

Digital and reliable production: Thin-walled aluminium profiles for battery trays

About this project



LightBat

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Markets: 

Material: Aluminium

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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

Battery housings in electric vehicles often consist of large-format extruded aluminium profiles. These profiles stiffen the structure and protect the battery modules. In order to store more energy in the same installation space and use less material, thin-walled, large-format profiles are becoming increasingly important. Even small differences in wall thickness have a significant impact on weight and resource requirements.

However, conventional manufacturing processes reach their limits with thin-walled, large-format hollow chamber profiles. Decreasing wall thicknesses increase the load on the moulds during extrusion. At the same time, larger dimensional and shape deviations make it more difficult to precisely fit and process the profiles. This makes a stable process chain a challenge. At the same time, the reduction of primary aluminium and the return of material to the cycle is becoming a central task for climate-friendly mobility.

Purpose

The team in the LightBat project is developing and testing a process chain that can be used to produce and process large-format, thin-walled hollow chamber profiles made of aluminium for battery support systems. It proves that the construction weight of such systems can be reduced by more than 20 per cent compared to the state of the art and that the profiles can be handled reliably right up to assembly. A sample battery housing serves as a demonstrator of the developed process chain.

To this end, the team is working on methods to achieve low wall thicknesses in a reproducible manner. To this end, the team is developing improved simulation models in order to shorten development and start-up times. In addition, an assistance system is being created that records process data inline and makes it usable for process control. The team is also investigating the transfer to an industrial scale. Less primary aluminium and lower vehicle masses should save resources and reduce CO₂ emissions.

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Procedure

The project partners combine process development, measurement technology and simulation to create an integrated process. During extrusion, the participants record mould conditions such as temperature and the geometry of the profile directly in the process. They link this measurement data with adjustable parameters and use it to monitor and specifically control the process. For this purpose, information is processed in such a way that interventions in the process control are possible in a more targeted manner.

The data is also used as input for numerical models of extrusion and subsequent cooling. Based on this, the team develops cooling strategies and supplements the models with material data from material characterisation. In further steps, it analyses the joining of the profiles, defines suitable parameters and evaluates the quality of the joints. An assistance system supports process monitoring and creates the basis for digitally linking the steps in the value chain.

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Funding duration:

Funding sign: 03LB1016

Funding amount: EUR 890 thousand

Final report

Further websites

foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB1016A - LightBat in the federal funding catalogue

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Project coordination

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English (EN){ { Projektpartner } }



Lightweighting classification

Realisation

Offer

Products

Semi-finished parts



Services & consulting

Testing and trials, Validation, Simulation



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Lightweighting classification	
	Realisation
Field of technology	
Design & layout Lightweight design	✓
<i>Functional integration</i>	
Measuring and testing technology Component and part analysis, Non-destructive analysis	✓
Modelling and simulation Loads & stress, Processes	✓
<i>Plant construction & automation</i>	
<i>Recycling technologies</i>	
Manufacturing process	
<i>Additive manufacturing</i>	
<i>Coating (surface engineering)</i>	
<i>Fibre composite technology</i>	
Forming Extrusion moulding	✓
Joining Welding	✓
Material property alteration Heat treatment	✓
<i>Primary forming</i>	
Processing and separating Milling, Sawing	✓
<i>Textile technology</i>	

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Lightweighting classification	
	Realisation
Material	
<i>Biogenic materials</i>	
<i>Cellular materials (foam materials)</i>	
<i>Composites</i>	
<i>Fibres</i>	
<i>Functional materials</i>	
Metals	
Aluminium	✓
<i>Plastics</i>	
<i>Structural ceramics</i>	
<i>(Technical) textiles</i>	