is considered to be an automotive industry "All-Star." This award's recipient may not have been involved directly in the technical advances of polymeric materials in vehicles, but will have led his/her company to profitability, increased market share, and in new vehicle launches that have been a great success. The award's first recipient was Jim Padilla, now president of Ford Motor Company.

Executive Leadership Award Recipient

The SPE Automotive Division Executive Leadership Award for 2005 is **Tom Edson**, Director of Applied Material and Manufacturing Technology, Advanced Vehicle Engineering at DaimlerChrysler. Mr. Edson has 33 years of experience with DaimlerChrysler, including assignments in Program Management, Vehicle Development, Body Engineering, Chassis Engineering, Proving Grounds, and Vehicle Dynamics.



Tom Edson
DaimlerChrysler Corporation

Mr. Edson received a BS in Engineering Mechanics and an MS in Mechanical Engineering from the University of Michigan, a MS in Engineering Management from the University of Detroit Mercy, and an MBA from Michigan State University. He is active in the Materials Technical Leadership Council - USCAR, and has been a long time supporter of the Society of Plastics Engineers.

Prior to the start of the Innovation Awards Gala, both Mr. Suzuki and Mr. Edson will also be honored at the VIP cocktail reception reserved for program sponsors and senior-level automotive executives. This event was called "One of the absolute best networking opportunities in town," by several supplier executives at last year's event.

Break Through Plastic Innovations Are the Core of This Years Category Finalists

At the heart of this year's event are the innovative component finalists within our 10 judging categories, which have been chosen by our Board of Directors.

An elite group of Blue Ribbon judges comprised of automotive and plastics journal editors and auto industry experts will unite to select the category winners on October

26 for announcement on the evening of November 16. Hence a lot of excitement and anticipation will be in the air for this extraordinary event.

Winners will be selected from ten categories, which include Body Interior, Body Exterior, Chassis/Hardware, Process/Assembly/Enabling Technologies, Powertrain, Materials, Environmental, Performance/Customization and new this year Automotive Safety. In addition the Hall of Fame and Grand Award (which is selected from the 9 category winners) recipients will be announced at the event.

We have an outstanding program in store for you this year. So accept our invitation to join us for this very special 35th Anniversary year. The **"License To Thrill"** Innovation Awards Gala is an event you will want to invite your company executives and clients to attend. Our executive award recipients are outstanding decision makers in the global automotive industry and our finalists are truly exceptional! We fully anticipate a sold-out event so confirm your tables and tickets today to avoid last minute disappointment. Don't hesitate contact Pat Levine today at (248) 244-8993.

You are invited to join us for a very spectacular 35th Anniversary Celebration! We thank you in advance for your participation and look forward to seeing you on Wednesday, November 16 at Burton Manor in Livonia, Michigan.



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Meeting Minutes - Automotive Division Board Planning Meeting

June 6, 2005

by Tom Pickett, Division Secretary

Attendance:

Norm Kakarala, Tom Pickett, Nippani Rao, Bonnie Bennyhoff, Kevin Pageau, Suresh Shah, UV Umamaheswaran, Mark Lapain, Fred Deans, Josh Madden, Jay Rasoni, Peggy Malnati, Terrence Cressey, Al Murray, Ed Garnham, Monica Prokopyshen, Rahul Mukherjee

1. Meeting Called to Order. Chairman Norm Kakarala called meeting to order at 5:20 PM. Meeting minutes recorded by Secretary Tom Pickett.

2. Chairman Message. Norm Kakarala expressed his gratitude being elected chair and looks forward to having a great and eventful year. He plans to introduce a new materials conference.

3. SPE Automotive Division Officers Updated. Mark Lapain - Chairman-Elect, Brian Grosser -Vice-Chair, Nippani Rao - Division Councilor, Monica Prokopyshen - past Chairman. Director Emeritus are: Fred Schwab, Josh Madden, Al Murray, and Gordon Miesel. Tom Pickett from GM was nominated as Secretary.

4. SPE Automotive Division Committee Chairpersons Updated. Jay Rasoni - Technical Programs, Monica Prokopyshen - Education, Bonny Bennyhoff Membership, Suzanne Cole - Awards, Jim Staargaard - Golf Outing, Fred Deans - Composites Conference, Tom Pickett - ANTEC, Mark Lapain - Inter-Society, Peggy Malnati - Publicity, Kevin Pageau - Newsletter Editor, Teri Chouinard - Newsletter Sponsorship.

5. SPE Automotive Division Board of Directors. Kevin Pageau will update the list of Board of Directors in the newsletter directory. Rahul Murkerjee indicated that there are a few people from Visteon who are interested in joining the Board of Directors.

6. Contact Sheet Updated. Nippani requested Officers and Board Members to include SPE membership number and when membership dues paid through on the contact sheet that was circulated.

7. 2005-2006 Schedule of Events. Golf Outing on July 25, 2005; 5th Annual SPE Automotive Composites Conference September 12 -14th 2005 at MSU Management Education Center in Troy, MI; SPE Automotive TPO Global Conference October 10-12th 2005 at Best Western Sterling Inn, Sterling Heights, MI; The 35th SPE Automotive Innovations Awards Gala November 16th 2005 at Burton Manor in Livonia, MI; Automotive Materials Technical meeting & Exhibit planned for March or April. Tom Pickett and Nippani Rao will co-chair this technical meeting on materials. Looking at making it a joint meeting with SPE Detroit Section. Volunteers are welcome to help Tom and Nippani. The goal is to fill the niche between structural composites and TPO's and educate our members and promote the use of plastics. Seek Industry sponsorship. A follow up meeting will be planned with the Detroit Section.

8. Budget Reviewed. Budget similar to previous years. Did we want to start an education fund? Board will consider.

9. Treasurer Report. No update.

10. Automotive Awards. Suzanne could not be present but sent report. Wednesday, November 16th has been finalized for the Awards Gala at Burton Manor. Friday, September 16th is the nomination deadline. BOD and Blue Ribbon judging will take place at GE's new facility. The theme is "License to Thrill". Seeking sponsorship. Concept Communications will do the visual. Posters of the 2004 Innovation Award winning team are available for sale by contacting Pat Levine. Roy Palasek and Ed Garnham will coordinate placement of vehicles and parts.

11. Councilor Report. Nippani Rao presented his report of the April 30th and May 1, 2005 councilor meeting at ANTEC Boston. AIM Program is successful in recruiting new SPE members. Membership is over 20,000 and exceeded the goal. SPE National formed a Technical Advisory Board

to keep track of upcoming new technologies. Preliminary results of ANTEC show possible \$20,000 profit. Council agreed to budget rebates. Rebates will be paid quarterly in the same year they are budgeted. The HSM committee will review the HSM requirements and report at next council meeting. The council approved new division of Flexible Packaging. Next meeting September 24th 2005 in Milwaukee.

12. Communications. Peggy Malnati gave an update on the publicity of the SPE Automotive Composite Conference & Exposition. There are 7 keynote speakers, 45 abstracts received to date, 2 panel discussions planned. There are 10 paying sponsors / exhibitors to date. Teri Chouinard has been retained to help in sponsorship. Open discussion on giving a 25% discount off the lesser value sponsorship if a company sponsors more than one SPE Automotive events. It was tabled. 3 media sponsors have committed to the conference. Multipurpose conference flyer and eforms of conference details are made. Peggy also provided an update on the publicity of the SPE Automotive Innovations Awards Gala. Shigeki Suzuki, Toyota Executive, to be recipient of Lifetime Achievement Award. Poster of last year's category winners will be used as a promotional & sales tool. Program guide cover produced. First press release distributed.

13. Membership. Bonnie Bennyhoff challenges each board member to bring 3 new members. Membership up 8%. Objections to additional charge automatically added on when sign up to renew membership.

14. Awards. - Honored Service member. Nominations requested.

15. ANTEC. Norm Kakarala chaired the 2005 ANTEC Automotive Division Session. The session was well received with large attendance. Jay Rasoni, Suresh Shah, Michael Shoemaker and Tom Pickett were on the ANTEC Committee that helped Norm organize an outstanding session of technical papers. Tom Pickett will chair the 2006 ANTEC Automotive Division Session.

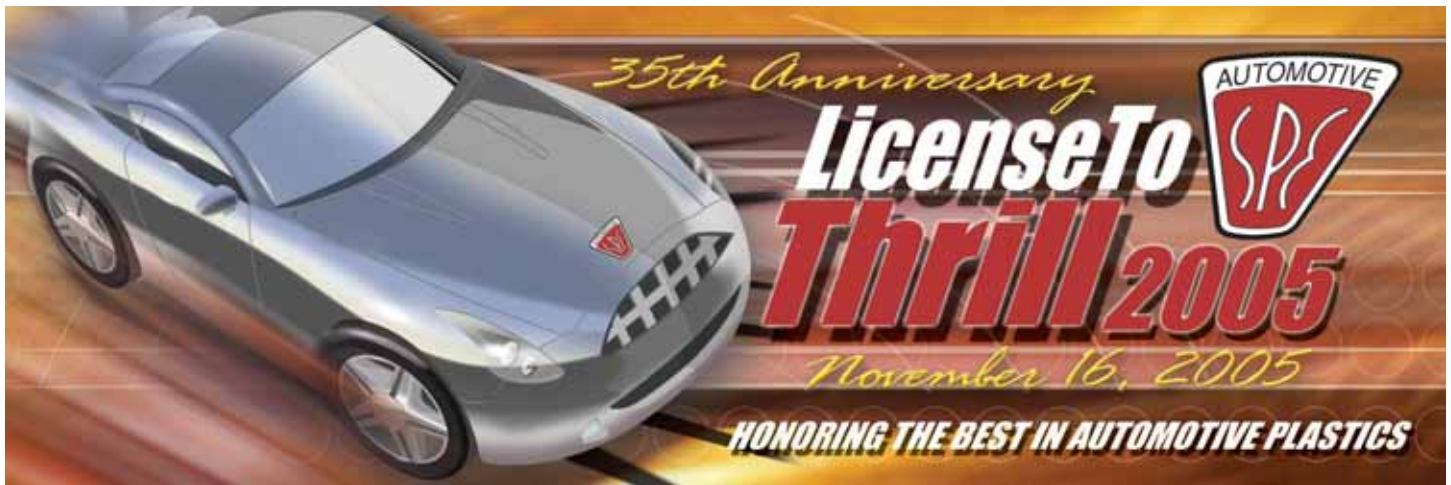
16. Intersociety. Mark Lapain talked about working together with the SPE Detroit Section. There was some discussion of changing it from Inter-Society to Intra Division.

17. Education. Plastivan, expanding services. Kevin Pageau request more schools added for Plastivan. Total of 15 visits. The Automotive Division contributed \$3,000 to Eastern Michigan Teacher Training. The Detroit Section did also. Kevin Pageau and Fred Deans requested that Plastivan go to Michigan Teacher Training Program to make teachers aware. UV will explore Elephant Auction. Sponsor College for Creative Study. Monica motioned that Automotive Division request the Detroit Section to be a cosponsor of College of Creative Study. Proposed \$3000 sponsorship. Education chair will coordinate with Greg Borchich, Detroit Section Education Chair.

18. Future SPE Automotive Board Meetings. Monday August 29th Luncheon Past Chair meeting, October 3th, December 5th, February 6th, April 3rd, and June 2006 Planning Meeting. Business meeting after ANTEC Automotive Division Session.

19. New Business. There was some discussion on the technical meeting and expo. Various ideas on the title, date, and subject was discussed. The committee will plan a follow up meeting to discuss.

20. Meeting Adjourned.



Attend the 35th Anniversary Innovation Awards Program

Don't miss this fantastic evening. See first hand the latest innovations in the award categories of Body Interior, Body Exterior, Materials, Environmental, Performance and Customization, Chassis/Hardware, and Process/Assembly/Enabling Technologies, and the all new Safety category.

All nominated applications will be on display for you to review in detail. The Automotive Division Innovation Awards Gala is an evening you do not want to miss!

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Composites in the Trucking Industry

Edward Zenk

International Truck and Engine Corp.

Over the years, the transportation industry has incorporated more and more composite materials into its vehicles. The automotive industry has used composites for exterior body panels, e.g. hoods, fascias, hatches and doors, as well as under the hood and structural reinforcements. The truck industry followed by introducing composites for hoods, doors, roofs, bumpers and fairings. This paper will focus on the advancements made in composite materials, from hand-spray up open molded parts to the various improvements in sheet molding compounds to liquid molded resin materials. It will concentrate on parts used in the trucking industry and how quality, especially in cosmetic and surface properties, has improved over the years.

Background

Since the late 1950s and early 1960s, composites have played an important role in their incorporation into body panels for the transportation industry. Beginning with hand lay-up parts for the automotive industry, composite usage has expanded into the truck and industrial equipment segments and become a staple design medium for original equipment manufacturers (OEMs). This paper will look at the development, expansion and future opportunities of composites within the transportation market, specifically the truck industry.

Composites are defined as materials that are made up of two or more different types of materials that combine to form a singular substrate. Most composites are polymeric in nature, with glass, carbon, or other fibers used as reinforcing materials, commonly called fiber reinforced plastics (FRP). These are broken into thermosetting materials and thermoplastic materials, about which more will be stated later. There are also metal-matrix composites, whereby a metallic matrix, such as aluminum or titanium, can be reinforced with small metallic fibers or powder-like metallic fillers. Ceramic materials can also be reinforced as a composite. This paper will focus on FRP materials, which are the most commonly used in transportation applications.

Traditional Polymer Materials

As previously mentioned, FRP materials can come as thermosets or thermoplastics. Examples of thermosets are polyester-based resins that contain glass fibers for strength and may or may not contain fillers. Some processes that are common to this kind of composite are hand-spray-up (HSU), sheet molding compounds (SMC) and resin transfer molding (RTM). In thermoplastic composites, a polymer matrix with fibers, usually glass, is incorporated to add strength. An example here is glass mat thermoplastic (GMT), which is a glass-reinforced thermoplastic. Many other examples of this could be given, as many thermoplastic resins can be reinforced with one kind of fiber or another.

Most of the composite usage in the transportation industry is in the thermoset area and has evolved over the course of forty years. Composites began as smaller automotive body panels (e.g. fascias, quarter panels et al) and expanded to hoods, roofs, decks and doors. As composite usage grew, the size and application of this material did also. Smaller automotive panels became large truck and industrial equipment pieces. This was a slow transition but one that was very important to the composite industry insofar

as becoming a viable material choice across many different applications and customers. Large hoods, roofs, extenders, and deflectors are some of the parts now used in truck and industrial applications.

Advantages of Composites

Composite usage is advantageous in several areas, which can explain its growth over the years. One big advantage, especially attractive to the truck industry, is its lower weight when compared to steel or aluminum. The density of FRP materials can be anywhere from 30% to 70% of commonly used metallic materials. Another big advantage is its inherent corrosion resistance. Plastic materials do not rust the way most metallic materials do and when exposed to the fluctuating conditions of the environment, as most trucks are, this can improve operation efficiency. Dent resistance is another advantage, also attractive to truck. Perhaps the biggest overall reason for choosing composites is the reduction in tool costs. Composite tooling may cost as little as 30% of steel equivalent and provides increased design flexibility. For truck body parts, that is quite important, as most pieces have extensive geometry and stiffness built into them. All this can explain the expanded use of composite materials in the truck industry.

Evolution of FRP Composites

The evolution of composite usage was a slow and tedious process that evolved over time. Open molded composites were generally the first materials to achieve widespread usage in transportation applications. Hand spray-up (HSU) is the most common and is still used today. It incorporates spraying chopped roving into a single side, soft-shelled tool, generally epoxy or polyester in nature, using a polyester gelcoat to improve surface and minimize porosity. The roving has been run through a resin, generally unsaturated polyester and the fibers chopped to a length of one inch. There is no press required as the part cures in the tool, with or without baking or other means of heating. It is a very laborious process, as the spray-up material in the mold must be rolled out for shaping and thickness control and there is significant trimming that must be done post cure. Cure times vary with catalyst system chosen but are generally between 30 and 60 minutes. Since there is no pressure involved and a lot of manual labor, surface quality is somewhat lacking. Waviness is often seen on flatter surfaces due to the lack of pressure and the rolling out of the material. Shrinkage of both the tool and the substrate contributes to the lesser surface quality seen in HSU parts. Tool quality can also affect the surface quality and over time, the tool itself can become porous. Replacing tools generally must be done as the wear will impact part quality to the point of rejection to most OEM standards. Tool life varies but 1000 parts is a common figure used to estimate lifetime tool costs. Tool cost is relatively inexpensive, since it is soft tooling. However, multiple tools are generally needed to meet OEM demands. As an example, a truck hood that is from the HSU process may need 6-10 molds to meet a demand of 10,000 units per year. All this can make for an overall expensive program. Figure 1 provides a cost comparison.

Introduction of presses to aid in part formation and surface quality were then incorporated. Cold molding and resin transfer molding (RTM) are processes whereby a press is used to help mechanically shape parts and thereby remove some of the labor

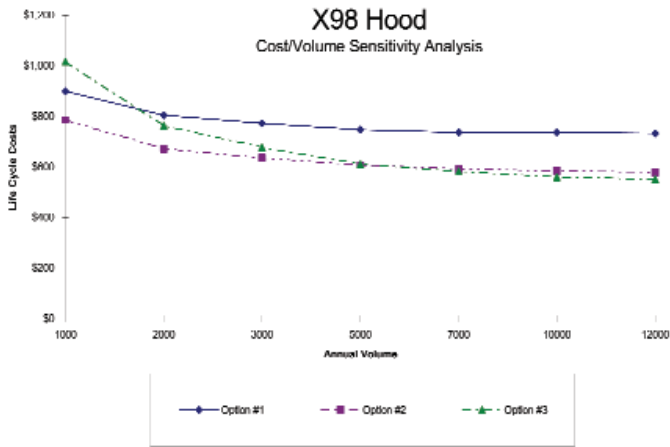


Figure 1: Lifecycle cost analysis

involved in part formation. Soft tools are still used to keep tooling costs down. Cold molding involves mixing resin, filler and catalyst and pouring into the mold. Filler addition makes this material lower in cost. RTM involves laying glass into the cavity of the mold, closing and injecting resin into the tool and impregnating the glass mat. It is referred to as "cold molding" because the molds are heated but to temperatures that are around 200°F, below that of other closed molding operations. Both processes are an improvement over open molding for surface and part quality. Tool life is generally expanded to approximately 10,000 parts but still can be porous. It is still a laborious process due to the glass trimming needed, especially in cold molding. Lower volume, non-show surface parts still employ these processes today.

The most employed composite process for large body panels is SMC. This is a process where resin, filler and glass are compounded (with other additives) and made into a thin sheet that is maturated and molded in a heated, matched metal molds (usually steel) under pressure, around 1000 psi at approximately 300°F. Qualitatively, this is the best process among those referenced because of the nature of the tooling and pressures used to form the part. The graph below shows a comparison of orange peel for SMC (9200 and 9400 hoods) and HSU (9900 hoods) at an OEM paint facility.

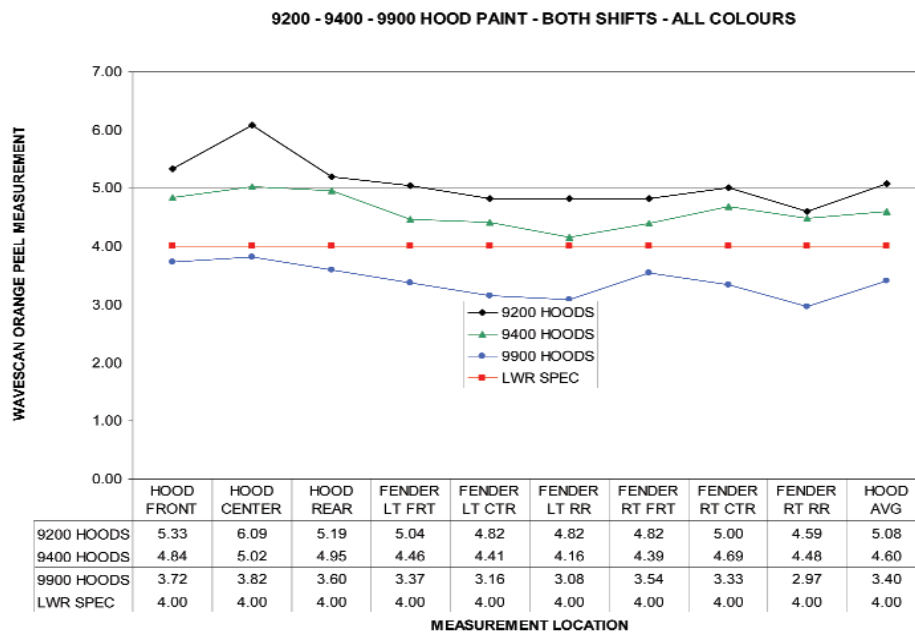


Figure 2: SMC vs. HSU orange peel comparison

It is also the least laborious although deflashing and finessing are certainly a part of part preparation. In-mold coating (IMC) can be used to seal porosity and provide conductivity for electrostatic paint application. SMCs come in many formulations, depending on the application desired. There are structural grades that are usually a vinyl ester resin containing glass up to 50% by weight. Pigmentable formulations, general purpose, Class A and other formulations are available.

Quality Issues with FRPs

The main qualitative issue with FRPs is porosity that forms on the surface and usually impacts the paint performance on body panels. This stems from the fact that there are two or more ingredients that do not want to blend together and when forced into a single material, trap air within the composite and is released in the molding process. Much work has been done over the years within the FRP processes to address this issue. This includes the FRP substrates themselves (some of which will be detailed later), coatings (such as IMC and primers), tool design and paint process to alleviate the surface and edge porosity that is common to these materials. Closed molding, particularly in SMC has shown the most favorable results. Incorporation of vacuum molding, improvements in tool design, such as flanges on edges to force any edge effects to a non-show surface, and press leveling and speed control (for closing and opening) have improved part quality over the years, but chronic porosity is still an ongoing battle for the industry as the basic premise of air incorporation into the raw material is still a basic fact of life.

There have been some improvements made in the area of soft shell tooling and RTM. Vacuum assisted molding, known as VARTM or VRIM, have incorporated the use of vacuum to help eliminate trapped air within the substrate and provide the pressure to form the part. This eliminated the need for large presses and reduces the wear on the tools. Resin is infused behind the vacuum as opposed to being introduced prior to a vacuum being pulled, as in RTM. As most of the truck industry has moved away from open molding and soft shell tooling, the discussion of improvements in FRP will be centered on SMC and newer materials.

New FRP Material Developments

SMC development seemed to stagnate in the 1980s and early 1990s. One development that occurred in the mid-90s was low pressure SMC (LPMC). This improvement assisted with the molding of larger truck parts that often were too large to accommodate the presses and yield the 1000 psi molding pressure needed. These formulations allowed one to reduce typical molding pressures to the range of 100-300 psi, thus enabling these large parts to run at 4000 tons and achieve optimum pressure on the part. The drawback to this system was that it was more expensive, in that a slightly more expensive resin was used and some filler, the least costly ingredient, was removed. Also, if IMC were used, pressures would most likely need to be raised to at least 500 psi to coat the part.

Composites in the Trucking Industry

Continued from page 9

Another formulation that the truck industry has taken notice of is low density SMC. For large over the road haulers, weight reduction is a much sought after trait that can help with fuel economy or increase the load carried by the hauler. Typical SMC filler, calcium carbonate, contributes heavily to the specific gravity of SMC, typically 1.90 g/cc. Incorporation of clay fillers can reduce the gravity to 1.60-1.65 and glass beads can bring it down to 1.30-1.40. Again, cost increases due to replacing the lowest priced ingredient. With the glass beads, surface quality is sacrificed, as well as some physical properties (5-10% reduction over standard). The challenge for the SMC industry has been to get the specific gravity down to a point where it reduces enough weight to help offset the cost difference versus a typical SMC formulation.

Currently, resin companies, filler suppliers and molders are working to get the benefit of a true lower density, around 1.50 g/cc and maintain surface without sacrificing physical properties. Nanocomposites seem to show the most promise of achieving all of the aforementioned in a way that is not too cost prohibitive. While a production formulation does not exist, the development work being done shows promise and could provide the industry with one of its better technological breakthroughs in recent years.

Recently, the industry has come up with a system designed to reduce the edge popping so commonly seen on painted body panels. The concept is to make the edges more flexible so as to better resist small surface breakage that is one of the underlying causes of edge popping. Since the edges tend to be resin rich, the resin was formulated to be tougher than standard without being so flexible as to not retain rigidity necessary for the application. These toughened systems were formulated with edge performance in mind and maintaining or improving surface quality. Both the automotive and truck industry have introduced this type of material on body panels within the last couple of years. The reduction in edge effects allows the molders to do less in-house repairs and ensure edge quality while giving the OEM better first time yield, increasing their throughput and reducing rejects.

Alternative fibers are also an ongoing effort within the composite industry, both with SMC and other materials. Carbon fiber is the biggest type being pursued, as it has become big in the aerospace


and aeronautical arena. Carbon's advantages are that it has a lower specific gravity versus glass and can achieve equivalent or superior strength at equivalent or reduced loading. Its major detriment is its significant cost increase over glass. With this in mind, several truck companies have teamed up with the Department of Energy, looking at means of incorporating carbon fiber materials into vehicles that reduce weight and increase fuel efficiency. At the same time, this could increase the usage of carbon fibers and thus bring the price down to a level that would justify its use in the truck industry.

Another material that has found its way into the truck market is dicyclopentadiene (DCPD). While the application of DCPD, trade names Metton®, Telene® and Cymatech®, has not been as a composite, it is a thermosetting material that can be reinforced or filled and become a composite. DCPD has been used as an impact-modifying agent in standard open and closed molded polyester resins, namely isophthalic and orthophthalic acid based systems. DCPD offers superior impact resistance while maintaining physical properties that compare to many HSU, cold molded and engineering thermoplastic systems. Applications within the truck industry employ the neat system, which allows for a homogeneous material that flows well and needs very little preparation prior to painting and installation. Surface quality is quite good, as the lack of filler and glass give a flat surface.

While the emphasis here has been on thermosetting materials, thermoplastic composites have made inroads into the transportation industry. Glass reinforced polypropylene and polycarbonate have been incorporated into parts such as interior trim pieces, battery box covers, engine covers and other non-appearance parts. Superior surface parts are currently not available but as thermoplastic materials evolve, the use of these materials will only expand, as they offer lighter weights and opportunity for reuse that thermosets currently do not.

Challenges for the Composites Industry

This brings up the challenges faced by the composite industry, particularly in thermosetting materials such as SMC. Edge and surface quality remains a topic that OEMs maintain must be solved. Materials such as the toughened system, along with developments in the coating arenas show promise that this issue is being addressed with some degree of success. Technology

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must further evolve, as the combination of resin, glass and filler is still a recipe to incorporate air causing the detrimental effects the industry has been referring to.

Cost is another area in which composites have suffered. Resin prices have continued to trend upward as well as glass reinforcements. Carbon fiber introduction is continually slowed by the cost impact of its use. Technology usually comes at a price but just maintaining current materials is having a negative impact as to cost. The industry needs to address the processing issues associated with these materials as a means to offset the continuing rise in raw material costs.

The biggest obstacle faced by the composites industry as it relates to the transportation industry is the issue of recyclability. Thermosetting materials are generally considered to be non-recyclable as they cross-link rather than chain extend, as thermoplastics do. The truck industry has been and will be mandating that more content in vehicles be considered recyclable and this will limit the use of SMC and similar materials unless something is done. About a decade ago, there was an attempt to reclaim scrap SMC parts, shred them, pyrolyze them and use them as filler in future formulations. The endeavor failed, as all it did was raise the cost of the SMC, when using the reclaimed filler material, as once again the least costly ingredient, calcium carbonate, was replaced with a more expensive option. There are attempts being made now to revisit this option.

Composite materials can expand in non-appearance applications, such as under the hood and structural parts. There are heat resistant materials available in the composite library that can resist the increasing temperatures that will come from the new generation of truck engines. Carbon fiber application can reduce weight and give improved structural properties that could result in new composite materials used for tie rods, frames, floors et al that currently is not be considered. Composite usage may have to rethink the types of applications they wish to be considered for in future programs in order to maintain a presence in the transportation industry.

Summary

To summarize, composite usage has grown and expanded from its early days. Strides have been made in the materials, tooling and processing that make composites such as SMC and other FRP more attractive than 20-25 years ago. At the same time, the industry leveled off somewhat whereby they risked their competitive advantage over metals and thermoplastics due to the perceived lack of progress in the technology arena. Today, the FRP industry is at a crossroads. Some new technology, like tougher systems and nanocomposite formulas, can open up some new opportunities for the industry while at the same time, obstacles such as porosity and recyclability threaten to further reduce composite usage and do significant harm to the industry. How the material suppliers and molders, working with the OEMs, address these issues and come up with viable, cost competitive solutions, will determine the direction composite usage takes in the years ahead.



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ANTEC 2006 Call for Papers

The SPE Annual Technical Conference (ANTEC) will take place in Charlotte, North Carolina May 7 - 11, 2006. Do you have a paper that you would like to present to the world's largest international gathering of engineers, scientists, and business professionals in plastics? It is an opportunity to receive feedback and discussion on your paper from leaders in the plastics industry.



Submit your abstract in the Automotive Division Session. The Automotive Division Session of ANTEC is well attended each year by leaders in the Automotive Industry. This year Chair of the Automotive Division is Tom Pickett. Also, helping on the ANTEC Automotive Session is Dr. Norm Kakarala, Dr. Jay Raisoni, Dr. Suresh Shah, and Michael Shoemaker.

Authors must first submit an abstract (300 characters maximum) by October 14, 2005 in order for their paper to be considered. The deadlines are firm so do not miss them.

Important deadlines are:

October 14, 2005 (5 p.m., Eastern Time)	Abstract Submission Deadline
December 2, 2005 (5 p.m., Eastern Time)	Technical Paper Submission Deadline
January 11, 2006 (5 p.m., Eastern Time)	Final Paper Revision Deadline

Log on to the SPE website address and follow the directions to register and submit your abstract. The SPE website is: www.4spe.org

SPE Automotive Composites Conference and Exposition Grows Stronger This Year

This year's SPE Automotive Composite Conference & Exposition (ACCE) again proved that good things do get better with time. For the 2005 ACCE, it got a lot better. In its 5th year, the ACCE was extended to 3 full days, 47 technical papers were presented on 10 industry-related topics, 7 keynote speakers highlighted topical subjects, 2 industry expert panels discussed timely topics on specialty vehicles and the future of automotive composites, and over 35 sponsor/exhibitors/media took the opportunity to show their products, resources, and technologies to over 300 attendees.

The Michigan State University's Management Education Center, Troy, MI once again provided the conference/exposition venue for SPE. The MSU facility provided a near perfect setting for presenters, exhibitors, and attendees. "Of key importance for our ACCE is the opportunity for all attendees to learn new technologies, exchange information, and network with a variety of industry experts, suppliers, and end-users.

Many new technologies, materials, applications, and industry trends were presented. Speakers from around the automotive world shared material and testing data, application development information, and composite process capabilities.



For those who could not attend this year's ACCE, copies of the conference program guide and CD are available from SPE at a cost of \$100 USD / set. To purchase copies, please contact Pat Levine at +1.248.244.8927 or e-mail her at spe@plastics.org.

Next year's 2006 ACCE has been scheduled for September 12 - 14, 2006. It promises to also be bigger and better. Plan to be there.

SPE Automotive Materials Conference Coming in April

Tom Pickett

One of Norm Kakarala's vision as Chair of SPE Automotive Division is to have an annual materials conference that would educate and promote the latest advances and developments related to automotive engineering plastics. There is much interest. Tom Pickett and Nippani Rao agreed to Co-Chair the conference. In addition, the SPE Detroit Section agreed to support the conference. The following volunteers agreed to be part of the committee: Norm Kakarala, Mike Shoemaker, Terry Cressy, Tom Miller, Jim Keeler, Jim Kolb, and Venkatakrisnan Umamaheshwaran.

At our first planning meeting, the conference committee discussed the scope of the conference. The team listed several topics that would be of interest to many of our members. Some potential topics that were discussed: Engineering Thermoplastics, Under the Hood, Exterior Body, Interior, Interior IP, Seating, Interior Trim, Exterior Trim, Decoration / Ornamentation, Modules, Load Floors, Chrome, Soft Touch Trim, Engineering Plastics in Safety, Environmental, and Light Weight Solutions. The team narrowed it down to three potential topics: Modules (Light Weight Solutions), Under the Hood, or Exterior Body & Trim.

The conference will be a one day conference on a Monday in April in Metro Detroit area (exact date & location to be determined). There will be exhibitors through out the day. In addition, there will be papers in the afternoon. This would be followed by a reception and dinner. After dinner would be a key note speaker. Contact Tom Pickett at (586) 492.2454 if you would like more information on this new SPE Automotive Division Technical Conference.

Education Report

Monica Prokopyshen

This fiscal year, the automotive division is again sponsoring the Plastivan, participating in Explorathon®, offering a student program for the Innovations Award program, and supporting the CCS senior transportation design project. A limited number of scholarships are awarded through our conference programs, as well. In addition, the Division, the Detroit Section and a number of suppliers supported the Eastern Michigan University teachers' polymer workshop this past July.

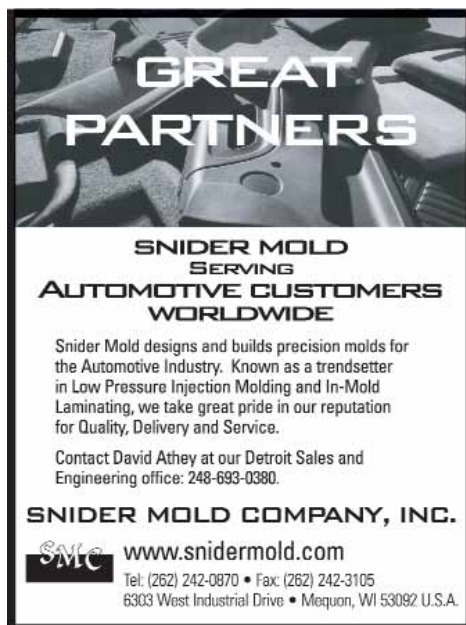
Funding for education programs comes from the support of members, sponsors and participants of our conferences and Innovations Award Program.

Plastivan is an education program managed by the National Plastics Center and Museum which brings a polymer chemistry laboratory and hands-on lessons directly to schools and students in grades 3 to 12. The SPE AD sponsors a number of these visits to schools in Southeast Michigan each year.

Explorathon is a one-day event open to high school students in Southeast Michigan and is designed to spur interest in careers in maths, sciences and engineering. It is geared towards students who normally do not choose such fields. The Division provides 3 sessions of hands-on experiments and lessons related to automotive polymers.

The SPE Automotive Division and Detroit Section are again supporting the American Plastics Council in the College for Creative Studies senior transportation design project. Students in the fall 2005 project identify a need that is not currently being met by either the OEM or aftermarket with regard to vehicle interiors or exteriors and then create a design to satisfy the need.

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: <http://speautomotive.com/>



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Membership Matters

Bonnie Bennyhoff

SPE cares about its members! Beyond the monetary donation and donation of supplies made to the relief efforts aiding victims of Hurricane Katrina, SPE Headquarters is extending membership to any member affected by the disaster. Additionally, to help plastic businesses in the affected area, SPE has developed a website for members' use in seeking help or offering assistance to hurricane-affected companies. Please share the site with colleagues who might be interested in participating. The blog is located at <http://www.4spe.org/katrinablog/>

How International Should SPE Be?

Susan Oderwald, Executive Director for SPE, addressed this topic to all of the leaders involved with our "international" society. While SPE has theoretically always been an international organization, it has behaved more like a U.S. society with international members. Indeed, even today only roughly 10% of members are from outside the U.S.

One very compelling reason for SPE to further internationalize is a broader recognition that cutting-edge research and development in plastics materials and processing will come increasingly from many places in the

world. If SPE is to be a global technology leader for the plastics industry, it needs to capture members and content from all the main R&D and manufacturing centers around the globe, not just those in the U.S.

In the future, the U.S. and Europe will continue to be very important plastics markets, but so will China and India and other parts of the world. All of these places will be providing an increasingly complex mix of contributions to our industry. In fact, place may become very unimportant in the future, and people will be much more at the center and heart of new technologies, applications, products and markets.

SPE has always been more about people than it has about place. Our industry is spread all over the globe, and so it is to everyone's benefit to incorporate the fullest measure possible of people within the industry. SPE should be as international as the industry and members require it to be. To this end, SPE's Executive Committee and International Committee are in the initial stages of drafting a comprehensive plan to move SPE into new markets, while remaining committed to serving the traditional ones. The focus is to maximize meaning, mission and relevance to our members. We invite you to share your ideas on how to make this transition to a genuinely global organization.

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

Aaron M. Schuiling	Pilkington	Richard McLaughlin	Total Product Development	Gregory L. Gibson	Applied Chemical Technologies
Jason R. Fincher	Advanced Composites Inc	Hideki Ishikawa	Kaneka Texas Corporation	Milind D. Arbatti	
Jimmy M. Hawkins	Georgia Tech	Matthew T. Calvage	IG Manufacturing Services	Terry E. Burkhard	Delphi Saginaw Steering
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Alfredo H. Villalobos	Ciateq AC	Aaron Amstutz	Caterpillar Specialty Products	Joseph A. Dattilo	Zoltek Corp
Jody M. Sanders		Eric H Lee	Bayer Material Science	Levi Guy	Western Diversified Plastics
Ralf Hoffmann	Murrplastik	Stan Wile	DLH Industries Inc	Anthony J. Glenn	Bribros (Australia) Pty Ltd
Terry D. Seagrave	Bayer Material Science	Michelle Mirabal	Honda Manufacturing	David M. White	JSP International
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Alan L. Andersen	AL Andersen Companies Inc	Ed Nerlich	DSM Thermoplastic Elastomers	Edward Cason	ZF Lemforder Corp
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Micha L. Fulgham	J McFall & Associates	Brett R. Walburn	Dar-Tech Inc	Robert G. Rogowski	Dow Automotive
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Matthew Langford	Fortune Personnel	Rick J Young	Tigerpoly Mfg Inc	Joshua D. Burkhardt	
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Dennis Fall	Federal Foam Technologies	Alexander Hoffmann	Laserquipment AG	Gary Balthes	Flexform Technologies
Suzanne Cole	Cole & Associates	Anthony Gasbarro	Advanced Composites	Hameed S Khan	Rieter Automotive NA
Michael J. Glotzbach		Adam Li	Applied Chemical Technologies	Danielle L. White	Toyoda Gosei North America
Thomas M. Bell	Solvay Engineered Polymers	Steven L-K Mok	E I Dupont De Nemours	Matthew G. Powell	
Pat O'Donnell	Performance Gear Systems	Shane L. Weeks	Marplex Australia Ltd	James E Robbins	
Ashley L. Maylor	Hook Plastics PL	Lana Spencer	Dow Chemical	Harry Hurrelbrinck	Cooper Standard Automotive
Mark Vliem	M Vliem & Associates LLC	Dennis A. Luczak	Guardian Automotive	Thomas Katchmark	Basell Polyolefins
		Mark A. Fisher	Honda of America		

Councilor's Corner

Nippani Rao

The following summarizes the highlights of the Councilor's meeting, September 22-25, 2005 in Milwaukee, Wisconsin

Budget

2006 Budget was presented to the council and after some discussion on various items, was approved by the council overwhelmingly.

Total income for 2006 is \$5,635,000 and total expenses \$5,556,000 and net income \$79,000

The budget is based on gross revenues of \$2,100,000 or approximately 21,000 members. Out of this \$350,000 is paid back to Sections and Divisions in rebates. The rebates are back and will be paid quarterly in 2006. Rebates will be paid bases on the same formulas as prior years. \$120,000 will be allocated to the European budget based on a membership of 1,200 in Europe.

SPE is still loosing a little money in the areas of Plastics Engineering Magazine, European programs, online programs and Bookstore & Training. These areas are being reviewed in separate committees to develop plans to make them profitable

Membership

SPE Membership has stabilized and grown slightly in the past 18 months. Over the years 1995-2004, the membership declined progressively and through extensive efforts by the membership committee in the year and the AIM program, the membership stabilized and showing a modest growth in 2005. Projection for 2006 is 21,000 and is expected to grow 2-3% per annum.

ANTEC

Gross revenues for ANTEC 2006 are budgeted at \$900,000 and gross expenses at \$65,000. The location is Charlotte, NC and is not as expensive as Boston in 2005. A net income of \$79,000 is projected for 2006Antec, compared to \$34,453 for 2005Antec.

Topical Conferences

SPE continues to feel that Topical conferences are a high priority and work closely with the Sections and Divisions to promote and support. Projected net income from topical conferences is \$124,500 in 2006.

Constitution and Bylaws

Presentations were made by K.Mehta and L.Neward in regards to the reasons to update and change the Bylaws to

make them simpler and easy to understand. The council approved the proposal and the process to proceed. A more complete plan will be presented at the winter council meeting for approval. After the final draft and the council approval, the new Bylaws will be sent to total SPE membership. A minimum of 20% response from the 21000 membership and a 2/3 majority approval is needed to change the bylaws.

The next council meeting is in Albuquerque, NM, Jan.20-22, 2006



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