PRESS RELEASE

Research

KHS develops an intelligent filling valve in the DnSPro research project

- Filling system uses artificial intelligence to optimize production processes
- Self-learning valve suitable for all beverages and container types
- New development minimizes operation and maintenance effort

Dortmund, November 13, 2019 – KHS presents the future of filling: at BrauBeviale the machine and systems manufacturer is to introduce a new, self-learning filling valve. The system optimizes the production process with the help of artificial intelligence and at the same time considerably reduces the time and effort required for operation and maintenance. The feasibility of this flexible valve has been verified by KHS in the DnSPro research project[1].

"To date, depending on the beverage and container around 20 different types of filling valve are used," says Jochen Ohrem, expert of R&D

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[1] DnSPro – sensor-based subsystems with decentralized cooperation for Industry 4.0 production systems.

Management at KHS in Bad Kreuznach, Germany. "The beverage industry is increasingly calling for versatile filling systems. Digitally networked line and machine systems are also in high demand." KHS would like to significantly push these changes which is why the Dortmund systems provider has taken part in the DnSPro research project alongside six other partners[2]. Their common goal is to develop a self-learning filling valve with which beverage producers can fill all liquids into all existing types of container. This would do away with the need for manual conversions and the effort required for operation and maintenance would be greatly reduced, says Ohrem.

Self-learning and digitally networked

"We developed cyber-physical systems for this purpose, with the help of which the valve can determine how to best fill a certain beverage into a certain container as quickly as possible," Ohrem continues.
The filling process is analyzed with the assistance of a camera. This continuously monitors the inclusion of bubbles and foaming to prevent excessive foaming and thus product loss.

With the help of microcontrollers and the camera's evaluation electronics, the filling valve is opened to varying degrees by a stepper motor depending on the fill level. "The focus was on 'learning' a number of skills:

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[2] Besides KHS, Infineon, WIBU Systems, EPOS, the Ruhr University in Bochum and Ostwestfalen-Lippe University of Applied Sciences are involved in the research project. The project is coordinated by KROHNE Innovation from Duisburg, a supplier of sensors and measuring equipment and long-term partner of the Dortmund engineering company.

self-configuration, analysis, self-diagnosis and, ultimately, self-optimization," explains Ohrem. The future objective behind all this is to increase flexibility and energy and resource efficiency in production through the application of an autodidactic system of artificial intelligence. For the first time at BrauBeviale KHS will be presenting the key data on this intelligent filling valve which fully satisfies all of the previously specified project requirements.

Ideas for the future of the beverage industry

"The development is now entering the next phase where we'll be gathering further experience with this prototype," Ohrem states.

He already has one idea for later use of the valve in practice. Instead of a filling computer centrally positioned on the machine that regulates the process of all valves, in the future this task is to be managed locally by miniaturized computers installed on each valve group. This would allow a simple sensor such as a pressure sensor to be inserted into each filling valve which documents and analyzes the pressure curve, resulting in a process which optimizes itself of its own accord. "As less effort is involved in installation, this should yield a number of cost and time benefits, for instance during commissioning," concludes Ohrem.

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Press release captions

DnSPro research project: KHS has developed a versatile, self-learning filling valve during the course of the DnSPro research project.

Extensive monitoring of the filling process: During the filling process a camera constantly monitors the inclusion of bubbles and foaming. Excessive foaming and any ensuing product loss are therefore prevented.

Jochen Ohrem: "We developed cyber-physical systems, with the help of which the valve can determine how to best fill a certain beverage into a certain container as quickly as possible," is how Jochen Ohrem, expert of R&D Management at KHS in Bad Kreuznach, Germany, outlines the result of the DnSPro research project.

About KHS GmbH

KHS GmbH is one of the leading manufacturers of filling and packaging systems for the beverage, food and non-food industries. The KHS Group includes the following companies: KHS GmbH, KHS Corpoplast GmbH and numerous subsidiaries outside Germany, located in Ahmedabad (India), Sarasota and Waukesha (USA), Zinacantepec (Mexico), São Paulo (Brazil) and Suzhou (China).

KHS GmbH manufactures modern filling and packaging systems for the high-capacity range at its headquarters in Dortmund, Germany, and at its factories in Bad Kreuznach, Kleve and Worms. The group's PET expertise is pooled at KHS Corpoplast GmbH in Hamburg, Germany, where innovative PET packaging and coating systems are developed and produced. KHS is a wholly owned subsidiary of the SDAX-listed Salzgitter AG corporation. In 2018 the KHS Group and its 5,081 employees achieved a turnover of around €1.161 billion.

Contact for journalists

Sebastian Deppe
Sputnik GmbH
Press and PR
Hafenweg 9
48155 Münster
Germany
Phone: +49 251 6255 61243
Fax: +49 251 6255 6119
deppe@sputnik-agentur.de
www.sputnik-agentur.de

Contact for publishers' representatives

Eileen Rossmann
Mediaberatung
mmb mediaagentur gmbh
Rotebühlplatz 23 (City Plaza)
70178 Stuttgart
Germany
Phone: +49 711 26877 656
Fax: +49 711 26877 699
eileen.rossmann@mmb-media.de
www.mmbmedia.de