The only event focusing on optimising EV/HEV performance

3rd International Conference

Thermal Management for EV/HEV

24 – 26 June 2013 | Maritim Rhein-Main Hotel, Darmstadt, Germany

Intelligent battery thermal management, advanced climate control solutions and energy harvesting strategies to achieve increased vehicle range, efficiency and safety

Don’t miss presentations from our expert speakers from the following companies:

- Fiat Research Centre (CRF), Italy
- Hyundai Motor Group, Korea
- Daimler AG, Germany
- Renault S.A, France
- TATA Motors European Technical Centre plc, UK
- Behr GmbH & Co.KG, Germany
- Magna Engineering Center Steyr GmbH & Co. KG, Austria
- Valeo S.A, France
- Fraunhofer Institute For Solar Energy Systems, Germany
- Empa-Swiss Federal Laboratories for Materials Science and Technology, Switzerland
- TUM Create Ltd (joint research programme: TU München & Nanyang TU Singapore), Singapore
- Delphi S.A, Luxembourg

With participation of:

Michael Fairchild, 
Chef Engineer CAE, 
Lotus Engineering, UK

Sponsor:

<table>
<thead>
<tr>
<th>Learn from these experts among others:</th>
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<tbody>
<tr>
<td>Dr. Raimund Siegert, Senior Manager Thermal Management, Daimler AG, Germany</td>
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<tr>
<td>Jungho Kwon, Senior Research Engineer Cooling &amp; HVAC Development Team, Hyundai Motor Group, Korea</td>
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<td>Jaehyun Park, Research Engineer, Cooling and HVAC Development Team, Hyundai Motor Group, Korea</td>
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Interactive Workshop Day

A | Advanced waste-heat recovery, storage and re-use technologies and concepts
B | Battery thermal management using system approach
C | Energy Efficient HVAC system control method for EV
D | Efficient heat-pump concepts and potential for cabin climatisation

To Register | T +49 (0)30 20 91 30 | F +49 (0)30 20 91 32 10 | E info@iqpc.de | www.thermal-management-ev.com/MM
Dear Colleague,

Is the increase in vehicle range and battery capacity for EV/HEV one of the greatest obstacles you face? Do you want to be ahead of challenges such as the reduction of energy discharge from HVAC, while ensuring passenger comfort? Are efficient EV/HEV-Thermal Management and Climate Control solutions important for the success of your company?

It gives me great pleasure to introduce the 3rd annual international conference Thermal Management for EV/HEV. The only event focusing on optimising EV/HEV performance. OEMs who successfully navigate these issues will be well placed to maximise EV/HEV market-share.

Featured case studies:

- Fiat Research Centre, the only OEM out of 6 partner-companies involved in the project HeatReCar will present on the first light commercial vehicle equipped with a Thermoelectric Generator.

- Hyundai Motor Company Seoul, will provide insight into their special HVAC control and highly innovative energy saving Occupied-Zone System.

- TUM Create, a joint research programme between Technische Universität München (TUM) in Germany and Nanyang Technological University (NTU) in Singapore will present on their development of a holistic prototype Thermal Management system for an EV in tropical climate.

Additionally, share your expertise with leading engineers from Daimler, Lotus, Renault, Tata Motors Europe among others at one conference!

I look forward to meeting you in Darmstadt!

Kind regards

Maria Nikolopoulou
Project Manager

Testimonials:

“Very well organized, very relevant to the challenges we, as an industry, are facing at the moment”
James Baxter, Engineer, Ricardo

“Great opportunity to discuss and share up-to-date visions and on-going projects with other specialist”
Ludovic Lefebvre, Powertrains thermal management, PSA Peugeot Citroen

“Well organized, good quality presentations”
Andrew Harris, Principal Engineer, Tata Motors

Past delegates by industry sector:

- Heating System EV
- Cooling System EV
- Thermal Management EV
- HVAC System EV
- Climate Control

Thermal Management for EV/HEV will be co-located with IQPC’s International Conference Automotive Fuel Cells

Fuel cell concepts • Components and materials • On-board hydrogen storage

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www.automotive-fuel-cells.com

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Integrated thermal management: lower cost and increased range

09:40 Solutions for EVs: Thermal management enabling a higher range

- Thermal comfort for EVs
- Overview of technical solutions
- Focus on the cabin heating systems

Osoke Shonda, Innovation Project Leader, Advanced Electronics and Technologies Division, Renault S.A., France

10:20 Speed Networking and Business Cards Exchange Session

Get connected to most of the other delegates, with this series of short one to one meetings.

Share your professional background, discuss your business issues briefly and find out who you have to catch up with during the conference or afterwards.

Don’t forget your business cards!

11:00 Refreshment break and networking

11:30 Development of a holistic thermal management concept for an ultra-fast charging EV in tropical climate

- Holistic thermal design process for a highly specialised vehicle with focus on high range and competitive operational cost
- Integral design, combined mitigation of structural and thermal loads
- Selected aspects of battery cooling design
- Electrolyzer based dehumidification
- Composite latent heat storage devices and adapted control strategy adding flexibility and safety

Christian Huber, Principal Engineer-Thermal Management, Energy Storage Engineering, TUM Create Ltd (joint research programme: TU München & Nanyang TU Singapore), Singapore

12:10 Overcome the cost & complexity challenge: How to match vehicle restrictions with component requirements to optimise the thermal performance

- Down-cascading of vehicle targets to a component level as enabler for cost reduction
- Impact of design space and package restrictions on component and system performance
- Insufficient thermal component performance is driving system cost and complexity
- Comparison of different system architectures regarding cost and complexity

Dr. Raimund Siegert, Senior Manager, Thermal Management, Daimler AG, Germany

12:50 Networking luncheon

14:10 New efficient HVAC system and thermal insulation material to achieve the maximum range of Electric Vehicles

- Energy efficient heat pump system utilising heat recovery method from power electric components
- Energy saving Occupied-Zone HVAC (O2 HVAC) system
- Advanced vacuum insulation head lining for thermal load reduction

Jungho Kwon, Senior Research Engineer Cooling & HVAC Development Team, Hyundai Motor Group, Korea

14:50 Unitary HPAC (Heat Pump Air Conditioner) System

- Background
- System concept and operation principle
- Differences and benefits over traditional Air/Conditioning systems
- Future steps

Chrystel Arnaud, Systems Engineering Manager, Delphi Thermal Systems, Delphi S.A, Luxembourg

15:30 Refreshment break and networking

16:00 Thermal Modelling of Battery Pack within Integrated Powertrain Control

- Thermal management within the context of battery ageing
- Simulation level assessment of the use of the battery under different operational conditions
- On board monitoring, management, and prediction
- System level control and energy management

Dr. Steven Wilkins, Research Scientist, Powertrains, TNO, The Netherlands

16:40 Scalable complexity simulation of thermal battery models in the EV/HEV development workflow

- Thermal simulation of EV/HEV batteries with different levels of detail
- Requirements of a battery cooling system
- Which questions occur in different phases of the development process and how can they be answered with thermal simulation
- “One model for the complete process” – How continuous evolution of one simulation model through the complete development process can improve efficiency and quality of thermal simulation
- From 1D to 3D transient thermal analysis. Finding the balance between cost, effort and necessary precision

Alexander Lichtenberger, Projects & Development, Energy and Fluid Simulation, MAGNA Engineering Center Steyr GmbH & Co KG, Austria

17:20 Closing remarks by Dr. Dirk Neumeister and end of conference day one

18:00 Join us for an informal evening get-together!

This is an excellent opportunity for you to meet the other attendees and make new business contacts.
To register  |  T  +49 (0)30 20 91 30   |   F  +49 (0)30 20 91 32 10   |   E  info@iqpc.de   |   www.thermal-management-ev.com/MM

Thermal Management for EV/HEV

Conference Day Two | Tuesday, 25 June 2013

08:30  Registration and coffee

09:00  Welcome & opening address by
Dr. Dirk Neumeister,
Manager Thermodynamics, Central Advanced Engineering,
Behr GmbH & Co. KG, Germany

09:10  Introduction to thermoelectricity
 Sascha Populoh,
Project Leader, Solid State Chemistry and Catalysis,
Empa-Swiss Federal Laboratories for Materials Science and Technology, Switzerland

09:50  Waste heat recovery by thermoelectricity
 Dr. Kamel Azzouz,
Thermal Expert, Thermal Simulation & Innovation

10:30  Refreshment break and networking

09:10  HeatReCar: First light commercial vehicle equipped with a TEG
 Daniela Magnetto,
Project Manager Fuel Economy & Vehicle Systems Efficiency, CRF (Fiat Research Centre), Italy

09:50  Introduction to thermoelectricity
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10:50  HeatReCar: First light commercial vehicle equipped with a TEG
 Daniela Magnetto,
Project Manager Fuel Economy & Vehicle Systems Efficiency, CRF (Fiat Research Centre), Italy

11:00  Efficient thermal management for batteries at different ambient temperatures
 Dr. Dirk Neumeister,
Manager Thermodynamics, Central Advanced Engineering,
Behr GmbH & Co. KG, Germany

11:40  Tata EV/HEV Battery thermal management development
 Simon Dossett,
Principal Engineer, Aero-Thermal Vehicle Integration Group,
Tata Motors European Technical Centre plc, UK

12:20  Networking luncheon

13:50  Speakers’ Corner: New Li-ion batteries promise less cost and greater range. Is safety guaranteed?
 Dr. Dirk Neumeister,
Manager Thermodynamics, Central Advanced Engineering,
Behr GmbH & Co. KG, Germany

14:30  PCM introduction and its use for cooling applications
 Stefan Gschwander,
Senior Scientist, Thermally Active Materials and Solar Cooling, Fraunhofer ISE, Germany

15:10  Refreshment break & networking

14:30  PCM introduction and its use for cooling applications
 Stefan Gschwander,
Senior Scientist, Thermally Active Materials and Solar Cooling, Fraunhofer ISE, Germany

15:40  Optimal design of a latent heat battery for electric vehicle thermal comfort
 Dr. Kamel Azzouz,
Thermal Expert, Thermal Simulation & Innovation

16:20  Deep Dive: Discussion and Q&As to the conference speakers

17:00  Closing remarks by Dr. Dirk Neumeister and end of conference day two
## Advanced waste-heat recovery, storage and re-use technologies and concepts

In order to meet the new target on CO₂ emissions, new technologies will have to be implemented. The increased engine efficiency and powertrain electrifications require systems/strategies to improve the engine/cabin warm-up and to provide on-board carbon free electric power generation. US and EU legislation are including specific credits for waste heat recovery.

The workshop will address the following topics:

- To fix drivers for waste heat recovery technologies developments
- Waste heat recovery to improve systems/components warm-up technologies
- Waste heat conversion in useful power (mechanical, electrical, cooling power)
- Discussion about implementation: target segments/powertrain type, possible timeframe for the different technology introduction, standardisations.

Daniela Magnetto,
Project Manager Fuel Economy & Vehicle Systems Efficiency,
CRF (Fiat Research Centre), Italy

## Battery thermal management using system approach

To ensure the performance and the optimal lifetime of the battery of an electric and Plug-in Hybrid vehicle, a thermal management system is necessary. The design of the thermal management system depends on the environment of the battery and its interactions with other components. So a system approach needs to be considered in order to ensure an optimal dimensioning.

- How to define the thermal specification for the cooling/heating system
- Factors and requirements to be considered
- Using numerical simulation system to accelerate the process

Rany Choufany,
Battery Thermal Management Leader,
Renault S.A., France

## Energy Efficient HVAC system control method for EV

In an electric vehicle, a maximum cruising range is adversely affected by electric power consumption of auxiliary electric components for heating and cooling. Therefore, it is important for the air-conditioning to consume energy as efficiently as possible. In this workshop, we will discuss a new HVAC control method to attain a significant increase in the cruising range while satisfying the demand for passenger comfort.

- Climatic control system evolution to include energy consumption optimisation capability, such as heat pump and others
- Decentralised HVAC system technologies to include occupied-zone control and direct heating and cooling, such as seat heating/cooling
- Decentralised HVAC system control strategy to reduce HVAC power consumption while satisfying passenger’s thermal comfort
- Optimisation of energy consumption by shifting from temperature focused tuning to tuning based on human thermal comfort, utilising a thermal comfort manikin and a human comfort model

Jaehyun Park,
Research Engineer, Cooling and HVAC Development Team,
Hyundai Motor Group, Korea

## Efficient heat-pump concepts and potential for cabin climatisation

This workshop will be a sharing platform where various aspects of the implementation of heat pump systems will be discussed. Topic of interests could be:

- Exchange views on how cabin climatisation can be optimised with cost/efficient solutions
- Challenge and opportunities with necessary adaptations in the system operation
- Ideas on how to best recover the heat from other sources

Chrystel Arnaud,
Systems Engineering Manager, Delphi Thermal Systems,
Delphi S.A., Luxembourg

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### Schedule

<table>
<thead>
<tr>
<th>Time</th>
<th>Session A 09:00 – 12:00</th>
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<tr>
<td>08:30</td>
<td>Registration &amp; coffee</td>
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Payment Methods
Delegate Details

Please indicate your choice of workshop on 26 June 2013

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B | Battery thermal management using system approach
C | Energy Efficient HVAC system control method for EV
D | Efficient heat-pump concepts and potential for cabin climatisation

Documentations will be sent 6 weeks after the event

Every registration includes a complimentary membership to Automotive IQ

Conference Packages

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