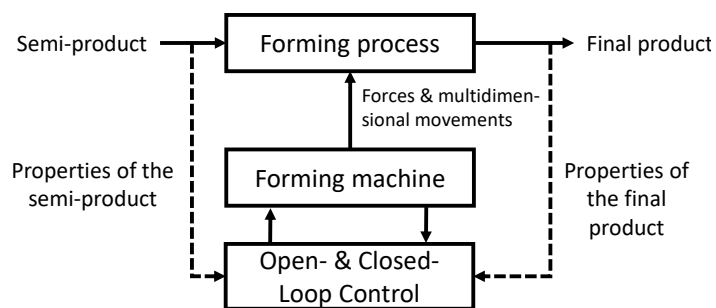


Subproject B2: Forming - Production families with consistent quality (CRC 805)

Forming processes are subject to inherent uncertainties that prevent a highly reliable production of products. In the first funding phase of the Collaborative Research Centre 805, the 3D servo press was developed, whose three degrees of freedom provide a previously unknown freedom of movement of the tool. The subproject investigated control engineering approaches to exploit the resulting potential and designed a multi-stage process chain to demonstrate approaches for controlling product properties.

Project description

The content of the subproject is the mastering of uncertainty in forming processes with special regard to fluctuations in demand and semi-finished product properties. The main objective of the subproject is to control these uncertainties by increasing the flexibility and adaptability of forming processes and process chains. With the development of the 3D servo press and its three degrees of freedom there are potentials regarding a (real-time) control of product properties on the one hand, and challenges in process modelling and tool design on the other hand, which have been systematically investigated in the subproject.



Picture 1: Approaches to control product properties in forming technology

Results

The subproject developed methods and processes for open and closed-loop control of product properties on the 3D servo press. For free bending, for example, a learning control system was developed that compensates for the springback that is dependent on the semi-finished product properties. By measuring process variables close to the part, uncertainties in the parts flow limits could be controlled and springback could be predicted precisely. In addition, a flexible multi-stage punching and bending process was developed and a method for tool design was worked out for it. In this way, it was possible to obtain information on the product side about measurements of sheet thickness and punching force in the punching stage and, with the aid of these process parameters of the bending process, to adjust them in such a way that high-quality end products were produced.

Acknowledgement

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Projektdata

Runtime Jan. 2013 – Dez. 2016
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Dept. Process chain

Sponsor

DFG