

# Federal Cluster of Excellence MERGE

## Central institution of the TU Chemnitz

### About this organisation

#### Machine translation

This profile has been machine-translated based on data provided in German.

The Federal Cluster of Excellence MERGE (Technology Fusion for Multifunctional Lightweight Structures) is Germany's first and only cluster funded by the German Research Foundation (DFG) in the field of lightweight construction research. Scientists from six interacting specialist disciplines are developing innovative manufacturing processes to reduce the weight of components and optimise value chains.

The focus is on the fusion of basic technologies suitable for large-scale production from the fields of plastics, metal, textiles and smart systems for the resource-efficient production of lightweight structures with high performance and functional density. Along process chains suitable for large-scale production, textile and metallic semi-finished reinforcement products are designed in in-line technologies to withstand loads and equipped with active components such as sensors and actuators using in-situ processes. The researchers are pursuing strategies for the recyclability of multi-material systems and the use of renewable raw materials as well as so-called bivalent resource efficiency (BRE for short) in order to tap into particularly high savings and innovation potential in the production and use of a component. The research areas involved are concentrated at one location, the Technology Campus, with Chemnitz University of Technology, the affiliated institutes and Fraunhofer Institutes, which promotes the transfer of knowledge over "short distances".

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[www.tu-chemnitz.de/MERGE](http://www.tu-chemnitz.de/MERGE)



#### Organisation type

University or higher education institution

#### Sectors



#### Employees

50 up to 249

#### Turnover

n/a

#### Funding

n/a

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### Main areas covered

Semi-finished and preform technologies, Plastics and metal processing, Textile engineering and technology, Modelling and simulation, Interface Engineering/Design

### Infrastructure

MERGE Technology Centre (MTC), Lightweight Manufacturing Complex

### Certifications

DIN EN ISO 9001

### Keywords

In-line and in-situ process chains, Multifunctional lightweight structure, Plastic/metal hybrid components, Smart Systems Integration, Bivalent resource efficiency

### Memberships

## Overview of lightweighting expertise

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	Research	Development	Manufacturing & Supply
<b>Offer</b>			
<b>Products</b> Parts and components, Semi-finished parts, Machines and plants, Software & databases, Systems and end products, Materials, Tools and moulds	✓	✓	
<b>Services &amp; consulting</b> Training, Consulting, Testing and trials, Engineering, Prototyping, Validation, Simulation, Technology transfer	✓	✓	
<b>Field of technology</b>			
<b>Design &amp; layout</b> Lightweight manufacturing, Lightweight design, Hybrid structures, Lightweight construction concepts, Lightweight material construction	✓	✓	
<b>Functional integration</b> Actuator technology, Sensor technology, Material functionalisation	✓	✓	
<b>Measuring and testing technology</b> Component and part analysis, Visual analysis (e.g. microscopy, metallography), Materials analysis, Destructive analysis, Non-destructive analysis	✓	✓	
<b>Modelling and simulation</b> Crash behaviour, Loads & stress, Life-cycle analysis, Multiphysics simulation, Optimisation, Processes, Structural mechanics, Materials	✓	✓	
<b>Plant construction &amp; factory automation</b> Plant construction, Automation technology, Handling technology, Robotics	✓	✓	
<i>Recycling technologies</i>			

## Overview of lightweighting expertise

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	Research	Development	Manufacturing & Supply
<b>Manufacturing process</b>			
<b>Additive manufacturing</b> 3D printing, Deposition welding, Selective laser melting (SLM, LPBF, ...), Selective laser sintering (SLS)	✓	✓	
<b>Coating (surface engineering)</b> Galvanising, Plasma process, Sputtering	✓	✓	
<b>Fibre composite technology</b> Filament winding, Manual lamination, Resin infusion process, Resin transfer moulding, Pre-preg processing, Vacuum infusion	✓	✓	
<b>Forming</b> Bending, Impact extrusion, Compression moulding, Forging, Extrusion moulding, Stretch forming, Thermal converting, Deep-drawing, Fluid active media based forming, Rolling	✓	✓	
<b>Joining</b> Clinching, Hybrid joining, Adhesive bonding, Soldering, Sewing, Riveting, Screwing, Welding	✓	✓	
<b>Material property alteration</b> Mechanical treatment, Thermochemical treatment, Thermomechanical treatment, Heat treatment	✓	✓	
<b>Primary forming</b> Extrusion, Sintering, Injection moulding	✓	✓	
<i>Processing and separating</i>			
<b>Textile technology</b> Braiding, Preforming, Knitting, Textile surface treatment and finishing, Nonwoven & mats production, Weaving, Knitting, laid web production	✓	✓	

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	Research	Development	Manufacturing & Supply
<b>Material</b>			
<b>Biogenic materials</b> Bioplastics, Biocomposites, Wood	✓	✓	
<b>Cellular materials (foam materials)</b> Closed-pore, Open-pore	✓	✓	
<b>Composites</b> Basalt fibre-reinforced plastic, Glass-fiber reinforced plastics (GFRP), Ceramic matrix composite (CMC), Carbon-fiber reinforced plastics (CFRP), Natural fibre reinforced plastics (NFRP), Laminates	✓	✓	
<b>Fibres</b> Aramid fibres, Basalt fibres, Glass fibres, Ceramic fibres, Carbon fibres, Natural fibres	✓	✓	
<b>Functional materials</b> Electrostrictive / magnetostrictive materials, Shape memory materials, Piezoelectric materials	✓	✓	
<b>Metals</b> Aluminium, Intermetallic alloys, Magnesium, Steel, Titanium	✓	✓	
<b>Plastics</b> Thermoset plastics, Elastomers, Thermoplastics	✓	✓	
<b>Structural ceramics</b> Monolithic ceramics, Non-oxidic ceramics, Oxidic ceramics, Ultra-high-temperature ceramics	✓	✓	
<b>(Technical) textiles</b> Meshes, Laid webs, Crocheted fabrics, Woven fabrics, Knitted fabrics, Nonwovens, mats	✓	✓	

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## Contacts

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