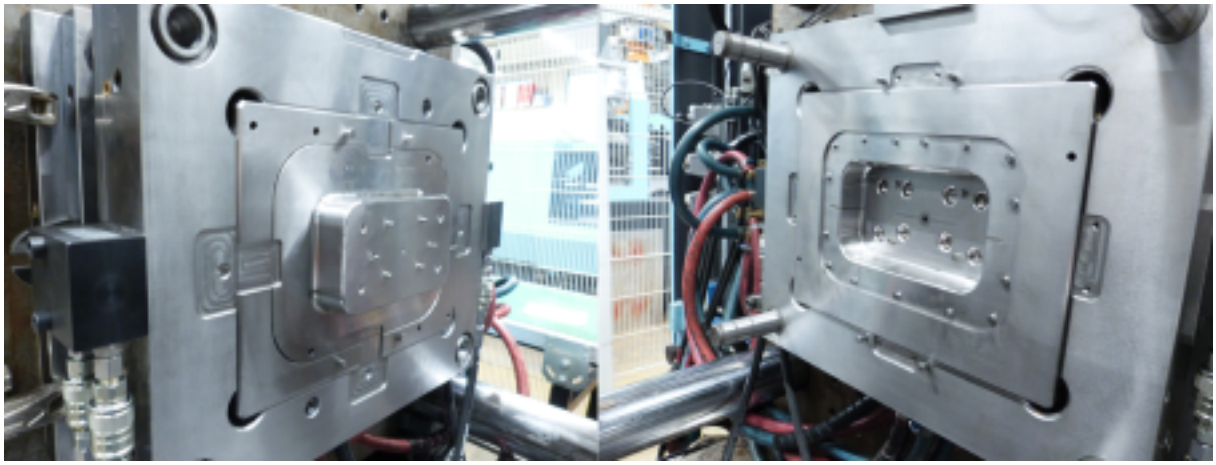
More sustainable housings for EV: hybrid process replaces CO#-intensive aluminium

About this project



EACplus

More sustainable housings for EV: hybrid process replaces CO#-intensive aluminium

Markets:

Material: Glass fibres, Thermoplastics, Aluminium, Steel, Glass-fiber reinforced plastics (GFRP), Others (Metal-plastic composite)

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

Technology Transfer Program Leichtbau

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Context

The switch to electric drives is fundamentally changing the architecture of vehicles. Many components that are exposed to high mechanical and thermal loads in combustion engines are no longer needed or have to be rethought. At the same time, the requirements in other areas are increasing: Electrical components must be reliably shielded against electromagnetic interference, while at the same time they need to be lighter, quieter and more sustainable.

The choice of housing materials is particularly important here. Today, aluminium solutions dominate, but although they are functional, they consume a lot of energy during production, are relatively heavy and leave a high carbon footprint. In view of ambitious climate targets and the challenges for the automotive industry to deliver resource-saving products, new design methods are needed that harmonise functionality, recyclability and cost-effectiveness. The team in the EACplus project wants to show new ways of manufacturing such housings in a resource-saving way.

Purpose

The scientists are researching how housing structures for electric vehicles can be made more sustainable - without compromising on functionality or safety. They are focussing on the development of a new generation of components made from metal and plastic using hybrid manufacturing processes. Specifically, the team is testing this technology on the traction inverter, a particularly sophisticated key component of electromobility that converts the battery current into alternating current for the motor and, conversely, feeds energy back when braking.

The housings should not only be lighter and cheaper to manufacture, but also consistently recyclable and therefore suitable for recycling. In the future, the solutions can also be transferred to other high-voltage components such as DC/DC converters, chargers or battery housings. In the long term, the researchers want to significantly reduce CO# emissions per vehicle - while remaining competitive at the same time.

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Procedure

The project team is developing an innovative manufacturing process that combines injection moulding and metal forming in a single process step for the first time. This results in hybrid housings that combine the advantages of both materials: metals provide electromagnetic shielding, while plastics reduce weight, open up design freedom and facilitate recycling. The team is also testing innovative material variants, such as plastics from waste streams in which CO# is already bound - these also improve the carbon footprint because the carbon is not released but is retained in the material.

At the same time, design methods are being developed that take recycling into account from the outset, such as strategies for separating material combinations, digital material flow models and life cycle analyses.

The scientists are using prototypes, simulations and EMC measurements to test the practicality of the technology. The aim is to develop a robust technology that can be quickly transferred to series production and pave the way for climate-friendly electromobility.

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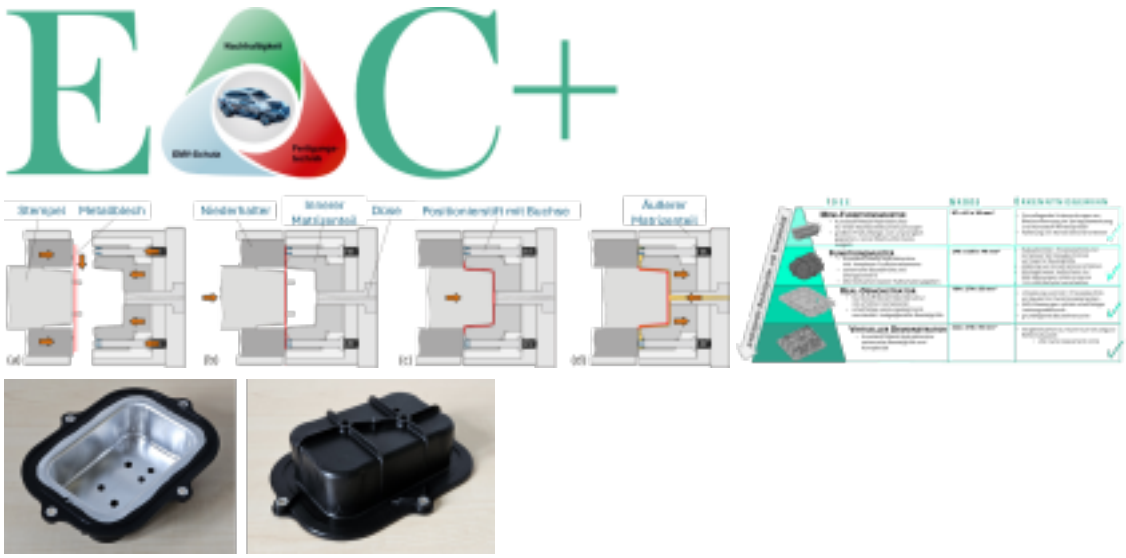

Funding duration:

Funding sign: 03LB3022 **Funding amount:** EUR 1.3 million

Final report

Further websites

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3022A - EACplus in the federal funding catalogue

plattform-forel.de/EACplus - Project directory EACplus of the Forel platform

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Project coordination

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Universität Stuttgart

Institut für Leichtbau und Kunststofftechnik

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Lightweighting classification

	Realisation
Offer	
Products Parts and components, Machines and plants, Tools and moulds	✓
Services & consulting Engineering, Simulation	✓
Field of technology	
Design & layout Hybrid structures	✓
Functional integration Others (EMV)	✓
Measuring and testing technology Component and part analysis, Non-destructive analysis	✓
Modelling and simulation Loads & stress, Processes	✓
Plant construction & automation	
Recycling technologies Downcycling, Material separation, Recycling	✓

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Lightweighting classification

	Realisation
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming Deep-drawing	✓
Joining	
Material property alteration	
Primary forming Injection moulding	✓
Processing and separating	
Textile technology	
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites Glass-fiber reinforced plastics (GFRP), Others (Metal-plastic composite)	✓
Fibres Glass fibres	✓
Functional materials	
Metals Aluminium, Steel	✓
Plastics Thermoplastics	✓
Structural ceramics	
(Technical) textiles	