

Bavarian research & innovation



ForWerkzeug – Bavarian Research Cooperation for Flexible Tool Systems

CONSOLIDATION OF MARKET POSITION THROUGH INNOVATIVE TOOL SYSTEMS

The objective of ForWerkzeug is to develop novel technologies and machine concepts for tool design and production. The participating research facilities include three institutes of the Technical University Munich, two institutes of the University of Erlangen-Nuremberg and the Bayerisches Laserzentrum gGmbH (BLZ). 35 industrial partners contribute manpower and funding to the 10 projects of ForWerkzeug. Companies of this industrial sector have to compete with countries of low wages. The current methods and procedures used in the tooling industry do not always meet the challenging production requirements of tomorrow. Flexibility, cost reduction and

strong competition with countries of low wages are aspects of special interest. Shorter product development cycles, increased product life time and partial reuse of existing tools are potential solutions in this situation. The projects of ForWerkzeug handle the aspects of design, manufacturing and quality assurance in tool systems for metal forming and assembly processes. Three committees are responsible for the interdisciplinary exchange of expertise within the consortium: Surface and abrasion, modeling and simulation, and rapid technologies.

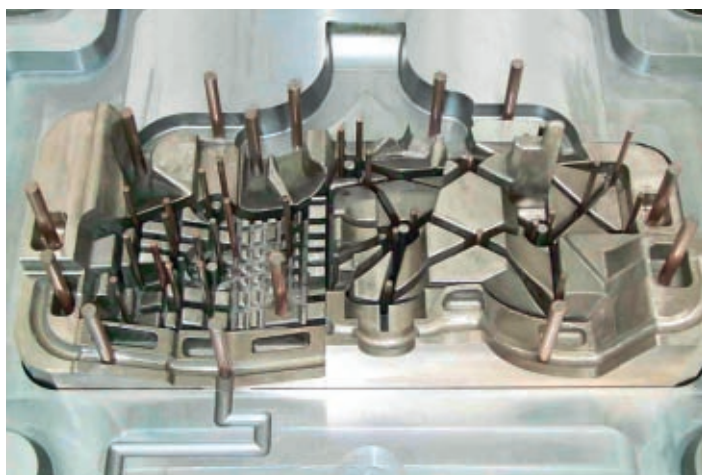
Optimized Economics

The research aims to cut down on tool production costs

through a holistic strategy comprising surface optimization, accuracy and flexibility features. Scientists develop novel concepts for the construction of flexible and modular tool systems and improve existing technologies in cooperation with the industry. Sensor technology enables the production of intelligent tool systems with longer lifetime and higher robustness. Preventive and predictive quality assurance techniques play a key role. Not only flexible tool design and construction but also flexibility in production parameters, such as accuracy levels, leads to optimal economics: "as accurate as necessary, as inaccurate as possible".



Tools for casting technologies.



Rapid technologies in tool design and construction.

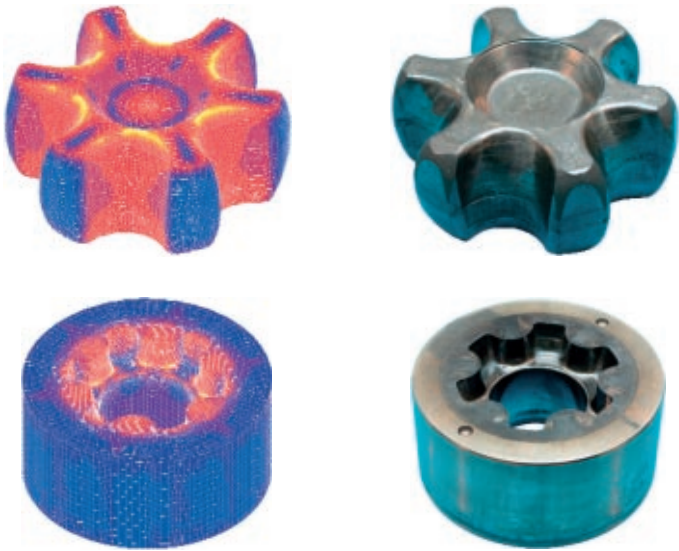
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Simulation of the cold solid forming process.

RESEARCH TOPICS:

I: Design and construction of tools and mold inserts

LFT, University of Erlangen-Nuremberg; utg, TU Munich; FAPS, University of Erlangen-Nuremberg

II: Production of tools and mold inserts

BLZ, Erlangen; *iwb*, TU Munich; LFT, University of Erlangen-Nuremberg

III: Integrated quality assurance and optimized processes and parts

FZG, TU Munich; *iwb*, TU Munich; utg, TU Munich

Economic Applications:

Taking the EU east enlargement and the growing global competition into account, innovation plays a key role in the existence of the Bavarian tooling systems industry. One of the goals of the consortium is to give the region impulses for an advantageous position in the global market. New methods and materials will be investigated in order to optimize dimensional accuracy, surface roughness and resistance to abrasion. Here the FEA offers a perfect starting point to contribute to tool optimization by means of effective predictive models. Another main focus point is represented by the layered manufacturing processes, or rapid technologies, which revolutionized the metal forming industry in the last few years with their flexibility and speed. Different technologies and applications will be investigated in the research cooperation within ForWerkzeug in order to use the advantages of the layered manufacturing technologies in the tool-shop area.

Scientific Cooperations:

Technical University Munich (TU Munich):

- Institute for Metal Forming and Casting (utg), Prof. Dr.-Ing. Hartmut Hoffmann
- Institute for Machine Elements, Gear Research Center (FZG), Prof. Dr.-Ing. Bernd-Robert Höhn
- Institute for Machine Tools and Industrial Management (*iwb*), Prof. Dr.-Ing. Michael F. Zaeh

University of Erlangen-Nuremberg:

- Institute for Manufacturing Automation and Production Systems (FAPS), Prof. Klaus Feldmann
- Chair of Manufacturing Technology (LFT), Prof. Dr.-Ing. Manfred Geiger

Bayerisches Laserzentrum gGmbH, Erlangen (BLZ), Prof. Dr.-Ing. Manfred Geiger



Robot model made by generative manufacturing processes.

Industrial Partners:

3D-Systems GmbH, Darmstadt; appex GmbH, Munich; BeaTec GmbH, Herzogenrath; BMW AG, Regensburg; Bruderer GmbH, Dortmund; CADFEM GmbH, Grafing near Munich; Ecoroll AG, Celle; Eifeler Beschichtungscenter GmbH, Rückersdorf; EOS GmbH, Krailing; Erlas GmbH, Erlangen; Femutec GmbH, Nuremberg; Hartmann und Hartmann GmbH, Augsburg; H.C. Starck Ceramics GmbH & Co. KG, Selb; Herberg Service Plus GmbH, Nuremberg; Hirschvogel Umformtechnik GmbH, Denklingen; H-O-T Härte- und Oberflächentechnik GmbH & Co. KG, Nuremberg; HOERBIGER Antriebstechnik GmbH, Schongau; Hummel-Formen GmbH, Lenningen; INA-Schaeffler KG, Herzogenaurach; Karl Binder GmbH, Reichertshofen; KL-Technik GmbH, Krailing; KUKA Roboter GmbH, Augsburg; Kunststofftechnik Jantsch GmbH, Stein; M. Weibrecht Lasertechnik GmbH, Wolpertshausen; Martin GmbH, Wessling; Micro Mechatronic Technologies AG, Siegen; Netzsch Gerätebau GmbH, Selb; PARitec GmbH, Weilheim; PERCEPTION GmbH, Munich; Schleich GmbH, Schwäbisch Gmünd; Siebenwurst Werkzeugbau GmbH, Zwickau; Siemens AG, Erlangen; SSF Verbindungsteile GmbH, Nuremberg; Thyssen Krupp Presta AG, Eschen; Trumpf Werkzeugmaschinen GmbH & Co. KG, Ditzingen.