Producing washing machines more sustainably: Material recycling and digital simulation

About this project

DigiLaugBeh

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Markets:

Material: Thermoplastics, Glass fibres, Other fibres

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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

The drums of washing machines spin in almost every German household. It is therefore important that the appliances are not only as energy-efficient as possible in use, but also in their production. This is where the researchers in the DigiLaugBeh project come in, using digital simulations to transfer innovative lightweight construction solutions from automotive engineering to the washing machine application. The lye containers are manufactured using an injection moulding process. A machine plasticises the plastic used - short fibre-reinforced thermoplastic - and injects the softened material into shape under pressure.

Purpose

The project partners want to use the lye container that surrounds the washing drum to show how great the potential is to save CO2 and recycle materials. To do this, they are using innovative lightweight construction solutions. The researchers are creating a digital twin in order to visualise the entire product development chain, simulate the entire component design and take a holistic view of the process, material and environmental balance. Ultimately, the project team wants to produce a demonstrator that combines all the knowledge gained and thus enables the transition to serial production of the innovative lye container.

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Procedure

The project partners are using digital simulations to optimise the entire manufacturing process. For example, they want to use long glass fibres instead of the short fibre-reinforced material. They are also replacing conventional injection moulding with thermoplastic foam injection moulding. In this process, the molten plastic is charged with carbon dioxide or nitrogen and then foamed. This protects the fibres and reduces the risk of component distortion.

The approaches used are analysed for their life cycle right from the start. The researchers assess the respective CO2 footprint and optimise it. They also aim to replace around 50 per cent of the materials used with recycled materials, for example by recycling returns at the end of their service life.

The researchers assume that this will save 30 to 40 per cent of CO2 equivalents per kilogramme of material used. The lye container weighs around 4 kilograms. With 8 million parts produced annually, replacing half of the materials used with recycled material would save 19 to 25 thousand tonnes of CO2 equivalents per year.

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Funding duration:

Project partner:

Funding sign: 03LB3044

Funding amount: EUR 2.8 million

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3044A - DigiLaugBeh in the federal funding catalogue

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Project coordination

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Lightweighting classification

	Realisation
Offer	
Products Parts and components	✓
Services & consulting Consulting	✓

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Lightweighting classification

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

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Lightweighting classification

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