CO# balance, resource efficiency, recycling: evaluating lightweight plastic components

About this project

SuLiCo

CO# balance, resource efficiency, recycling: evaluating lightweight plastic components

Markets:

Material: Bioplastics, Biocomposites, Glass fibres, Carbon fibres, Natural fibres, Thermoset plastics, Thermoplastics, Glass-fiber reinforced plastics (GFRP), Carbon-fiber reinforced plastics (CFRP), Natural fibre reinforced plastics (NFRP)

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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

Lightweight plastic components reduce weight and energy requirements, for example in vehicles or technical devices. At the same time, new material formulations, fibre composites or joining techniques can increase environmental impacts in other phases of the product life cycle. In practice, companies often only assess ecological effects after construction or only for individual criteria such as CO# emissions. Conflicting objectives between weight, recyclability, use of resources and function thus remain undetected.

Particularly in early development phases, there is a lack of easily accessible, comparable data on the entire life cycle of a component - from raw material extraction to utilisation and recycling. Existing software solutions either only partially map these relationships or are aimed at specialised users. This means that lightweight plastic construction lacks a tool that systematically integrates ecological and resource-related aspects into design decisions and makes different lightweight construction variants transparently comparable.

Purpose

In the SuLiCo project, the research team is developing a database-supported software tool that evaluates the environmental and resource impact of lightweight plastic components as early as the design and construction phase. The application will take the entire life cycle into account and calculate and compare parameters such as the carbon footprint, other environmental impacts, energy and resource consumption and recyclability.

The aim is to visualise conflicting objectives between lightweight construction, climate impact and recyclability and to enable fact-based decisions. The tool serves as a multi-criteria decision-making aid for developers and is intended to ensure the selection of suitable materials, construction methods and recycling strategies. A prototype is being trialled in an application-oriented manner to ensure transferability to different lightweight construction products.

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Procedure

Following a requirements analysis in collaboration with potential users from industry, the researchers are developing a consistent database of material, process and environmental data that maps the entire life cycle of lightweight plastic components. Building on this, they are developing evaluation methods that combine ecological indicators, resource efficiency and recycling aspects in a common structure. The researchers are transferring these methods into a software concept that allows a comparative assessment of different design variants.

The team then implements a functional prototype and applies it to selected use cases. The participants use tests to check the comprehensibility and significance of the results. In addition, the team prepares the results for transfer so that the tool can be used in industrial practice and disseminated further.

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Funding duration:

Funding sign: 03LB3084 **Funding amount:** EUR 550 thousand

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3084A - SuLiCo in the federal funding catalogue

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Project coordination

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English (EN){{ Projektpartner }}

Lightweighting classification

	Realisation
Offer	
Products Software & databases	✓
Services & consulting Training, Consulting, Funding	✓

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Lightweighting classification

	Realisation
Field of technology	
Design & layout	
Functional integration	
Measuring and testing technology Environmental simulation	✓
Modelling and simulation Life-cycle analysis, Optimisation	✓
Plant construction & automation	
Recycling technologies	
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology	

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Lightweighting classification

	Realisation
Material	
Biogenic materials Bioplastics, Biocomposites	✓
Cellular materials (foam materials)	
Composites Glass-fiber reinforced plastics (GFRP), Carbon-fiber reinforced plastics (CFRP), Natural fibre reinforced plastics (NFRP)	✓
Fibres Glass fibres, Carbon fibres, Natural fibres	✓
Functional materials	
Metals	
Plastics Thermoset plastics, Thermoplastics	✓
Structural ceramics	
(Technical) textiles	