

## Test Zone for Agile Manufacturing

Cornerstone Ceremony for “Karlsruhe Research Factory“ Boosts Vision of Self-learning Manufacture



Cornerstone ceremony for Karlsruhe Research Factory on KIT's Campus East. (Photo: Amadeus Bramsiepe, KIT; the detailed caption is given at the end of the text)

**With the help of digitization, artificial intelligence, and machine learning, science and industry jointly transfer new, challenging manufacturing processes from scratch to practice within shortest time: this is the vision of the Karlsruhe Research Factory. In the presence of more than 100 guests from industry, politics, and science, Karlsruhe Institute of Technology (KIT) and the Fraunhofer Society (FhG) today celebrated the cornerstone ceremony for their joint project. Work of the Research Factory will start in late 2020.**

After groundbreaking in December 2018, the project crucial to the innovative capacity of Germany has now reached its second milestone: the cornerstone ceremony on KIT's Campus East. Construction of the Karlsruhe Research Factory, a development and demonstration center for tomorrow's factory, has started. In late 2020, it will be here where new manufacturing technologies will be planned, tested, and transferred to industry more quickly than ever.

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“The Karlsruhe Research Factory will enable research into smart production based on real processes in practice,” said the President of KIT, Professor Holger Hanselka. “The partners KIT and Fraunhofer contribute their comprehensive expertise in the areas of artificial intelligence, mechanical engineering, process technology, sensor development, and sensor integration to create added values for strong and innovative companies.”

Professor Alexander Kurz, Executive Vice-President of the Fraunhofer Society for Human Resources, Legal Affairs and IP Management, emphasized the broad, cooperative approach: “This joint project in Karlsruhe pools KIT’s and the Fraunhofer Society’s research in the area of future, innovative manufacturing technologies and methods. Integration of industry and further development of research, including academic education, are major elements of our joint approach.”

State Secretary Katrin Schütz of the Baden-Württemberg Ministry of Economic Affairs, Labor, and Housing underscored the benefit for regional industry: “The Karlsruhe Research Factory will be of lighthouse character for Baden-Württemberg as a location of innovation. To remain Europe’s innovation region No. 1, we have to transfer new technologies as quickly as possible to industrial practice. The Research Factory will help significantly accelerate this process.”

“The Research Factory will open up new paths in several respects,” added Ulrich Steinbach, Head of Office of the Baden-Württemberg Ministry for Science, Research, and the Arts. “It is an excellent example of joint research of KIT and the Fraunhofer institutes in Karlsruhe. Research, for instance, focuses on how results of high quality can be achieved very early, i.e. when the manufacturing processes required for a new product are not yet understood completely. This will foster new technologies made in Baden-Württemberg.”

### **On the way towards agile manufacturing**

To reach this ambitious goal, two strong research institutions have jointly initiated the Karlsruhe Research Factory and will operate it together: the KIT with its wbk Institute of Production Science headed by Professor Jürgen Fleischer and the Fraunhofer Society with its Institute for Chemical Technology ICT represented by its Deputy Director and holder of the Professorship for Lightweight Construction at KIT, Professor Frank Henning, and its Institute of Optronics, System Technologies and Image Exploitation IOSB headed by Professor Jürgen Beyerer, who also holds the Professorship for Interactive Real-time Systems at KIT’s Institute for Anthropomatics and Robotics.



Graphic animation of Karlsruhe Research Factory on KIT Campus East. (Figure: Heinle, Wischer, and partners, free architects)

These three scientists and Dr. Olaf Sauer from Fraunhofer IOSB as the project coordinator on behalf of the Fraunhofer Society explained how the Research Factory is to reach the goals defined by “AI-integrated manufacturing.” “Latest digitization methods, artificial intelligence, and machine learning enable us to more quickly plan, test, and transfer to industry new manufacturing technologies.” KIT and Fraunhofer already gained vast expertise in collaboration projects with industry, examples being “SMiLE – System-integrated Multi-material Lightweight Construction for Electric Mobility” or “MoPaHyb – Modular Production Plant for Highly Loaded Hybrid Components.”

The goal is agile manufacturing, which means that high-quality products leave the production line, while the corresponding manufacturing process is still optimized. Agile manufacturing is aimed at significantly shortening the time-to-market by sometimes several years. In this way, innovative companies are enabled to commercialize products on target markets much earlier than before.

Scientists working at the Research Factory will conduct pertinent research and transfer their findings to application in cooperation with industry partners. In pursuing their claim of “optimizing established processes and upgrading immature processes,” they will focus on developing laboratory-scale production processes to maturity as well as on the start of production using an industrial-scale machine and continuous monitoring and optimization of current manufacture. All three phases will be supported by methods of machine learning and artificial intelligence at the Research Factory. Researchers of KIT and the Fraunhofer Society are driven by the vision of making not only individual manufacturing steps agile, but expanding complete process chains to an internally communicating, self-learning system.

### **Collaboration with Industry**

The method of quick industrialization of new manufacturing technologies to be developed by the Karlsruhe Research Factory promises to yield decisive advantages for innovative companies in Baden-Württemberg in global competition. For the specific and quick transfer of findings, interested companies will be integrated from the very beginning through close cooperation, cooperation projects, and workshops. The initiators and future operators Jürgen Fleischer, Frank Henning, Jürgen Beyerer, and Olaf Sauer pointed out: “Work in the next years will focus on lightweight construction and new manufacturing processes for future mobility. The branch is experiencing a strong change at the moment. Rapid commercialization of new plants, methods, and processes will be decisive for maintaining the competitiveness.”

## Major Data of the Karlsruhe Research Factory

For the construction of the Research Factory on KIT's Campus East, a total budget of EUR 15 million is available. The cooperation partners KIT and Fraunhofer share these costs. The same applies to investments in the equipment of factory halls, laboratories, and offices in the amount of presumably EUR 2.25 million. Upon its planned completion in late 2020, the Research Factory will accommodate about 70 scientists on two floors with a total area of 4500 square meters. About 50 workplaces will be available for industry partners, other offices will be offered in the immediate vicinity.

The Research Factory will be active in the areas of electric mobility and lightweight construction, but also in other innovative areas requiring smart and efficient manufacturing technologies based on Industry 4.0 and AI methods.

The project is funded by the Federal Ministry of Education and Research, the Baden-Württemberg Ministry for Science, Research and the Arts, the Baden-Württemberg Ministry of Economic Affairs, Labor, and Housing, and the European Regional Development Fund.

### Detailed Figure Caption:

Today's cornerstone ceremony for the Karlsruhe Research Factory on KIT's Campus East with Undersecretary Otto Fritz Bode (Federal Ministry of Education and Research), Jürgen Beyerer (Fraunhofer Institute of Optronics, System Technologies and Image Exploitation IOSB), Olaf Sauer (IOSB), State Secretary Katrin Schütz (Baden-Württemberg Ministry of Economic Affairs, Labor and Housing), Frank Henning (Fraunhofer Institute for Chemical Technology ICT), Ulrich Steinbach (Head of Office of the Baden-Württemberg Ministry for Science, Research, and the Arts), Holger Hanselka (President of KIT), Alexander Kurz (Executive Vice-President of the Fraunhofer Society for Human Resources, Legal Affairs and IP Management), Jürgen Fleischer (wbk Institute of Production Science of KIT), Renate Schubert (ETH Zürich; Chairperson of the Supervisory Board of KIT), Frank Mentrup (Lord Mayor of the City of Karlsruhe), Michael Ganß (KIT Vice-President; from left to right). (Photo: Amadeus Bramsiepe, KIT)

**Fraunhofer is Europe's largest application-oriented research organization. Its research efforts are geared entirely to people's needs: health, security, communication, mobility, energy, and**

the environment. As a result, the work undertaken by Fraunhofer's researchers and developers has a significant impact on people's lives. By creativity, shaping technology, and improving methods and techniques, Fraunhofer forges the future.

Being "The Research University in the Helmholtz Association," KIT creates and imparts knowledge for the society and the environment. It is the objective to make significant contributions to the global challenges in the fields of energy, mobility and information. For this, about 9,300 employees cooperate in a broad range of disciplines in natural sciences, engineering sciences, economics, and the humanities and social sciences. KIT prepares its 25,100 students for responsible tasks in society, industry, and science by offering research-based study programs. Innovation efforts at KIT build a bridge between important scientific findings and their application for the benefit of society, economic prosperity, and the preservation of our natural basis of life.

This press release is available on the internet at [http://www.sek.kit.edu/english/press\\_office.php](http://www.sek.kit.edu/english/press_office.php).

The photos in the best quality available to us may be downloaded under [www.kit.edu](http://www.kit.edu) or requested by mail to [presse@kit.edu](mailto:presse@kit.edu) or phone +49 721 608-21105. The photos may be used in the context given above exclusively.

This year's **anniversary logo** recalls the milestones reached by KIT and its long tradition in research, teaching, and innovation. On October 1, 2009, KIT was established by the merger of its two predecessor institutions: the Polytechnic School and later University of Karlsruhe was founded in 1825, the Nuclear Reactor Construction and Operation Company and later Karlsruhe Research Center in 1956.

