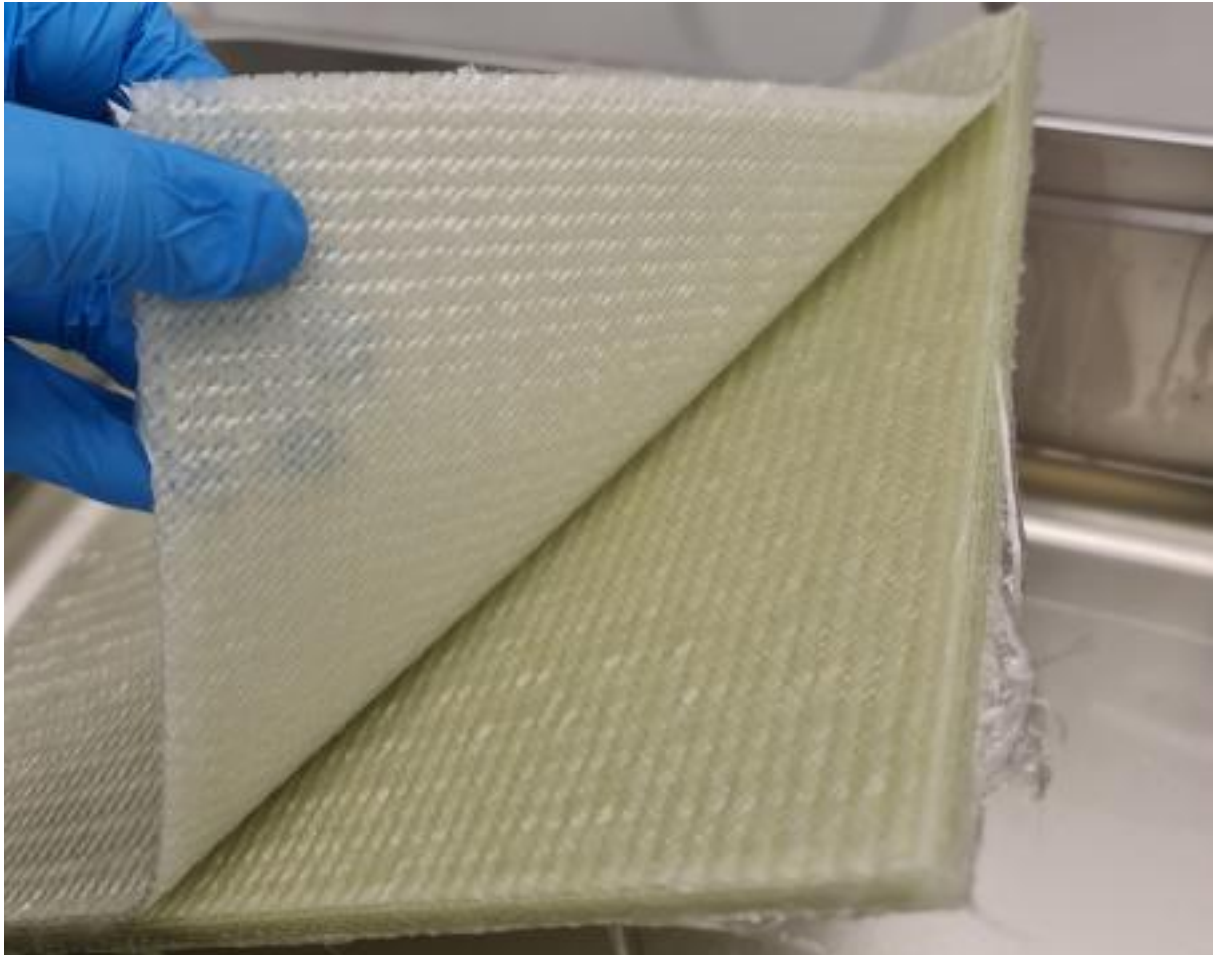


Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

About this project



EnSuRe

Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

Markets:



Material:

Bioplastics, Biocomposites, Glass fibres, Thermoset plastics, Aluminium, Laid webs, Glass-fiber reinforced plastics (GFRP)

Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

About this project

This project is funded by the Technology Transfer Programme Leichtbau (TTP LB) of the Federal Ministry of Economics and Energy.

[Technology Transfer Program Leichtbau](#)

Context

With the decarbonisation of transport, battery housings are becoming increasingly important in vehicle development. They fulfil key tasks: They protect the battery in the event of a crash, keep moisture out and support thermal management. At the same time, there is an increasing demand for these components to be manufactured in a resource-saving manner and for the materials used to be recycled to the highest possible quality after use. This brings the entire life cycle into focus - from raw material extraction to production and recycling.

Of particular interest here are construction methods made from aluminium and fibre-reinforced plastics, or FRP for short. These hybrid structures combine low mass with high functionality and open up new avenues for more sustainable battery housings. This requires concepts that combine materials, construction and recycling from the outset.

Purpose

In the EnSuRe research project, the project team is developing a battery housing system in an aluminium/FRP hybrid design that combines technical requirements and sustainability over the entire life cycle. The team is consistently aligning the housing with the design-for-recycling approach. The materials used should be able to be separated as easily as possible after use and recycled to a high standard. At the same time, the project partners are designing the battery housing so that it fulfils the usual market requirements: low mass, crash safety, tightness and thermal properties.

To this end, the project team is investigating secondary aluminium for structural components and bio-based matrix systems for fibre-reinforced plastics. The matrix is the plastic that embeds the fibres in the composite material. At the end of their use, aluminium, matrix and fibres should be separated as easily as possible and reused to a high quality.

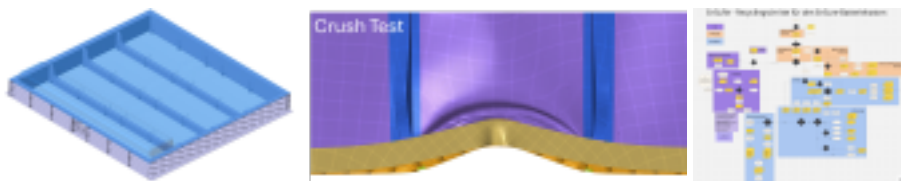
Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

About this project

Procedure

The researchers are initially developing a concept for a lightweight battery housing in an aluminium/FRP hybrid design. They are analysing the structure using finite element simulations to assess how the housing behaves under mechanical and thermal stress. At the same time, they are also testing the use of secondary aluminium for crash-relevant structural components. To this end, the partners are investigating how different material qualities affect mechanical properties and corrosion resistance. For the FRP components, they are developing bio-based matrix systems for use in the automotive industry.

The project team is also developing joining technologies that securely join aluminium and FRP, ensure tightness and can be separated again later. In addition, the researchers are evaluating the concept with regard to its ecological balance over the entire life cycle and comparing it with current battery housing solutions.



Funding duration:

Funding sign:

03LB3098

Funding amount:

EUR 1.4 million

Final report

Further websites

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3098A - EnSuRe in the federal funding catalogue

Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

Project coordination

Contact:

Mr Stefan Braun

+49 8271 83-2705

stefan.braun@sglcarbon.com

Organisation:

SGL TECHNOLOGIES GmbH

Werner-von-Siemens-Str. 18
86405 Meitingen
Bavaria
Germany

🌐 www.sglcarbon.com



English (EN){ { Projektpartner } }



Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

Lightweighting classification	
	Realisation
Offer	
Products Parts and components, Materials	✓
Services & consulting Testing and trials, Engineering, Validation, Simulation	✓
Field of technology	
Design & layout Hybrid structures, Lightweight construction concepts	✓
<i>Functional integration</i>	
Measuring and testing technology Component and part analysis, Visual analysis (e.g. microscopy, metallography), Environmental simulation, Materials analysis, Destructive analysis	✓
Modelling and simulation Crash behaviour, Loads & stress, Life-cycle analysis, Optimisation, Processes, Structural mechanics, Materials	✓
<i>Plant construction & automation</i>	
Recycling technologies Downcycling, Material separation, Recycling	✓

Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

Lightweighting classification	
	Realisation
Manufacturing process	
<i>Additive manufacturing</i>	
Coating (surface engineering) Others (Laser structuring)	✓
Fibre composite technology Others (Wet presses)	✓
<i>Forming</i>	
Joining Hybrid joining, Adhesive bonding, Screwing	✓
Material property alteration Heat treatment	✓
Primary forming Others (Die-cast aluminium)	✓
<i>Processing and separating</i>	
<i>Textile technology</i>	

Designing for circularity: Battery housings made of aluminium and fibre-reinforced plastics

Lightweighting classification	
	Realisation
Material	
Biogenic materials Bioplastics, Biocomposites	✓
<i>Cellular materials (foam materials)</i>	
Composites Glass-fiber reinforced plastics (GFRP)	✓
Fibres Glass fibres	✓
<i>Functional materials</i>	
Metals Aluminium	✓
Plastics Thermoset plastics	✓
<i>Structural ceramics</i>	
(Technical) textiles Laid webs	✓