Institut für Produktionstechnik und Umformmaschine (PtU)
Otto-Berndt-Straße 2, 64287 Darmstadt

Prof. Dr.-Ing. Dipl.-Wirtsch.-Ing. Peter Groche
info@ptu.tu-darmstadt.de

SFB 805 B2
Production Families at Equal Quality – Phase 1

Uncertainties, which arise due to changes in the sales or procurement markets in forming manufacturing processes, are to be mastered by work in this subproject. One aim of the subproject is to create process chain families for forming manufacturing. These production families will be created by changing the tool kinematics in connection with tools that gradually become more complex. Another goal of the subproject is to master changes in the procurement-based part of the value-added system by means of controlled forming processes

Project description

Production process chains are subject to uncertainties, both with regard to the assessment of the sales market and to quality fluctuations in semi-finished products and auxiliary materials. The predicted number of units to be produced has a decisive influence on the structure of the production process chain, the coordination of the sub-processes of the chain and the properties of the manufactured components. Of particular interest here are load-bearing components which are used in load-bearing systems and whose fluctuations in properties due to different production processes dependent on the number of pieces can influence the strength and stability properties. An optimum process chain is achieved by integrated product and process development. Fundamental changes to the process chain structure in the production phase are often not possible today, as such measures change the geometric and mechanical properties of the product and require high investments. Process chains in the production phase must therefore be regarded today as largely rigid. One aim of this sub-project is to create process chain families for the forming production of medium and higher quantities. Production families to be developed should be able to react without incurring additional costs and without the product thus produced experiencing any relevant deviations in its properties.

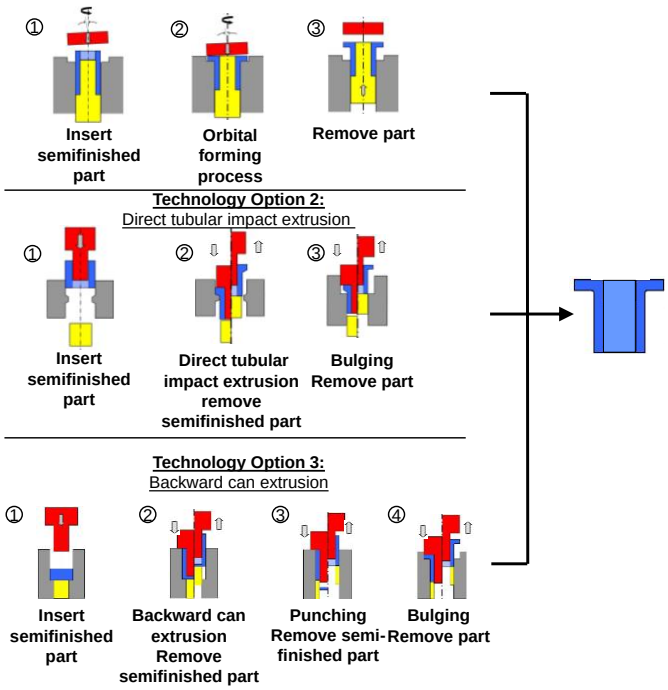

Figure 1: Process stages of the three technology variants on the 3D servo press [GROCHE, P., et al. Rechnet sich Flexibilität in der Umformtechnik. *Does Flexibility Pay Off*, 2010]

In this subproject, product properties are defined as characteristics that are considered to be decisive for the fulfilment of the product's function. The desired production families or changes in the process chain structure are to be created by changing the tool kinematics in connection with partial tool modifications involving incremental forming processes. A further goal of the sub-project is the control of changes in the procurement-based part of the

value-added system through controlled forming processes.

Results

In times of fast-moving products and greatly reduced development times, it is important to estimate and minimize uncertainty in product and investment planning. Conventional production systems are often not sufficiently able to cope with the market dynamics, which inevitably results in uneconomic production of individual products. The degrees of freedom of the 3D servo press open up the possibility of using the high flexibility of a single machine. With little additional financial outlay, a wide range of products and quantities can be produced economically in the event of fluctuating demand. In order to prove this, conventional manufacturing processes are compared with the 3D servo press on an economic basis using an example component. It is shown that with a flexible manufacturing system, uncertainties regarding the development of the sales market can be reliably controlled in comparison to conventional production processes.

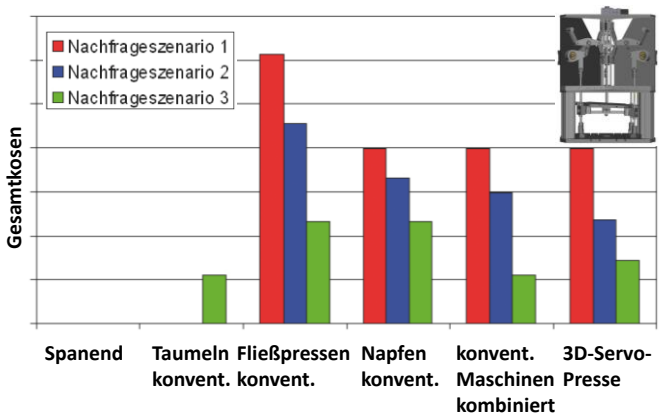

Figure 2: Total cost comparison of the technology variants following [GROCHE, P., et al. Rechnet sich Flexibilität in der Umformtechnik. *Does Flexibility Pay Off*, 2010]

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Project Information

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