

Smart Manual Workstations Deliver More Flexible Production

- The *SmartFactory*^{KL} Industrie 4.0 production plant demonstrates closer interaction between operators, manual workstations, and production modules
- Smart manual workstations offer improved operator-assistance via Plug & Play

The Industrie 4.0 production plant on display by the *SmartFactory*^{KL} partner consortium shows a manual workstation with improved Human-Machine Interaction at the Hannover Messe 2017. This interaction is achieved with an IT structure more closely integrated with the production plant. Furthermore, the manual workstation features an assistance system with intuitive controls. The Technologie-Initiative SmartFactory KL e.V. and the German Research Center for Artificial Intelligence (DFKI) will present this advanced development project in cooperation with 18 contributing partner companies at the Hannover Messe from April 24 to 28, 2017, in Hall 8 / Booth D20.



A manual workstation in the Industrie 4.0 production plant of the *SmartFactory*^{KL} partner consortium demonstrates improved Human-Machine Interaction. This allows for a more flexible production set-up. ©*SmartFactory*^{KL} / C. Arnoldi

The manual workstation is an advanced version that has been closely integrated with the assembly plant to enable flexible production of a customized product; in this case, a business card holder. Similar to the automated production modules, the manual workstation also communicates via OPC UA. Consequently, the production modules can be directly linked to the manual workstation. They are physically connected by an autonomous guided vehicle (AGV) that transports the product being manufactured back and forth between the manual workstation and the various machines. The destination of a part is automatically selected according to its production plan and machine availability.

Assistance system with intuitive user interface

An operator at the manual workstation receives order summaries on a display with an easy-to-operate user interface (UI). The UI has been redesigned to enable the "docking" of the AGV to the manual workstation. The operator confirms delivery of a product from the AGV and can even request a product from the AGV on the UI. This enables the operator to actively influence the processing order. The new design provides the great benefit of a flexible and requirements-based production: fully automated, semi-automated/partially manual, or fully manual.

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Easy control of the manual workstation using Plug & Play

Various parts for the customized business card holder, such as the different covers or clips, are stored in assigned containers at the manual workstation, where the operator picks and assembles them into the individual product. The container system is mounted on load cells equipped with a cyber-physical system (CPS) that automatically calculates the current fill level of each container based on weight. The data generated in this way, for example, facilitates inventory warehousing or can give evidence of wrong material use or even theft. Additionally, each container is outfitted with an RFID chip for identification.

In the next development step of the manual workstation, the "Plug & Play" concept will be implemented on the load cell level. Thus, when a container is placed on the load cell, the system will automatically recognize it thanks to its RFID chip and adjust the production process accordingly.

Further development of assembly assistance systems promises great opportunities for the operator as the installation of manual workstations becomes increasingly simple. The aim is to provide intuitive user assistance systems that do not require any special IT skills. The necessary IT structures run completely in the background and remain invisible to the operator. The use of modern technology enables the operator to easily control and adapt the plant during operations. This results in flexible production, courtesy of the intuitive control of the assembly assistance system.

"Successful Human-Machine Interaction reflects the basic concepts of Industrie 4.0: flexible, fast, and simple adjustment of the production plant to quickly accommodate individual customer requirements," said Professor Dr.-Ing. Detlef Zuehlke, Chairman of the Board of Management of *SmartFactory^{KL}* and Director of the Research Department Innovative Factory Systems at DFKI.

Partners in the *SmartFactory^{KL}* Industrie 4.0 production plant network are:

Belden/Hirschmann, Bosch Rexroth, CISCO, EPLAN Software & Service, Festo, HARTING, IBM, iTAC, LAPP KABEL, METTLER TOLEDO, MiniTec, PHOENIX CONTACT, Pilz, proALPHA, TE Connectivity, TÜV SÜD, Weidmüller, and Wibu-Systems.

Download photos for this press release here:

<https://cloud.dfki.de/owncloud/index.php/s/AlfbDRrjMXiBWGT>

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About the Technologie-Initiative SmartFactory KL e.V.

The Technologie-Initiative SmartFactory KL e.V., founded in 2005 as a non-profit association, is an Industrie 4.0 network of industrial and research partners who jointly carry out projects regarding the factory of the future. *SmartFactory^{KL}* is a manufacturer-independent demonstration and research platform which is unique in the world. Here, innovative information and communications technologies and their application are tested and developed in a realistic, industrial production environment. The technology initiative, supported by the active participation of its members, has already established pragmatic solutions, first products and common standards. *SmartFactory^{KL}* intensively cooperates with the German Research Center for Artificial Intelligence (DFKI) in Kaiserslautern and was appointed Mittelstand 4.0-Kompetenzzentrum Kaiserslautern (SME 4.0 Competence Center) by the German Federal Ministry for Economic Affairs and Energy in 2016. www.smartfactory.de

About the German Research Center for Artificial Intelligence

The German Research Center for Artificial Intelligence, with sites in Kaiserslautern, Saarbruecken, Bremen (with an associated branch in Osnabrueck) and a project office in Berlin, is the leading German research institute in the field of innovative software technology. In the international scientific community, DFKI ranks among the most recognized "Centers of Excellence" and currently is the biggest research center worldwide in the area of Artificial Intelligence and its application in terms of number of employees and the volume of external funds. The financial budget in 2015 was 42.5 million Euro. The DFKI projects cover the whole spectrum from application-oriented basic research to market- and client-oriented design of product functions. Currently more than 478 employees from 60 countries are conducting research focusing on Knowledge Management, Cyber-Physical Systems, Multilingual Technologies, Plan-Based Robot Control, Educational Technology Lab, Interactive Textiles, Robotics Innovation Center, Innovative Retail Laboratory, Institute for Information Systems, Embedded Intelligence, Smart Service Engineering, Intelligent Analytics for Massive Data, Intelligent Networks, Agents and Simulated Reality, Augmented Vision, Language Technology, Intelligent User interfaces, Innovative Factory Systems. Impact: more than 98 professorships of former DFKI employees, and 70 spin-off companies with approximately 2,500 highly qualified jobs. www.dfki.de

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