



- 1 *Robot-based machining center.*
- 2 *Mobile robotic machining platform.*

MACHINING WITH INDUSTRIAL ROBOTS

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Status quo

Conventional machining centers often have limits with regard to their versatility. In particular, the machining of larger components is very costly. However, new machining systems utilizing industrial robots (IR) allow such components to be machined much more efficiently. The flexibility of the production system can be increased by integrating additional processes. With mobilizing these robots versatile and thus more flexible production solutions become possible. Furthermore, machining can be executed simultaneously which significantly increases productivity.

Advantages of using industrial robots

- Versatile machine concepts for a variety of tasks
- Increased productivity with simultaneous operating robots
- Large working spaces with mobilization possible
- The use of standard components means lower investment costs than for conventional machining centers
- Relatively light machinery – no special foundations required
- Ideal for integration into fully automated process chains

The Automation and Production Technology department of the Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM is based in Stade and possesses a **robot-based machining center** that allows components of up to 13 meters in length to be machined in parallel by several robots. **Mobile machining systems** based on platforms represent a second key element of the research and development. Features of the systems are as follows:

- | Industrial robots of various manufacturers suitable for loads up to 300 kg, 8-17 kW HSC spindle, force control options available
- | Mobile platform for loads up to 2.5 t for industrial robots
- | Linear axis of 4 m, optimized for machining FRPs
- | Room and local dust extraction systems for FRP machining
- | Flexible component clamping devices
- | Measuring systems for machine evaluation: Laser tracker, 3D camera system, vibration sensor, and ballbar system, etc.
- | Measuring systems for process evaluation: Force measurement technology, thermographic camera, pyrometer, workpiece measurement, high-speed camera, and 3D tool evaluation, etc.

Range of services offered

- ➔ Optimization, measurement and increasing accuracy of industrial robots for machining processes
- ➔ Development of mobile and versatile production systems
- ➔ Development of automation systems based on different controllers and robot systems
- ➔ Integration and adaption of sensors for robotic based machining systems
- ➔ Comparison of various machining technologies for robot based processes
- ➔ Development and analysis of machining processes
- ➔ Development and testing of machining tool concepts
- ➔ Development of energy efficient dust removal concepts for machining of FRPs
- ➔ Process monitoring systems for machining of FRPs
- ➔ Optimization of CAD/CAM chains for machining with industrial robots

In cooperation with the Institute for Production Management and Technology of Hamburg University of Technology:
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