

Reducing resource consumption by 80 per cent: production of lightweight structures

About this project



METEOR

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Markets:



Material:

Thermoplastics, Aluminium

This project is funded by the Technology Transfer Programme Leichtbau (TTP LB) of the Federal Ministry of Economics and Energy.

[Technology Transfer Program Leichtbau](#)

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Context

In order to drive forward the transition to a climate-neutral industry, new technologies and processes must be quickly put into practice - including in lightweight construction. This is where the National Lightweight Engineering Validation Centre (LEIV) at the Technical University of Dresden comes in. The project is making a significant contribution to accelerating the transfer from research to the real economy.

To this end, the LEIV is organised as an independent and open research platform with around 1,500 square metres of test space. In addition to large companies and original equipment manufacturers, small and medium-sized enterprises (SMEs) in particular also benefit from the opportunity to realise demonstrations on an industrial scale. This can significantly accelerate the practical transfer of research results. The start-up funding for the centre is based on the TTP LB-funded METEOR project.

Purpose

METEOR is the first in a series of research projects, the results of which are intended to help reduce CO₂ in the production of sustainable lightweight structures. The aim is to reduce resource consumption in the production of high-performance lightweight structures by 80 per cent in real terms by 2030 and to create a largely environmentally neutral production network. To this end, material cycles are to be established and an end-to-end virtual process chain, the continuous balancing of resource efficiency and the consistent use of renewable energies within the process network are to be implemented.

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Procedure

Initially, the development and construction of a solar thermal mould heating and cooling system and the establishment of a temperature control cascade will form the infrastructural basis for the LEIV. The researchers are using the process chain of light metal die casting, plastic injection moulding and mechanical joining, which is relevant for lightweight system construction, to demonstrate the saving CO₂ potential that can already be realised.

The project partners are demonstrating new approaches to validate and optimise the efficiency of lightweight structures - for example in solar-assisted temperature control, the inline simulation of production processes or the robot-assisted joining of composite structures. They are developing the process chain for manufacturing a hybrid structure into a linked process network - with intelligently controlled process management and coordinated technologies. In doing so, the team collects extensive data and thus enables an improved assessment of resource efficiency in order to quantify potential CO₂ savings and demonstrate the value of modern process networks.

One result of the project is a new market-ready installation tool that installs threaded inserts in a process-monitored manner. During the entire assembly process, sensors on the nose piece monitor the correct installation of the HELICOIL thread insert. In addition, the angle of rotation and torquecontrolled installation enables the thread insert to be inserted to a precise depth.

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Funding duration:

Funding sign:	03LB2010	Funding amount:	EUR 15.8 million
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Final report

Further websites

plattform-forel.de/meteor/ - METEOR on the Forel website platform
foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2010A - METEOR in the federal funding catalogue

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Project coordination

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English (EN){ { Projektpartner } }



Reducing resource consumption by 80 per cent: production of lightweight structures

Lightweighting classification	
	Realisation
Offer	
Products Parts and components	✓
Services & consulting Testing and trials	✓
Field of technology	
Design & layout Hybrid structures	✓
<i>Functional integration</i>	
<i>Measuring and testing technology</i>	
Modelling and simulation Life-cycle analysis, Processes	✓
Plant construction & automation Plant construction, Automation technology, Handling technology	✓
<i>Recycling technologies</i>	
Manufacturing process	
<i>Additive manufacturing</i>	
<i>Coating (surface engineering)</i>	
<i>Fibre composite technology</i>	
<i>Forming</i>	
Joining Screwing	✓
<i>Material property alteration</i>	
Primary forming Casting, Injection moulding	✓
<i>Processing and separating</i>	
<i>Textile technology</i>	

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Lightweighting classification	
	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites	
Fibres	
Functional materials	
Metals	
Aluminium	✓
Plastics	
Thermoplastics	✓
Structural ceramics	
(Technical) textiles	