Developments in Thermal Management and Plastic Powertrain Components 2021





Sheraton Detroit Novi Hotel - Novi, MI USA













7:30 a.m. Registration, Networking and Continental Breakfast

8:30 a.m. Welcome and Introductory Remarks

Mr. Sean Osborne, Vice President

The ITB Group

Battery Thermal Solutions

8:45 a.m. Thermal Management System Design Using the Cell Cooling Coefficient

Alastair Hales, Research Associate, Yatish Patel, Research Fellow, and Gregory Offer, Reader in Mechanical Engineering

Imperial College London

The Cell Cooling Coefficient metric defines a lithium-ion battery cell's ability to be thermally managed and quantifies the temperature gradient expected across the cell due to internal heat generation. Imperial College London investigates battery cell designs and effects on thermal transfer, including how cell geometry can impact the Cell Cooling Coefficient. Research results show how surface cooling limits cell performance, and how thermal design changes can improve battery pack safety and energy density.

9:15 a.m. Engineering the Thermal and Safety Challenges in Next-Generation Battery Packs

Bret Trimmer Application Engineering Manager

NeoGraf Solutions

Thermal management improvement is a key factor in extending electric vehicle driving range and achieving faster charge rates. In addition to improving charge rate and energy density, graphite heat spreaders make battery packs smaller and lighter. This presentation will show how flexible graphite heat spreaders reduce battery pack thermal management material thickness by half, and weight by one third, compared to aluminum.

9:45 a.m. Changing BEV Thermal Systems

Sean Osborne. Vice President

The ITB Group

This presentation will highlight key thermal system cost and performance challenges for BEVs plus solutions being developed over the next ten years. Changes in thermal system architectures and integration will be presented. Additionally, battery cell and pack thermal system design changes will be explored as the

industry moves toward solid-state chemistries and rapid charging capability.

10:15 a.m. Networking Break Sponsored by:



Material Innovations

11:00 a.m. Advances in High Performance Thermal Management

John Allen, Thermal Technology Leader W.L. Gore

This presentation will highlight advanced ultra-thin thermal insulators, heat spreading composites, as well as commercial electronic component application examples. A high-level roadmap will be shared, highlighting the potential automotive technology applications such as batteries, power electronics and other high heat generating components for new vehicle architectures.

11:30 a.m. Engineering Plastics Developed for EV Thermal Management System

Russell Bloomfield, Application Development **DSM Engineering Materials**

Vehicle drivetrain electrification brings unique challenges and opportunities for thermal management system material selection. This presentation will provide a perspective for engineered plastic material selection. Additionally, the latest DSM PPS material developments for EV thermal management systems will be reviewed. A PPS material performance update will include insights for coolant system application engineering.

12:00 p.m. New Approaches to Material Selection and Heat Stabilization for Future Powertrains

Lenar Abbasov, Market Segment Manager, Automotive Powertrain

BASF Corporation

Transformation from pure ICE to electric propulsion challenges the conventional approaches for material selection positioning of engineering plastics. How can the diverging material requirements for ICE downsizing, and new requirements for hybrid and electric propulsion systems be managed? This presentation will explore a new approach in heat stabilized polyamide 6 solutions that bridges this divide.

12:30 p.m. Lunch

Solutions for Thermal Management Systems 1:45 p.m. in E-Mobility

Greg Poterala, Transportation Marketing Manager

Solvay Specialty Polymers

Electrified vehicles, particularly full electric vehicles, have challenging thermal management requirements. The unique chemical, electrical, and thermal environments of electric vehicles must be considered when designing thermal svstem components. This presentation discusses materials used in electrified vehicle thermal systems with an emphasis on electrified pumps, electrified valves, and coolant lines.

Waste Heat and Fluid Systems

2:15 p.m. **Cooling System Component Design for** Efficiency and Reliability

Anthony Khoraych, CEO

Advanced Test & Automation

This presentation explores successful and unsuccessful thermal component designs. Key attributes will be highlighted using real-world test data at corner case conditions (such as -40C, pulsation and cavitation). Pump, valve, and heat exchanger design decisions will be compared in a case study format. Thermal design, innovation and validation engineers will benefit from an 4:45 p.m. overview of key issues and opportunities.

2:45 p.m. **New Integrated Thermal Manifold Assemblies for EVs**

Andy Sutherland, Global Director, Thermal Products Advance Technology

TI Fluid Systems

An innovative Integrated Thermal Manifold assembly for EV coolant fluid management will be presented. The design is a one-piece, lightweight, blow-molded plastic manifold which optimizes complex line design and replaces multiple line assemblies for heating and cooling of next generation EVs. This approach has significant OEM value of improved flow performance for efficiency gains, lower part count for sub and final vehicle assembly, lower 5:15 p.m. weight, and reduced tooling cost.

Quantifying Uncertainty from Design 3:15 p.m. **Concepts to Manufacturing for Thermal** Components

Payman Kianpour, Director

Kepstrum

This presentation will describe analytical algorithms to understand design limits and avoid product failures. Analytical models are more

effective than traditional specification-based designs to predict how, why, and when failures occur. Fluid pump examples will be shown to explain how predictive models can be used to reduce development and quality costs.

3:45 p.m. Sponsored by:



4:15 p.m. Heat Pumps: Challenges in Design, Operation, and Controls

Sudhi Uppuluri, CTO and Gaurav Patil, Thermal Systems Lead

CSEG

Heat pumps systems are becoming common in electric vehicles to reduce cabin energy consumption and increase vehicle range in cold conditions. However, heat pump systems have complicated operation with performance and cost challenges. CSEG's work quantifyies the impact of the challenges using a physicsbased system model. The model quantifies energy savings and identifies the right operating zones for system components. Additionally, this integrated physics-based model and control system enables component operating point optimization and development of a feed-forward control system for optimal performance.

Electric Actuators for Expansion Valves

Dr. Gerald Masson, Technical Specialist, Business Development Manager

Moving Magnet Technologies

Stricter vehicle C0, regulations and increasing electric vehicle range require more efficient solutions. Precise control of the refrigeration loop enables better vehicle efficiency. A new generation of actuator, Electronic Expansion Valves (EXV), has progressively been replacing purely mechanical Thermostatic Expansion Valves (TXV). A new linear EXV solution has been designed based on non-parallel gears to achieve the high force density needed/required for high flow or to reduce the size of low flow valves by drastically reducing electric motor size.

Closing Remarks and Cocktail Hour





9:00 a.m. **Welcome and Introductory Remarks**

> Dr. Joel Kopinsky, Managing Director & Co-Founder

The ITB Group

Innovations in Cooling Lines

9:30 a.m. **Elastomeric Performance When in Contact** with FR Plastics and in EV Coolant(s)

Priscilla Ogaro, NA Technical Service Specialist -Vamac® and John Huber, Market Development Manager

DuPont

The transition from internal combustion engines to include BEV/EV/Hybrid vehicles has altered material requirements. One trend is the need for high CTI (Comparative Tracking Index) resins to manufacture high voltage connectors including miniaturization that must be flame retardant rated. Changes in these plastic based components leads to the demand for elastomeric solutions that have excellent sealing capabilities but are also compatible with NHFR resins.

10:00 a.m. Material Solutions for ICE & EV Cooling Line **Applications**

Desiree Maurer, Business Development Engineer

Arkema

A broad and unique portfolio of long-chain polyamides (LCPA), including PA 11, PA 12 and others, has been developed for under-the-hood applications. These LCPAs offer superior longterm thermal and hydrolysis resistance, cold temperature impact performance, flexibility, and zinc chloride resistance. Specific grades have been formulated to meet the demands inside and outside the battery pack as well as near the engine and other high temperature routing environments.

10:30 a.m. Plastic Multilayer Tubing for Cooling Lines: **Efficient Solutions for Current and Novel Powertrains**

Dr. Jennifer Hasselberg, Senior Business Development Manager

Evonik

Globally the share of plastic solutions for cooling lines has been increasing over the past few decades based on weight, packaging and economic benefits. Originally monolayer tubing solutions were predominantly used but now multilayer tubing solutions are playing the major role. The combination of the performance of different materials in one multilayer provides higher performance and competitiveness. This trend has been further accelerated with the introduction of electrified powertrains.

11:00 a.m. Networking Break Sponsored by:



11:45 a.m. KEYNOTE PRESENTATION

Market Trends and Developments Driving the Future of e-Mobility

Vuk Milojkovic, CEO

BASF Toda America

A key driver of the e-mobility market is battery performance, which in turn depends on the cathode active material used to make the battery. As a leading cathode active material supplier to battery producers, BASF has unique insights into this fast-changing market. This presentation highlights BASF's view of the key market trends and developments/materials for vehicle electrification. In addition to the global perspective, a regional view of opportunities and challenges with North American value chain development will be discussed.

Innovations in Powertrain Components

12:30 p.m. New Electronic Methods of Quick Connector Verification

Dave Gabbey, Fluid Carrying Systems Regional Director, Americas

TI Fluid Systems

With the increasing complexity of vehicle systems, the number of critical fluid connections is growing rapidly. To minimize warranty and enhance safety, a new 'operator independent' electronic connection verification solutions for a wide range of quick connector (QC) designs has been developed. These optical and RF-based systems confirm joint integrity with options for traceability and automated reading.

1:00 p.m. **High Aspect Ratio Graphites for Light-**Weighting

Dr. Anna Ellett, Field Application Engineer **Polymers**

Imerys Graphite & Carbon

The benefits of high aspect ratio graphites for light-weighting and greater formulation flexibility

Presentations from both conference days will be made available to conference attendees two weeks after the conference has concluded AND when provided permission by the speaker

will be showcased. For automotive thermal management, these provide high thermal conductivity at low loadings. They exhibit high electrical conductivity which makes them light-weighting additives of choice for EMI shielding. Their high thermal conductivity is beneficial to remove the frictional heat in lubrication and wear applications.

1:30 p.m. Lunch

2:30 p.m. Innovative Motorbike Air Box

Bill Dwyer, Manager Product Portfolio Americas Roechling Automotive

A motorbike air box with movable trumpets is described. This includes a full plastic application with integrated components that include a resonator, a filter box and an intake manifold.

3:00 p.m. Fast Track Development of Automotive Degas (Surge) Tank via Hybrid Weld

Techniques

Ankur Bhosale, Senior Application Development Engineer - **BASF** David Alvarez, Advanced Product Manager Fluid Systems - **ABC Technologies**

This presentation will describe the fast-track design development, and global level support for launching an automotive degas tank. Extensive knowledge and experience on various joining techniques including a global ULTRAJOIN team umbrella were utilized for this launch. During the design phase, CAE Simulation Techniques and Burst Failure Index were relied upon. This presentation will describe the hybrid welding techniques (vibration welding/IR pre-heat) for developing the surge tank application.

3:30 p.m. Closing Remarks



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IN-PERSON

Wednesday, September 29 and Thursday, September 30, 2021

Register to Attend at www.itbgroup.com

Fee: \$945 USD to Attend Both Days

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Exhibitors To-Date:

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