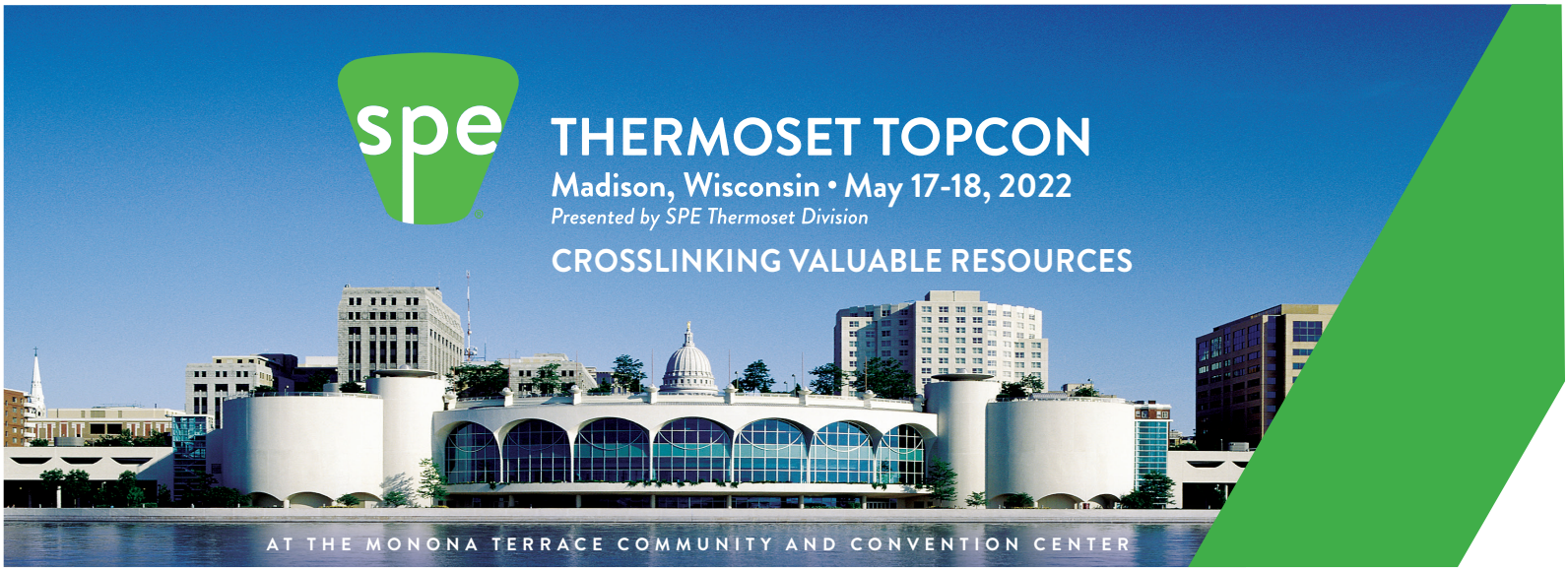


TUESDAY, MAY 17

ALL TIMES USA EDT

7:00–8:00 **NETWORKING BREAKFAST** *Sponsored by* IDI Composites International **& EXHIBITS**

8:00–8:15 **OPENING COMMENTS: Len Nunnery,** *Plenco*

MODERATOR: Len Nunnery, *Plenco*

8:15–9:00 **KEYNOTE ADDRESS: Thermosets - A Historical Perspective**
Tim Osswald, *University of Wisconsin-Madison*

BIO: Professor Tim A. Osswald is the Director of the Polymer Engineering Center at the University of Wisconsin-Madison and is Honorary Professor of Plastics Technology at the University of Erlangen-Nuremberg in Germany and the National University of Colombia. His research includes modeling and simulation in polymer processing, engineering design with plastic and composite materials, and sustainability in plastics manufacturing. Professor Osswald serves as the Chief English Language Editor for the *Journal of Polymer Technology* and Editor for the Americas for the *Journal of Polymer Engineering*. He has published over 300 peer-reviewed conference and journal articles as well as 15 books translated in five languages, including: International Plastics Handbook (2019), Polymer Processing – Modeling and Simulation (2006), Understanding Polymer Processing (2017), and Materials Science of Polymers for Engineering (2012). Professor Osswald has also served as an expert witness in polymer engineering litigation, including product failure, patents and intellectual property and is on the advisory board of multiple companies. He is currently adviser to the President of Colombia in their creation of a new Ministry for Science, Technology, and Innovation.

ABSTRACT: This talk will take the audience through time, from the "heat and pressure" patent application in 1907, through the growth of an industry now known as the thermoset plastics industry. This growth also included an entirely different branch of the plastics field, namely, the composites industry; from asbestos filled Bakelite to unsaturated polyester fiber glass panels during the Second World War, to a growing SMC automotive body panel industry all the way to today's aerospace applications. Finally, the talk will take a look into the future of thermosets through the emerging 3D printing field, including hybrid structures where the synergy of great thermosetting materials are combined into a light weight product that is better than each of its individual components.

9:00–9:30 **PROCESS TECHNOLOGY: 3D Printed Adhesives: Enabling High-Performance Composite Structures**
Alec Redmann, *Trek Bicycle*

BIO: Alec Redmann is currently a Research and Development Engineer at Trek Bicycle. He has experience in plastics and composites manufacturing, previously working as a project engineer for wind turbine blade manufacturing and receiving a PhD from the University of Wisconsin-Madison with Professor Tim Osswald as an NSF Graduate Research Fellow. His research focuses on material characterization, processing, and application development.

ABSTRACT: As designers and engineers continue to push the boundaries of high-performance design, fiber reinforced plastics (FRP) are increasingly finding use in structural applications due to their light weight and superior mechanical properties. Many of these applications, especially in the aerospace and automotive industries, require geometrical complexity, multiple components, and multiple materials. These requirements lead significant challenges for traditional assembly and joining techniques used during manufacturing - typically mechanical fasteners or adhesives.

In order to solve these problems, a new process has been developed for joining composite members utilizing additive manufacturing and a dual-cure epoxy resin. The resin is first 3D printed using a UV process; resulting in a semi-rigid, but only partially cured part. This part still has chemical potential and bonding availability when it is integrated with pre-impregnated fiber reinforcement. The assembly is then heated to activate the second curing reaction and co-cure the two materials, forming a permanent, void-free cohesive bond.

Utilizing the design freedom of 3D printing and the mechanical properties of FRP enables a new family of hybrid, high-performance composite structures. Benefits are observed in the mechanical performance, assembly time, and repeatability of the hybrid structures.

BIOS/ABSTRACTS

9:30–10:00 **MATERIAL TECHNOLOGY: Structural SMC Working in Conjunction with Prepreg Parts with Stiffness Dominated Failure Modes, Ruchir Shanbhag,** *Lattice Composites*

BIO: Ruchir Shanbhag is the CEO and Chief Scientist as Lattice Composites, a custom formulator and manufacturer of epoxy based composite materials including SMC, BMC, winding resins and prepregs. Ruchir has two decades of formulating experience and has worked across multiple industries. A graduate of the University of Southern California, Ruchir is actively involved in academia.

ABSTRACT: Hot melt epoxy resin based SMC makes a small percentage of total molding compounds in the marketplace. Given the high strength performance of these molding compounds, they are finding new and innovative applications hitherto untapped by traditional Sheet Molding Compounds. Many applications in the marketplace for traditional prepreg parts have stiffness dominated failure modes. The SMC materials, when co-cured with prepregs, allow for a lower total cost solution and ease of processing while also eliminating defects related to delamination of prepreg layers.

10:00–10:30 **BREAK & EXHIBITS**

10:30–11:00 **PROCESS TECHNOLOGY: Epoxy Molding Compounds: Enabling Electronics Today and in the Future**
Jeff Gotro, Ph.D., *InnoCentrix, LLC*

BIO: Jeff Gotro, Ph.D., is the President and Founder of InnoCentrix, LLC. InnoCentrix provides a wide range of consulting services to the polymer industry. Jeff has over forty years of experience in polymers having held scientific and leadership positions at IBM, AlliedSignal, Honeywell International, National Starch Electronic Materials as VP of R&D, and InnoCentrix. He has published four book chapters including Thermosets in the Encyclopedia of Polymer Science & Technology, John Wiley & Sons, 2017. Jeff has published over 50 papers in technical journals and conference proceedings. Jeff has a Bachelor of Science in Mechanical Engineering and Materials Science from Marquette University and a Ph.D. in Materials Science from Northwestern University with a specialty in polymer science (polymer chemistry, physics, and characterization).

ABSTRACT: Epoxy molding compounds (EMC) are used extensively in electronic applications to protect sensitive semiconductor computer chips. The paper will describe the various types of applications in electronics where EMC's play an important role in the device performance. Epoxy mold compounds are a critical material in an emerging electronic packaging application for mobile phones and high-end electronics. After the semiconductor chip is attached to a substrate, a transfer or compression molding process is used to encapsulate the device. The paper will cover the most common types of epoxy chemistry used in EMC's. Epoxy mold compounds are highly filled composite materials. The filler particle size, particle size distribution, and filler surface treatment are key to achieve highly functional encapsulants. Finally, the rheological properties and curing process will be discussed. In summary, the paper will cover the key structure/property/process/performance relationships in epoxy molding compounds for semiconductor applications.

11:00–11:30 **TESTING TECHNOLOGY: "Setting" the Path for Success in Thermoset Manufacturing with Upfront Process Simulation**
Eric Foltz, *The Madison Group*

BIO: Erik Foltz is a Senior Managing Engineer at The Madison Group, an independent plastics consulting firm located in Madison, WI. At The Madison Group, Erik assists designers, engineers, and molders with optimizing their plastic part design for manufacturability and performance. Taking a holistic approach, Foltz helps his customers understand where the practical limitations of their material, design, or manufacturing method exist. Using both simulation and functional prototypes, he has helped customers during all the phases of product development and performance validation. Foltz, is an active member for both the Product Design and Development Division (PD3) and Injection Molding Division of the Society of Plastics Engineers.

ABSTRACT: The need to accelerate product development, improve part quality, and reduce time to market has placed a large burden on material suppliers, manufacturers and OEMS that does not allow for the traditional trial and error approach. With the initiatives of reducing part weight and cost without sacrificing performance at elevated temperatures, companies are looking to thermoset material for achieving these performance metrics that thermoplastic resins cannot realize. This talk will discuss the current state of process simulation for thermoset materials, and how many of the traditional processes such as compression molding, RIM, and RTM have been simulated to provide useful information to all stakeholders. The presentation will highlight the practical uses of process simulation both through a theoretical basis and case studies.

11:30–12:00 **MATERIAL TECHNOLOGY: Maximizing Weight Reduction While Improving Properties of Glass Bubble Containing Thermoset Composites, Stephen Amos,** *3M Advanced Materials Division*

BIO: Mr. Stephen Amos has over thirty years of experience in the international plastics industry as a plastic additive application and product developer. His functional experience includes: Formulating additive packages for polyolefins and developing applications for new plastic additives. He's given keynote addresses on polymer additives at SPE ANTEC and other conferences. Mr. Amos has a B.S. in Chemistry from The University of Wisconsin – Madison and an M.S. in Polymer Science from The University of Ferrara, Italy. He currently works at 3M Company, developing new products and applications with materials produced by 3M Advanced Materials Division.

ABSTRACT: Formulating with new high strength to density ratio hollow glass bubbles in sheet molding compound (SMC) and automotive plastisol can make these composites significantly lighter with excellent surface properties. Some SMC and plastisol formulators can achieve < 1.0 g/cc composite density. These new products have a smaller top particle size, and a narrower distribution, which can provide Class A surfaces. Highly filled epoxy compounds have improved dielectric properties for 5G electronics yet remain tough with minimal viscosity build. Highly filled liquid silicone rubber (LSR) compounds can achieve.

12:00–1:00 **NETWORKING LUNCHEON** *Sponsored by* MBI MAR-BAL INCORPORATED **& EXHIBITS**

MODERATOR: Dale Silvernell, *IDI Composties International*

1:00–1:45 **KEYNOTE ADDRESS: How Composites May Play a Role in Future Mobility**
Carla Bailo, *Center for Automotive Research*

BIO:

Carla Bailo is the President and CEO of the Center for Automotive Research (CAR), and is a leader in engineering and vehicle program management with 35 years of experience in the automotive industry. Under her leadership, CAR continues to be a preeminent resource of objective and unbiased research, analysis, and information regarding the North American automotive industry.

In addition to her role at CAR, Ms. Bailo is the 2016-2018 vice president of automotive for SAE International, a global association of more than 138,000 engineers and related technical experts in the aerospace, automotive and commercial-vehicle industries.

Prior to joining CAR, she was most recently the assistant vice president for mobility research and business development at The Ohio State University. She also has 25 years of experience at Nissan North America, Inc., where she served as senior vice president of research and development. Ms. Bailo also spent 10 years at General Motors. She has a MS degree in mechanical engineering from the University of Michigan and a BS degree in mechanical engineering from Kettering University.

ABOUT CAR: THE CENTER FOR AUTOMOTIVE RESEARCH (CAR) produces industry-driven research and analyses; develops forecasts; fosters dialogue and convenes forums; and publicly disseminates our research through events, our website, and the media.

As an independent, non-profit, research organization with a multi-disciplinary approach, CAR engages with leaders in the global automotive industry to support technology advancements and improve the competitiveness of the U.S. automotive industry. We succeed through close collaboration and strong relationships with automakers, suppliers, industry associations, government, non-profits, labor organizations, and educational institutions.

ABSTRACT:

Carla's presentation will outline the evolution taking place in the Auto/Mobility industry including Automated, Connected, Shared, and Electric (ACES) mobility, and will include CAR research demonstrating how plastics and composites can play a role.

"Our research suggests that automakers and suppliers continue to look at new and innovative ways to utilize composites in next-generation vehicles" "According to CAR research, plastics and polymer composites are projected to more than double in automotive applications by 2035,"

"Increasing electric vehicle production is supercharging the growth of plastics and composites in the automotive industry."

The demand for affordable, lightweight, fuel-efficient vehicles created a greater demand for polymer composites in recent years. Today, electric vehicles are increasing the demand for composites to reduce battery weight, improve safety by decreasing the risk of short circuits, enhance battery protection in case of impact, and extend charging range. Composites are also playing a key role in the development of the infrastructure for electric vehicles including charging stations, ancillary equipment, and more. Beyond this, the demand for sustainable polymer composites is growing and this will be discussed from a corporate ESG perspective.

1:45–2:15 **MATERIAL TECHNOLOGY: Development of Sheet Molding Compound (SMC) with Specific Gravity Below 1.0 to Meet Aggressive Lightweighting Targets**
Vinod Arora and **Jason Corpus,** *Core Molding Technologies,*
Lora Mason and **Jonathan M. McKay, Ph.D.,** *INEOS Composites*

BIO:

Jonathan McKay received his bachelor's degree in chemistry from Northwestern University and his Ph.D. in organic chemistry from the University of Illinois. He began his industrial career for Hercules, Inc., developing water soluble polymers for use in the pulp and paper industry. Since 2013 he has worked for INEOS Composites (formerly Ashland) in their product development group, spending the majority of that time devoted to the development of novel unsaturated polyester and vinylester resins and formulating them for transportation applications, including weatherable mold-in-color SMC, low density structural SMC, and styrene-free prepreg resins.

ABSTRACT:

The composites industry has been an important contributor to lightweighting trends within the transportation industry. Manufacturers find that lighter weight parts can address multiple needs within these industries: Increased fuel economy, better performance (acceleration, handling, and braking), and increased engine life are all potential benefits of lighter weight parts. Part manufacturers are especially challenged when materials that are already considered lightweight when compared to metals, such as composites, need to become even lighter. In this report we discuss the successful development of an SMC with a density below 1.0 g/cc, including some of the challenges confronted in maintaining material processability, mechanical properties, and customer usability for this application.

2:15–2:45 **BREAK & EXHIBITS**

2:45–3:15 **MATERIAL TECHNOLOGY: Thermosets – More than a Bridge Between Metal and Thermoplastic Materials**

Ingo Schwarz, *Schwarz Plastic Solutions*

BIO: Ingo Schwarz completed a dual education in industrial business management (aviation industry) and then entered the family-owned plastic molding business (thermosets and thermoplastic materials) near Munich (Germany). He covered various commercial positions, followed by production and engineering tasks. Besides the German facility, a new production site in Spain was started in the early 1980s'. At that time, he became Managing Director in the group with focus on project management.

To allow pushing thermosets, he focused on simulation technology from 2005. When he sold the company in 2015, he started the consulting company Schwarz Plastic Solutions GmbH with the aim, to bring scientific results and practical experience together and offer this as a package of experts to the market.

ABSTRACT: Thermosets are one of the most interesting polymer groups for light-weight design, electro mobility and electronic encapsulation. They are temperature resistant, almost linear in thermal expansion and with very little creep. The problem is, although they were invented in 1909 and thus the first industrial produced plasticsthe improvement in usability and implementation of process technology – compared to thermoplastics – was little. Our todays' engineers do either not have sufficient information/knowledge/education or even just do not trust the old Bakelite material. Our research therefore – supported by German and US Universities – was focused on improved methods of material characterization – creation of material files for simulation – capturing real process and improvements of the molding process like thermal and mechanical behavior of molds. Furthermore, we are working on process control by applying AI. The results for characterization are a big step ahead, as the simulation results are now better correlating to the real process/parts. An innovative capillary rheometer injection mold and an DEA-modified oscillation rheometer (dielectric analysis) were therefore developed to perform rheokinetic measurement close to real process conditions. And on top the expansion and shrinkage behavior can be implemented by a pvTcmeasurement. We are finally able to manage/compensate the influence of process variations on the crosslinking inside the mold right within the molding process by in-line process adaption. The combination of these results will allow the industry to use these phenomenal/excellent materials with a high level of confidence and will make product design much more reliable.

3:15–3:45 **MATERIAL TECHNOLOGY: EMI Shielding, Thermal and Electrical Conductivity for the COMPOSITE industry utilizing NOVEL technology like graphene in 2D and 3D structure**

Christian Oberleitner, *SP2 Carbon*

BIO: Christian Oberleitner has been in the Composites industry for over 30 years. He has obtained experience in resin manufacturing as well as Glassfiber production in Europe and USA covering all application technologies from Closed Mold to Open Molding as well as Thermoplastic compounding. After running the Reinforcement business unit in NA for Johns Manville he took on the responsibilities as GM for the European unit of the largest BMC producer globally (BMCI Citadel) which after several acquisitions combined Thermoset & Thermoplastic compounding incl. Carbon SMC (Quantum Composites). As an founder and investor to SP2 Carbon Christian and a small but dedicated global team (EU, USA LA with Randy Pu, and China) focused on bringing Graphene & 2 D Technology to the Composite world with the goal to add valuable performance attributes like conductivity, ESD EMI shielding.

SP2 brings a wide variety of knowledge, experience, between resin design, reinforcement and compounding and an extensive business network on a global basis and is grateful for the opportunity to share development updates with the SPE- members and organization.

ABSTRACT: EMI Shielding and thermal as well as electrical conductivity allows the Composite Market to extend its reach into new additional applications.

This can only be accomplished with novel technology, state of the art science and professional implementation on application opportunities.

This patent pending technology enables Composite part to show antistatic, electrical and thermal conductive properties which provide value added application performances.

2D materials around the Graphene technology enables to design based on customer needs following features and benefits:

1. Elimination of Static.
2. Shielding of EMF.
3. Improvement of Chemical resistance.
4. Light weight.
5. Easy molding.
6. Design freedom and integration of part
7. Lower cost than aluminium.

3:45–4:15 **SOURCING:** **Evolution of Sourcing Methology**

Zachary Montognses, *Ashley Industrial Molding*

BIO: Zach Montognses has been with AIM for 11 years as a Customer Development Sales Engineer. Prior to AIM Zach studied Composite Materials Engineering at Winona State University which provided solid backing to offer OEM's unique perspectives related to materials science and design solutions. Initially, his roll at AIM was focused solely on the agricultural market with more recent diversification in E.V.'s, military, commercial products, construction, and marine.

ABSTRACT: Process and material selection, by OEMs, have and will always be heavily weighed by Return on Investment (ROI). Key OEM decision makers have historically used a 1-3 year ROI period for process and material selection. Major differences in part quality, repeatability, throughput limitations, and required supplier management between 'soft/low budget' and 'hard tooled' composites/plastics manufacturing processes have evolved OEM sourcing methodology to extended ROI time periods. Ultimately, OEM's are trending towards future sustainability through robust composite solutions, despite moderate-high tooling investments.

4:15–4:45 **TESTING TECHNOLOGY:** **Characterization of Thermosets RCR Capillary Rheometer for the Laboratory or on the Shop Floor**

Tim Haake, *Goettfert*

BIO: Tim Haake studied physics in Germany, got an MBA in America and worked trade shows on all continents but Antarctica. He taught classes about Rheology, Organizational Change, Critical Thinking and International Marketing. He managed small and large companies, mostly being involved in the realm of measurement instruments, especially being involved in the field of rheology, in the third generation. Tim has been involved with SPE and worked with GOETTFERT for over 20 years.

ABSTRACT: The RCR is an innovative Capillary Rheometer to determine the flow behavior of rubbers and other thermosets under special physical processing conditions.

With up to 75 kN of available force, it is capable to push material through a capillary die into open air, to get a shear rate curve, or to inject material into one of two molds.

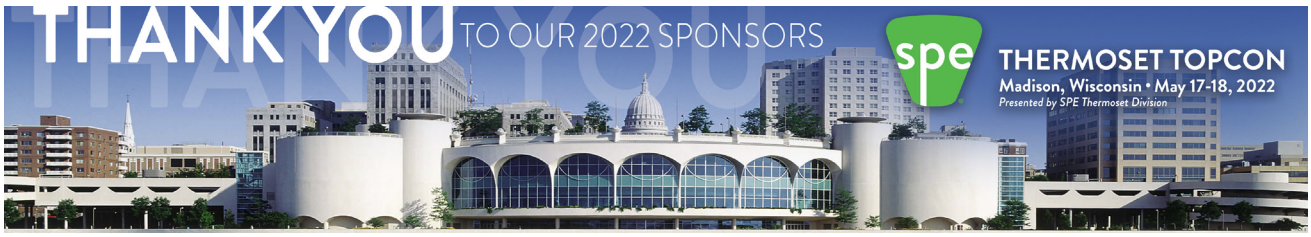
Users are able to see how far the flow will reach in a spiral mold, before curing sets in. The ramification mold, which looks like a radar antenna, also gives information on how well connections are made.

This is an instrument that allows to quickly judge the quality of the material on hand on the production floor, but is just as useful for R&D.

4:45–5:00 **CLOSING COMMENTS: Len Nunnery,** *Plenco*

5:00–7:00 **COCKTAIL RECEPTION** *Sponsored by* plenco **& EXHIBITS**

7:00 **CONFERENCE ADJOURNS FOR THE DAY**



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WEDNESDAY, MAY 18

7:30–8:45 **NETWORKING BREAKFAST** *Sponsored by* lyondellbasell *Advancing Possible* **& EXHIBITS**

8:45–9:00 **OPENING COMMENTS: Len Nunnery,** *Plenco*

MODERATOR: Allen Roman, *University of Wisconsin-Madison*

9:0–9:30 **PROCESS TECHNOLOGY: Toyota Tundra Seat Back Thermoplastics Coupled with Thermoset Structure**
Hank Richardson, *L&L Products*

BIO: Hank Richardson is a Product Engineering Manager in North America at L&L Products. He is responsible for the CAE team and for overall global development of L&L'S Continuous Composite Systems™ (CCS™) product line. He has been with L&L Products since 1996 where he started in manufacturing as a Project / Process engineer. Hank transitioned to the Commercial team and Product Development in 2000 and helped lead the development of L&L's Composite Body Solutions™ (CBS™) product line to a point now that nearly every passenger type vehicle built has structural inserts (CBS™) which help each vehicle become lighter, stronger, quieter and safer.

Hank is a graduate of Michigan Technological University and currently lives in Romeo MI.

ABSTRACT: Toyota Tundra Rear Seat Back Thermoplastics coupled with Thermoset structure

BASF and L&L Products have recently launched several new applications using the L&L Products CCS™ (Continuous Composite Systems) and BASF Elastocoat® Polyurethane. These composite solutions are replacing traditional high strength metal solutions due to the superior strength to weight ratio, new assembly advantages, and an improved value proposition. BASF and L&L Products will review the manufacturing process, a new simulation methodology, and a recent launch of the Toyota Tundra rear seat back using this continuous fiber solution for occupant protection, part consolidation, weight reduction and cost reduction.

9:30–10:00 **PROCESS TECHNOLOGY: New Innovative Cutting Processes For SMC Material**
Christian Fais, *Schmidt & Heinzmann North America Inc.*

BIO: Christian Fais has held his position since July 2018, where he is responsible for business development, sales, and technical support in North/South America. Christian has more than 20 years of experience in Technical Sales and Project Management and held several positions in the plant engineering and construction business. During the start-up phase of the Fraunhofer Project Center in London, ON he was responsible for implementing and setting up the LFT-D, D-SMC and RTM process in cooperation with the Fraunhofer selected researchers. In his current primary role, he is responsible for the business growth of the newly founded company Schmidt & Heinzmann North America Inc.

ABSTRACT: The presentation will outline the newest innovative cutting technology, which is setting new standards in SMC Material preparation in terms of cutting, stacking & weighing. Individual formulation of SMC material from very dry to tacky increasing the demand of new cutting processes to achieve a high process stability and reduces downtime. The presenation also show different solution in semi-automatic cutting cells to full automatic high performed cutting cells.

10:00–10:30 **BREAK & EXHIBITS**

10:30–11:00 **INDUSTRY NEWS: How PlastiVan® is Making a Difference, Eve Vitale,** *SPE Foundation*

BIO: Eve Vitale is Chief Executive at the SPE Foundation which supports the development of plastics professionals by funding quality educational programs, grants, and scholarships, emphasizing science, engineering, sustainability, and manufacturing while working to create inclusive opportunities for students around the world. She has 10+ years' experience in STEM-education and non-profit development and leads the PlastiVan®, a national plastics education program for K-12 students. PlastiVan works to change the perception of plastics one classroom at a time through positive plastics education and material sustainability while encouraging students to consider the industry they've never heard of – plastics – as a career path. Ms. Vitale has degrees in mechanical and manufacturing engineering and has worked as a consultant in recycled materials and plastics sustainability.

ABSTRACT: Through positive plastics education the SPE Foundation has developed unique programs to overcome the high hurdles of successful workforce development in the plastics industry which is an invisible entity to children. Product ideation, design and manufacture is also a foreign concept to students. To impel the next generation to consider Science, Technology, Engineering, and Math (STEM) careers along the whole value chain, we must introduce the joy of science, engineering, and manufacturing early and often. In addition, under-resourced, under-represented populations in STEM need equity-building opportunities which require commitment and collaboration. To make progress, we must be willing to think big, start small and stay in it for the long haul. Eve's talk will demonstrate how to:

- Build partnerships with community-based organizations
- Develop strong key performance indicators for programming and think like an investor
- Assemble strong mentoring networks

11:00–11:30 **MATERIAL TECHNOLOGY: Assessing the Influence of Moisture and Surface Treatment of Aluminium Hydroxide on the Processing and Stability of Highly Filled 2K-Resin, Reiner Sauerwein,** *Nabaltec AG*

BIO: Reiner Sauerwein is Head of Division R&D/Technical Service at Nabaltec AG. He is a polymer chemist by education and started his industrial career in Technical Service. Since 2003 he has been holding several management positions within Nabaltec focusing on development, application technology, technical service and marketing & sales.

Reiner's main fields of technical expertise are in polymer compounding, formulation and stabilization with a focus on functionality by mineral fillers, especially flame retardancy.

In his current position he is also responsible for innovation & IP management and R&D co-operations.

ABSTRACT: The processing of reactive resins highly filled with Aluminium Hydroxide (ATH) is a common procedure in standard polymers used in fire resistant end applications. Glass fibre reinforced composites filled with ATH are used in construction and public transport since many years. But whenever a two-component-system (2K-system) comes into play, manufacturers avoid the loading of the more sensitive monomer with ATH. Like most mineral fillers, ATH entraps some moisture on its surface and due to its manufacturing history also traces of sodium hydroxide. When ATH is brought into a reactive monomer by mixing, unwanted reactions may occur.

Due to more severe fire resistant standards and new end applications like heat conductivity, end users request reactive resins of very high ATH loading. Thermoset loadings of 70 – 85 weight-% make it unavoidable to also fill the reaction sensitive monomer of a 2K-system. Therefore, ATH grades which can be filled in reaction sensitive components, while still having a minimum storage stability before being processed and cured, are needed.

Nabaltec has performed a basic study in a Polyurethane (PUR) system. The filling of the polyol and the sensitive di-isocyanate was done with ATH specifically designed for low moisture content and / or hydrophobicity. Alternate drying procedures have been studied and checked for industrial feasibility. Viscosity performance and stability over time of both ATH filled components was investigated. And last but not least initial curing behaviour (gel-time) was compared with stored components.

11:30–12:00 **COMPONENT TECHNOLOGY: EVO PT®: New Self-Tapping Fastener Technology for Direct Fastening into Thermoset Materials:, Zack Lanman,** *ATF*

BIO: Zack Lanman is the Product Manager for ATF-Inc. and has been with the company since graduating from college. In his current role, Zack is responsible for business development, leading the application engineering group to identify and provide our customers with solutions to fastener issues within the automotive market.

Zack has 9 years of experience within the Automotive Fastener market. He first started his career as an application engineer with a focus on thread forming technologies in the automotive lighting, interiors, and seating markets, along with multiple EV customers in California. In his previous position, he was the Key Account Manager for the Adient account at ATF-Inc. and was responsible, for new business development, engineering, and program management.

Zack is passionate about building relationships with ATF's customers, while identify the best solution for each individual application, and solving market-wide fastener issues within the automotive industry.

Zack is a proud alumnus of Purdue University where he graduated with a Bachelor of Science in Mechanical Engineering.

ABSTRACT: Self-Tapping fasteners are used today in a wide array of materials by design engineers in all manufacturing industries and can be found in almost everything you touch. With the advancement of material sciences in high strength steel, aluminum, plastics with additives, and carbon fiber reinforced materials the challenge of mixed material fastener joints are growing exponentially. New self-tapping fastener technologies are being developed to meet these challenges and offer solutions to design engineers to optimize their design without sacrificing performance and strength of the fastener while minimizing the cost impact. ATF's new EVO PT® is the next generation of self-tapping fasteners for thermoplastic and thermoset materials. With it being the first fastener designed completely through FEA analysis it has led to an all new innovative thread shape and oversized lead thread. These designs now make it possible for the same installation torque to be used for the same part, no matter if the same thread engagement is utilized in the application. In addition, these advancements have increased the tensile strength, failure torque, and fatigue strength of the fastener and allow for customers to commonize multiple fasteners in an application to one and thus reduce cost in purchasing, and requirement of multiple tools on the assembly line.

12:00–1:00 **NETWORKING LUNCHEON & EXHIBITS**

MODERATOR: Hridyesh Raj Tewani, *University of Wisconsin-Madison*

1:00–1:30 **PROCESS TECHNOLOGY: Recycling Thermosets: The History and How To Do it Cost Effectively, Randy Lewis,** *PR Consulting*

BIO: Randy Lewis has been in the thermoset industry for 50 years and has done every job from Setup to Division President of a fortune 100 company. He has one patent, one applied for and one provisional. He is currently working with G&H Diversified on using regrind in down hole applications with very high volumes molded parts. He has a degree in Industrial Engineering from Gaston College and has held many positions on the Thermoset Division Board.

ABSTRACT: Thermosets have been successfully recycled since 1975, since that time, they face two obstacles, logistics and not invented here (NIH). The technical problems do not exist. This paper will attempt to present the history, method, and economics for recycling thermosets. Simple technical and process improvements, such as, proper plating to reduce screen wear to acceptable levels, proper particle size for different desired effect, using different resins as the recycled to improve properties of the virgin material and ways of adding the recycle thermoset to the matrix. Adding recyclate, properly, has been shown to improve impact strength by up to 20% in a toggle application at Eaton in Puerto Rico.

1:30–2:00 **MATERIAL TECHNOLOGY: Advanced Low VOC Composite Materials for Automotive Applications, Junxian Wu,** *Ineos Composites*

BIO: Dr. Junxian Wu is a research scientist at INEOS COMPOSITES. She graduated from the Chemical Engineering and Materials Science Department at the University of Minnesota-Twin Cities in 2005. Her research and product development focuses include developing compression mold resin systems for various applications, such as advanced resin systems for EV battery enclosures and low VOC low odor resins for structural applications. Dr. Wu's prior industrial experiences include developing corrosion resistant epoxy vinyl ester resin and polyurethane structural adhesives.

ABSTRACT: The paper discusses efforts in measuring and reducing VOC of fiberglass reinforce plastic interior parts, the main source of styrene and other hazardous volatile species in a vehicle. VOC can be measured by various methods. Reporting a VOC value without the details of the testing methods can be misleading when comparing composite materials. We review details of equipment setup and sample preparations of three VOC testing methods commonly used in the industry. Sheet mold composite panels made from low VOC resin solutions are measured by all three methods. A summary of cons and pros of each method in analyzing these panels is provided. VOC values of the low VOC composite materials are compared with the results of control panels. The advanced low VOC resin technology provide part manufactures an alternative solution to reduce VOC concerns, which is typically addressed by adding a post-baking step.

2:00–2:30 **MATERIAL TECHNOLOGY: Strategies for Cure Monitoring of Wind Turbine Blades, Huan Lee,** *Lambient Technologies*

BIO: Huan Lee is a co-founder of Lambient Technologies, which manufactures sensors, instruments and software for dielectric cure monitoring (DEA), and is the author of The Handbook of Dielectric Analysis and Cure Monitoring. He is a graduate of the Massachusetts Institute of Technology, where he was part of the research group that developed the methods now commercialized by Lambient Technologies.

ABSTRACT: Wind power was 9.2% of total U.S. electrical generation in 2021, and global wind capacity additions almost doubled in 2020. The length of the largest wind turbine blade already exceeds 100 meters, placing huge demands on quality. With costs over $500,000 each for larger blades, the stakes are high when curing the thermoset composites used in their production. Currently, manufacturers simply assume correct process temperature produces correct cure. Temperature, however, does not measure the material itself and defects caused by problems with curing may still arise. This presentation discusses dielectric cure monitoring, also known as dielectric analysis (DEA), and its ability to report material state in real time during manufacturing. DEA can provide documentation to assure a blade has been made correctly or indicate a problem if cure does not proceed as expected. Looking to the future, cure state information can be incorporated into a closed loop control system that actively adjusts process temperature to improve the efficiency of wind turbine blade manufacturing.

2:30–3:00 **BREAK & EXHIBITS**

3:00–3:30 **MATERIAL TECHNOLOGY: Nano Materials and Weatherable Molded-in-Color Composites with Reduced Density Characteristics, Paul A Rettinger,** *Chromaflo*

BIO: Paul A. Rettinger is Technology Director, Thermosets – Americas for Vibrantz Technologies. Prior to serving as Technology Director, Mr. Rettinger served as Technology Manager, Quality Assurance Manager, Quality Assurance Supervisor for Coatings, and Product Development Scientist. An innovator of novel composite and coatings technologies, Mr. Rettinger has served on the scientific staffs of large and small corporations. Examples of his work can be found in many applications, including but not limited to tactile plates at walkway intersections, interior and exterior materials of high performance vehicles, unpainted weatherable molded-in-color composites, and possibly the bumper – or the truckbox – of your vehicle.

ABSTRACT: This presentation will provide an overview of nanotechnology as relates to composite materials. This includes optimization of mechanical properties for light-weighting applications, and electrical and thermal properties for electrical and battery applications. Several examples are provided in demonstration of the current state of science, and an also a guideline as to the step that are necessary to achieve benefits in a composite application. Also provided are recent examples of advances in science for weatherable molded-in-color composites with reduced density characteristics.

3:30-4:00 **CLOSING COMMENTS: Len Nunnery,** *Plenco*

4:00–4:30 **"All Things Bakelite: The Age of Plastic"** *A video documentary about* **LH Baekeland,** *inventor of Bakelite*

4:30 **CONFERENCE ADJOURNS**