



PRESS RELEASE

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Ricardo shares insights on thermal optimization of electrified and conventional powertrains

At the Vehicle Thermal Management Systems conference (VTMS 14) to be hosted by the Institution of Mechanical Engineers in London on 5-6 June, Ricardo will present papers on the latest approaches to optimizing thermal performance of electric vehicle batteries, hybrid powertrains and conventional engine systems

Across all powertrains, thermal optimization has a clear positive impact on overall life cycle costs. Electric vehicle battery operating temperature is known to have a critical influence upon a wide range of performance aspects – including electrochemical behaviour, charge acceptance, power availability, trip efficiency, and safety and reliability, as well as affecting overall life-cycle costs. In the paper *Model Based Predictive Battery Thermal Management System Design*, Ricardo will outline a model-based approach to predictive battery thermal management system design. This comprises a high-fidelity numerical model of the battery, which enables individual cell temperatures to be inferred from a set of easily obtained external measurement data, thus enabling an effective, practical and affordable means of optimizing battery pack thermal performance.

The challenges of hybrid vehicle thermal management are outlined in a further paper *Thermal management module control optimization through an integrated simulation approach*. Hybrid powertrains typically exhibit complex interactions both



within the cooling circuit, as well as with energy usage through the operation of the hybrid elements of the powertrain. Such interactions can be difficult to identify through traditional development approaches, resulting in the risk of sub-optimal solutions for either vehicle attributes, performance or cost. The paper describes simulation work carried out as part of the collaborative European research project, THOMSON, using an integrated toolchain capturing thermal, electrical and mechanical energy flows. This project aims to develop cost-effective solutions, based on 48V architectures, to reduce the environmental impact of the transportation sector through a clever combination of advanced engines technologies, electrification and wider use of alternative/renewable fuels.

The final two Ricardo papers to be presented at VTMS 14 will present work being carried out on the APC UK funded Latitude project in which Ricardo worked in collaboration with Jaguar Land Rover and other research partners, to develop new technologies for the Ingenium engine family aimed at providing an even greater level of fuel efficiency, with obvious benefits for reductions in both emissions and costs. The paper *Powertrain Encapsulation for Low CO₂ Emissions*, describes a comprehensive sensitivity study using a methodology to assess the benefits of powertrain encapsulation. The approach is based on a test methodology for assessing varying levels and types of encapsulation with respect to heat storage and CO₂ emissions reduction (over the WLTC), as well as NVH benefits.

A further paper *Lubrication Circuit Thermal Management Solutions for Low CO₂ Emissions* outlines the methodology used in developing the new lubrication circuit aimed at improving engine oil warmup, using extensive use of 3D computational fluid dynamics and 1D thermo-hydraulic analysis. The energy balance for the updated oil circuit in the new lightweight cylinder block assessed by the Latitude project, is then compared to the one from the baseline oil circuit and cylinder block in order to assess the fuel consumption and CO₂ emissions benefits over WLTC.

Ends



NOTES TO EDITORS:

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For more information about the project, visit: www.thomson-project.eu/

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