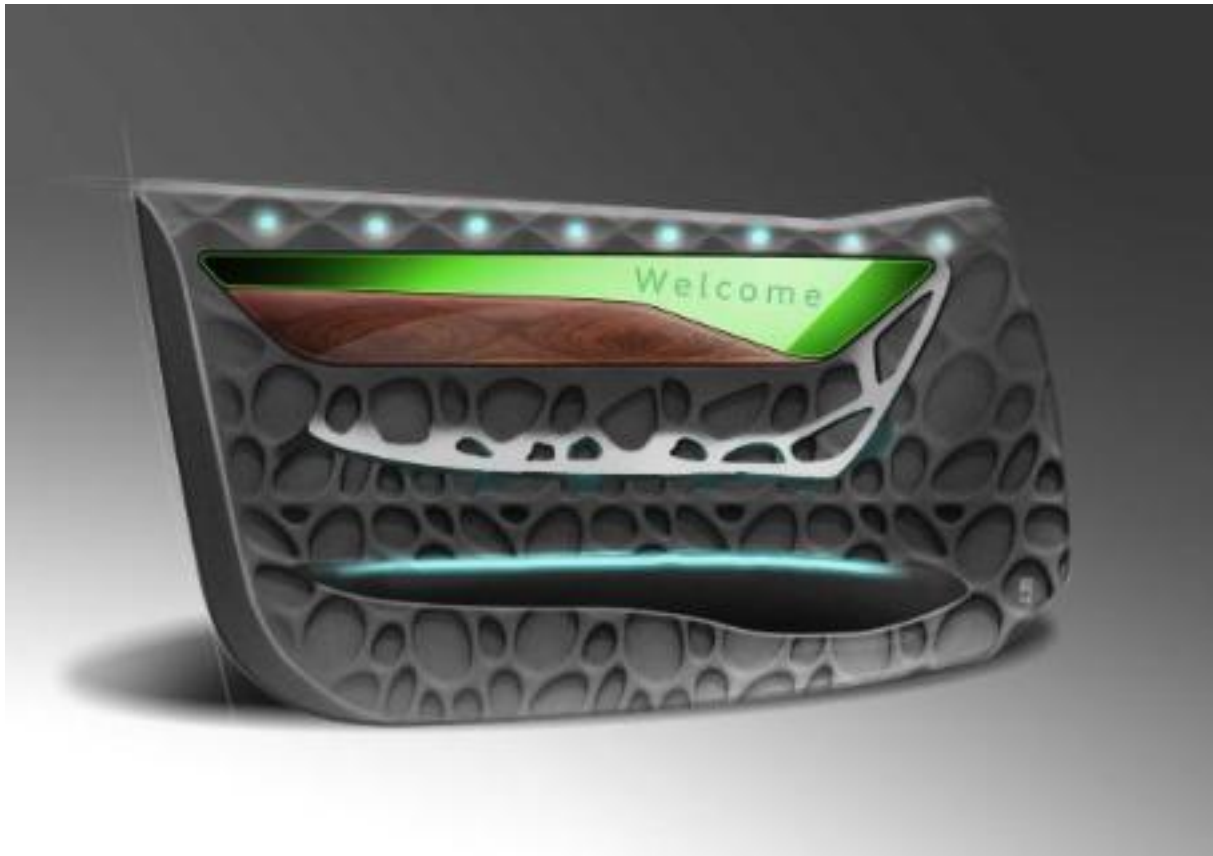


# Making the process chain for lightweight products more sustainable: based on bionics and AI

## About this project



## BIKINI

Making the process chain for lightweight products more sustainable: based on bionics and AI

Markets:



Material:

Others (Cross-material), Others (Cross-material)

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## About this project

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

Lightweight construction is a key technology for curbing global warming and increasing economic performance at the same time. In the mobility sector in particular, companies can save material and therefore resources thanks to lightweight construction. At the same time, lightweight vehicles emit less CO<sub>2</sub> during operation. However, the manufacturing and recycling processes for vehicles are often emission-intensive. There is a lack of holistic solutions that make products more sustainable over their entire life cycle and optimise them along the vertical and horizontal process chain.

## Purpose

The project partners want to make the entire process chain for lightweight products more sustainable and increase resource efficiency across the entire life cycle. To this end, they are optimising the CO<sub>2</sub> footprint and the use of resources in the manufacturing process. The researchers are working on new development concepts in order to be able to take these aspects into account during the planning and design of individual components or complex building structures. They use methods of automation, artificial intelligence (AI) and bionics, i.e. the transfer of natural phenomena and principles to technology, as the basis for new algorithms and assistance services.

## Procedure

The researchers are supplementing established processes such as the computer-aided design of components (CAD designs) with additional elements. To this end, they are developing design algorithms inspired by biology. AI-based assistance services should take into account and integrate the downstream life phases as early as the product creation stage and predict simulation results. The project team is developing a semi-automated design process that enables products to be adapted and optimised quickly without having to carry out extensive new development. This not only saves time, but is also sustainable. This is because manufacturing processes and materials that are only economical and sustainable in the introductory phase of a product, for example, can be replaced quickly and easily in later phases of the product life cycle.

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## About this project

Funding duration:

Funding sign:

03LB3018

Funding amount:

EUR 2.3 million

Final report

Further websites

[bikini-projekt.de/](http://bikini-projekt.de/) - Project website in German language  
[youtube.com/watch?v=ekaH\\_6jV46Y](https://youtube.com/watch?v=ekaH_6jV46Y) - Video about the project  
[foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3018A](http://foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3018A) - BIKINI in the federal funding catalogue

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### Project coordination

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### English (EN){ { Projektpartner } }



ALFRED-WEGENER-INSTITUT  
HELMHOLTZ-ZENTRUM FÜR POLAR-  
UND MEERESFORSCHUNG



HEINZ NIXDORF INSTITUT  
UNIVERSITÄT PADERBORN



## Making the process chain for lightweight products more sustainable: based on bionics and AI

Lightweighting classification	
	Realisation
<b>Offer</b>	
<b>Products</b> Parts and components	✓
<b>Services &amp; consulting</b> Consulting, Simulation	✓
<b>Field of technology</b>	
<b>Design &amp; layout</b> Lightweight construction concepts, Others (Bionics)	✓
Functional integration	
Measuring and testing technology	
<b>Modelling and simulation</b> Life-cycle analysis, Optimisation, Processes, Others	✓
<b>Plant construction &amp; automation</b> Automation technology	✓
Recycling technologies	
<b>Manufacturing process</b>	
<b>Additive manufacturing</b> 3D printing	✓
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology	

## Making the process chain for lightweight products more sustainable: based on bionics and AI

Lightweighting classification	
	Realisation
<b>Material</b>	
<i>Biogenic materials</i>	
<i>Cellular materials (foam materials)</i>	
<i>Composites</i>	
<i>Fibres</i>	
<i>Functional materials</i>	
<b>Metals</b>	
Others (Cross-material)	✓
<b>Plastics</b>	
Others (Cross-material)	✓
<i>Structural ceramics</i>	
<i>(Technical) textiles</i>	