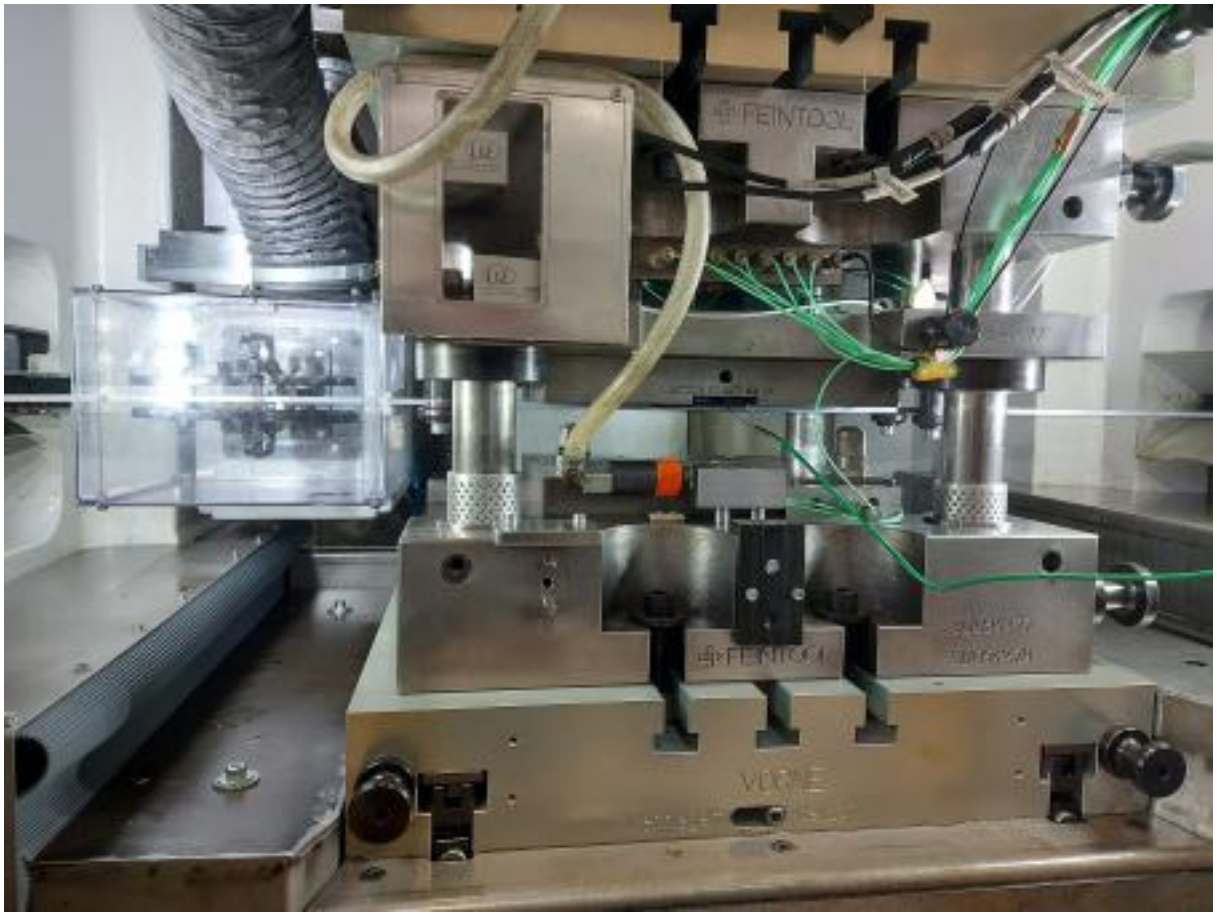
Efficient machining of high-strength steels: Fineblanking with integrated heating

About this project



FESt

Efficient machining of high-strength steels: Fineblanking with integrated heating

Markets:

Material: Steel

Efficient machining of high-strength steels: Fineblanking with integrated heating

About this project

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 automotive industry is faced with the challenge of reducing the weight of vehicles in order to reduce energy consumption and emissions during use. High-strength steels - i.e. steels with increased strength and comparatively low weight that enable high load-bearing capacity and good formability - offer the possibility of producing more stable and at the same time lighter components. The material offers particular advantages for electric vehicles with heavy batteries. Although the production of higher-strength steels requires energy, the lower material input and higher efficiency in vehicle operation can improve the CO# balance over the entire life cycle of the vehicles. This is where the team in the FESt project comes in: it is developing an innovative technology to efficiently process these demanding materials and optimally utilise their potential.

Purpose

The project team wants to develop a new technology for fineblanking high-strength steels that enables components with a lower material thickness and high precision. To this end, the researchers want to heat the sheet metal in a targeted manner before cutting. This will facilitate processing and reduce energy and material consumption.

In addition to material and energy savings, the technology extends the tool life as it reduces wear. The researchers also select high-strength steels with optimised heatability and adapted flow properties in order to further improve fineblanking properties.

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Procedure

The project team is combining two technologies: fineblanking and targeted heating of the material. To this end, it is developing a system that integrates heating units directly into fineblanking presses. In a benchmark comparison, the researchers show that inductive heating is more suitable than laser-based heating. A particular challenge is to integrate the heating in such a way that the material retains the desired temperature during cutting.

The researchers are investigating the interactions between temperature, material behaviour and cutting quality. They are analysing both the optimum heating method and the effects on tool wear and process stability. They are also developing a special lubricant concept that ensures optimum friction properties even at elevated temperatures.

To deepen their understanding of the process, they simulate the fineblanking process using the finite element method (FEM). This enables them to precisely model the effects of heating and optimise the process in a targeted manner.

Finally, the researchers will test the technology in an industrial environment to prove its suitability for practical use. They will also analyse the sustainability of the new method and calculate the extent to which it contributes to CO# reduction and weight reduction.

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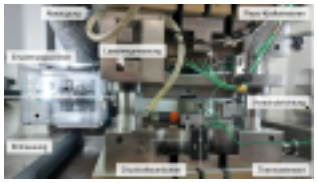



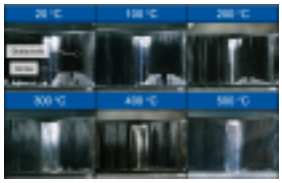

Funding duration:

Funding sign:	03LB3016	**Funding amount:**	EUR 1.6 million

Final report

Further websites foerderportal.bund.de/foekat/jsp/SucheAction.do?actionMode=view&fkz=03LB3016A - FESt in the federal funding catalogue

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Project coordination

Contact:

Mr Prof. Dr.-Ing. Thomas Bergs

+49 0241 80-27401

t.bergs@wzl.rwth-aachen.de

Organisation:

Manufacturing Technology Institute - MTI of RWTH Aachen University

Campus-Boulevard 30
52074 Aachen
North Rhine-Westphalia
Germany

mti.rwth-aachen.de

English (EN){{ Projektpartner }}

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Lightweighting classification

	Realisation
Offer	
Products Parts and components, Semi-finished parts, Machines and plants, Materials	✓
Services & consulting Training, Testing and trials, Simulation	✓
Field of technology	
Design & layout Lightweight manufacturing, Lightweight material construction	✓
Functional integration Sensor technology, Thermal activation, Material functionalisation	✓
Measuring and testing technology Component and part analysis, Visual analysis (e.g. microscopy, metallography), Materials analysis, Destructive analysis	✓
Modelling and simulation Loads & stress, Processes, Structural mechanics, Materials	✓
Plant construction & automation Plant construction	✓
Recycling technologies	

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Lightweighting classification

	Realisation
Manufacturing process	
Additive manufacturing	
Coating (surface engineering)	
Fibre composite technology	
Forming	
Joining	
Material property alteration	
Primary forming	
Processing and separating Shearing/punching, Cutting	✓
Textile technology	
Material	
Biogenic materials	
Cellular materials (foam materials)	
Composites	
Fibres	
Functional materials	
Metals Steel	✓
Plastics	
Structural ceramics	
(Technical) textiles	