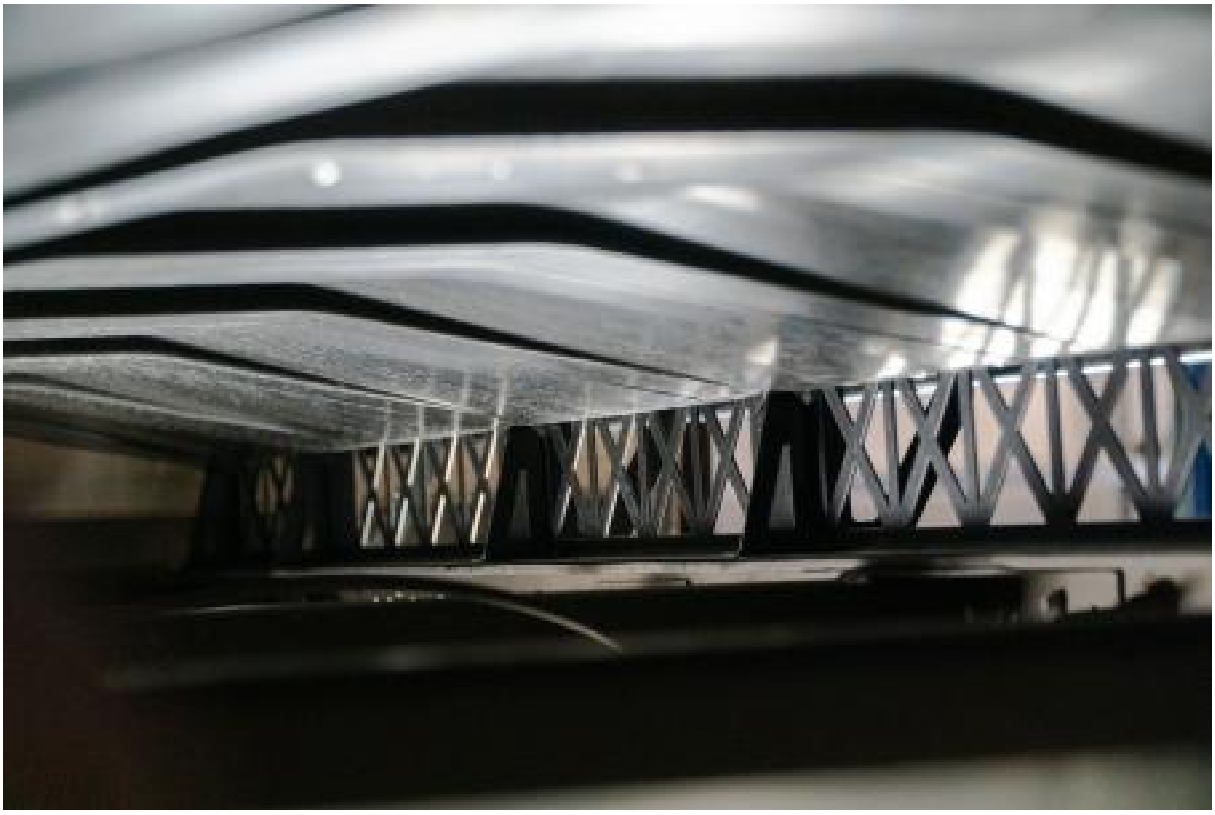
Utilising hybrid materials: Lightweight trunk floors for commercial vehicles

About this project



HyDuty

Utilising hybrid materials: Lightweight trunk floors for commercial vehicles

Markets:

Material: Glass fibres, Thermoplastics, Glass-fiber reinforced plastics (GFRP)

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

Lightweight construction is one of the key technologies for sustainably reducing CO# emissions in the transport sector. It offers enormous potential, particularly in the area of light commercial vehicles, which make up two thirds of the vehicle fleets in the courier, express and parcel service (CEP) sector. The floor of such vehicles often consists of numerous individual parts made of heavier materials such as wood or metal. This construction method is not only costly and time-consuming, but also difficult to optimise.

One challenge is the use of modern materials such as glass fibre reinforced plastics. Although these materials are light and resilient, they require special processing and manufacturing techniques to make them usable for vehicle construction. The integration of functional elements such as lashing points or screw connections poses additional technical challenges. This is where the HyDuty research project comes in, with the aim of overcoming these hurdles through innovative approaches.

Purpose

The HyDuty project aims to develop a new box body floor assembly for light commercial vehicles. This floor is made from glass fibre reinforced plastics and hybrid materials. The modular design allows flexible adaptation to different vehicle types. The integral design takes centre stage: It combines the substructure and floor panel in one compact unit.

This eliminates many assembly steps, saving time and costs. In addition to material savings, the focus is on reducing CO# emissions over the entire service life of the vehicles - from production and operation through to recycling. The project aims to show that lightweight construction can simultaneously reduce weight, emissions and costs without compromising functionality.

Procedure

The project team first defines the requirements for the floor assembly. Data from simulations and real test drives are incorporated in order to map the typical loads that a CEP vehicle is subjected to on a daily basis. On this basis, prototypes are created which are manufactured from glass fibre reinforced plastics using the extrusion process.

This process makes it possible to integrate functional elements such as lashing points or fastening elements directly in a single production step. This is followed by validation: the structure is tested on a test bench and in real-life use. The team checks whether the simulated loads correspond to the real loads. The results are used to optimise the design and manufacturing processes.

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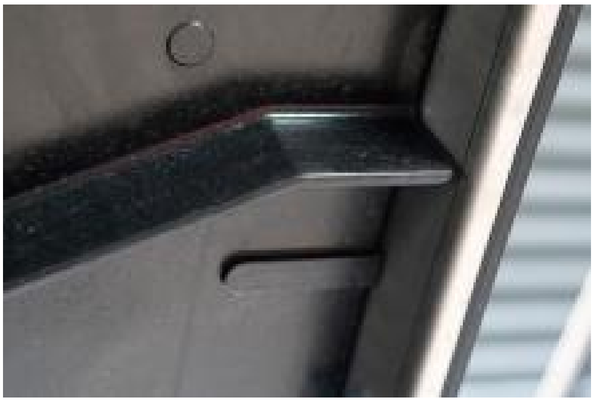

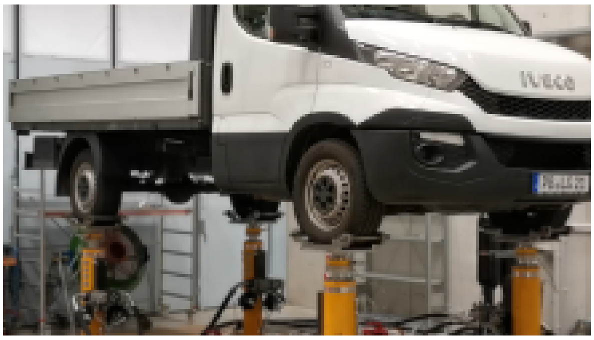

Funding duration:

Funding sign:	03LB2013	**Funding amount:**	EUR 700 thousand

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2013A

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Project coordination

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English (EN){{ Projektpartner }}

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Lightweighting classification

	Realisation
Offer	
Products Parts and components, Materials	✓
Services & consulting Engineering, Validation, Simulation, Technology transfer	✓
Field of technology	
Design & layout Lightweight manufacturing, Hybrid structures	✓
Functional integration Material functionalisation	✓
Measuring and testing technology Component and part analysis	✓
Modelling and simulation Loads & stress, Processes, Materials	✓
Plant construction & automation Plant construction	✓
Recycling technologies Recycling	✓

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Lightweighting classification

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