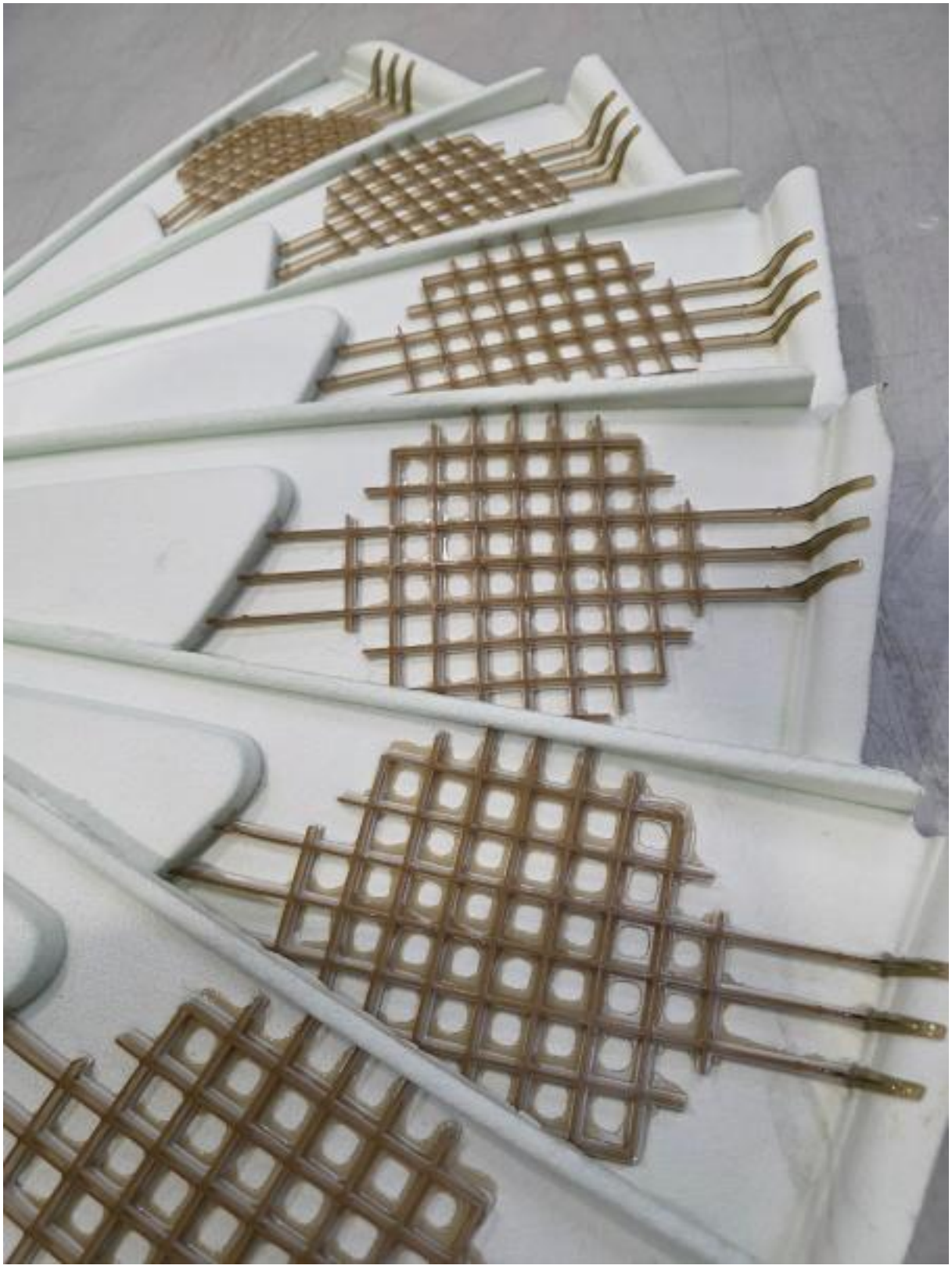
# Optimising micro- and monosandwich materials: Lightweight construction for functional vehicle components

## About this project



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## About this project

### FuMi-Lite

### Optimising micro- and monosandwich materials: Lightweight construction for functional vehicle components

**Markets:**

**Material:** Natural fibres, Others (PET fibres), Thermoplastics, Yarns, rovings, Nonwovens, mats, Natural fibre reinforced plastics (NFRP), Others (Self-reinforced plastics (SrPET)), Open-pore

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Technology Transfer Program Leichtbau

### Context

Lightweight construction is an important component in making vehicles more efficient and environmentally friendly. Micro- and mono-sandwich materials offer great potential here. They consist of a lightweight core material sandwiched between two cover layers. This structure enables high rigidity and low weight at the same time. In vehicle construction, microsandwich materials have so far mainly been used for simple panelling parts. New solutions are required for more sophisticated components such as door base beams or centre consoles, which integrate additional functions and can reliably absorb mechanical loads. In the FuMi-Lite project, the research team is working on further developing micro- and mono-sandwich technologies for complex applications in vehicle interiors.

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### Purpose

The research team is pursuing the goal of optimising micro- and mono-sandwich materials in such a way that they fulfil multifunctional requirements. Specifically, it is working on a combination of materials consisting of a recycled PET foam core and cover layers - such as natural fibre-reinforced nonwovens. This combination reduces the weight by up to 40 per cent compared to conventional materials and at the same time enables new functions. This includes the integration of heating systems or fastening elements. The scientists are also investigating how other sustainable and recycled materials can be integrated into the structure. The aim is to ecologically optimise the entire production chain and make the usage phase of the components more energy-efficient.

### Procedure

First, the researchers analysed the properties of the micro- and mono-sandwich material, which consists of the PET foam core and natural fibre-reinforced cover layers or self-reinforced PET cover layers. Through targeted material and structural optimisations, they developed solutions to stabilise critical areas, for example through local reinforcements or variable material densities.

Another focus is the functionalisation of the components. Here, the team uses processes such as injection moulding to add additional elements such as rib structures for stability. The low pressure resistance of the PET foam core poses a particular challenge here. The researchers tested innovative approaches such as foam injection moulding or special joining techniques in order to maintain the material structure.

The researchers are also investigating how heating systems and insulating layers can be integrated directly into the components. They are also focussing on alternative surface materials such as textiles or paper in order to further reduce the weight and promote the use of renewable raw materials. Finally, the team is testing the developed prototypes and evaluating the entire production chain in terms of environmental balance and readiness for series production.

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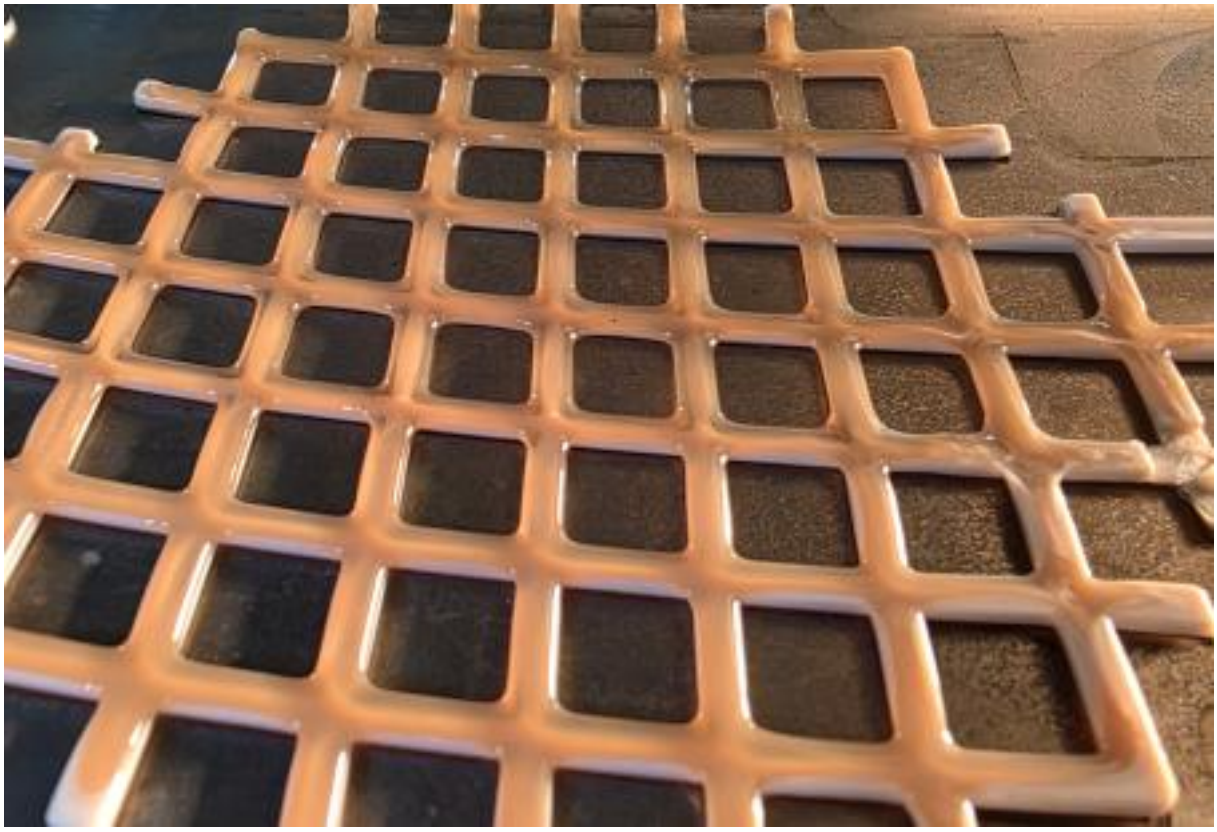

**Funding duration:**

| | | | |
|---|---|---|---|
| **Funding sign:** | 03LB4009 | **Funding amount:** | EUR 936 thousand |

**Final report**

**Further websites**

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## Project coordination

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### Organisation:

## English (EN){{ Projektpartner }}

Mercedes-Benz

ALBERT POLENZ GmbH & Co.KG
WERKZEUG- UND FORMENBAU

## Lightweighting classification

| | Realisation |
|---|---|
| **Offer** | |
| **Products**<br>Parts and components, Semi-finished parts, Materials, Tools and moulds | ✓ |
| **Services & consulting**<br>Engineering, Prototyping, Validation, Simulation, Technology transfer | ✓ |

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## Lightweighting classification

| | Realisation |
|---|---|
| **Field of technology** | |
| **Design & layout**<br>Lightweight manufacturing, Lightweight construction concepts, Lightweight material construction | ✓ |
| **Functional integration**<br>Thermal activation, Material functionalisation | ✓ |
| **Measuring and testing technology**<br>Materials analysis, Destructive analysis | ✓ |
| **Modelling and simulation**<br>Crash behaviour, Optimisation, Structural mechanics, Materials | ✓ |
| *Plant construction & automation* | |
| **Recycling technologies**<br>Recycling, Others (Recycling-orientated processing of shredded components) | ✓ |
| **Manufacturing process** | |
| *Additive manufacturing* | |
| *Coating (surface engineering)* | |
| *Fibre composite technology* | |
| **Forming**<br>Compression moulding, Thermal converting | ✓ |
| **Joining**<br>Welding | ✓ |
| *Material property alteration* | |
| **Primary forming**<br>Injection moulding | ✓ |
| *Processing and separating* | |
| **Textile technology**<br>Yarn & roving production, Preforming, Nonwoven & mats production | ✓ |

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## Lightweighting classification

| | Realisation |
|---|---|
| **Material** | |
| *Biogenic materials* | |
| **Cellular materials (foam materials)**<br>Open-pore | ✓ |
| **Composites**<br>Natural fibre reinforced plastics (NFRP), Others (Self-reinforced plastics (SrPET)) | ✓ |
| **Fibres**<br>Natural fibres, Others (PET fibres) | ✓ |
| *Functional materials* | |
| *Metals* | |
| **Plastics**<br>Thermoplastics | ✓ |
| *Structural ceramics* | |
| **(Technical) textiles**<br>Yarns, rovings, Nonwovens, mats | ✓ |