

MASTER THESIS

Thermal optimization of an automotive Li-ion battery pack architecture through CFD modeling

Research domain

Clean Powertrains

Topic

Context: Vehicle electrification is a hot topic nowadays. As Flanders' DRIVE has the ambition to become a world class innovation partner for the automotive industry in the area of 'Clean Powertrains', it has to build up these specific competencies. This can be achieved by creating a research battery pack which includes technologically interesting and well performing new-to-the-world innovations in the domain of Li-ion batteries and its management (BMS: Battery Management System).

Aim: The objective is to optimize the temperature distribution within a battery pack. In such a pack it is important that the temperature variation between the different cells is kept low for good cell balancing and health. It is even more important to keep the cell temperatures low to improve life expectancy. The cells should at least be stored, charged and discharged within the factory given storage and operating temperatures. The first task is to make a study of research that already has been conducted in this area. Starting from this study, battery pack temperatures are simulated with CFD software. Different types of coolants should be taken into account. From these simulations the best cell distribution will be selected together with an optimized cooling. In a final task the researcher will create an interface with an existing electro-chemical model.

Profile

Master of (Applied) Engineering: Electromechanics.

The master thesis student should have a strong interest in automotive mechatronics and the development of energy storage systems for vehicles. Knowledge of CFD software (e.g. Fluent) is a must, knowledge of MATLAB and Simulink is considered an asset.

Term

Q3 2010 Q1-2011

Supervisor

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