The development of BEV & xEV technology continues to accelerate at an ever increasing pace; challenged by factors which include performance, cost, lifetime and safety of the battery. Optimal management of batteries is necessary to reach the maximum performance when operating in varies conditions. This congress focuses specifically on the battery thermal management system (BTMS) and its vital role in control of the battery thermal behaviour. The congress will explore innovating and breaking technologies in cooling systems, safety, thermal runaway and ultra-fast charging. We will analyse systems through the lens of performance, weight, size, cost, reliability, safety and energy consumption. We will look at design simulation, safety, regulation. Furthermore we will investigate carefully the electric energy consumption of BTMS and look for savings that will help battery performance by reducing energy consumption of the BTMS and extend the electric range of the EV.

Key Challenges Addressed:

- Increasing Battery Range
- Ultra Fast Charging
- Strategic Global Analysis
- Battery Power Issues for xEVs
- Testing For The Future
- Simulation & Modeling
- Integration And Optimisation of Battery Vehicle Structures
- Battery Pack Design
- Solid State vs Lithium-ion
- Cooling
- Requirements Vs Cost
- Thermal Runaway Solutions
- Battery End Of Life
- Crash
- Adhesives
- Surface Preparation
- Materials
- Coating
- Joining
- Thermal Interface Materials

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Thermal Management Innovation USA 2019 provides an in-depth analysis of key battery thermal management solution current challenges, and benchmarks the strategic imperatives for upcoming BTMS technologies, road maps and advancements. The Summit is the industries largest technical meeting for AutomotiveThermalManagementprofessionals and foremost communication network for OEMs, technology and solutions providers, Tier1’s, Tier2’s and leading Research Institutes alike.

The presentations and networking sessions will highlight the current and future product planning for various manufacturers and their growth potential. Thermal management experts will meet to enhance the performance, efficiency and usability of battery thermal management systems, as well as reduce the cost of adoption for high performance battery-systems. The Summit will look at OEM profiles, discuss key partnerships in co-developing new technologies and the key technology trends driving enhanced thermal performance at a reduced cost.

Batteries require a unique range of issues be taken into consideration. First, detailed models and sub-models are needed to simulate the chemical and physical phenomena inside battery cells; Then, these models need to be tied into a system-level model of a battery pack, which can comprise hundreds of cells and cooling circuits. Finally, the battery pack model needs to be integrated with the system model of the entire powertrain and vehicle. Engineers must consider the physical placement of the battery pack within the EV, not only to minimize the effects of ambient temperatures and maximize heat dissipation, but also to avoid excessive mechanical stresses, structural fatigue from road vibrations and potential impact from which passengers must be protected.

Our focus across the two days will be to address the current and key challenges, and deliver a rage of technical key note presentations and case studies; as well as encouragedelegate participation during expert ‘fire-side chat style’ panel discussions and workshops.

As ever faster and ultra-fast battery charging rates are demanded, higher performance electric vehicles with a requirement for consistent performance and adequate durability in global markets has meant that special and more advanced thermal management methods for the battery pack are now required. We will look at the business environment and key strategies the OEMs in North America plan to use to produce high-performance batteries, and the impact of thermal management systems, both the status of existing technologies and development, and how it will evolve in the future.

We look forward to welcoming you to the Summit this November in Detroit.
TOPICS TO BE COVERED AT THE EVENT:

- Exploring How Advanced Thermal Management Solutions Can Increase Range For A Battery
- Ensuring The Pack Operates In The Desired Temperature Range For Optimum Performance
- Key Trends And Challenges Impacting Battery Thermal Management Needs & Solutions
- Improving Energy Storing Capabilities; The Functional Capacity Of The Battery
- Thermal Management Of The Battery Pack For EV Safety
- Testing, Modeling & Simulation Of Thermal Management & Thermal Runaway
- Battery Pack & Battery System Design & Material Selection
- Exploring New Technologies for Cooling/Heating Solutions
- Increasing Performance & Longevity
- Strategies For Dealing With Battery End Of Life
- Fast Charging & Batteries Of The Future: The Impact Of Fast and Ultra-Fast Charging and Battery Thermal Management
- Adhesive Innovations Advancing Thermal Management Capabilities
- The Role Of Thermal Interface Materials In Battery Systems
- Wireless Charging for xEV’s: A Crucial Step Forward
- Thermal Energy Storage
- Advancements in Lithium-Ion And Solid State Battery Technologies

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AGENDA
DAY 1: 13 NOVEMBER 2019

7:50AM REGISTRATION & MORNING REFRESHMENTS IN THE EXHIBITION HALL

8:30AM Key Trends And Challenges Impacting Battery Thermal Management Needs & Solutions
- Identifying the future model, charging and infrastructure requirements
- Analysing the current and future product lines by OEMs - highlighting the major growth opportunities
- What are the strategic imperatives of the global battery thermal management market
- What impact will the development and cost of various types of batteries have on the emerging market for xEVs
- Progress in the next decade; what critical barriers will need to be overcome along the way?
- Global technical regulation for EVs covering high voltage electrical safety, safety of electrical components and rechargeable electrical energy storage systems.

8:50AM More Powerful Batteries To Improve The Energy-Storing Capabilities Of Electric Cars; A Matching Capability In Thermal Management Systems
- Battery Power Issues for EV’s: How to boost battery power while maintaining thermal stability
- Increasing tolerances for operating temperatures: What advanced thermal management solutions are required to better protect the battery itself, the vehicle, and provide stability at high temperatures
- Protecting power electronics: Material challenges for motors; Components and connectors; Battery insulation and lithium-ion battery separators
- New electro-chemical mechanisms that might boost the specific energy performance of future batteries

9:10AM Where is the market going from a voltage standpoint and what effect will that have on the battery architecture and vehicle design?
- What overall impact will this have on battery thermal management systems?
- What impact will this have on regulatory requirements and cash testing?
- Protection against the possible and unexpected derating effects which lead to reduced acceleration capabilities, as well as possible thermal events and pack runaway/venting.
- Exploring the next generation of Battery and fuel cell technologies on the horizon

9:30AM How Can Thermal Management Increase The Range Of A Battery

9:50AM Adhesive Innovation
- Instant adhesives that help control battery cell spacing and ensure components stay fixed
- Adhesives that help bond metals and seal fluids internally – essentially in hybrid systems

10:30AM MORNING NETWORKING & REFRESHMENTS

11:00AM Testing For The Future of EV’s: As The Demand For More Efficient And Sophisticated EV’s Increases So Must The Underpinning Technology –
- How to Improve diagnostics of High Voltage Batteries – the predictive tools for early detection of cell failures
- Exploring the newest temperature handling methods to protect cells, preventing damage and optimising performance
- Testing of HV System Components

11:30PM Thermal Management of The Battery Pack For EV Safety
- Thermal requirements in ‘pack level’ to prevent thermal runaway
- The possible cooling solutions for the battery pack
- Thermal Management and battery protections – hardware and software
- CFD Simulations of battery cells and battery pack

12:00PM Battery Pack Design & Material Selection
- Material selection for battery pack and components: Design and selection of optimal materials to protect the battery pack and components – optimal material combinations
- Explore the opportunities for composite materials and advanced materials
- Integration of battery cells, components and electrical communication within the battery structure.

12:30PM Battery Systems and Packaging Integration
- Utilise cutting edge solutions to achieve more efficient battery packaging and battery systems integration
- The advantages of a ‘complete box packaging solution’ – compare the cost benefits of a solution where the cells and modules are integrated with the battery management system and distribution unit.
- Pros and cons of integrating: The battery and the distribution unit inside one complete box: the impact such a solution will have on overall design.
- Battery packaging with separately attached module solution.
- High voltage electric components integration: options for wire connector packaging
- Optimal integration systems and electronics and electrical interactions

1:00PM LUNCHEON & NETWORKING IN THE EXHIBITION HALL
AGENDA
DAY 1: 13 NOVEMBER 2019

Thermal Performance Optimisation

1:30PM The Next Generation of Innovative Solutions For Packaging The Thermal Management System
- Comparing different thermal management systems solutions depending on the vehicle type, system requirements and costs
- Thermal Management Solutions in R&D phase
- Benchmark different thermal system layouts to achieve a simplified, optimised & smart holistic thermal solution that is easily integrated into a vehicle.

2:00PM Exploring Different Cooling Circuit Layouts Including Separate And Mixed Architecture
- Identifying challenges and reviewing opportunities of:
  - Liquid Cooling Solutions: Analysing thermal layouts and performance advantages in high power and high heat flux applications
  - Heat Pumps – As a solution to optimise thermal systems in EV's
  - Air Cooling – Over coming the technical limitations associated with air cooling circuits

2:30PM New Technologies & Techniques for Simplifying and Taking Complexity out of Cooling Processes
- Heat rejection from components needs to be directed to systems requiring heat
- Warmup and temperature regulation of components should be optimised – resulting in a multi-variable optimisation

3:00PM Advanced Material Solutions To Protect The Battery And Assist with thermal management.
- Material trends with battery packs
- How can the battery structure itself be light weighted
- Role for aluminum extrusions for safety: Protection and to assist battery thermal management
- Multi-Material combinations for battery structures
- What are the best methods and technologies to protect high voltage batteries
- Design and material selection to optimize battery packaging and integration into the body structure

3:30PM AFTERNOON REFRESHMENTS & NETWORKING IN THE EXHIBITION HALL

Thermal Runaway

Safety is the most important criteria for electric car batteries. Even a single battery fire could turn the public opinion against electric mobility and significantly set back industry development. The main aim in this area is preventing thermal runaway – a positive feedback loop whereby chemical reactions triggered in the cell exacerbate heat release, potentially causing a fire.

Thermal run away can be caused by an overcharged battery, too-high discharge rates, a short circuit or damage. Chemistries that are prone the thermal run-away, such as NCA, NMC, and LMO must be used in conjunction with system level safety measures that either contain the cells or monitor their behaviour. Such measures include a robust battery box, a very efficient cooling system (to prevent the early stages of thermal runaway), precise state of the art monitoring and cell-discharge balancing.

16:00PM Advanced Materials and Solutions to Limit Thermal Run Away
- A higher ambient temperature can alter how the electronics themselves operate, with further temperature rises resulting: How to best protect power electronics components.
- Preventing effects on the on-resistance of transmitters, which heat up, and contribute to a positive feedback loop, likely to lead to the electronics in the vehicle burning out.
- The use of mica insulation and mica components to significantly reduce the risk of thermal runaway
- Balancing inherently safer chemistries, such as LFP and LTO, or Chemistries that offer higher energy but are less safe, such as NCA, which must be used in conjunction with rigorous safety systems.

4:30PM Thermal Criteria For Best Performance And Longevity
Battery Thermal Management Requirements: The benefits of efficient battery thermal management are shown in detail, as a cell’s health, power availability and driving range strongly depend on it.
- Analysis the Cylindrical battery cell type which is sensitive to high radial temperature gradients as they have an unfavorable outer surface to volume ratio
- Analysing the Prismatic and pouch battery cell type: they have a lower temperature gradient in depth (but still depending on cell thickness) as they present a good outer surface to volume ratio.
- Thermal criteria for best performance and longevity

05:00PM How Can Energy In An Impact Be Managed To Protect The Batteries?
- Identifying and analysing optimal methods of holding and protecting cells in a module
- Performance debate needed to manage “Range Anxiety” and thermal requirements

5:30PM CHAIRS CLOSING REMARKS & DAY 1 SUMMARY
8:15AM CHAIRS OPENING REMARKS

8:30AM What Are The Strategies And Options For Dealing With Battery End Of Life
  • Regulations on vehicle and battery recyclability
  • Designing for Recyclability
  • Cost benefits of re-use vs recycling

9:00AM Solid-State Technology – What Are The Thermal Management Implications
  • Solid State batteries are not so far from the market: Many OEMs are now developing and experimenting with this technology, identifying the future road map for a solid state battery role out
  • Exploring the issues of solid state technologies for USA automotive Industry
  • How to create new opportunities for Solid-State Technology
  • What are the thermal management challenges associated with solid state batteries?
  • How systems engineering can reduce the cost of development
  • What are the keys to choosing the best BMS architecture

9:30PM Efficiently Using Battery Thermal Management For Meeting a Higher EV Drive Range [Session Reserved for Magna Powertrain: Thermal & Manufacturing]
  • Choosing the Right components for handling high voltage batteries
  • Battery operation in winter conditions
  • Benefiting from new battery thermal management architecture design

10:00AM Thermal Performance Optimisation & System Integration [Supplier]
  • Exploring advanced solutions to optimise thermal performance of EV systems

10:30AM MORNING REFRESHMENTS & NETWORKING

11:00AM Fast Charging & Batteries Of The Future: What Will Be The Impact Of Fast Charging On Battery Thermal Management?
  • Ultracapacitors and their role in future powertrains: Increased power density for enhanced vehicle performance and reduced battery size.
  • New battery materials and design for greater energy density and efficiency
  • Solid state batteries and their commercialisation
  • Lithium-ion innovation
  • Developing a battery that operates optimally across a wider range of temperatures.
  • Battery Packing: Thermal Dissipation Materials for assembling the battery

11:20AM Managing Impacts Of Fasts Charging On Thermal Management Of The Battery Pack
  • Management and control of high capacity battery systems
  • How fast charging impacts thermal management and heat generation
  • State-of-health and state-of-life estimation

11:40PM Improving Energy Density and Performance of EV Battery Packs with Thermal Management Materials and Coatings [Reserved for Lord]
  • Implications of shifting battery performance curve with increased energy density
  • Introducing CoolTherm® Potting Materials, Adhesives, Gap Fillers

12:00PM The Role of Thermal Interface Materials in Battery Systems (TIMs)
  • Efficient heat transfer – Electrical isolation – Gap filling / conformability – Vibration damping
  • Liquid-Dispensed, Curable Gap Fillers
  • Pre-cured, Pre-cut Thermal Pads (“Gap Pad”)
  • Thermal Pads vs. Gap Fillers – How Do They Compare?
  • Gap Fillers vs. Thermal Pads – Specifications
  • Effect of Pressure on Thermal Impedance of Thermal Pads
  • Practical Comparison: Compressed Thermal Pads vs Gap Fillers
  • Comparing Pads and Gap Fillers During Fast Charging
  • Thermal Pads versus Liquid-Dispense Gap Fillers

12:20PM Assembly & Manufacturing
  • Consideration of important aspects such as simplicity: Packing, Assembly and cost without neglecting cooling performance and safety
  • Advanced Assembly and manufacturing tools to achieve seamless integration of battery packs and BTMS’s
  • Identify which solution is best for your organisation – how to integrate within existing production lines
  • Manufacturing 4.0 – Exploring the potential of EV manufacturing digitalisation from the perspective of BTMS’s.
  • How to cost effectively adapt your manufacturing & production lines for Battery EVs
  • Learn about the newest methods to handle the variability in production automation

12:40PM A Complete System Solution for Battery Management [BMS Partner 2019]
  • Challenges in automotive electrification & battery management systems
  • Component Systems
  • Component (Cell/Pack) level Modeling
  • Functional Safety Analysis / Software Simulation and Tests
  • Control Software Design

1:00PM LUNCHEON IN THE NETWORKING EXHIBITION HALL
1:30PM Sipiol Flame Resistant (FR) Coatings
- Outside of prismatic, cylindrical, or pouch cells to stop a fire
- Inside individual module boxes to stop a cell fire from spreading beyond the module
- Inside of a battery-box housing to stop cell fires from spreading
- Coat the outside of the battery box to stop external fires from affecting the battery

2:00PM Ultra-Fast Charging Systems: Increasing Voltage and current for achieving higher charging power
- How to reduce battery stress and protect battery life, identifying ways of dissipating heat and keeping the battery and charging devises cool
- Dealing with ultra-fast charging thermal issues
- Thermal management of the power electronic components
- Dissipation of heat to the outside air
- What are the standards for EV’s?
- Cooling charging connectors for reaching higher charging power
- Technological progress and remaining challenges on the cell and system level
- How can battery improvements help ultra-fast charging: technology, chemistry and cooling system innovation?
- How is battery cooling achieved in the context of ultra-fast charging?
- What is the effect of ultra-fast charging on battery durability?
- What are the cost implications on ultra-fast charging battery-health?
- Overcoming lithium plating caused by ultra-fast charging

2:30PM Wireless Charging for xEV’s: A Crucial Step Forward to Cable-Free Electro Mobility
- Technology overview, compatibility with wireless chargers.
- What are the wireless charger communication and safety systems?
- Future Developments.
- Project STILLE (Audi, BMW, Daimler and Toyota, suppliers (Bosch, Continental, Qualcomm, and Witricity) and academia

3:00PM Understanding The Effect Of Thermal Gradient on Lithium-Ion Battery Performance [Research Ins.]
- Causes and consequences of the thermal gradient
- Simulation tools for predicting the thermal gradient
- How model information could be used in battery Management System

3:30PM AFTERNOON REFRESHMENTS AND NETWORKING IN THE EXHIBITION HALL

4:00PM Dealing With The Thermal Simulation Challenges of Electric Vehicles
- Leveraging a virtual model which can be tested in the harshest environments without the time and cost of building and testing prototypes
- How to identify and solve thermal issues in a matter of hours or days as opposed to weeks or months
- Simulating unconventional materials and shapes (in order to fit into the available space); import and solve complex CAD geometry - something legacy simulation tools often struggle with.

4:20PM Tools For Simulation Of Component Level Thermal Management
- Understand which thermal management simulation solutions provide dedicated tools to build and analyse complete thermal management models.
- Identify the best simulation tools to identify the cooling load and the resisting load of the batteries.
- Implement solutions for careful analysis of cooling airflow, component placement and thermal shielding to avoid design fixes and production failures.

4:40PM How To Best Connect Simulation And Testing To Get Much Closer To Reality
- Today there is a gap between simulation and testing: This is especially true for thermal management. To front load thermal management tasks on testbeds requires dynamic conditioning units and accurate simulation models.
- How to ensure you are testing to behaviours that correspond with a real vehicle; without such a connection components are only tested with constant coolant temperatures and volume flows resulting in behaviours that do not correspond to that in a real vehicle and, for example, derating effects caused by over heating or the battery are not accurately reflected.
- How to test for and represent derating

5:00AM Surface Preparation
- Functional coatings to protect critical components, extend battery life, promote increased adhesion.
- Choice of battery configuration – single vs multiple pack approaches
- Making the battery pack denser - tighter packing benefits (range /reduced energy consumption

5:20AM Integration and optimisation of Battery Vehicle Structures
- Maximizing Safety And Performance Through Integration And Optimization of body structures, battery pack, thermal management and powertrain
- Powertrain layout optimisation: number of motors and component placement, to find the best solution to enhance electrical powertrain performance.
- High voltage energy distribution
- Managing thermal runaway risks and crash safety

5:40PM CHAIRS DAY 2 SUMMARY & CLOSE
WHO SHOULD ATTEND

• Chief Engineers • Systems Engineers • Automotive OEMs
• Electric, Autonomous and Hybrid Vehicle • CEO, Vice President, General Manager from EV OEMs • Chief Engineer - Battery Electric & Plug-In Hybrid Vehicles • Chief Engineer, Electrified Propulsion Systems • Chief Engineer, Electrical Systems • Head, EV Engineering Systems • Head of Vehicle Electrification Technology • Head of Hybrid and EV Battery Systems • Chief Scientist, Energy and Systems • Head of Vehicle Architecture • Head of Systems and Control Engineering
• Electrification Project Engineer • Head of Research, Materials and Manufacturing • Group Product Director Hybrid and Electric Systems • Lead Engineer, Electrical Systems Engineering • Lead Engineer, Electrified Powertrains • Head of Body Structures & Body in White • Battery Electric Vehicle Global Lead Engineer
• Global Battery Systems Engineering • Battery Research Engineer • Technical Manager - Innovation Management
• Innovation & Technology Development Manager • Chief Engineer & Technical Leader • Energy Storage & Systems Manufacturers • Heads of Concepts and Systems • Manager Batter Integration • Thermal Systems Development • Market Segment Head Electric Vehicles • Director Product Engineering Electric Heating • Head of Advances engineering Thermal Systems • Senior Manager Thermal & Manufacturing Solutions • Leader of Thermophysics and Thermo Dynamic Group • R&D Thermal Management • Project Lead Electrification • Head of EV Charging Infrastructure • Chief EV Battery System Engineer.

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