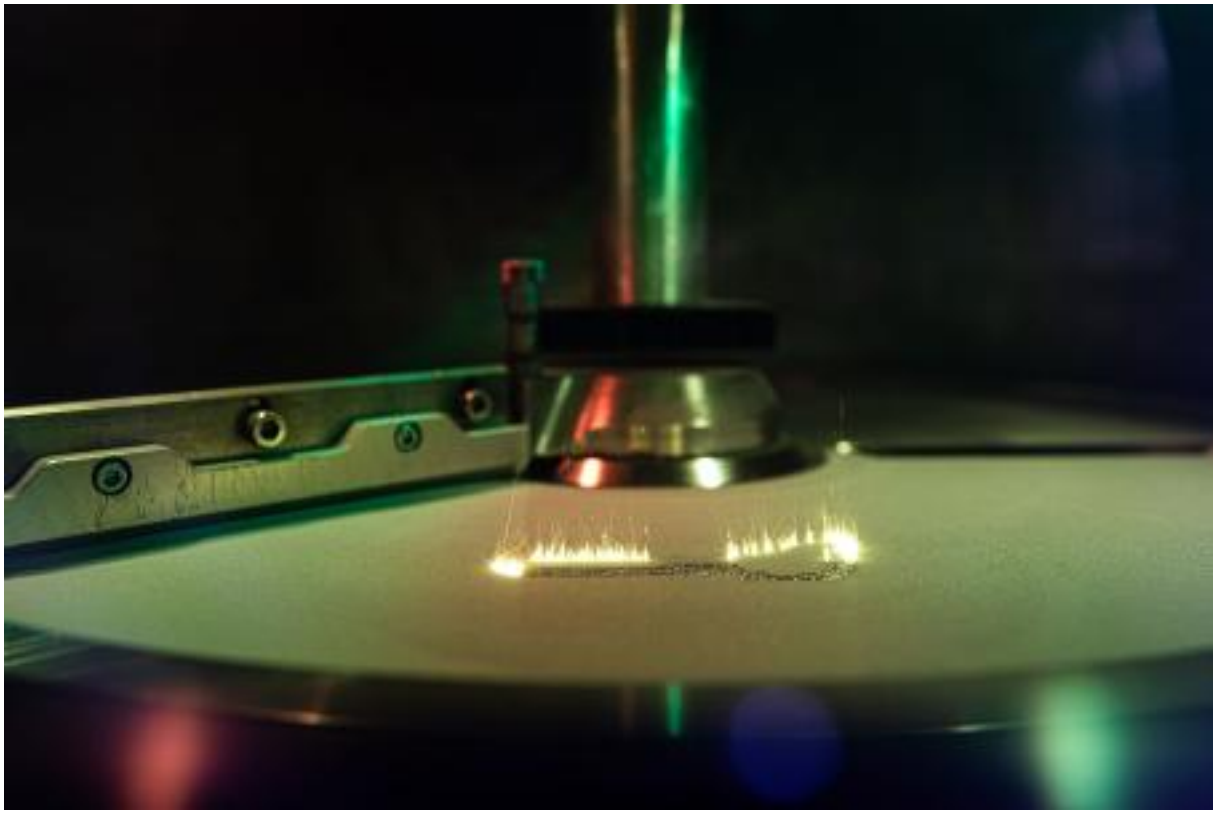
Efficient laser beam melting: reduce material loss, enable reprocessing

About this project



RESULT

Efficient laser beam melting: reduce material loss, enable reprocessing

Markets:

Material: Aluminium, Steel, Titanium

This project is funded by the Technology Transfer Programme Leichtbau (TTP LB) of the Federal Ministry of Economics and Energy.

Technology Transfer Program Leichtbau

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Context

Additive manufacturing offers companies new opportunities in lightweight construction. In the most widely used additive manufacturing process for metallic components, laser beam melting (LBM), components are created layer by layer from fine-grained metal powder. This allows complex, bio-inspired structures to be realised and components to be manufactured 40-60 percent lighter.

However, the entire LBM process chain, from the production of the metal powder to the post-processing of the additively manufactured components, is energy and material intensive. In addition, a significant proportion of the metal powder is produced as non-recyclable waste, which pollutes the environment and increases production costs. These technical and ecological challenges hinder the broad industrial utilisation of LBM, although the process offers enormous potential.

Purpose

The RESULT research project is specifically addressing these challenges. The project team aims to improve the material efficiency of laser beam melting and significantly reduce material loss. To this end, the researchers are developing technical processes for recycling and reusing the cost-intensive metal powder. They are also developing guidelines for handling the metal powder and contaminated operating materials.

With these optimisations, the team not only aims to reduce production costs, but also energy consumption and climate-damaging emissions. The project thus contributes to the sustainable and economical use of additive manufacturing in lightweight construction.

Procedure

The project team first analyses the entire laser beam melting process chain at various users in order to identify exactly where material losses and environmental pollution occur. On the basis of a detailed assessment - based on the waste hierarchy of the Closed Substance Cycle Waste Management Act - the researchers are developing technical prototypes for recycling the metal powder and for the environmentally friendly management of operating materials contaminated with metal powder.

A specially set up pilot plant simulates the real production process. The team then intends to make the data obtained and the best-practice solutions developed publicly available in order to promote cross-industry technology transfer and support sustainable optimisation in lightweight construction.

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Funding duration:

Funding sign: 03LB3046 **Funding amount:** EUR 660 thousand

Final report

Further websites

Project coordination

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Organisation:

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English (EN){{ Projektpartner }}

RUWAC Industriesauger GmbH

Lightweighting classification

	Realisation
Offer	
Products Parts and components, Machines and plants	✓
Services & consulting Training, Consulting, Testing and trials, Standardisation, Prototyping, Technology transfer	✓
Field of technology	
Design & layout Lightweight manufacturing	✓
Functional integration	
Measuring and testing technology	
Modelling and simulation	
Plant construction & automation Plant construction	✓
Recycling technologies Material separation, Recycling	✓

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Lightweighting classification

	Realisation
Manufacturing process	
Additive manufacturing Selective laser melting (SLM, LPBF, ...)	✓
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating	
Textile technology	
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites	
Fibres	
Functional materials	
Metals Aluminium, Steel, Titanium	✓
Plastics	
Structural ceramics	
(Technical) textiles	