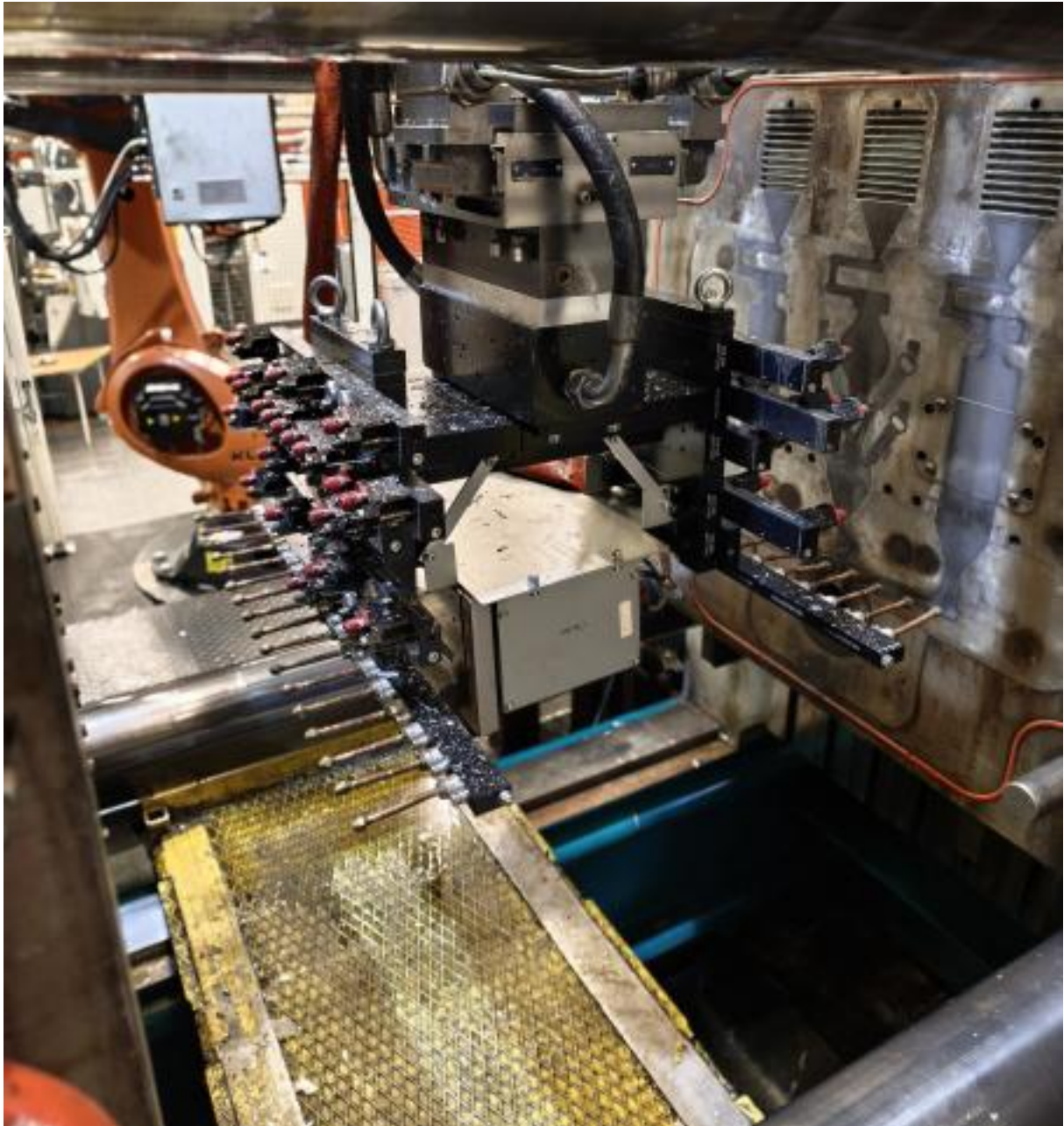


In-line measurement methods in die-casting: targeted application of release agents

About this project



InMoDie

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About this project

Markets:



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

Die-casting enables the cost-effective production of complex lightweight components made from aluminium and magnesium. To ensure a stable process, release agents and lubricants are required, which are applied to the mould and process components before each casting operation. Today, this application is usually carried out without targeted control. As a result, excessive quantities are often applied and distributed unevenly. The consequences are emissions, pores in the component and residues on the surface. These impair subsequent processes such as bonding or painting and necessitate additional, energy-intensive cleaning. At the same time, increased use of release agents shortens tool life and increases scrap.

To date, there is no measurement technology that records release agent application during the process with both spatial coverage and positional accuracy. Furthermore, residues on components can only be determined with considerable effort or through destructive testing. Consequently, a key influencing factor in die-casting remains largely uncontrolled.

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Purpose

The project team is developing an in-line measurement method that accurately detects and quantifies release agents on mould and component surfaces. The method is based on a fluorescence-based laser scanning system that makes organic residues visible and measurable. The aim is to control the previously unregulated application of release agents according to requirements and to stabilise the die-casting process.

The concept enables release agents to be applied precisely in minimal quantities and surface contamination to be checked uniformly. In this way, those involved reduce scrap, cleaning effort and emissions. At the same time, they improve component quality, particularly for downstream joining processes. In the long term, they lay the foundations for end-to-end digitalisation and standardised quality control in die-casting.

Procedure

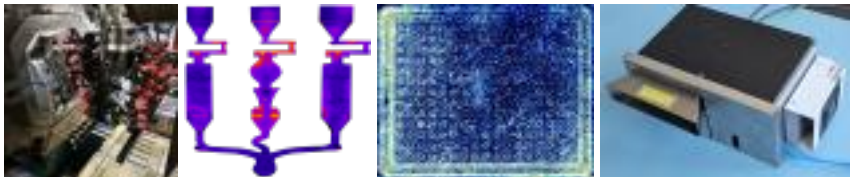
The researchers are first analysing the behaviour of release agents and lubricants under process conditions and investigating their detectability using fluorescence-based methods. In parallel, they are developing a laser scanning system that can quickly and comprehensively detect small quantities of release agents. Building on this, they are developing a controllable spray head that adapts the application locally.

In a series of experiments, the researchers are investigating the relationship between release agent application, mould condition and component contamination. In addition, they are cross-checking the measurement results with laboratory analytical methods to ensure accuracy.

The team are integrating the system into a die-casting plant and testing it under near-production conditions. A demonstrator combines the measurement system and application technology and demonstrates the automated process control. Finally, the researchers are inspecting components before and after cleaning to assess the impact on subsequent processes.

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Funding duration:

Funding sign: 03LB5011 Funding amount: EUR 1.6 million

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB5011A - InMoDie in the federal funding catalogue

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English (EN){ { Projektpartner } }



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Lightweighting classification	
	Realisation
Offer	
Products Machines and plants	✓
Services & consulting Training, Testing and trials, Engineering, Validation	✓
Field of technology	
<i>Design & layout</i>	
<i>Functional integration</i>	
Measuring and testing technology Visual analysis (e.g. microscopy, metallography)	✓
<i>Modelling and simulation</i>	
Plant construction & automation Plant construction	✓
<i>Recycling technologies</i>	
Manufacturing process	
<i>Additive manufacturing</i>	
Coating (surface engineering) Galvanising, Painting, Powder coating	✓
<i>Fibre composite technology</i>	
<i>Forming</i>	
Joining Adhesive bonding, Welding	✓
<i>Material property alteration</i>	
Primary forming Casting	✓
<i>Processing and separating</i>	
<i>Textile technology</i>	

In-line measurement methods in die-casting: targeted application of release agents

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