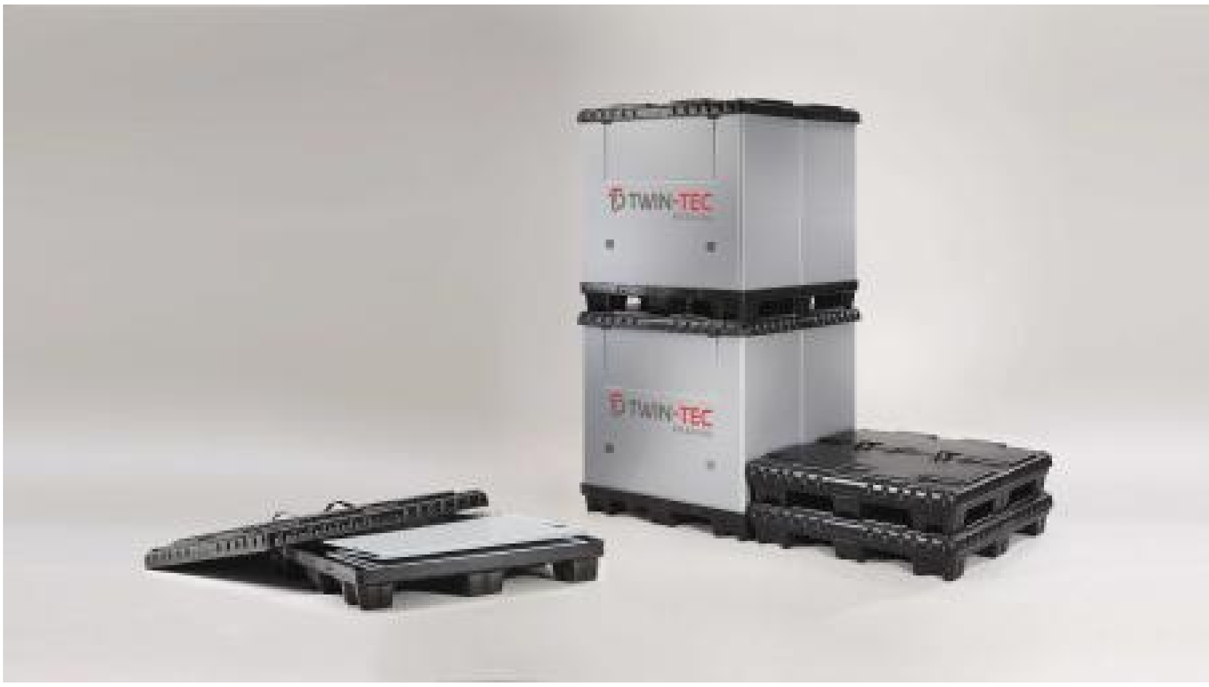
Reducing CO2 emissions in logistics: plastic large load carriers in fibre composite construction

About this project



LightLog

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Markets:

Material: Other fibres, Thermoplastics, Other composites

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

Technology Transfer Program Leichtbau

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Context

Companies use so-called large load carriers for the worldwide transport of goods and vendor parts. Thanks to their customised design, they offer special protection and have plenty of storage space - especially for heavy and bulky goods, machine parts or workpieces. Components for the automotive industry in particular are transported worldwide in these containers. An estimated 2.5 million large plastic load carriers are used in the automotive sector alone. For heavier goods and supplied parts, lattice boxes made of steel are currently used. Their disadvantages: The rigidly constructed boxes have a high dead weight and cannot be folded to save space when empty. This results in high CO_2 emissions in logistics and transport, as the utilisation phase accounts for the majority of greenhouse gas emissions from large load carriers.

Purpose

The project team is optimising comparatively lightweight plastic large load carriers so that they are more stable and at the same time more flexible in use in order to reduce greenhouse gas emissions in logistics and the environmental impact of the production and recycling of large load carriers. To this end, the researchers are developing a fibre composite construction method suitable for large-scale production for optimised plastic-based large load carriers. With these thermoplastic-based sandwich constructions, they want to achieve a better mass-performance ratio in order to further increase the payload and load capacity of plastic-based large load carriers. The volume of the boxes can be minimised many times over for empty transport by folding them up and stacking them on top of each other. This saves CO_2, as significantly more boxes can be transported in one lorry. The lightweight sandwich construction also extends the service life of the transport containers. The team also wants to reduce the repair rate through an optimised design and functional integration - with an increased payload. The researchers want to recycle the fibre-reinforced thermoplastics and recycle them in the large load carrier system or make them available to other plastics processing industries.

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Procedure

For the innovative lightweight carrier box, the researchers combine two fibre-reinforced cover layers with a core material that has already been successfully used. This enables an optimised ratio between mechanical properties and component weight, with industrial production and recyclability. Compared to monolithic construction, they can achieve significant weight savings of up to 70 per cent - while maintaining the same mechanical performance, or increase the performance for higher payloads in large plastic load carriers. The project team uses thermoplastic, meltable plastics for the core and the cover layers in order to be able to manufacture the sandwich panels in continuous production processes. Further innovation paths are conceivable in the future by applying the manufacturing process developed in the project to other components.

Funding duration:

Funding sign:	03LB2028	**Funding amount:**	EUR 685 thousand

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2028A - LightLog 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	

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Lightweighting classification

	Realisation
Field of technology	
Design & layout	
Functional integration	
Measuring and testing technology Component and part analysis	✓
Modelling and simulation Loads & stress	✓
Plant construction & automation	
Recycling technologies Recycling	✓
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology Manual lamination	✓
Forming Deep-drawing	✓
Joining	
Material property alteration	
Primary forming Extrusion	✓
Processing and separating	
Textile technology Others	✓

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Lightweighting classification

	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites Others	✓
Fibres Others	✓
Functional materials	
Metals	
Plastics Thermoplastics	✓
Structural ceramics	
(Technical) textiles	