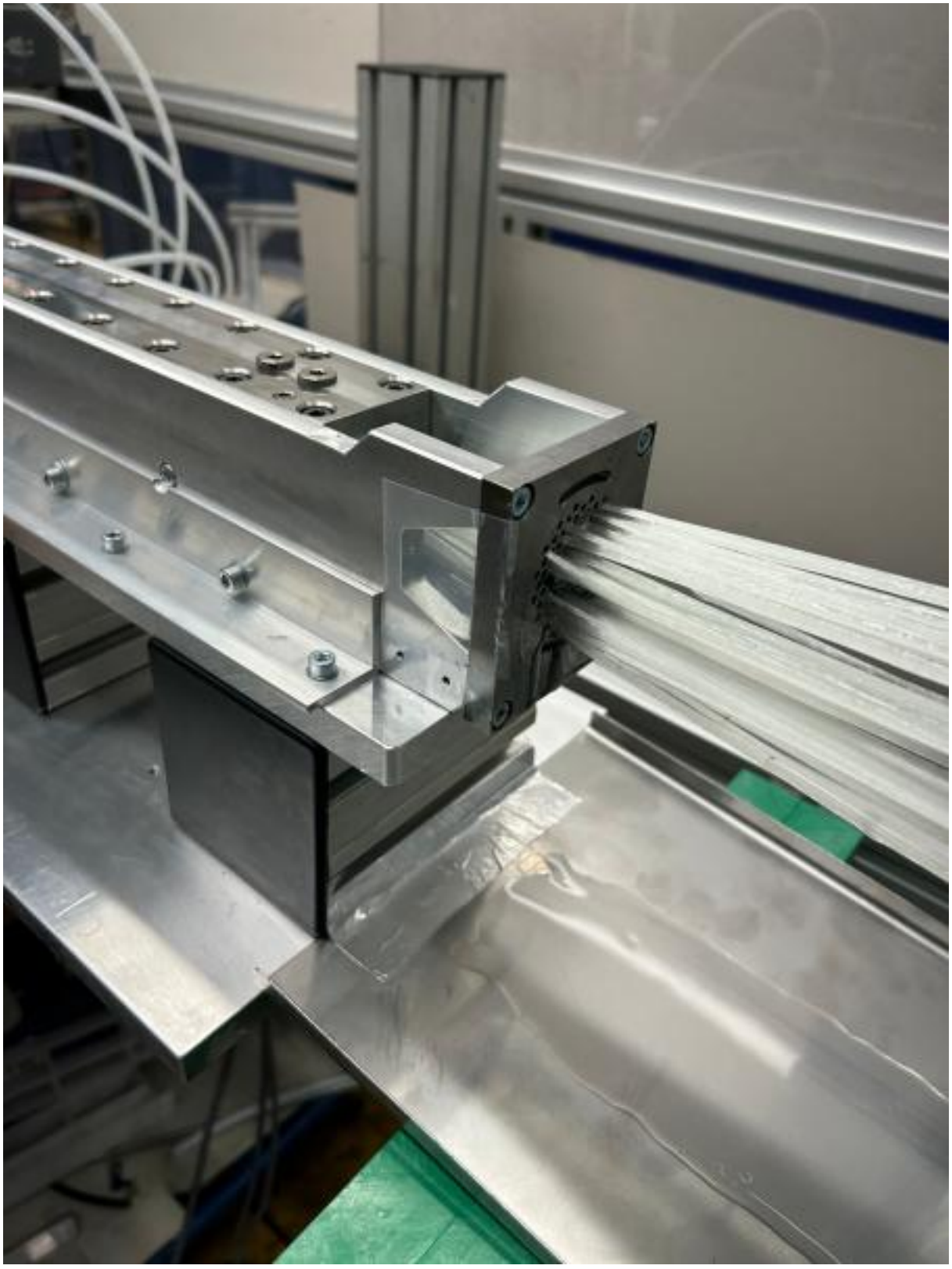
Producing postformable profiles: innovative UV pultrusion for fibre-reinforced plastics

About this project



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About this project

UVPult

Producing postformable profiles: innovative UV pultrusion for fibre-reinforced plastics

Markets: 

Material: Glass fibres, Thermoset plastics, Others (UV-curable resins), Glass-fiber reinforced plastics (GFRP)

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 increasing demands for efficiency and sustainability in vehicle construction require innovative solutions. Lightweight construction approaches play a key role in reducing CO2 emissions and minimising the weight of vehicles. Thanks to their adaptability and strength, lightweight fibre-reinforced plastics (FRP) offer great potential to replace conventional materials such as steel. A proven manufacturing process for FRP profiles is pultrusion, in which the materials are continuously drawn through a mould and cured there. However, existing pultrusion processes are limited to producing profiles with a constant cross-section, which limits their use for more complex applications. In order to expand the flexibility and range of applications of this technology, the team in the UVPult project is developing a new process to produce post-mouldable pultrusion profiles that offer ecological benefits as well as being highly cost-effective.

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Purpose

The aim of the researchers is to develop an innovative pultrusion technology that enables the subsequent moulding of FRP profiles for the first time. The team uses glass fibre reinforced plastics (GRP) and processes them with UV-curing resins to enable precisely controllable curing. The result is GRP profiles that are characterised by lightness, stability and cost efficiency and can be used in series production - for example as coupling rods in vehicles. With this technology, the scientists not only want to reduce the weight and thus the energy consumption during vehicle use, but also significantly reduce the energy requirements in production.

Procedure

First of all, the researchers are developing new UV-curing resins and innovative LED UV lamps that enable zone-by-zone and switchable curing. They are designing the pultrusion process in such a way that certain areas of the profile remain partially cured for the time being. These sections can then be reshaped and finally cured, allowing complex geometries to be realised.

At the same time, the scientists are developing tools and procedures to automate these processes and integrate them into existing production lines. Finally, they test the technology on demonstrators such as the planned coupling rods and comprehensively validate their mechanical and functional properties.

Due to its innovative potential, UVPult has been recognised as a finalist in the prestigious JEC Innovation Awards 2025 in the automotive and transport sector.

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Funding duration:

Funding sign:	03LB2036	**Funding amount:**	EUR 1.3 million

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB2036A - UVPult in the federal funding catalogue

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Project coordination

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Lightweighting classification

	Realisation
Offer	
Products Parts and components, Others (GRP coupling rod)	✓
Services & consulting Training, Testing and trials, Engineering, Prototyping, Validation	✓
Field of technology	
Design & layout Hybrid structures	✓
Functional integration	
Measuring and testing technology Environmental simulation, Materials analysis, Destructive analysis, Others (Complete validation of use)	✓
Modelling and simulation Loads & stress, Multiphysics simulation, Others (Design of the UV lamp technology for the pultrusion mould and the forming mould)	✓
Plant construction & automation	
Recycling technologies	

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Lightweighting classification

	Realisation
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology Others (Pultrusion with UV matrix)	✓
Forming Others (Sequential UV pultrusion: hardening of the bar centre in the pultrusion tool, downstream forming/hardening of the non-hardened bar ends in the haul-off unit to produce the undercuts)	✓
Joining Others (Form-fit injection moulding of the undercuts produced in pultrusion with joints made of short-fibre-reinforced plastic with sealing system)	✓
Material property alteration	
Primary forming Pultrusion, Others (Reinforcing rovings impregnated with matrix are continuously fed through a profiling mould.)	✓
Processing and separating Sawing	✓
Textile technology	

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Lightweighting classification

	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites Glass-fiber reinforced plastics (GFRP)	✓
Fibres Glass fibres	✓
Functional materials	
Metals	
Plastics Thermoset plastics, Others (UV-curable resins)	✓
Structural ceramics	
(Technical) textiles	