

CONTACT

**Fraunhofer Institute for High Frequency Physics
and Radar Techniques FHR**

Fraunhoferstr. 20
53343 Wachtberg
Germany

Phone: +49 228 9435-227
Fax: +49 228 9435-627
info@fhr.fraunhofer.de
www.fhr.fraunhofer.de

Head of the Institute

Prof. Dr.-Ing. Peter Knott (executive)
Prof. Dr.-Ing. Dirk Heberling

Speaker Business Unit Production

Daniel Behrendt
Phone: +49 (0)228 9435 - 887
daniel.behrendt@fhr.fraunhofer.de



Reference Projects:
<http://www.fhr.fraunhofer.de/production>

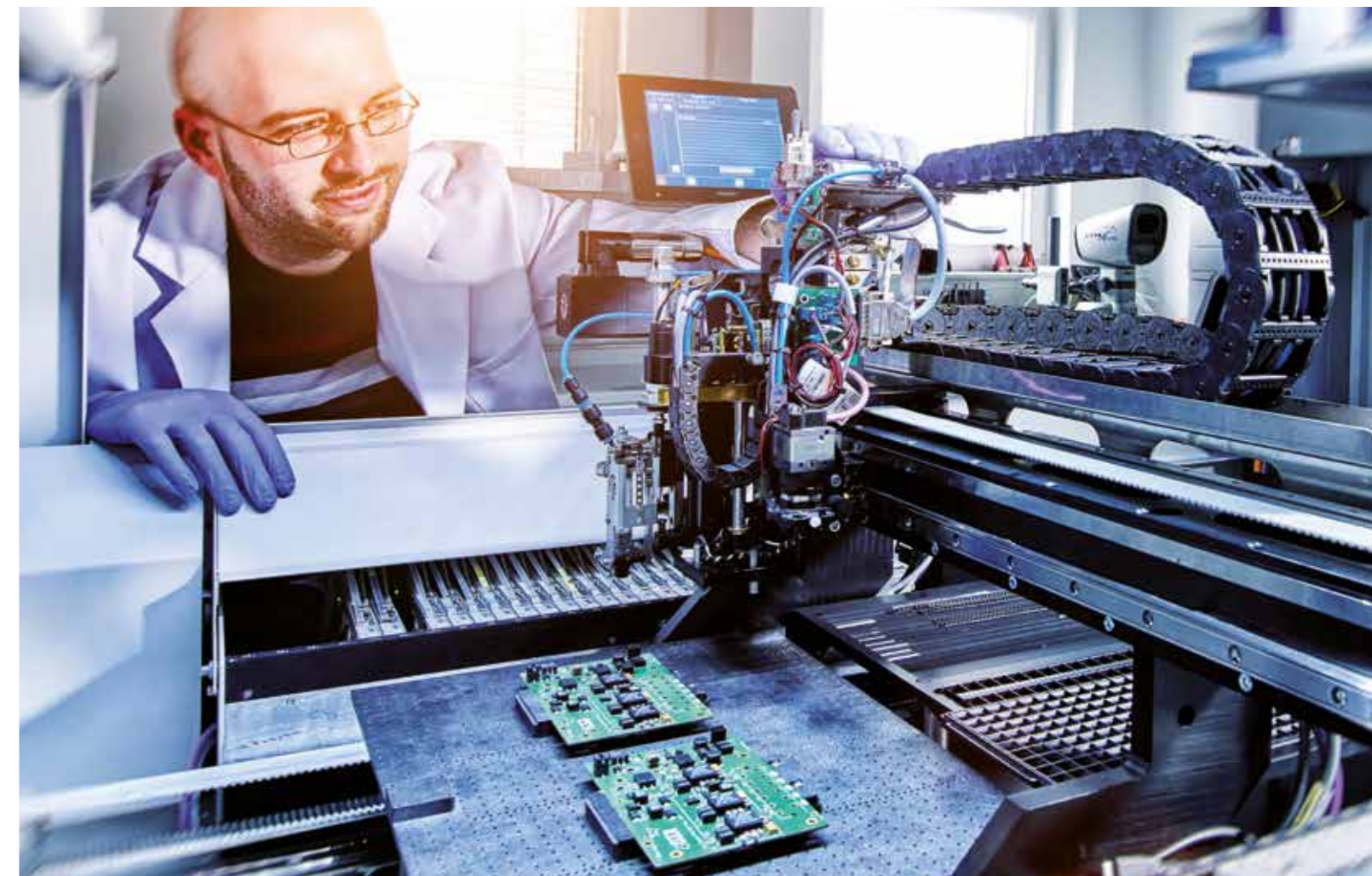
Fraunhofer FHR is participant of the



**Forschungsfabrik
Mikroelektronik**
Deutschland



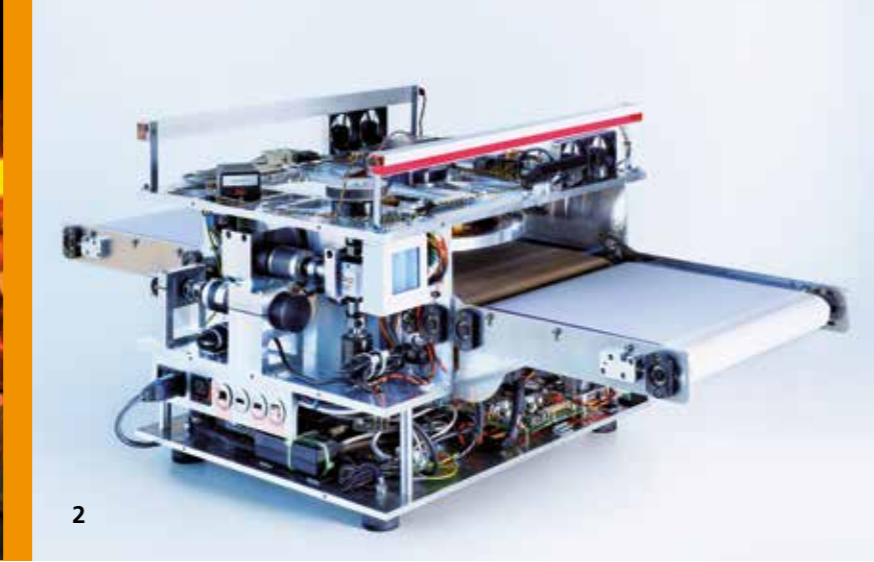
**Forschungsfabrik
Mikroelektronik**
Deutschland



TITLE *The researchers
use state-of-the-art produc-
tion techniques throughout
the development of the
versatile sensors.*

Pictures

© Fraunhofer FHR
© shutterstock



A LOT OF HERTZ FOR PRODUCTION

Fraunhofer FHR conducts research on innovative sensors for quality control in real time. High measurement speeds in combination with the ability to carry out high-precision measurements, also in adverse environmental conditions, are the most important hallmarks of high frequency systems for industrial applications.

Electronic sniffer devices and artificial eyes – modern quality control has access to countless amounts of information when measuring production tolerances as well as product and material properties. Big Data allows a wealth of parameters which can be used to optimize production. Within the framework of the digital revolution in the production plants, in short Industry 4.0, the networking of production facilities and operational management is leading to increased demands on sensor systems: they have to be faster, more precise and more versatile.

Sensors for production and industry have been a focal point of the research at Fraunhofer FHR for many years already. Although the results attract a great deal of attention at a scientific level, industrial application is still the ultimate aim. The synergy of scientific excellence and highly professional engineering paves the way for the creation of customized solutions. In this context, the institute uses state-of-the-art techniques such as additive production processes (3D printing) and in-house chip development – with continuous regard to obsolescence management and cost efficiency. The systems developed by Fraunhofer FHR find application in a wide variety of areas: from the food and recycling industry through to plastics and steel production and agriculture.

Smart, compact, versatile

The matters to be addressed are, in the most cases, very specific with the result that commercial solutions are of little assistance. Harsh environmental conditions – temperatures of several hundred degrees, steam or smoke, vibrations and belt speeds of over 20 m/s – quickly reveal the limitations of conventional systems. The high frequency systems from Fraunhofer FHR have already proven their stability under such conditions. The sensors work in 24/7 operation, measure in real time and ensure accuracy in the micrometer range. And: they can be fully integrated into the existing production equipment.

When developing application-specific solutions, the price, cost-efficiency and short development periods are important, but so too are reliability and durability. Legal conditions and industrial standards are, of course, also observed, e.g. in the case of interfaces. Fraunhofer FHR offers all services from a single source: after a period of just two to four weeks, the scientists can estimate whether or not the required application is technically feasible. A specific feasibility study can last three to six months depending on the level of detail. If required, the scientists can also design the system and build a prototype

which can subsequently be developed for series production in cooperation with an industrial partner. Prototype development also extends to the integration of the test system in the production plant. The institute then accompanies the further development of the system up to pilot series production.

Cost-efficient thanks to chip technology

The highly integrated single-chip radars developed by Fraunhofer FHR on a silicon-germanium (SiGe) basis allow the realization of task-specific systems, also in large quantities. Generally, the largely standardized but adaptable systems operate at 30, 60, 90, 120 and 240 GHz – but frequencies up to 300 GHz are also possible. In addition to sensors for the measurement of distance, density and thickness, Fraunhofer FHR also develops a range of imaging sensors. Radar cameras are the latest innovation in this category. Similar to optical systems, the line or surface sensors are capable of recording entire scenes.

Fraunhofer FHR is part of the Research Fab Microelectronics Germany (Forschungsfabrik Mikroelektronik Deutschland (FMD)) In its role as a research and development partner, the institute provides unique production and measurement possibilities. New laboratories for the production and testing of highly integrated, compact radar systems as well as for the IEEE-compatible measurement and qualification of completed systems and antennas in the frequency range from 100 MHz to 1.1 THz are currently being created in Wachtberg. With its global network, Fraunhofer FHR offers its partners access to wide-ranging expertise. New innovation cycles ensure that the technology is always up-to-date. This helps our partners to strengthen and further extend their market position.

- 1 Millimeter wave sensors work reliably in 24/7 operation, also in harsh environmental conditions.
- 2 Fraunhofer FHR accompanies its partners up to pilot series production.
- 3 Single-chip radars on a SiGe basis pave the way for cost-effective systems, also in large quantities.
- 4 Fast development thanks to rapid prototyping using additive production processes such as 3D printing.



Speaker Business Unit:
DANIEL BEHRENDT
Phone +49 228 9435-887
daniel.behrendt@fhr.fraunhofer.de