ALBATROSS

Advanced Light-weight BATteRy systems Optimized for fast charging, Safety, and Second-life applications

NEWSLETTER

FEBRUARY

Contents

- Thermal, Electrical and Mechanical Integration

FOLLOW US

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

WP2 - Battery Modules and Packaging

Thermal, Electrical and Mechanical Integration

The main concept of cooling channels embedded in the modules has not been changed, with some minor changes being mainly reflected in the design of the modules themselves.

To transfer the heat from the battery to the fluid and thus maintain a suitable cell temperature, a proper design is needed. The design of the partial immersion was simulated and the thermal analyses of fluid and battery are shown below. Different arrangements of series and parallel flow of fluid through the batteries were investigated, after which it was concluded that the best arrangement in terms of heat and pressure drop is an array of 4 columns and 4 rows.

The heat transfer and fluid movement in the cooling channel were modelled using the Computational Fluid Dynamics (CFD) method.

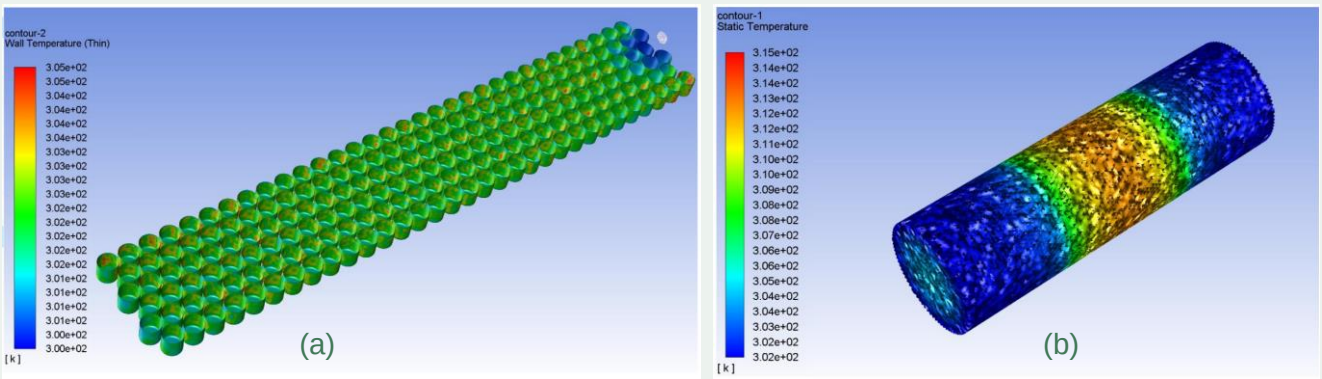


Figure 1. Heat transfer analyses and temperature distribution in the battery.

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

ALBATROSS
Advanced Light-weight BATteRy systems Optimized for fast charging, Safety, and Second-life applications

WP2 - Battery Modules and Packaging

In terms of electrical integration, the partners from FEV and Cleantron worked on the Control Monitoring Unit (CMU) integration on battery modules and several requirements were considered:

- **Clearance & creepage distance check:** High-voltage (HV) busbars are critical components and possible failures can occur due to their HV potential.
- **Material selection:** The effect of the material properties for mounting on current flow was considered.
- **Measurement point locations:** Suitable voltage measurement point locations were located away from HV busbars to get accurate and reliable measurement signal.
- **Interface separation:** a recommendation of separating the voltage and current draw measurement points was followed.

The mechanical integration of the Secondary Control Unit (SCU) remained unchanged since the preliminary design freeze. Different aspects have been analysed:

- The critical electrical safety aspect has been considered and risks have been mitigated by implementing isolation of all connectivity to systems and circuits external to the SCU subsystem. This allows full integration with externally designed systems with no impact to the performance of the distributed Battery Management System (BMS).
- The risk of a high potential direct current (DC) application to sensitive systems was identified, which could occur if mechanical isolation of the cells were compromised or otherwise bypassed.
- Other risks such as a fault in the power supply from the BMU, the CAN communication or the wiring harness were mitigated through the implementation of an isolated CAN and power supply on board of the SCU.

FOLLOW US

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

WP2 - Battery Modules and Packaging

Along with the SCU, the sensor foil is attached to every module and is weaved through the cells in order to get the best temperature sensing and heating effects. The position has not changed with regard to the preliminary design freeze.

A mechanical prototype of the sensors has been integrated in a scaled down prototype of the battery module, as seen in Figure 2, where it can be seen how the sensors weaving through one row of cells. This same shape is repeated for every other row.

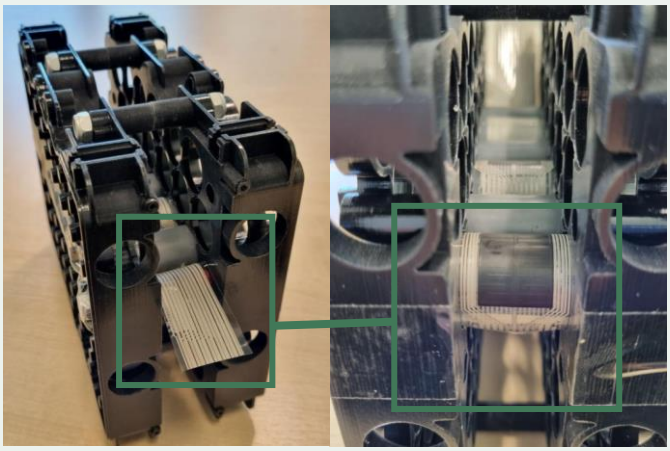
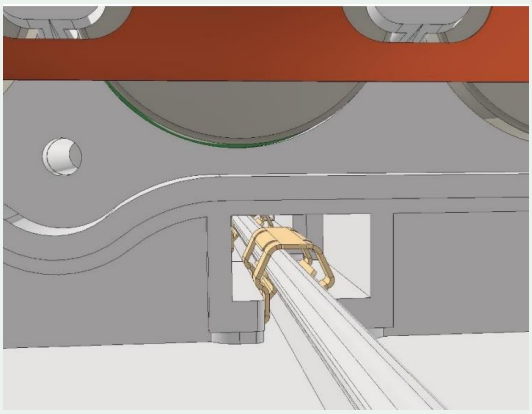


Figure 2. Mechanical prototype of the cell sensing and heating foil.



Finally, regarding the mechanical integration, the sub-modules were joined to the tray in two different ways.

They were joined with clips at the bottom of the sub-module that snap to the rails at the bottom of the tray (see Figure 3).

Figure 3. Clip connection of the sub-module.

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

WP2 - Battery Modules and Packaging

For additional strength and to join the modules in the correct place along the length of the battery tray, a connection to the flange was also realised. This connection joins the plastic parts of the sub-modules to the side of the battery tray. To enable this, the geometry of the side beam has been adapted as it can be seen in Figure 4.

This assembly was designed to allow submodules to be easily installed and fixed by ensuring that the mountings include a slot that is wide enough to allow for the insertion of the submodules and access for tools.

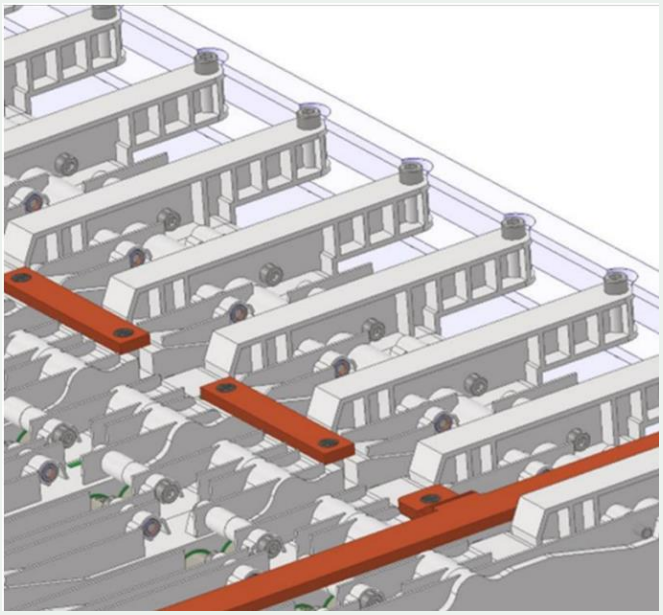


Figure 4. Flange connection of the submodule.

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

FOLLOW OUR SOCIAL MEDIA

GET UPDATED WITH OUR RECENT ACTIVITY

This project received funding from the European Union´s Horizon 2020 research and innovation programme under grant agreement No 963580- ALBATROSS

ALBATROSS

Advanced Light-weight BATteRy systems Optimized for fast charging, Safety, and Second-life applications

WWW.ALBATROSS-H2020.EU