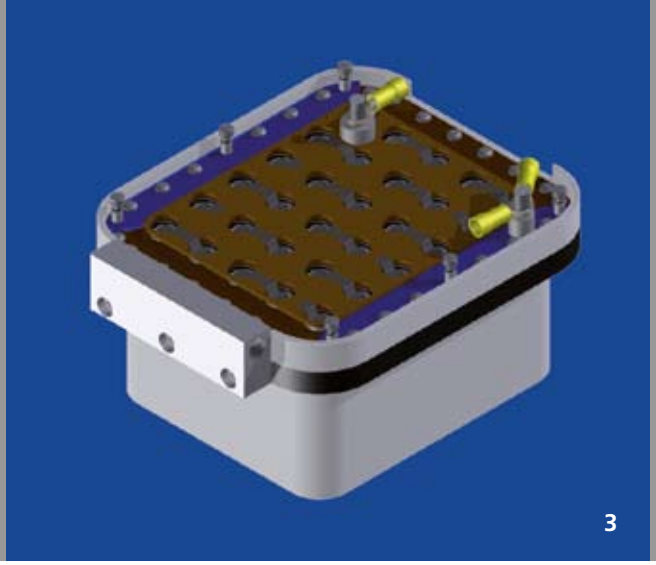
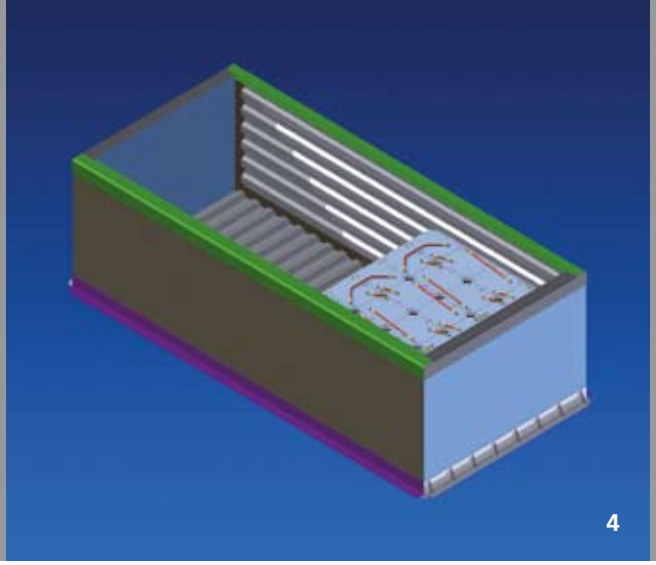


3



4

# LIGHTWEIGHT POWER PACK

**Task**

In electromobility, the energy pack constitutes an important component, which firstly has to have a high energy density and secondly low weight. Within the scope of the Fraunhofer project, »Fraunhofer System Research on Electromobility«, the Fraunhofer ILT, along with the Fraunhofer Institutes for Solar Energy Systems ISE, for Mechanics of Materials IWM, and for Environmental, Safety, and Energy Technology UMSICHT, developed a »lightweight power pack«. This pack consists of highly integrated and exchangeable energy components in the sector of battery packs and of thermo aggregates. It is planned to be used in an all-electric, multi-user vehicle. The »lightweight power pack« should distinguish itself from other batteries through its use of different lightweight technologies as well as innovative cooling and set-up strategies.

**Method**

In the scope of the project, the project partners worked on three sectors – battery pack, housing/lightweight construction and cooling.

The work group 'Battery Pack' has developed a process whereby the strings of the battery pack are built out of small-format cylindrical cells of the type 18650. These cells offer, on account of their metal housing, possibilities for direct cooling. By means of laser micro welding, both poles of the cell are contacted on the upper side and the cells are switched in parallel into units (blocks), which act as individual cells for the battery management system (Fraunhofer ISE) and the overall system. To directly cool the individual cells internally, one block is provided with PCM slurry (Fraunhofer UMSICHT) without additional heat conducting structures inside the block.

For the housing, a lightweight construction made out of high-tensile steel, plastic-metal composites and organic sheets is used. For this, crash simulations at the Fraunhofer IWM were conducted in order to guarantee a corresponding safety and, simultaneously, a low weight along with inexpensive production.

**Result**

The development of the power pack and the proof that individual components can be produced currently stand in the foreground. The components designed from organic sheets, reinforcement structures and plastic-metal composites are all currently being tested. Positive results have been demonstrated by investigations on the wear of the cells with a copper alloy concerning the electrical resistance and stability of the connections during thermal cycle.

**Applications**

The processes applied to battery technology presented here can be used in many sectors of electrical contacts and of lightweight construction. They go far beyond the use in electromobility.

This project is funded by the internal program of Fraunhofer Gesellschaft under grant number 826 472.

**Contact**

Dip.-Ing. Benjamin Mehlmann
Telephone +49 241 8906-613
benjamin.mehlmann@ilt.fraunhofer.de

*3 CAD model of a unit (without cover).*

*4 CAD model of a housing (without cover).*