Press release

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FOUNDRIES ON THE WAY TO INDUSTRY 5.0

AIT and its partners are developing an assistance system for die casting plants. The aim is to drive the digital and green transformation of foundry operations in Austria.

In an effort to reduce the fuel consumption of their vehicles, car manufacturers are increasingly relying on the use of lightweight components made of aluminium or magnesium, especially in the field of electromobility. Austrian foundries play a decisive role here, as they have extensive competence and know-how in the production of high-quality and complex cast components. The components are manufactured in a resource-intensive die-casting process. In order to make this process more efficient, the digital and green transformation of Austrian foundries is to be advanced in the sense of Industry 5.0. To this end, an assistance system for the sustainable operation of die casting plants is being developed in the recently launched DG Assist research project under the leadership of the AIT Austrian Institute of Technology.

In the FFG project DG Assist, partners from research and industry pool their expertise. From AIT, the Center for Vision, Automation & Control as the coordinator, the Center for Technology Experience, the Center for Energy and the LKR Leichtmetallkompetenzzentrum Ranshofen are involved. Other partners from the industry are Maxan Automation, MELTEC Industrieofenbau GmbH, Siemens Aktiengesellschaft Österreich and TCG UNITECH GmbH.
The partners' goal is to develop an assistance system that ensures agile and sustainable production of high-quality cast components. This should significantly reduce the proportion of defective cast components and thus energy and material consumption. The experts are relying on the latest information and communication technologies as well as model-based and AI-supported methods. In addition, innovative solutions are to be developed for the interaction between man and machine, which will support the operating personnel in process monitoring and control as well as quality control. The assistance system is to be implemented and tested as a prototype on a test machine at the LKR in Ranshofen.

Digital solutions as essential building blocks of the assistance system

The starting point for agile and sustainable production is the digitalisation of the plant. For this purpose, a data and knowledge management system is being developed for the efficient exchange of data and information between humans, machines and algorithms. A knowledge graph is used here to digitally represent the process and plant knowledge and to navigate through the heterogeneous data landscape of the die casting process. The operation of the plant can thus be better monitored and high energy and material consumption can be detected at an early stage.

In addition, digital twins of the die casting machine and the cast components are being developed in order to predict the operating status of the machine and the quality of the cast component and to contain potential sources of error in good time. The digital twin is further supported by virtual sensors that are designed to reconstruct previously unmeasurable variables in the die casting process. This provides the operating personnel with additional information for process monitoring.
The information stored in the knowledge graph should ultimately be able to be used for a knowledge-based machine setting. The planned assistance system thus forms the starting point for the development of increasingly efficient production processes and is an essential building block for the targeted use of resources. "Experienced employees are responsible for the machine settings, i.e. for the selection of up to 200 different parameters, which ultimately affect the product and process quality. An unfavourable setting leads to defective components and costs material, energy and working time. A slip in the visual inspection results in a complaint from the customer and subsequently in a loss of confidence. With the new assistance system, we can support the operating personnel," says Herbert Kerbl, responsible for quality data management at TCG UNITECH GmbH.

Putting human needs at the centre of research

Production operations in foundries are essentially based on the expert knowledge and wealth of experience of the operating personnel, who take on comprehensive tasks such as visual inspection, process monitoring or machine setting. In addition to the algorithmic aspects of the assistance system, innovative solutions are therefore being developed for the interaction between man and machine according to the needs of the operating personnel. "If we not only optimise the process, but also focus on the needs of the operating personnel, we can make the workplaces in the harsh working environment of a foundry more pleasant and counteract the shortage of skilled workers. Intuitive operation of the die-casting machine not only promotes acceptance among the staff for the modernisation, but also leads to a reduction in workload and thus to more fun at work," adds Herbert Kerbl.

Stephan Strommer from the Center for Vision, Automation & Control is an expert in the field of process automation and optimisation. He leads the research project and sums up:
"The DG Assist research project is a groundbreaking initiative to drive the digital and green transformation in Austrian foundries. The cooperation between research and industry as well as the integration of the latest technologies and solutions will significantly increase the efficiency and sustainability of production. The results of the project will have a lasting impact not only on the automotive industry, but also on climate protection and working conditions in foundries."

The DG Assist project runs until April 2026 and is funded by the Federal Ministry for Climate Protection, Environment, Energy, Mobility, Innovation and Technology, BMK, and is carried out within the framework of the "Production and Material 2022" call for proposals.

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LKR Light Metal Competence Centre Ranshofen
Maxan Automation

MELTEC Industrieofenbau GmbH
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