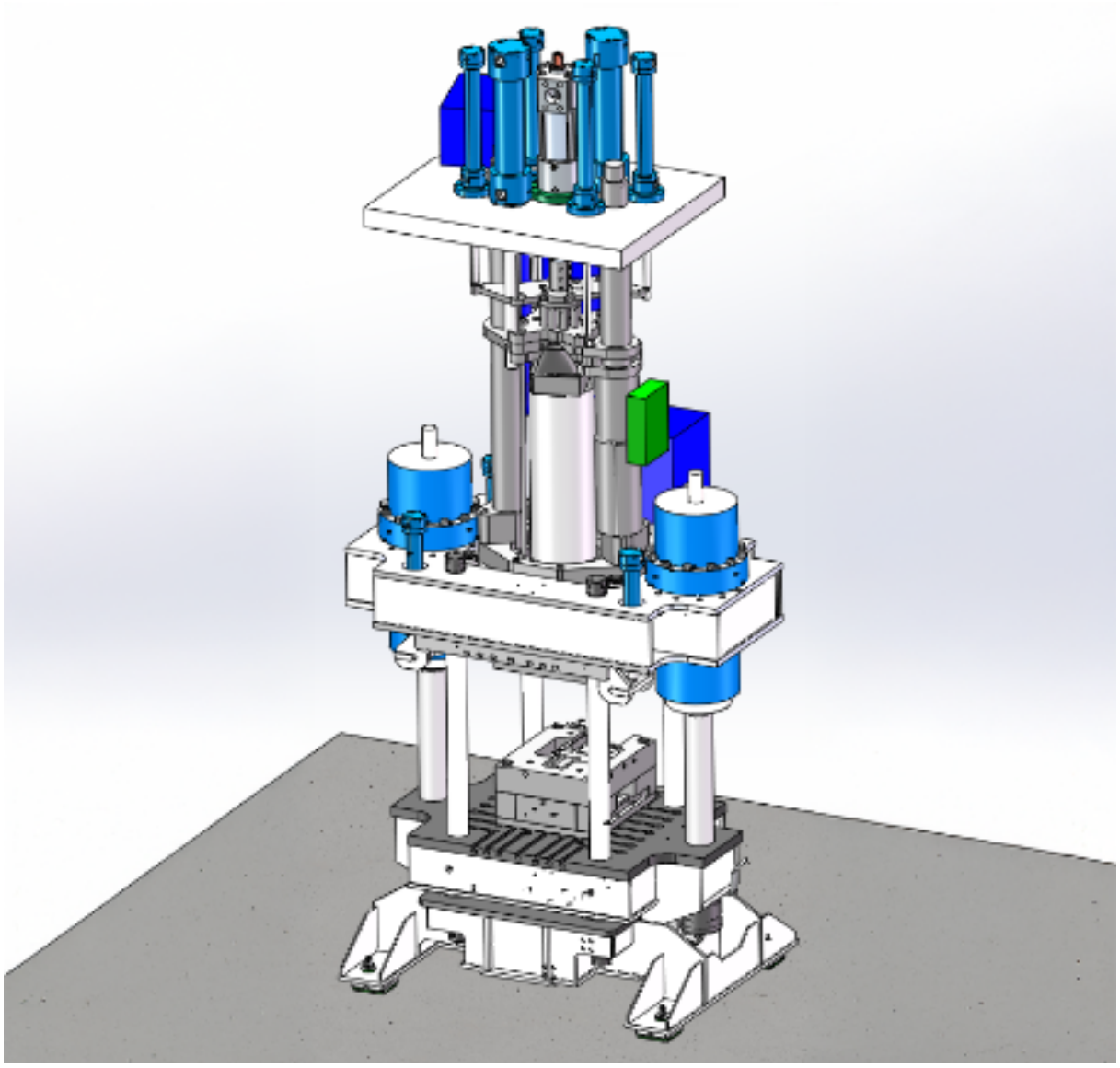
Light and precise magnesium components: Efficient production with semi-fluid processing

About this project



MAXImoulding

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Markets:

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About this project

Material: Magnesium

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

The mobility industries in particular require ever lighter yet stable components in order to reduce energy consumption and emissions. Magnesium, one of the lightest structural metals, offers good properties for lightweight construction due to its high strength and recyclability. However, the processing of magnesium places high demands on production technologies, especially for complex component geometries. This is where the MAXImolding project comes in, focusing on the development of new semi-fluid injection moulding processes for magnesium.

Purpose

The project team is developing an innovative injection moulding process specifically for the precise and resource-saving processing of magnesium. The aim is to develop a process to produce magnesium components more efficiently using simplified machine technology. To facilitate the introduction of the technology into production, the new concept for melt preparation can be used to convert existing production lines to the processing of magnesium with minimal effort. The researchers want to reduce material consumption by up to 50 per cent compared to die casting and significantly reduce energy requirements in the manufacturing process. At the same time, they are optimising cycle times, which play a key role in series production, in order to reduce costs and increase competitiveness. This approach should make it possible to increase the sustainability and competitiveness of the production of magnesium precision lightweight components.

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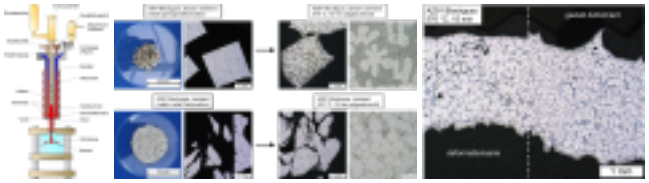
Procedure

The project team first analyses the mechanical and thermal properties of the magnesium pre-material (AZ91, granulate/chips) in order to optimise semi-fluid processing without shearing by a screw. The researchers then design a metal injection moulding machine that is tailored to these special requirements. The machine concept combines elements from energy-efficient production technologies in order to produce near-net-shape components with high precision and minimise energy consumption. For the design and optimisation of the energy balance, the scientists are developing models for the manufacturing process and carrying out simulations to identify potential challenges as early as the development phase. They use prototypes to test the process under real-life conditions. The team then transfers the technologies into practice. Among other things, the participants are targeting applications in electromobility and other areas with high weight and stability requirements.



Funding duration:

Funding sign:	03LB3053	**Funding amount:**	EUR 926 thousand

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3053A - MAXImolding in the federal funding catalogue

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Project coordination

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English (EN){{ Projektpartner }}

Lightweighting classification

	Realisation
Offer	
Products Parts and components, Machines and plants, Tools and moulds	✓
Services & consulting Consulting, Testing and trials, Engineering, Validation, Simulation, Technology transfer	✓

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Lightweighting classification

	Realisation
Field of technology	
Design & layout Lightweight material construction	✓
Functional integration	
Measuring and testing technology Component and part analysis, Visual analysis (e.g. microscopy, metallography), Materials analysis, Destructive analysis, Non-destructive analysis	✓
Modelling and simulation Optimisation, Processes, Materials	✓
Plant construction & automation Plant construction	✓
Recycling technologies	
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming Casting, Injection moulding	✓
Processing and separating	
Textile technology	

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Lightweighting classification

	Realisation
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites	
Fibres	
Functional materials	
Metals Magnesium	✓
Plastics	
Structural ceramics	
(Technical) textiles	