

Bavarian research & innovation



FORMIKROPROD – Bavarian Research Cooperation
Microproduction Technology

PRODUCTION WITH MAXIMUM PRECISION



Precise production methods ensure that machines and equipment run like clockwork.
(Picture: DATOGRAPH from the Lange company)

Products in the automotive industry, information and communication technology, control systems and medical equipment are becoming ever smaller. In many cases, the conventional spatial separation between electronic and mechanical functions puts an obstacle in the way of further miniaturisation. This makes it all the more important to develop integrated mechatronic

microsystems which are capable of fulfilling not just electronic but also optical, sensory and actuator functions, amongst others.

The more functional elements a microsystem contains, the longer it takes to develop and design. Apart from the large investments required for the manufacturing systems, even the design phase entails very

high costs. Hybrid systems, on the other hand, consist of several microcomponents which can be grouped together to form a miniaturised module with the aid of suitable construction and connection technology. The individual components are first manufactured in separate production processes and only then assembled to form the microsystem – a process known as hybrid manufacturing.

FORMIKROPROD is developing and optimising flexible manufacturing processes which

permit both the production of individual components and the combining of these elements into a complex integrated system. The coordinator is the Bavarian Laser Centre. 22 business enterprises, a Fraunhofer Institute and three faculties at the University of Erlangen-Nuremberg and another three at the Technical University of Munich work together in FORMIKROPROD. The results of the three-year research projects are transferred by the participating companies directly into the Bavarian economy.

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Funded by the Bavarian Research Foundation.

RESEARCH TOPICS:

FORMIKROPROD has three central themes:

- Construction and connection technology
- Handling and assembly technology
- Quality assurance.

Construction and connection technology:

Achieving precision in the micrometre range at an economically acceptable manufacturing cost demands flexible construction and connection systems. The cooperation is developing processes for precise metering of fluid connection media. It is also reducing the size of joint geometries produced by laser welding of plastics.

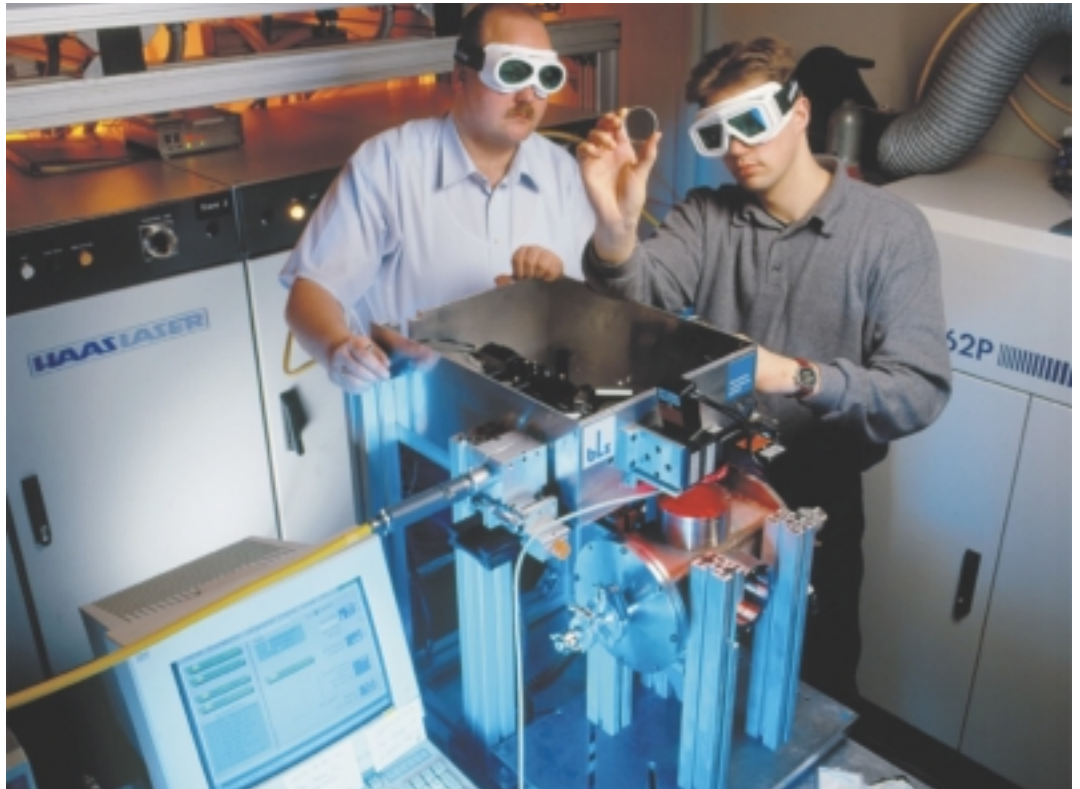
Handling and assembly technology:

Extreme precision in handling and assembly systems is a prerequisite for achieving the required levels of accuracy in the micrometre range. Consequently, handling devices that are modular in design and simple to automate are being implemented, together with a microtechnical drive. A new type of non-contact gripping method will provide a reliable solution for handling delicate components.

Quality assurance:

An interdisciplinary project area is investigating suitable methods for ensuring the required qualities in terms of positional, dimensional and shape tolerances, as well as detecting defects in components quickly and reliably.

The smaller electronic devices become, the more complex their design and the more demanding the associated quality inspection. FORMIKROPROD aims to qualify three-dimensional microcomputer tomography as a non-destructive testing method for industrial applications. (Picture: Fraunhofer Institute of Integrated Circuits and Bavarian Laser Centre gGmbH)



Laser-assisted techniques are being used increasingly in microproduction technology.

Research partners at the University of Erlangen-Nuremberg

- Prof. Dr.-Ing. Dr. h.c. Gottfried W. Ehrenstein, Faculty of Plastics Engineering
- Prof. Dr.-Ing. Klaus Feldmann, Faculty of Automated Manufacturing and Production System Technology
- Prof. Dr.-Ing. Reinhard Lerch, Faculty of Sensor Technology

Research partners at the Technical University of Munich

- Prof. Dr.-Ing. Joachim Heinzl, Faculty of Precision Engineering and Microtechnology
- Prof. Dr.-Ing. Hartmut Hoffmann, Faculty of Forming and Casting Technology
- Prof. Dr.-Ing. Michael Zäh, Institute of Machine Tools and Scientific Management

Other research partners

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Business partners

ABB Flexible Automation GmbH, ALLOD GmbH & Co. KG, Bratke Kunststofftechnik GmbH, Coherent (Deutschland) GmbH, Dr. Hielscher GmbH, feinfocus Röntgen-Systeme GmbH, Finisar Europe GmbH, Horst Scholz GmbH & Co. KG, Knotenpunkt, Laserequipment AG, Lifocolor Farben GmbH & Co. KG, Loctite Research, Development & Engineering, Martin GmbH, PicoRapid Technologie GmbH, Robert Bosch GmbH, Siemens AG, Siemens Dematic AG, Simotec GmbH, TETRA GmbH, Thermosensorik GmbH, Volume Graphics GmbH, W. C. Heraeus GmbH & Co. KG.

