Hemp as a raw material: Making natural materials industrially usable for lightweight construction

About this project

Hemp-LMC

Hemp as a raw material: Making natural materials industrially usable for lightweight construction

Markets:

Material: Bioplastics, Biocomposites, Other biogenic materials, Natural fibres, Others (Hemp stalk elements), Thermoset plastics, 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

The use of natural raw materials is becoming increasingly important in lightweight construction. Hemp fibres offer enormous potential here: they are light, stable and ecologically beneficial, as they bind CO# during their growth and do not require intensive irrigation. Nevertheless, their industrial use has so far been limited, as they only fulfil the high requirements of modern lightweight construction materials to a limited extent. The gentle fibre extraction and processing of the fibrous plant parts required for use as a high-performance material and the availability of functionally adequate biogenic matrices are considered a challenge.

Hemp bast bark is therefore considered to be a particularly promising plant fibre material, which impresses with its high mechanical strength due to its morphology, low density and native, unidirectional fibre orientation and can also be used without further fibre insulation.

In the automotive and construction industries in particular, there is a need for materials that can replace fossil raw materials without compromising on stability, processing or cost efficiency. This is precisely where the Hemp-LMC research project comes in, in which researchers are investigating the properties and processing possibilities of hemp fibre elements and hemp saw elements for industrial production.

Purpose

The Hemp-LMC project focuses on the development of sustainable composite materials. The aim is to use hemp stalk elements as a reinforcing material in sheet moulding compounds (SMC) and bulk moulding compounds (BMC). These materials are used in the automotive industry for interior door panelling, for example.

At the same time, the partners want to develop bio-based resins that can replace fossil resins without compromising production processes. The project team aims to significantly reduce greenhouse gas emissions by using raw materials locally and optimising production processes - by up to 70 percent compared to conventional materials.

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Procedure

The project team is analysing the entire value chain of hemp cultivation and harvesting through to production. The focus is particularly on the processing of hemp and hemp stalk elements. And this right from the first stage - harvesting: New harvesting and processing methods have enabled the simultaneous dual harvesting of stalk and fruit material.

At the same time, the researchers are developing bio-based resins that are on a par with petroleum-based alternatives in terms of curing times and mechanical properties. To ensure practical applicability, the team is testing the newly developed materials in large-scale production facilities. This is followed by an evaluation of product-specific properties such as density, fire behaviour or water absorption of the natural fibre-reinforced plastics (NFRP). This shows that the hemp fibres not only meet the technical requirements, but also enable the resource-saving and cost-efficient production of lightweight structures.

Funding duration:

Funding sign:	03LB3004	**Funding amount:**	EUR 650 thousand

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3004A - Hemp-LMC 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 Training, Testing and trials, Engineering, Prototyping, Validation, Technology transfer	✓

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Lightweighting classification

	Realisation
Field of technology	
Design & layout Lightweight material construction	✓
Functional integration Material functionalisation	✓
Measuring and testing technology Environmental simulation, Materials analysis	✓
Modelling and simulation	
Plant construction & automation	
Recycling technologies Recycling	✓
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology Others (Processing SMC and BMC)	✓
Forming Compression moulding	✓
Joining	
Material property alteration	
Primary forming Others (Presses)	✓
Processing and separating	
Textile technology	

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Lightweighting classification

	Realisation
Material	
Biogenic materials Bioplastics, Biocomposites, Others	✓
Cellular materials (foam materials)	
Composites Natural fibre reinforced plastics (NFRP)	✓
Fibres Natural fibres, Others (Hemp stalk elements)	✓
Functional materials	
Metals	
Plastics Thermoset plastics	✓
Structural ceramics	
(Technical) textiles	