Innovative Multi-Material Lightweight Solutions
To Reduce Vehicle Weight, Improve Performance
And Drive Higher Volume BEVs

Applying Material Innovations
To New Multi-Material Design Opportunities
For The BEV Body-In-White
And Battery Protection Systems

NEW! HIGHLIGHTS OF 2019 AGENDA

Examining New Opportunities & Innovative Solutions For Bringing In New Materials & Joining Innovations To Bring Costs Down And Drive Higher Volume BEV's.

Learn About New Material Characteristics, Key Application Areas And Overcoming Real-World Limitations For:

- New Steels & Mixed Metals Including Super High Strength Steels And Innovations To The Aluminium Series
- Innovations In Low Cost Composites Including The Use Of Recycled Composites
- Combining Hybrid Materials To Improve Material Performance Including Stiffness
- Developments In Lower Cost Glass-Fibre Technologies To Compete With Aluminium

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The Global Automotive Lightweight Materials Europe 2019 Summit is returning with a brand new programme with two full days focusing on the theme of high performance lightweight materials for electric vehicle body and battery protection structures.

Automotive lightweighting is taking on a new significance with the increased powertrain electrification. OEMs today are in search of innovative multi-material solutions to allow reduction of weight, improve the range and overall performance, and ultimately to drive higher volume of BEVs.

The 8th Edition of the GALM Europe Summit has evolved by bringing practical solutions for today, combined with visions for the future, to help car manufacturers deliver the next generation of lightweight electric, hybrid and conventional ICE vehicles.

WHAT’S NEW ABOUT THE 2019 AGENDA?

To address the latest innovations and challenges in the development of high performance lightweight materials for BEVs, the 2019 Summit features a mix of discussion panels, OEM and supplier led case studies offering insight into:

**Benchmarking Different Concepts For Integrating The Battery Into The Body-In-White And Battery Protection Structure**
- Design guidelines and requirements for the optimal use of new high performance lightweight materials for BEV

**Evaluating Simulation Models For Different Multi-Material Combinations And Assessing The Hottest Innovative Joining Solutions That Can Be Used In BEV Design And Manufacture Right Now**
- The latest innovations in the joining of dissimilar materials and how to use simulation to solve thermal and fatigue behaviour issues

**Optimisation of Adhesive Applications In Automotive Production**
- How to apply the right amount of adhesive and avoid quality issues that can arise from over application? The current approaches and equipment for non-destructive testing and quality control of joints

**The Visions For Lightweighting For Autonomous Vehicles And New Technologies For Sensor Embedded Composites**
- The new technologies for metal and composite additive manufacturing and how to apply them in automotive production applications

‘As someone new to Honda Engineering and the automotive industry, GALM is a very eye opening conference, giving me a lot to review’

Engineering Staff - Honda Engineering Europe Ltd

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### 2019 Speaker Line-Up:

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<thead>
<tr>
<th>Name</th>
<th>Title</th>
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<tr>
<td>Mustafa Basaran</td>
<td>Senior Material and Manufacturing Core Engineer</td>
<td>Ford Otosan</td>
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<tr>
<td>Lei Shi</td>
<td>Senior Chief Engineer of Qoros R&amp;D</td>
<td>Qoros Motor Company</td>
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<td>Ahmed Elmarakbi</td>
<td>Professor of Automotive Composites</td>
<td>Member of EU Graphene Flagship Project</td>
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<tr>
<td>Nir Kahn</td>
<td>Director of Design</td>
<td>Plasan</td>
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<tr>
<td>Mark White</td>
<td>Technical Specialist Lightweight Vehicle Structures</td>
<td>Former OEM Chief Engineer</td>
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<tr>
<td>David Salway</td>
<td>Senior Advanced Concept CAE Engineer</td>
<td>NIO</td>
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<tr>
<td>Tobias Link</td>
<td>Researcher and Project Manager</td>
<td>Institute For Chemical Technology Fraunhofer ICT</td>
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<td>Tomasz Czarnecki</td>
<td>Chief Operations Officer</td>
<td>EconCore</td>
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Benchmarking Different Concepts For Integrating The Battery Into The Body-In-White & Battery Protection Structure

08:45  Coffee and Registration
09:10  Chair’s Welcome and Introduction
9:15  OPENING CHIEF ENGINEER PANEL – DESIGN REQUIREMENTS CASE STUDIES
Evaluating Design Guidelines & Requirements To Make Optimal Use Of New Materials For Electrified Body-In-White And Battery Protection Structures
Car body structures will change quite dramatically with the rise of BEVs. This panel aims to answer some of the key questions for the selection of right materials, at the right time and the right place.
- What the future holds for vehicle electrification and what are the timescales and requirements?
- What are the future material developments?
- Design principles and guidelines for the most optimal use of a multi-material mix
- How are OEMs worldwide working towards safety requirements and what type of structure and construction are they applying?

09:20  CASE STUDY 1: Multi-Material Design Solutions For Meeting Global Regulatory Requirements On Integrating High Voltage Batteries Into Body Structures - How Are OEMs Worldwide Working Towards This Requirement?

09:35  CASE STUDY 2: Multi-Material Body In White Concept For BEV - Which Materials For Which Application?
Lei Shi, Sr. Chief Engineer, Qoros R&D, Qoros Motor Company

09:50  CASE STUDY 3: Identifying Optimal Hybrid & Mixed Metal Solutions For Integrating The Battery Into The Body In White
Mustafa Basaran, Senior Material and Manufacturing Core Engineer, Ford Otosan

10:05  Extended Questions & Discussion
10:50  Networking Refreshments Break

DAY 1
Wednesday, April 24, 2019

11:00  Keynote Speech

11:10  Incorporating High Thermal Conductivity, Lightweight Polymer Materials Into BEV Heat Exchange Systems
- A look at developments of thermal conductivity of plastics to incorporate into heat exchange systems in order to integrate with the battery.
- Understanding the pros and cons of polymers and other materials and how they can be deployed within the battery structures to achieve heat exchange, flexibility and keeping vehicle mass down

11:20  Comparing Aluminium With Hybrid Composites And Polymers For Optimal Lightweighting Of The Battery Case
With the battery being an integral component of the electric car it is important to design the best mix/interaction of various materials like hybrid structures, composites and metal materials, and to understand how they perform/interact with each other to maximise the light weighting opportunity. This presentation covers the following core issues:
- The selection process and what materials are best suited for the battery boxes and enclosures
- Integration of the battery box into the vehicle architecture from the design point of view
- Which materials are optimal for the battery case and holdings from both a protection and thermal management perspective
- Ensuring electromagnetic (EMC) compatibility and integrity to prevent the leak or loss of current and which materials are best suited for this?
- Opportunities and challenges for utilising composite materials instead of aluminium and steel

11:50  The Application Of The Latest Innovations In New Steels Including Super High Strength Steels
An overview of the new steels entering the market and a look at new developments in steel for lightweight solutions

12:10  Design Considerations For Optimising Multi-Material Combinations For Sub-Frame Structures, E-Motors & Carriers – The OEM Perspective
Mark White, Technical Specialist Lightweight Vehicle Structures, Former OEM Chief Engineer, DSW Automotive

12:40  The Application Of The Latest Innovations In New Steels Including Super High Strength Steels
An overview of the new steels entering the market and a look at new developments in steel for lightweight solutions

13:10  Lunch in the Networking Exhibition Area

14:10  Analysing Innovations To The Aluminium Series
A look at the developments in the expansion of the Aluminium Series including the prospects for emerging technologies including new hot stamping manufacturing processes

14:20  The Latest Research Advancements in Multi-Material Lightweight Design: Hybrid Thermoplastic Composites for Automotive Applications
- An update on the development of a lightweight rear floor structure
- One-shot Process Route including a holistic virtual design
- Reviewing new process developments in LFT-D compression molding for hybridisation and functionalisation
- Transferring to a process chain for larger demonstrator parts
Tobias Link, Researcher and Project Manager Institute For Chemical Technology, Fraunhofer ICT

15:05  In-Line Integrated Production Of Thermoplastic Honeycomb Panels – Can Weight And Cost Savings Meet Together?
- The importance of weight and cost reduction in today’s market
- A review of state-of-the-art processes for high-performing material solutions and an introduction to the process of continuous production of lightweight thermoplastic honeycomb sandwich panels
Timothy Grodski, Operations Manager, Organosandwich

15:30  Networking Refreshments Break

16:00  Innovations In Low Cost Composites Including The Use Of Recycled Composites
- Can carbon fibre win the lightweight race despite high cost and utilisation challenges?
- Recycled carbon fibre solutions for automotive lightweight construction
- Injection-moulded composites and processes systems

16:30  Combining Hybrid Materials To Improve Material Performance Including Stiffness
- Hybrid materials development and applications, and the opportunities for replacing metals and composites
- The pros and cons of using hybrid composites
- Joining hybrid composites with steel and aluminium
- The applications for glass fibre considering price and design optimisation
- Opportunities for high-entropy alloys application
Nir Kahn, Director of Design, Plasan

17:00  Developments In Lower Cost Glass Fibre Technologies To Compete With Aluminium
- A look at glass fibre uses in composite sides and new technologies and new applications including BEV powertrains
- An overview of Glass fibre technology applications in composites

17:30  Automotive Graphene-Based Nanocomposites
- Potential automotive applications
- Innovative hierarchical graphene nanocomposites for automotive structures
- Challenges, the way forward and roadmap
Ahmed Elmarakbi, Professor of Automotive Composites, Member of EU Graphene Flagship Project, Northumbria University, UK

17:55  Chair’s Closing Remarks – Day One
18:00  Networking Drinks Reception for Speakers and Delegates

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LIGHTWEIGHTING FOR AUTONOMOUS VEHICLES

16:30  New Technologies For Sensor Embedded Composites For Autonomous Vehicles
• Utilising sensor data (e.g. strain and temperature) from composite parts and applying to autonomous vehicles
• Material 4.0 and the impact of future of mobility on chemicals and materials usage

16:50  Questions And Discussion

17:00  Repair Strategies For Higher Volume Vehicles Involving Carbon-Fibre Reinforced Composites

17:20  Questions and Discussion

17:30  Closing Remarks and Close of Conference

Nir Kahn, Director of Design, Plasan
I would like to register the delegate(s) below for the 2 day conference
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24th - 25th April 2019
Munich, Germany

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