

SmartFactory^{KL}

Smart Safety

Safety for modular production plants at run time



smartFactory^{KL}

Smart Safety: Safety for modular production plants

- The safety concept is designed to protect people from the risk associated with manufacturing jobs. Increasingly complex, modular Industrie 4.0 production plants demand a new safety concept. The production processes in Industrie 4.0 plants often vary because of the various lot sizes - often at lot size 1. The safety policies must adapt to the flexible processes of the modular plant. The safety of the production staff is of utmost importance and new policies must be implemented.
- Smart Safety: AI provides an ideal solution to the challenge of minimizing the safety risk at modular work stations. Risks can be detected and the appropriate risk minimization measures can be initiated by adaptive AI algorithms.

"Artificial intelligence helps reduce the safety risk associated with modular work units. In the more complex Industrie 4.0 production plants of the future, such a smart safety concept will be necessary as today's strict safety policies will no longer be adequate for the flexible factories of the future."

Prof. Dr. Martin Ruskowski,
Department Head of Innovative Factory Systems research at **DFKI** and expert
in the use of AI for manufacturing

Automatic certification of modular work stations

- Every equipment manufacturer must provide a declaration of conformity confirming that the unit can manage all hazard scenarios and that the minimum safety requirements are met. In the future, confirming this conformity quickly after each conversion of a modular plant, will require a modular certification concept that checks the entire network of linked systems.
- AI algorithms can automatically perform the certification process for the interfaces between two production stations. Using smart software, so called safety agents, will reduce the complexity of the interfaces between linked units. The safety agent checks various scenarios to determine, for example, whether there is a mechanical or a chemical risk. If the risk is negligible, a safety certificate is prepared and the production can continue – avoiding long downtimes in the truest sense of Plug & Produce.

“The advantage of this solution is the significant reduction in downtime after a plant conversion, because the most expensive and time consuming decisions about plant safety are now performed by artificial intelligence. We demonstrate automatic certification at our exhibit stand.”

Prof. Dr. Detlef Zühlke, Chairman of the Board of **SmartFactory**^{KL}



Smart Safety concept of SmartFactory^{KL}

› Use Case: Integrated Flexible Transport System for Module Safety

- A flexible transport system (FTS) is included in the safety concept of the **SmartFactory^{KL}** Industrie 4.0 production plant. In the event that the FTS moves into the zone of a production line, it is automatically assigned to that unit and, consequently, also to the associated emergency stop circuit. Similarly, instead of the transport system, another module component could also be flexibly exchanged and automatically certified by AI.



› Use Case: Smart Vision Systems for Safety Checks

- When a signal comes from the FTS that it has arrived at the docking station, the workpiece carrier moves forward on the conveyor belt of the Industrie 4.0 production plant at the **SmartFactory^{KL}**. However, at this point there is no official confirmation from the safety system that the signal actually came from the FTS and there may be a risk if the workpiece carrier moves. Eventually, the workpiece carrier could fall off the belt and disrupt the process in the long term.
- A smart vision system uses a camera to check the interface between the docking station and the FTS, for example, looking for the correct orientation of the conveyor belts. The optical data is evaluated by agent systems. If the FTS is correctly positioned, the safety certificate is created and the process is released – the conveyor belt with the workpiece carrier starts to advance.
- This use case is visualized using colored light installations. If the vision system has not performed a final risk check, a flashing light on the FTS is activated. After checking for safety risk and confirming the certificate, the FTS becomes part of the safety circuit of the respective production line and the flashing light changes to reflect the corresponding color of the line. Only then the workpiece carrier can approach the FTS.

Companies participating in the Safety working group at **SmartFactory^{KL}** are B&R Automation, Bosch Rexroth, Festo, PHOENIX CONTACT, Pilz and TÜV Süd.



Technologie-Initiative SmartFactory KL e.V.

Trippstadter Straße 122
67663 Kaiserslautern, Germany

P +49 (0) 631 / 20575-3401

F +49 (0) 631 / 20575-3402

M info@smartfactory.de

The Technologie-Initiative SmartFactory KL e.V. (**SmartFactory^{KL}**) is a non-profit association registered in the register of associations for Kaiserslautern.

Association registration number: VR 2458 Kai
Sales tax identification number: DE249965612

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

A.Sell



Stay informed
about **SmartFactory^{KL}**
– with our Newsletter.

www.smartfactory.de