Developing natural fibre-reinforced plastic components: with innovative 3D printing

About this project

ECO2-LInE

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Markets:

Material: Bioplastics

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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

Context

Land vehicles consist of large and heavy components that are difficult to recycle. To make them lighter and more sustainable, lightweight, natural fibre-reinforced plastic components could replace the metal structures used today. These renewable raw materials are not only sustainable, but also have a lower density, better acoustic and mechanical damping and are biodegradable. Above all, their production consumes less energy and therefore emits significantly less CO2. Natural fibre-reinforced plastics are therefore particularly attractive for lightweight construction in mobile applications.

Purpose

The project team wants to develop the new lightweight components for a wide range of industries and applications: special vehicle seats - for example a lightweight seat for use in electric vehicles and special vehicles - tractor crossovers or attachments for pick-ups. The researchers are pursuing a holistic approach. They not only want to make the components lighter with environmentally friendly materials, but also consider the entire life cycle: how can the utilisation cycle of the components, from material selection and production to use and recycling, become more sustainable?

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Procedure

The researchers use the high-speed additive process SEAM (Screw Extrusion Additive Manufacturing). This innovative 3D printing process is eight times faster than conventional 3D printing. Thanks to the free shaping, even complex parts can be created. In addition, several conventionally manufactured individual components can be replaced by one additively manufactured part. The advantages: Digitalisation ensures shorter process chains and therefore faster production, the use of materials is as low as possible and manufacturers can produce many different individual pieces cost-effectively.

The team also uses natural fibre-reinforced plastics. The challenge with natural fibres is their ability to absorb moisture. The researchers want to solve this by means of an innovative pre-treatment of the fibres. The aim is not only to make the fibres water-repellent (hydrophobic) on the surface, but also on the inside to prevent them from penetrating the naturally occurring cavities and gaps.

The researchers are also carrying out ecological assessments of the individual fields of application over the entire life cycle. This enables them to demonstrate and further optimise CO2 and resource savings right from the start. The partners are also laying the foundations for the transfer to industrial production, for example by further developing and testing the SEAM process through specific applications with industrial partners.

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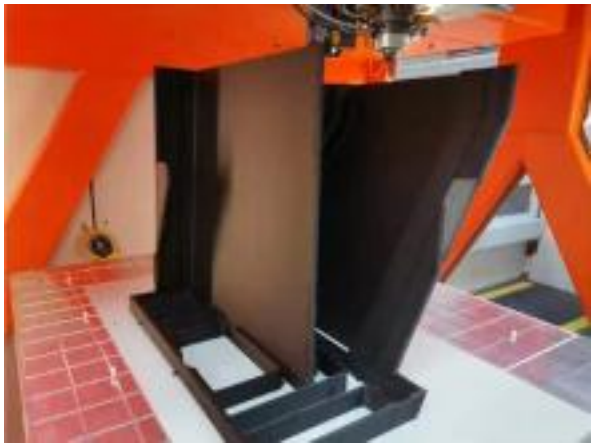

Funding duration:

Project partner:

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Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2017A - ECO2-LInE in the federal funding catalogue

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Project coordination

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Lightweighting classification

	Realisation
Offer	
Products Parts and components, Systems and end products	✓
Services & consulting	

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Lightweighting classification

	Realisation
Field of technology	
Design & layout Lightweight manufacturing	✓
Functional integration	
Measuring and testing technology System analysis	✓
Modelling and simulation Optimisation, Processes	✓
Plant construction & automation	
Recycling technologies	
Manufacturing process	
Additive manufacturing 3D printing	✓
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining Adhesive bonding	✓
Material property alteration	
Primary forming	
Processing and separating	
Textile technology	

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Lightweighting classification

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