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Marelli unveils Intelligent Energy Management technology for hybrid and electric vehicles at Berlin CTI Symposium 2025

Marelli, a global mobility technology supplier to the automotive sector, unveiled today its new solution for Intelligent Energy Management for hybrid and electric vehicles at CTI Europe 2025, in Berlin (Germany). The system is modular, and it's based on a proprietary software which can be integrated with vehicle and zonal control units and thermal components. This solution enables seamless coordination across the vehicle's three main energy domains: thermal, propulsion and electronics.

This holistic approach to vehicle energy optimization maximizes efficiency across all vehicle systems, delivering enhanced battery range, optimized fast charging and improved longevity, all while maintaining superior cabin comfort and operational reliability. Marelli's new Intelligent Energy Management system is aimed at advancing both hybrid and electric propulsion solutions, as well as Software-Defined Vehicle (SDV) technologies.

The system was developed by integrating advanced digital twin methodologies and innovative software strategies. These approaches significantly reduce development time and costs, while also enabling a strong and flexible collaboration model with customers.

Regarding the thermal domain, the system manages and optimizes thermal flows, ensuring precise control of heating and cooling processes within the vehicle. Decoupled software algorithms intelligently manage complex thermal systems, regulating temperatures to optimize overall performance and extend battery life. These advanced strategies reduce energy losses and promote effective reuse of excess thermal energy, resulting in lower operational costs and increased sustainability.

For electric/hybrid propulsion, the Intelligent Energy Management System continuously monitors and adjusts power delivery to optimize energy distribution. This maximizes battery efficiency and vehicle performance. By effectively recovering energy and balancing its distribution, the system extends driving range and enhances overall resilience, supporting the needs of next-generation electric vehicles.

Regarding the electronics domain, the solution enhances the intelligence and integration of vehicle systems, by facilitating seamless communication between all components and systems. Data exchanges occur over robust communication protocols – from CAN to Ethernet – enabling direct management of sensors and actuators. This ensures smooth operation, higher system responsiveness and greater adaptability to evolving vehicle environments.

Development of a digital twin application allows for precise virtual modeling of every vehicle subsystem, including electronics, electromechanics, thermodynamics and hydraulics. By creating

fully virtualized car models, automakers can iterate faster, test more efficiently and bring advanced vehicles to market sooner and more confidently.

The new Intelligent Energy Management technology leverages Marelli's software development capabilities, empowering agile customization and rapid deployment of solutions tailored to specific customer needs. By streamlining system architectures and minimizing component count, the company enables a simplified system at a competitive cost and faster time-to-market, while reducing development and testing costs.

Giovanni Mastrangelo, Head of R&D for Marelli's Propulsion business said: *"Intelligent energy management is the central challenge facing today's electric and hybrid vehicle development. At Marelli, we address this by delivering solutions that not only optimize energy flow across thermal, electric and propulsion domains, but also minimize losses and recover excess thermal energy. Through our digital twin and decoupled software approach, we empower our customers to reduce development timelines, gain flexibility, and accelerate adoption of cutting-edge technologies, driving the future of sustainable and efficient mobility."*

Marelli introduced the new technology at the CTI Symposium, held in Berlin on December 2 and 3. In the keynote speech "Application of Digital Twin Approach to Thermal Management System Development for xEV", Matteo De Cesare, R&D Innovation Manager of Marelli's Propulsion business, offered expert insight into innovative design and virtual development processes for thermal systems within the context of vehicle electrification, along with related achievements and performance KPIs.

About Marelli

Marelli is a global mobility technology supplier to the automotive sector. With a strong and established track record in innovation and manufacturing excellence, our mission is to transform the future of mobility through working with customers and partners to create a safer, greener, and better-connected world. With around 40,000 employees worldwide, the Marelli footprint includes over 150 sites globally.