Building fertiliser spreaders more sustainably: lightweight and modular support structure

About this project

LE²GRO

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Markets:

Material: Others (Multi-material composite)

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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 growing global demand for food and renewable raw materials requires increasingly intensive farming. This is accompanied by problems such as increasing soil compaction, which is also caused by increasingly heavy machinery. Conventional fertiliser spreader booms made of stainless steel structures are already so optimised in their lightweight steel construction that no major weight savings are possible. With innovative technologies and new material approaches, lightweight construction can help to make machines lighter and more efficient and thus make agriculture more sustainable.

Purpose

The LE²GRO project aims to develop a near-series, weight-reduced and modular support structure for fertiliser spreader booms. By using innovative lightweight construction technologies in the form of braided fibre-thermoplastic composite profiles, heavy and cost-intensive stainless steel tubes are to be replaced. This enables comprehensive manufacturing, structural and functional integration while avoiding cost-intensive post-processing steps. The scientists are not only striving for technological innovation, but also for an economically viable solution for the agricultural machinery industry.

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Procedure

The researchers use the continuous blow moulding process for the production of fibre-reinforced thermoplastic hollow profiles and develop a digital tool for the automated design and dimensioning of the supporting structure. They are developing load-appropriate profile connections and innovative braided node structures and implementing them as prototypes. The modularisation of the supporting structure enables rapid adaptation to different application scenarios and helps to increase efficiency when spreading the fertiliser. Integrated sensor technology also enables continuous monitoring and optimisation of the agricultural machine.

In addition, the researchers are further developing process chains to ensure the economical production of functional load-bearing profile structures and to guarantee consistent quality monitoring. The innovative approach of the multi-material support structure design not only promises a significant reduction in component complexity, but also improved competitiveness for the German agricultural industry as well as more sustainable agriculture by reducing soil compaction and optimising fertiliser application.

The project participants have been awarded 1st place in the "Innovative Products and Applications" category of the AVK Innovation Award 2024.

Funding duration:

Funding sign: 03LB2002 **Funding amount:** EUR 923 thousand

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2002A - LE2GRO in the federal funding catalogue

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Project coordination

Contact:

Mr Dipl.-Ing. Peter Schneider

+49 035204 3928-52

peter.schneider@thoenes-dichtungen.de

Organisation:

thoenes Dichtungstechnik GmbH

Zeppelinstraße 1
01665 Klipphausen
Saxony
Germany

www.thoenes-solutions.com

English (EN){{ Projektpartner }}

Institut für Leichtbau und Kunststofftechnik

RAUCH

Lightweighting classification

	Realisation
Offer	
Products Semi-finished parts	✓
Services & consulting	

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Lightweighting classification

	Realisation
Field of technology	
Design & layout Lightweight material construction	✓
Functional integration Sensor technology	✓
Measuring and testing technology	
Modelling and simulation Loads & stress, Reliability validation	✓
Plant construction & automation Handling technology	✓
Recycling technologies	
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology Braiding, Preforming	✓

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Lightweighting classification

	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites Others (Multi-material composite)	✓
Fibres	
Functional materials	
Metals	
Plastics	
Structural ceramics	
(Technical) textiles	