

# *SmartFactory*<sup>KL</sup> *Pioneer of Industrie 4.0*

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Welcome to the future of  
industrial production

*smartFactory*<sup>KL</sup><sup>®</sup>

## ***“The demand for solutions is growing”***

The Internet continues to be the driver of radical change – for many years, this was true mostly for us humans, but it is even more applicable today in manufacturing. The customers conveniently order individually configured products via a mouse click and expect quick deliveries. To make this vision a reality, manufacturers must be prepared to customize products and produce locally, which in turn requires competitive production costs and flexible production. Only with a completely new approach to factory automation can this be advanced. The Internet with its global standards provides the right path: Production will be much faster and more cost-effective if, via Internet technology, we network all elements in our production processes – similar to the concept of LEGO® building blocks. At the same time, we become more flexible when we involve the employees in these processes and empower them with the help of smart assistance systems. That is the basic concept of Industrie 4.0.

This idea, which originated at our SmartFactory in 2005, has since taken on the character of a global brand. Interestingly, the term “Industrie 4.0” is increasingly being spelled with an “ie” ending when written in English. In fact, we can now observe that we have arrived at the reality of the vision. Companies are demanding solutions and rightly so! The time for research and discussion is over – specific solutions are needed. The result has led to the development of a huge market: interest is focused not only on hardware and software products, but also increasingly on data/knowledge transfer. A gradual, step-by-step approach is required to get users started.

Together with approximately 50 industrial and academic partners in the **SmartFactory<sup>KL</sup>** technology initiative, we developed an innovative demonstrator platform capable of presenting many technical solutions. Many of our industrial projects, which we also carry out with SMEs in the region as lead manager from the SME 4.0 Competence Center Kaiserslautern, have provided us with the necessary experience to support companies in their implementation and use of these new solutions.



**Prof. Dr. Dr. h.c. Detlef Zühlke**

Initiator and Chairman of the Board of the Technologie-Initiative SmartFactory KL e.V.



***“Industrie 4.0 has been a familiar buzzword for many years – but, more than ever, we are now observing the introduction of specific ideas and concepts into production facilities around the world.***

***SmartFactory<sup>KL</sup> has been performing pioneering work in this field since 2005.”***



↑ The unique, manufacturer-independent Industrie 4.0 system was presented for the first time in 2014. The growing consortium completed the fifth version already.



↑ At **SmartFactory<sup>KL</sup>**, various network partners jointly develop pilot systems.

↑ A standardized transport system conveys the intelligent work-piece over multiple modules.

## *Researching, developing, realizing together.*

**SmartFactory<sup>KL</sup>** is a manufacturer-independent demonstration and research platform and unique in the world. Here, innovative information and communications technologies and their application are tested and developed in a realistic, industrial production environment. We aim to integrate sophisticated information technologies into factory automation.

The devices and applications of consumer electronics are already part of everyday life, e.g., tablet PCs, smartphones, navigation devices and wireless communication systems, will enrich the traditional working methods in industry and open the way for more flexible and efficient concepts in the future factory operation.

The Technologie-Initiative SmartFactory KL e.V. was founded in 2005 as a non-profit association to establish a network of industrial and research partners which initiate and implement together research and development projects ranging from base technologies to the development of marketable products.

From the beginning, **SmartFactory<sup>KL</sup>** has been cooperating intensively with the **German Research Centre for Artificial Intelligence (DFKI)**. This successful cooperation guarantees the access to leading German research in the field of innovative software technologies.

The initiative is supported by the active participation of its members and the financial and material contributions of its supporters and sponsors. The members, supporters and sponsors create a lively partnership to realize the vision of the factory of the future with modern and innovative ideas.

We invite you to become a part of our network.

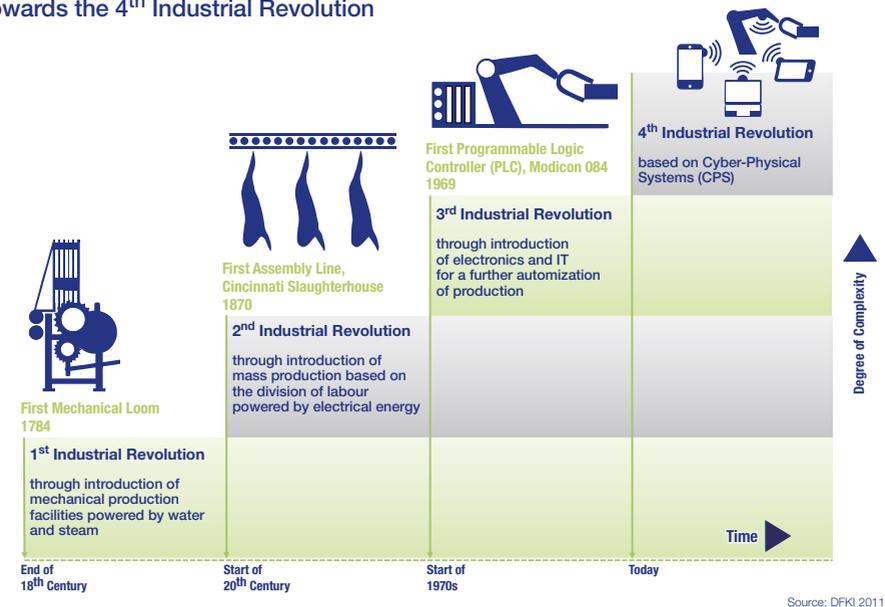


***Our mission:  
We are paving the way for the  
intelligent factory of tomorrow.***

The technologies required for the implementation of a smart factory are already available in the consumer electronics sector. The next logical step is their industrial application. Modern information and communication technologies such as wireless sensor networks, semantic product memories, mobile interaction or ubiquitous access to the web, are enabling the merger of production technologies with information technologies.

With the help of today's omnipresent internet, we can integrate individual elements of a production process into a flexible, self-organizing network of actuators, sensors and complete modules. The "Internet of Things" is facilitating the creation of intelligent environments in modern factories where the gulf between the real and the digital worlds is growing ever smaller. The "Internet of Things" in everyday life has delivered the vision for a production environment in the "Factory of Things" – to wit, the birth of the Smart Factory. As a manufacturer-independent technology platform, together with our partners, we create and implement innovative factory systems following the concept of Industrie 4.0.

### Towards the 4<sup>th</sup> Industrial Revolution



**SmartFactory<sup>KL</sup>** exhibits the world's first manufacturer-independent Industrie 4.0 production plant and shows just how high quality, flexible manufacturing can be efficiently implemented even for a batch size of one – regardless of whether in an existing production operation or a Green Field. Uniform interface standards enable a manufacturer-independent link to the production units, logistic systems, supply infrastructure, and IT systems. Challenging requirements already affecting production such as custom products, shorter innovation cycles, and more efficient on-site production can now be met.

## *Working with you to implement the smart factory of tomorrow.*

Cooperation is the key to success: **SmartFactory<sup>KL</sup>** produces no finished “Industrie 4.0” solution for sale. In keeping with our philosophy, we are solving the challenges of the future in cooperation with partners and other interested parties.

This implies our ability to check the readiness of companies to accept Industrie 4.0 and accompany them through all development stages right up to implementation.



↑ The interdisciplinary team at **SmartFactory<sup>KL</sup>** is composed of experts in the fields of mechanical, electrical, industrial and software engineering as well as marketing.

### › *Researching together*

**SmartFactory<sup>KL</sup>** coordinates the joint research and development activities for all of the members. We identify research interests, check possibilities for supporting the projects through subsidies at national and international level, and form competent consortia. For the implementation of research and development projects, we rely on experienced and highly qualified employees.

Our members can also produce studies and thesis works in the context of **Smart-Factory<sup>KL</sup>**, where a motivated pool of student and graduate staff with interdisciplinary training in the relevant courses of study are able and willing to provide assistance.

### › *Developing together*

At **SmartFactory<sup>KL</sup>**, members work together in various working groups on different topics. The group members discuss and jointly determine the development efforts, trends, visions, and ideas to be further developed and planned so, in the next step, they can be implemented in the demonstration facility. Research teams at **Smart-Factory<sup>KL</sup>** act as moderators and promote the exchange among partners.



↑ Working at eye level is a central element of our activities.



↑ Developing and testing: the **SmartFactory<sup>KL</sup>** demonstrators are a testbed for new technologies.

### › Testing together

Within a network of industrial companies and research institutes **SmartFactory<sup>KL</sup>** has created a manufacturer-independent, realistic research and demonstration environment. The platform serves as a testbed for new technologies, control architectures and components: Plant equipment and control elements from various suppliers can be integrated, tested, and further developed within this framework of prototypes and pilot projects.

### › Implementing together

**SmartFactory<sup>KL</sup>** supports members and customers in all phases of a consulting project: From the identification and assessment of possible applications to the design and embedding of individual Industrie 4.0 solutions in existing production processes. Services also include technical coordination of your Industrie 4.0 projects and the development of migration strategies for follow on activities.

In this way, we transfer the results obtained from application-oriented research projects to industrial operating practices.



↑ We transfer the results of research projects into industrial practice.

### › Communicating together

**SmartFactory<sup>KL</sup>** organizes information events interactive workshops on practical research questions and subjects for its members and customers. Thought provoking topics are discussed and passed on to our partner institutions. We encourage public awareness of the topics we are developing through our participation in activities such as trade show exhibits, conference contributions, professional publications and public relations work. We also communicate research and development results within the network and beyond.

**SmartFactory<sup>KL</sup>** is also a powerful voice heard in the direction of government and professional associations. We initiate and support standardization efforts at both national and international levels in cooperation with the relevant committees and boards. By preparing and providing the first publicly accessible standards, we supply the stimuli needed by industry and plant engineers to begin their implementations of the Industrie 4.0 concepts in specific products and as a new business model.

*Many members,  
one common goal:*

*We want to get ahead of the competition.*

The realization of Industrie 4.0 demands ideas and collaboration, as well as the eagerness to experiment and willingness to learn. Numerous renowned companies and institutions have recognized this and support us as members. Together in a strong network, we gather important experience, develop practical solutions – and play a key role in shaping the future of the intelligent factory.

We invite you to become a partner of our strong network.

As of: April 1, 2018





[www.dfki.de/web/research/ifs](http://www.dfki.de/web/research/ifs)

The **Innovative Factory System (IFS)** research department at **DFKI**, headed by Prof. Dr. Martin Ruskowski, deals with issues surrounding Industrie 4.0 and the factory of the future. We develop scientific approaches and new concepts in research and industry projects before moving on to practical testing in an industrial environment.

In some cases, the research results are transferred for implementation by **SmartFactory<sup>KL</sup>** and its members. The close collaboration between **DFKI** and **SmartFactory<sup>KL</sup>** is a major key to our success.



↑ The close cooperation of DFKI, **SmartFactory<sup>KL</sup>** and industrial partners is the key to our success.

Our topic areas:

### › *Smart Automation*

How are the units, modules, and control terminals automated and networked in an Industrie 4.0 environment?

What we are working on:

- Modularization concepts for units, infrastructures, and software (plug and produce)
- Integration of Industrie 4.0 solutions in existing environments (retrofitting)
- Multidisciplinary engineering of cyber-physical production systems
- Edge architectures for service-oriented plant structures



↑ Humans and machines will work together more closely in the future.

### › *Smart Integration*

How does the right information get to the right systems in a way that enables the work units to interact productively? We focus on the following topics:

- Digital networking of IT systems and work units
- Vertical and horizontal integration
- Combination of digitalization and lean production to “lean automation”
- Simulation and process optimization based on a digital twin

### › *Smart Human-Machine Interfaces*

How can humans and machines work efficiently together in a smart production setting? We are further developing these topics:

- Knowledge management and workflow management in a production setting
- Context sensitive human-machine interfaces
- Assistance systems and intention recognition (smart worker)
- Combining innovative technologies and equipment in a production setting



[www.kompetenzzentrum-kaiserslautern.digital](http://www.kompetenzzentrum-kaiserslautern.digital) (German only)

In 2016, **SmartFactory**<sup>KL</sup> initiative together with other regional competence partners was recognized as a Competence Center for SME 4.0 in Kaiserslautern by the German Federal Ministry for Economic Affairs and Energy (BMWi).

We support companies from the states of Rhineland-Palatinate and Saarland as well as from neighboring regions in tackling the challenges of digitalization. The aim of the federal high-tech initiative "Digital SMEs" is to inform small and medium sized enterprises about the importance of Industrie 4.0.



↑ The team at the SME 4.0 Competence Center Kaiserslautern consists of a pool of experts dedicated to digitalization and the concepts of Industrie 4.0.

### Priority of Support to SMEs for digitalization:

- Automation & Networking
- Strategy & Business Model
- Humans & Work 4.0

### Example Support Project: The MÖLLE company on its way to digitalization

As part of their digitalization project to enable data transfer to the ERP system (Enterprise Resource Planning), the MÖLLE company of Kastellaun, Germany implemented sensors onto existing systems. The specialists from the Mittelstand 4.0-Competence Center Kaiserslautern (SME 4.0) supported the retrofitting or upgrade project at this manufacturer of inner packaging.



### Example qualification: Training in the area of Industrie 4.0 and digitalization

The individual training modules of the Mittelstand 4.0 Competence Center Kaiserslautern (SME 4.0) can be combined based on individual needs. Participants familiarize with the Industrie 4.0 paradigms on a modular training demonstrator by following the practical example of how to produce a dice.



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Digital

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The Technologie-Initiative SmartFactory KL e.V. (**SmartFactory<sup>KL</sup>**) is a non-profit association registered in the register of associations for Kaiserslautern.

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### **Executive Board**

Prof. Dr. Dr. h.c. Detlef Zühlke (Chairman of the Board)

Andreas Huhmann, HARTING AG & Co. KG

Dr. Thomas Bürger, Bosch Rexroth AG

Klaus Stark, Pilz GmbH & Co. KG

### **Management**

Rüdiger Dabelow, DFKI GmbH

### **Source for images**

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[www.smartfactory.de](http://www.smartfactory.de)