Department of Polymer-based Lightweight Construction (PbL)

### About this organisation

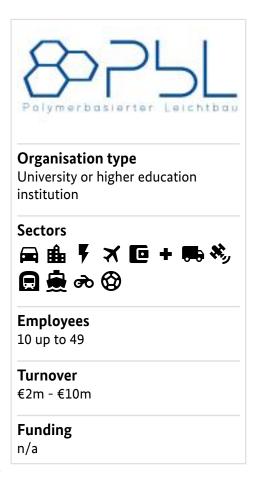
#### **Machine translation**

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Along the product-orientated value chain, the international and interdisciplinary team of the Polymer-based Lightweight Construction (PbL) department is involved in the crossindustry development of energy-efficient lightweight construction solutions and associated production technologies. The focus is primarily on the design, simulation and production of functionally integrative multimaterial construction methods.

The lightweight construction competences and research focuses in the field of polymer-based lightweight construction are: - Sustainable lightweight construction solutions with fibre-reinforced composites - Design, coupled process and structural simulation as well as prototype production of lightweight systems in metal and fibre composite construction - Development of special joining technologies and load application systems for high-strength composite structures with fibre-reinforced composites (FRP) and metals that are suitable for force flow - Continuous design and optimisation of manufacturing processes and process chains - Holistic material-adapted additive manufacturing processes - Material-appropriate recycling and repair processes - Testing lightweight constructions under mechanical, thermal and medial loads -Functionalisation of lightweight materials.

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About this organisation		
Main areas covered	Processes and components, Additive manufacturing processes, Examination, Plastics processing technologies, Function integration	
Infrastructure	Automated Fibre Placement (AFP), Prepreg slitter, rewinding system, 2K injection moulding machine, extrusion, Hot press, autoclave, RTM, Additive manufacturing centre (LFAM)	
Certifications	ISO 9001	
Keywords	Automated Fibre Placement (AFP), Additive manufacturing (3D printing), Hybrid technologies, Design, production, simulation, Rapid manufacturing	
Memberships	Carbon Composites e.V., VDI AK Plastics and Lightweight Construction Technology, Plastics Association BB e.V. (KuVBB), Network Lightweight Metal BB (LMB), Plastics and Chemistry Cluster BB	

### Overview of lightweighting expertise

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	Research	Development	Manufacturing & Supply
Offer			
<b>Products</b> Parts and components, Semi-finished parts, Machines and plants, Systems and end products, Materials, Tools and moulds	~	$\checkmark$	$\checkmark$
<b>Services &amp; consulting</b> Consulting, Testing and trials, Engineering, Prototyping, Validation, Simulation, Technology transfer	~	$\checkmark$	~

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	Research	N Development	/lanufacturin & Supply		
Field of technology					
<b>Design &amp; layout</b> Lightweight manufacturing, Lightweight design, Hybrid structures, Lightweight material construction	$\checkmark$	~			
<b>Functional integration</b> Media conductivity, Sensor technology, Thermal activation, Material functionalisation	$\checkmark$	$\checkmark$			
<b>Measuring and testing technology</b> Component and part analysis, Visual analysis (e.g. microscopy, metallography), Environmental simulation, Materials analysis, Destructive analysis, Non-destructive analysis	~		$\checkmark$		
<b>Modelling and simulation</b> Crash behaviour, Loads & stress, Life-cycle analysis, Multiphysics simulation, Optimisation, Processes, Structural mechanics, Materials, Reliability validation	~	~	~		
<b>Plant construction &amp; factory automation</b> Handling technology, Robotics	$\checkmark$	$\checkmark$			

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Overview of lightweighting expertise				
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Manufacturing process				
Additive manufacturing 3D printing, Laminated object manufacturing (LOM), Fused deposition modeling, Selective laser melting (SLM, LPBF,), Selective laser sintering (SLS)	~	$\checkmark$	~	
Coating (surface engineering)				
<b>Fibre composite technology</b> Fibre spraying, Filament winding, Manual lamination, Resin infusion process, Resin transfer moulding, Pre-preg processing, Vacuum infusion	~	$\checkmark$	~	
<b>Forming</b> Bending, Compression moulding, Thermal converting	$\checkmark$	$\checkmark$		
<b>Joining</b> Hybrid joining, Adhesive bonding, Soldering, Riveting, Screwing, Welding	$\checkmark$	$\checkmark$		
Material property alteration Mechanical treatment, Thermomechanical treatment, Heat treatment	$\checkmark$	$\checkmark$		
<b>Primary forming</b> Extrusion, Sintering, Injection moulding	$\checkmark$	$\checkmark$	$\checkmark$	
<b>Processing and separating</b> Drilling, Turning, Milling, Sawing, Shearing/ punching, Grinding, Cutting	$\checkmark$		$\checkmark$	
<b>Textile technology</b> Fibre manufacturing, Preforming, Textile surface treatment and finishing, Knitting, laid web production	$\checkmark$	$\checkmark$	$\checkmark$	

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	Research	Manufacturi Development & Supply	
Material			
<b>Biogenic materials</b> Bioplastics, Biocomposites	$\checkmark$	$\checkmark$	
<b>Cellular materials (foam materials)</b> Closed-pore	$\checkmark$	$\checkmark$	
<b>Composites</b> Aramid fibre composites, Glass-fiber reinforced plastics (GFRP), Carbon-fiber reinforced plastics (CFRP), Short fibre-reinforced concrete, Nanocomposites, Laminates, Textile-reinforced concrete	~	$\checkmark$	
<b>Fibres</b> Aramid fibres, Glass fibres, Carbon fibres, Natural fibres	$\checkmark$	$\checkmark$	
<b>Functional materials</b> Piezoelectric materials	$\checkmark$	$\checkmark$	
<b>Metals</b> Aluminium, Steel, Titanium	$\checkmark$	$\checkmark$	
<b>Plastics</b> Thermoset plastics, Thermoplastics	$\checkmark$	$\checkmark$	
<b>Structural ceramics</b> Oxidic ceramics, Ultra-high-temperature ceramics	$\checkmark$	$\checkmark$	

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### Contacts

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