



6TH ANNUAL

Lightweight Materials Joining, Forming & MANUFACTURING INNOVATION 2019

A GALM SERIES EVENT

FEBRUARY 19-20, 2019 | DETROIT MARRIOTT AT THE RENAISSANCE CENTER

Implementing Transformative Technologies,
New Tools & Processes For:

**Mixed-Metal & Low-Cost Composite Joining,
Application Optimization Of Adhesives**

**Exploiting New Manufacturing 4.0 Technology Innovations,
Simulation And Advancements In Material Systems That
Enable Greater Automation & Faster Processing**

Latest Innovations To Reduce Processing Complexity & Increase
Production Capacity For EVs and Autonomous Vehicles

*“The leading event on automotive mixed-material
joining, forming, manufacturing technologies and
processes for lightweight structures”*

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NEW! Highlights of 2019 Agenda

- **Application Optimization Of Adhesives** - And How To Avoid Quality Control Issues
- Solving Real World Challenges In **Joining Metallic And Non-Metallic Materials**
- Best Practices In **Simulation And Modeling Of Manufacturing Processes**
- **Approaches And Equipment Used For Non-Destructive Testing (NDT)** And Quality Control Of Joining Processes
- Joining Of New, **High Strength Steels And Aluminum Alloys**
- **Scaling Up Additive And 3D-Manufacturing With Metals**
- Simplifying Integration, Reducing Process Complexity An **Increasing Production Capacity With Manufacturing 4.0**



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THE LIGHTWEIGHT MATERIALS JOINING, FORMING AND MANUFACTURING INNOVATION SUMMIT 2019

is an OEM-led initiative driven by the latest **advancements in manufacturing techniques, joining methods and forming processes for lightweight vehicles including EVs and autonomous vehicles.**

The transition by OEMs to a new generation of electric vehicles is placing increased emphasis on break-through technologies for lightweight vehicle manufacturing processes and integrated assembly.

The 6th edition of the Summit will *explore new* manufacturing technologies and solutions being adopted for EVs, including multi-material components and structures to optimize structural integrity, meet safety and NVH objectives, and achieve mass reduction to offset heavy batteries.

WHAT'S NEW ABOUT THE 2019 AGENDA?

Exclusive to the 2019 Summit will be a top-level industry panel discussion on **exploiting digitalization of automotive manufacturing under industry 4.0 for smarter, more agile production and improved profit margins**, featuring senior decision-makers from global OEMs.

Our agenda is developed specifically for **senior engineers and technical specialists** in body structures, lightweight advanced materials, process engineering, materials joining and forming.

Attending one of the most important events in the automotive calendar will help improve your day to day decision making and face these challenges with enhanced knowledge including:

Best practices in joining of new high strength steels and aluminum alloys ... Application optimization of adhesives and how to avoid quality control issues ... Solving real world challenges in joining metallic and non-metallic materials ... Advances in simulation and modeling of manufacturing processes to reduce costs ... Assuring quality and dimensional control in the body shop Simplifying integration, reducing process complexity and increasing agility with Industry 4.0.

UNRIVALLED SPONSORSHIP AND EXHIBITION SHOWCASE OPPORTUNITIES:

The 2019 Lightweight Materials Joining, Forming & Manufacturing Innovation Summit offers North America's most focused platform for you to deliver your message on the latest developments and innovations in joining, forming and manufacturing processes, and meet OEM senior engineers and technical specialists implementing lightweighting strategies for a new generation of EVs and autonomous vehicles.

Achieve your business and marketing objectives through demonstrating thought leadership, raising brand awareness and increasing your profile, and meeting and networking with the automotive industry's manufacturing decision makers.

Contact sponsorship@lbcg.com for more information.

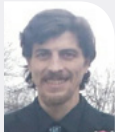
2019 SPEAKERS



Khaled Shahwan
Technology Lead, Advanced Development Engineering, Autonomy, Materials, Strategies, CAE
Fiat Chrysler Automobiles (FCA)



Hank Bonutti
Advanced Technology Manager
Mahindra NATC



Martin McDonnell
Experimental Mechanical Engineer, Joining and Additive Manufacturing Team, Materials Division
TARDEC



Dr. Venkat Aitharaju
Staff Researcher, Polymer Composites, R&D Technical Center
General Motors



Gregg Peterson
Principal Materials Engineer
Michigan Manufacturing Technology Center



Dr. Alan Taub
Senior Technical Advisor
Lightweight Innovations for Tomorrow (LIFT)



John Catterall
Executive Director
Auto / Steel Partnership (A/SP)



Zhenhua Huang
General Manager of Americas
Coherix



Ryuichi Funada
Technical Sales and Marketing - STAF Project
Sumitomo Heavy Industries



Vishwas Shankar
Research Manager, Mobility
Frost & Sullivan



Boris Baeumler
Senior Applications Engineer
DEPRAG



Brooke Virost
Business Development Manager
Henkel Corp.



Dr. Brandt Ruszkiewicz
Lead Development Engineer
Semblex Corp.



Eugene Chung
Business Development Manager
Henkel Corp.



Troy Waldherr
North American Sales Manager
TOX-Pressotechnik



George Ghanem
Founder and Principal Consultant, ProcessChamp
OSU Center for Design and Manufacturing Excellence

08:00 Coffee and Registration

09:00 Chair's Welcome And Introduction

COST-EFFECTIVE STRATEGIES FOR JOINING OF HIGH STRENGTH STEELS AND ALUMINUM ALLOYS

OPENING PANEL – SENIOR VP'S OF BODY STRUCTURE ENGINEERING

09:10 Cost Effectively Implementing Transformative Technology For Mixed Material Joining – *What Are The Best Practices And Latest Innovations?*

- Comparing different methods of joining aluminum to steel in terms of costs and payback
- Best practices specifically on joining of new high strength steels and aluminum alloys
- How to manage the joining process with different coatings and interfacial treatments
- Achieving a balance between lightweighting, vehicle performance and corrosion performance for EVs

Hank Bonutti, *Advanced Technology Manager*

Mahindra NATC

CASE STUDY: GEN 3 JOINING AND MANUFACTURING

09:40 Joining And Manufacturing New High Strength Steels And Aluminum Alloys – *Applying Innovation To Technology, Treatments And Coatings*

- Friction Stir Dovetailing (FSD) - applying innovation and quality enhancements to the joining process
- Examining the latest transformative technology for joining HSS and aluminum
- New steel alloys for the lightweighting of vehicle components and assemblies
- Developments in high strength Gen 3 steels with good formability at the 1000Mpa and 1200Mpa levels
- Managing springback for improved dimensional control
- Dealing with Liquid Metal Embrittlement (LME) and porosity challenges in welding processes

Martin McDonnell, *Experimental Mechanical Engineer, Joining and Additive Manufacturing (JAM) Team, Materials Division, TARDEC*

CASE STUDY: METALS TO CARBON FIBER

10:10 Headline Sponsor Presentation: *Innovations In New Fastener Types And Rivets For Joining Aluminum, Carbon Fiber And Steel*

- Developments in new lightweight fastener types and riveting for mixed material structures and reduced vehicle weight
- Joining aluminum and carbon fiber to each other and to steel
- Implications for mechanical fastening approaches with the adoption of Industry 4.0, increased automation and automated assembly cells

Rifast

10:35 Questions and Discussion

10:45 Networking Coffee Break In The Exhibition Area

OPTIMIZING STRUCTURAL ADHESIVE USE AND APPLICATIONS

PRESENTATIONS & PANEL DISCUSSION - ENHANCING ADHESIVE PROCESSES

11:15 Adhesive Application Optimization And Manufacturing Process Verification

- How much to put down for a given structure and avoid problems with over application?
- What are the full characteristics under welding?
- Developments in adhesive materials that enable greater control during application and processing and are more stable over long periods of time
- Avoidance of weld and paint application quality issues through improved wash resistance

11:50 Role Of Chemistry In Lightweighting The Battery Electric Vehicle

- Potential for smart chemistries to enable OEMs to meet lightweighting goals
- Paving the way for new vehicle structures
- Using different resins and fibers
- Structural hybrid solutions for EV battery protection

Brooke Virost, *Business Development Manager, Henkel Corp.*

Eugene Chung, *Business Development Manager, Henkel Corp.*

ROBOTIC TECHNOLOGY & ADHESIVE BONDING APPLICATIONS

12:25 Inline Robust 3D Inspection And Process Control Of Bead Dispensing

- Importance of inline inspection of bead quality with structural adhesives and sealants
- Utilizing 3D machine vision to inspect complex parts during the manufacturing assembly process to ensure highest quality finished components
- High speed inline inspection to increase throughput

Zhenhua Huang, *General Manager of Americas, Coherix*

12:50 Questions and Discussion

13:00 Networking Lunch In The Exhibition Area

NON-DESTRUCTIVE TESTING AND QUALITY CONTROL MONITORING IN JOINING PROCESSES

ULTRASONIC TESTING

14:00 Non-Destructive Testing (NDT) Process Development For Cost-Effective Joint Quality Monitoring

- Developments in ultrasonic evaluation approaches for different joint types
- What can be done to make the technology more robust for widespread use in the body shop?
- Inspection of laser joints for pores
- Non-destructive evaluation (NDE) of adhesive processes without disassembling

AUTOMATED VISION SYSTEMS AND DIMENSIONAL CONTROL

14:45 Developments In Automation For Inspection And Assuring Quality And Dimensional Control In The Body Shop

- Role for automation in ensuring enhanced dimensional control in manufacturing and reducing time to achieve objectives in new production lines
- Automated vision systems for optimized joining, assembly and dimensional control
- Inspecting Class A surfaces visible to the customer with laser scanning at high resolution and high volume rate to provide surface quality validation

George Ghanem, *Founder and Principal Consultant, ProcessChomp, OSU Center for Design and Manufacturing Excellence*

JOINING COMPOSITES TO METALS

15:20 Innovations In Joining Plastics And Thermoplastics To Steel Sheet Metals And Sheet Aluminum Alloys

- State-of-the-art in mixed-material joining solutions enabling lightweight, more efficient vehicle designs and structures for e-mobility
- Reducing the number of different joining technologies in multi-material body structures
- Strength and durability considerations in hybrid joint types including adhesive-mechanical and adhesive welding

Boris Baeumler, *Senior Applications Engineer, DEPRAG*

15:50 Questions and Discussion

16:00 Networking Coffee Break In The Exhibition Area

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FASTER, MORE COST-EFFECTIVE MANUFACTURING PROCESSES FOR ADVANCED PLASTICS AND COMPOSITES

16:40 Advances In Manufacturing Tools Using New Energies For Manufacturing Processes

- Advancements in material systems and processing
- Innovation in laser cutting of hydro-formed components
- Induction heating tools for cutting of materials and pre-curing adhesive bonded joints and sealants closure components
- Evaluation of energy utilization with various joining processes

HP-RTM AND NCF

17:00 Advanced Plastics And Carbon Fiber Composite Processes For Lightweighting

- Achieving faster cycle times and lower cost production with composite components through high pressure resin transfer molding (HP-RTM)
- Low cost non-crimp fabric (NCF) processes for high delamination resistance and impact strength - benefits in achieving complex shapes
- Benefits in terms of faster and cheaper production processes than unilayer based processes
- What is the progress towards \$5 per lb for carbon fiber reinforced material?
- 3D printer pre-forming opportunities
- Potential for replacing carbon fiber with bamboo strands - strength, weight and cost
- Developments in highly scalable sandwich hybrid composite technologies for greater lightweighting than carbon fiber alternatives for EV and autonomous vehicle applications

Dr. Venkat Aitharaju, *Staff Researcher, Polymer Composites, R&D Technical Center, General Motors*

17:30 Questions and Discussion

17:40 Chair's Closing Remarks - Day 1

17:45-18:45 Networking Drinks Reception For All Attendees
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08:00 Coffee And Registration

09:00 Chair's Opening Remarks

ADOPTING SIMULATION AND MODELING TOOLS FOR EFFECTIVE JOINING, WELDING, FORMING AND ADHESIVE BONDING

PRESENTATIONS & PANEL DISCUSSION - MANUFACTURING PROCESS MODELLING

09:10 Advances In Simulation And Modeling Of Manufacturing Processes To Reduce Production Costs And Minimize Physical Testing

- Innovations in predictive modeling of welding, stamping and adhesive joining processes to reduce physical testing processes
- Modeling of material properties for crashworthiness testing
- Simulating the assembly line for to ensure throughput and clearances
- Benefits in bringing new manufacturing plants and production online quicker

09:45 Composite Materials Simulation And Modeling For Enhanced Lightweight Body Structures

- Opportunities to reduce complexities in design so that you can look at manufacturing effects on performance
- Designing to use carbon fiber where exactly needed so you can change the density to match loadings on the component and optimize composite manufacturing processes

10:15 Questions and Discussion

REDUCING COMPLEXITY IN EV ASSEMBLY

10:25 Design For Manufacturing - Advanced Casting And Extrusion Processes Adoption For Increased Integration

- Reducing complexity in sub-assemblies and parts count in electric vehicle assembly
- Adoption of new extrusion alloys and processes
- Applications of extrusions for energy absorption including crash rails, bumpers and door intrusion beams

10:50 Questions and Discussion

11:00 Networking Coffee Break In The Exhibition Area

UNDERSTANDING AND REALIZING THE POTENTIAL FOR DIGITALIZATION AND INDUSTRY 4.0 MANUFACTURING

DIGITALIZATION AND INDUSTRY 4.0

11:30 Exploiting Digitalization Of Automotive Manufacturing Under Industry 4.0 For Smarter Faster Production And Improved Profit Margins

- Potential for new software and collaborative IT to enhance product design and transform traditional production and supply chain inefficiencies
- Achieving more agile manufacturing through leveraging artificial intelligence (AI), advanced analytics, sensors, machine learning and IoT
- Benefits in terms of faster tooling turnaround and lower capital investment with EVs and autonomous vehicles

Alan Taub, Senior Technical Advisor, Lightweight Innovations for Tomorrow (LIFT)

12:10 Adopting Digital Twin For Integrated Design And Manufacturing To Reduce Process Time And Cost

- Enabling a digital footprint of a product from design to development and throughout the entire product life cycle
- Modelling and simulating real time manufacturing processes
- Managing the performance, effectiveness, and quality of fixed assets such as machines, lines, and plants using advanced visualization, IoT, and analytical tools
- Case studies on digital twin in automotive design and production

12:45 Questions and Discussion

13:00 Networking Lunch In The Exhibition Area

ADOPTING AUTOMATED CELLS AND FLEXIBLE ASSEMBLY LINES FOR INCREASED PRODUCTION EFFICIENCY

FLEXIBLE CELLS AND ASSEMBLY

14:00 Maximizing Agility In Manufacturing For The Electric And Autonomous Customized Vehicle Future

- Adopting automated assembly to reduce processing complexity and increase production capacity
- Saving time and cost through adoption of flexible cells and flexible assembly lines – including robotic assembly cells
- Stability in assembly cells and assembly lines
- Universal intelligent robotic programming and simulation software for multi cell and robot configurations
- Optimization and predictive maintenance in manufacturing

14:25 Questions and Discussion

INCREMENTAL FORMING

14:35 Maximizing Lightweighting In Steel Automotive Bodies And Frames With The Steel Tube Air Forming (STAF) Process

- Hot metal air forming
- Flange forming technology
- Optimization of hot forming process

Ryuichi Funada, Technical Marketing, STAF Project, Sumitomo Heavy Industries

ADDITIVE AT LARGE SCALE

15:00 Progress Update On Manufacturing Process Enhancement Through Additive At Large Scale With Metals

- Scaling up additive and 3D manufacturing for metals
- Current capabilities - Where can additive manufacturing support high volume applications now? - In future?
- Where is the break over volume in industrial additive manufacturing? - How fast can you do it and at what volume are you better off just making the tool?
- Case studies on potentially transformational applications

15:25 Questions and Discussion

15:35 Networking Coffee Break In The Exhibition Area

MATERIALS CUSTOMIZATION AND DEVELOPMENTS IN ADVANCED MANUFACTURING PROCESSES

NEURAL NETWORKS IN JOINING

16:05 Lightweight Fastening And Joining Update

- Fastening design enhancements Flow Drill (FDS®)
- Application of neural networks to joining processes
- Future areas of investigation

Dr. Brandt Ruszkiewicz, PhD, Lead Development Engineer, Semblex Corp.

ICME AND MATERIAL COCKTAILS

16:30 Advances In Materials For Lightweighting That Will Make A Difference And Enable Advances In Manufacturing

- The situational vision for the future - Opportunities for parts consolidation and functional integration with tailored materials to reduce manufacturing costs
- Role for Integrated Computational Materials Engineering (ICME)
- Designing and exploiting customized material cocktails for structural applications
- Material systems that have potential for automation and faster processes

MANUFACTURING PROCESS INNOVATION

17:00 Key Applications And Processes For Metamorphic Manufacturing And Robotic Blacksmithing

- Looking ahead – The potential for more agile manufacturing and lower cost processing
- Optimizing the metamorphic manufacturing process with deformation and heating to improve material properties
- Delivering benefits in cost and time savings in vehicle production

17:25 Questions and Discussion

17:35 Chair's Closing Remarks - Amazon Echo and Champagne Draw

17:40-18:40 Networking Drinks Reception For All Attendees

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