

# DEFIne

## Monitoring of progressive tools through artificial intelligence supported process models

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<b>Duration</b>	May 2021 – May 2023
<b>Department</b>	Process Chains and Forming Units
<b>Funded by</b>	Dist@l Förderlinie 2 – Land Hessen

### Abstract

The DEFIne project researched the monitoring of progressive moulds using artificial intelligence. As part of the project, an industry-oriented modular progressive mould with integrated sensors was developed. The production process was monitored with the sensor-equipped FVW using artificial intelligence-supported process models, making it possible to obtain information on the condition of semi-finished products, tools and components during the ongoing production process in order to take countermeasures at an early stage in the event of production influences.

### Project description

Digitalisation and the associated sensor qualification and characteristic value-based modelling based on AI-supported methods have great potential to master these processes, support specialist personnel in process analysis and process control and thus increase the overall productivity of forming companies.

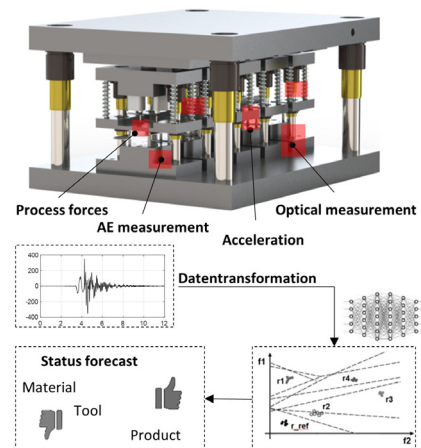
In order to achieve this goal, a modular progressive tool with integrated sensors was developed as part of the DEFIne project, taking industrial standards into account. A software platform for networking, structuring and synchronising company-specific data was developed and models for describing the condition of semi-finished products, tools and components were created. The illustration shows the procedure in the research project. The industry-oriented FVW is used to record process data, such as the process force shown in the figure, via the integrated sensor system. The data is then processed for machine learning algorithms and used for condition prediction. Data-driven analyses are combined with domain-specific knowledge to increase the quality of the AI-supported process models.

Strategies and recommendations for action for model-based monitoring of FVW are derived from this in order to make it easier for companies in the forming technology sector to start using AI-supported monitoring of their progressive tools in the future.

### Results

As part of the Distral project DEFIne, a measurement system and data evaluation arithmetic for process monitoring of industrial high-speed production processes on progressive dies was developed in close cooperation between the project partners from research and industry and the digitalisation possibilities of the industry were researched. The application of the developed solutions in the industrial environment at Thomas GmbH

demonstrated their suitability for industrial use. The activities carried out as part of the project have made a significant contribution to the sustainable development of expertise in the design and development of multi-stage progressive tools and the data-based monitoring of such industrial tools. In addition, a mobile measuring box was developed for integration into industrial production processes in order to transfer the results directly to industrial applications.



[1] Procedure in the DEFIne project

### Acknowledgement

The DEFIne project was supported by the Distr@l funding programme with funds from the state of Hesse. We would also like to thank our project partners Intelligent Data Analytics GmbH & Co. KG and Thomas GmbH.

### Funded by

