

PRESS INFORMATION

MOBI holds key to EV powertrain optimisation

Prof. Omar Hegazy, head of power electronics and electrical machines at the MOBI Research Centre, University of Brussels (VUB), recently highlighted his team's EV powertrain optimisation techniques at CWIEME Istanbul 2017.

Electric vehicle (EV) and hybrid electric vehicle (HEV) technology continues to gain momentum. The more research that goes into it, the more automotive OEMs are hailing it as the inevitable future of the industry. This shift is mirrored throughout the supply chain, with a greater number of parts manufacturers launching products tailored to the needs of hybrid and electric vehicle motor designers.

But such an impending revolutionary shift in the industry raises many questions: Will it be cost effective? Will it be efficient? And what will it take to implement the necessary infrastructure?

One organisation in Belgium is helping to provide some answers. The Mobility, Logistics and Automotive Technology Research Centre (MOBI), situated at the Vrije Universiteit Brussel (VUB), is a leader in EV and HEV research and in socio-economic evaluations for urban mobility and sustainable logistics. It employs a multidisciplinary team of over 90 specialists who address the challenges that the transport value chain faces, by integrating engineering, economic, social and environmental sciences and policy issues.



Technology meets topology

MOBI possesses state-of-the-art infrastructure and models for the testing, development and design of components (i.e. batteries, supercapacitors, power converters etc.), vehicle powertrains, and inductive and conductive charging infrastructure. Simulation techniques have been developed to define energy-efficient and low-emission power control strategies in hybrid propulsion systems. There is also a team working on big data and analytics.

Prof. Omar Hegazy is head of power electronics and electrical machines at MOBI. His team is focused on finding the perfect balance between efficiency and affordability using powertrain optimisation techniques. Prof. Hegazy recently spoke about MOBI's powertrain optimisation techniques at CWIEME Istanbul 2017, the region's only dedicated event to coil winding, electric motor and transformer manufacturing technologies. His seminar was entitled 'Co-design optimisation framework for vehicle powertrains: From technology to topology'.

This year's CWIEME Istanbul took place between 2nd-4th November at the Istanbul Expo Center. Its seminar programme explored the many areas of electrical industries on the brink of disruption at a time when demand for more efficient, intelligent and powerful electric machines is reaching new heights.

"The three largest barriers that we currently have in the electric transportation industry are a high purchase cost, a short driving range and a limited charging infrastructure," says Prof. Hegazy. "The solutions to the first two points can be found in the powertrains of the machines themselves. My team is focused on the optimisation of powertrain sizing components and control system design, known collectively as co-design. We start by looking at the available space in EV or HEV powertrains; we then evaluate which components would work best before trying to find innovative ways to incorporate them – the perfect symbiosis of technology and topology. There are many things to consider, such as battery technology, energy consumption, battery pack voltage, charging power and charging time, but we use our 40 years' experience in electric, hybrid, fuel cell vehicles and stationary applications R&D to produce successful results."

In recent years, a growing number of industrial companies, public administrations and institutions have approached MOBI for collaboration or direct contract research. Examples include:

- **STIB-MIVB:** Design of electrified buses and multi-criteria analysis of technological solutions aiming at recovering metro braking energy.
- **JSR Micro:** Testing, modelling and optimisation of Li-ion capacitors.
- **Umicore:** Characterisation and modelling of advanced Li-ion battery.
- **Electrabel:** Analysis of the unbalance between different renewable energy supplies. Comparison of various storage technologies together with assessment of the economical and the environmental impacts.
- **Powerdale (PWD):** Technical support on charging solutions and standardisations.
- **Bluways International:** Technical advice on supercapacitors and energy management. Testing and data analysis.

Investing in infrastructure

MOBI has also worked with companies to deliver social, economic and environmental impact studies, decision-making support, modelling and simulation, engineering and standardisation. It offers a unique life cycle assessment (LCA) methodology for the entire automotive sector to analyse the environmental, economical and societal impacts caused by the development and implementation of new vehicle technologies, components, materials and policy measures.

“Using a large database with real-life measurements, which has been developed by MOBI over four decades, we’re able to provide accurate technical, economical and environmental assessments,” Prof. Hegazy says. “The database is kept up-to-date with the latest information obtained during research projects and the execution of contracts.”

Over the last five years, the centre has undertaken 23 major European projects, 51 direct contracts with the industry, and 76 projects funded by national organisations (e.g. VLAIO, Belspo, Innoviris, FWO).

“Methods and models are developed and then translated into practical tools that are tailor made primarily for the transport sector, but also for the energy sector. From a technological perspective, the centre has a leading position in electromobility. Our international partners value the expertise that MOBI offers,” Prof. Hegazy says.

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For more information and to register for the event, please visit www.coilwindingexpo.com/istanbul

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