



PROFILREGION

MOBILITÄTSSYSTEME
KARLSRUHE

DEVELOPMENT OF SUSTAINABLE LIGHTWEIGHT TRACTION BATTERY SYSTEMS

Climate protection and limited resources demand new solutions for tomorrow's mobility. The electrification of the powertrain offers an opportunity to reduce emissions.

Moreover, in combination with information and communication technologies, it holds the potential for future mobility concepts.

An essential component of the electric drive train is the energy storage system. As one of the largest and heaviest components in electric vehicles, the traction battery makes special demands on efficient use of space and offers opportunities for weight reduction through lightweight construction. Safety must also be guaranteed, for example in the event of a fire. In addition, electromagnetic interference caused by the power electronics must be avoided.

Long charging times are regarded as a central obstacle to the broad acceptance of electric vehicles.

For this reason, rapid charging systems with charging capacities of up to 350 kW are currently under development and should be available as early as 2020. Due to this high power, new challenges arise for the cooling system of traction batteries.

The goal of the project is the conception and development of a lightweight traction battery system, which serves as a prototype for the e-mobility of the future through the use of innovative construction methods and processes.

Approach

Central elements of the product development process are the virtual modeling and the simulative validation of the battery system. Parallel to this, the manufacturing processes are further developed and characterized. The components and processes are then validated using demonstrators.

Consortium

The consortium of Fraunhofer institutes and the institutes of the KIT bundles all competences that are necessary for a holistic view of the battery system. The areas of design and simulation will be taken on by the department New Drive Systems at the Fraunhofer Institute for Chemical Technology ICT and by the Institute of Vehicle Systems Technology at KIT. This forms the basis for a virtual modelling of the battery system. The electrochemical and thermal characterization of the battery cells by the department Applied Electrochemistry at ICT, as well as the mechanical characterization of the composite materials by the Institute of Applied Materials – Materials Science and Engineering at KIT provide the necessary parameters for the modeling.



Example of a traction battery in fiber composite design

The Institute for Product Development at KIT is developing a thermal model of the battery cells, which enables safe testing of the cooling system. For the production of the battery system, the specific strengths of the manufacturing processes developed by the project partners are used systematically.

At Fraunhofer ICT in the Polymer Engineering department, processes such as locally reinforced sheet molding compound, thermoset injection molding and wet compression molding of sandwich structures are available for this purpose. The Institute of Production Science at KIT is investigating the process of fiber injection molding.

The close linkage of the work packages and regular meetings of the team ensure interinstitutional, interdisciplinary and efficient cooperation.

Contact:

Patrick Griesbaum

Fraunhofer Institute for Chemical Technology
 Polymer Engineering

Joseph-von-Fraunhofer-Straße 7, 76327 Pfinztal

phone: +49 (0) 721 4640-753

patrick.griesbaum@ict.fraunhofer.de