

- 1 *Mobile CNC machining robot.*
- 2 *MBFast18 set up with multi-axis machining system, robot, AGV, and mobile laser tracker.*

## MOBILE ROBOTIC SYSTEMS FOR HIGHLY FLEXIBLE PRODUCTION

**Fraunhofer Institute for  
Manufacturing Technology  
and Advanced Materials IFAM  
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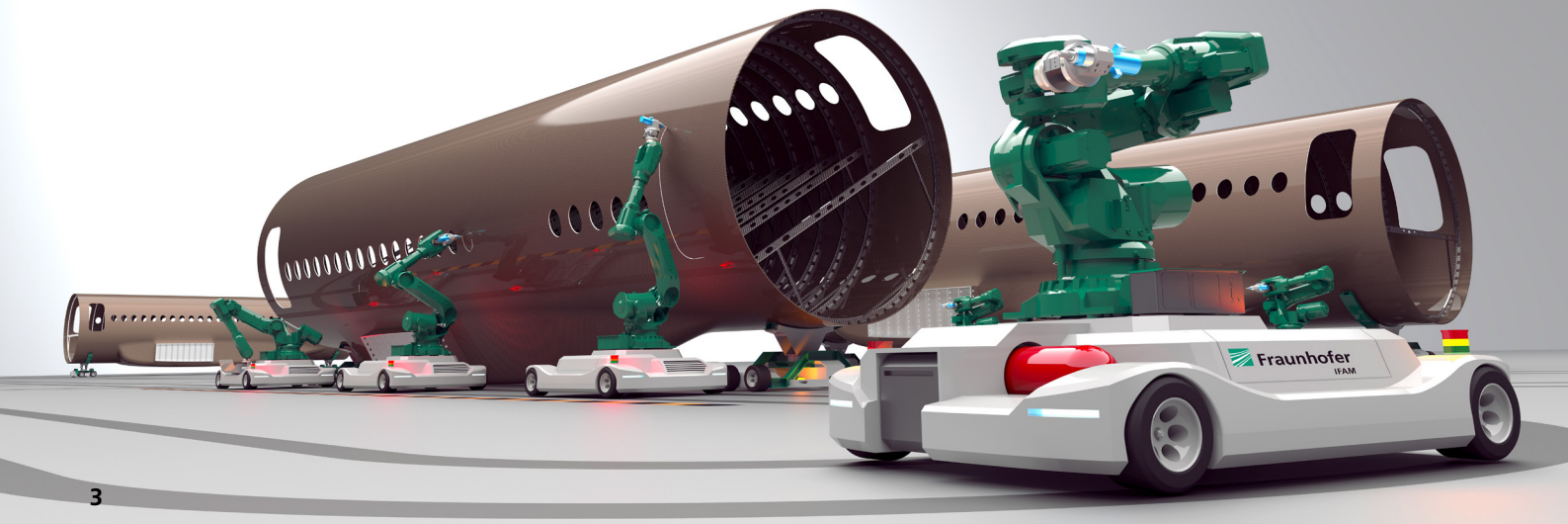
### Status quo

The demand for large components made to exacting requirements is constantly growing in a range of industries. Conventional production solutions are often inflexible, resulting in low productivity and high costs. Shorter development cycles and new production technologies mean there is a pressing need for versatile systems that can continuously adapt to technological advances.

Mobile robotic systems are the optimal solution here: They allow production procedures to be performed in parallel, idle times to be reduced, and cycle times shortened. In addition, the investment costs are lowered due to the use of standard components and the lack of need for special foundations.

### Advantages of mobile robotic systems

- Adaptability and multifunctionality
- Versatile machine concept for a variety of tasks
- Open plant layout enhances flexibility
- Ideal for integration into fully automated process chains
- Increased productivity by operating robots in parallel
- Large workspace due to mobility
- Short changeover and maintenance times
- Use of standard components, so lower investment costs than specialized machinery
- Lighter machinery, so no need for special foundations



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The experts for automation and production technology at Fraunhofer Institute for Manufacturing Technology and Advanced Materials IFAM in Stade have developed various **mobile robotic systems** for machining and other processes that require the utmost precision. These systems can be used in a multifunctional way. The manipulators can be changed as desired and adapted to specific applications. A further key R&D area concerns the development and testing of **mobile component carriers, measuring systems, and end-effectors** on autonomous platforms.

The work is carried out in collaboration with the Institute of Production Management and Production Technology at Hamburg University of Technology:  
 Prof. Dr.-Ing. Wolfgang Hintze  
 Research field Production Technology  
 PD Dr.-Ing. habil. Jörg Wollnack  
 Research field Optomechatronics

### Features of the plants

- Mobile platforms of various manufacturers having loads of up to several tonnes
- Industrial robots (IR) and lightweight robots (LWR) of various manufacturers having loads up to 300 kg (IR) and 15 kg (LWR) respectively
- Multifunctional end-effectors for milling, drilling, deburring, or measuring components
- Sensor systems for precise localization, navigation, or external control
- Safety sensors for operating in open plant concepts
- Measurement systems for machine evaluation: Laser Tracker, 3D camera system, vibration sensor, double ball bar system
- Flexible clamping devices for large components for near-reality testing of total systems

### Range of services offered

- Development of mobile and reconfigurable production plants
- Development of automation systems based on a variety of control platforms and robotic systems
- Development and testing of individual autonomous platforms
- Development of cooperating mobile robotic systems
- Development and optimization of offline programming methods for parallel use of several systems
- Precision analysis and optimization of existing mobile robotic systems
- Integration of sensor systems into robot-based systems
- Feasibility studies and economic considerations on the use of mobile robotic systems