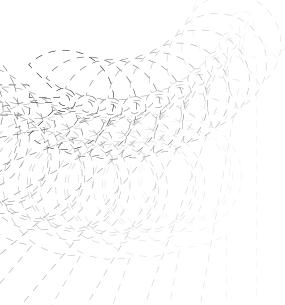*KHS: Easy operation and efficient control of filling and packaging production lines*

zenon – the ideal basis for an ergonomic HMI

Modern human-machine interfaces place efficient completion of working processes, an attractive visual design and an optimized usage experience at the forefront of human-machine interaction. KHS, one of the worldwide market leaders in the filling and packaging industry, has developed a new solution for the operation and control of production lines and machines in the drinks industry, on the basis of zenon HMI/SCADA software. It has already received many awards.

As one of the leading companies worldwide, with approximately 4,400 employees and offices in over 60 countries, KHS develops and produces machines and equipment for filling and packaging in the drinks industry. Because drinks manufacturing, filling and packaging consist of a number of highly-complex processes, the user-friendly and intuitive operation of equipment is increasingly gaining in significance. In order to design these processes as simply as possible for the user, KHS has decided to introduce a uniform, transparent and standardized solution: the new ClearLine HMI.

Ergonomics, simple and transparent navigation and innovative design – these are the characteristic features of the new HMI design from KHS.

DEVELOPMENT IN ACCORDANCE WITH THE "HUMAN-CENTERED DESIGN" PROCESS

Together with Fraunhofer IAO, KHS developed a concept for a new HMI that meets the needs and requirements of people with different qualifications. The objective was to combine functionality and aesthetic effect and to create positive user experiences when carrying out day-to-day work through simple learnability and increases in efficiency. To achieve this, the project partners examined the different user groups carrying out their respective work at a production line or a machine. Another task when developing the new HMI concept was standardization across different machine types and thus the complete production line. The information architecture, and the navigation and orientation mechanisms were then defined on the basis of individual user tests and in close cooperation with the KHS developers. "Our objective was to offer our clients a uniform and standardized platform which is characterized by the highest degree of user-friendliness. We wanted to ensure that our customers' employees could also operate the different machines on a production line without laborious training – in the national language desired. The recognition factor is very important for efficient and productive work," explains Dr.-Ing. Peter Stelter, Executive Vice President Technology Management at KHS GmbH.

USER INTERFACE DESIGN WITH ZENON

In addition to the new concept for the ClearLine HMI, KHS and Fraunhofer IAO also examined the power and the range of functions of different HMI/SCADA solutions. After careful evaluation, KHS decided to use zenon from COPA-DATA for the implementation of the new ClearLine HMI. "The zenon HMI/SCADA platform offers precisely what we need for our machines and production lines. The zenon software has well-developed graphical display possibilities and numerous HMI elements already included as standard. In addition, there are other comprehensive functions for user administration and access rights, recipe and type administration, as well as protocol and alarm management," explains Karsten Vollmer, Product Manager in the Technology Management department at KHS GmbH. "In addition, zenon offers the option to create interfaces to other systems. This flexible expandability is of great significance to us – from a long-term perspective too."

STANDARDIZED AND USER-FRIENDLY USER INTERFACE

The focus of modern HMI design is the interaction of the different users with the system, optimum support for the monitoring of the complete production line and simple and quick rectification of faults. New functions, forms of visualization and possibilities for interaction support the control and monitoring of a production line. Clear and efficient structuring of the content and functions also increases the security and efficiency of operation and always puts the view of the user onto the major elements. Thanks to the use and design of consistent control and display elements, users can find their way quickly and intuitively. Controls that belong together are grouped clearly and easily distinguishable from other elements. In addition, many of these are marked with symbols, for example to delete, filter, reset, save etc. Information is shown in the output fields, for example the current actual values. The targeted use of colors supports orientation and monitoring and makes it possible to review all relevant information quickly. KHS chose anthracite as

> " *With our new ClearLine HMI based on zenon, a complete production line can be operated and monitored with low personnel costs. A transparent, ergonomic solution for the operation of the KHS machines and equipment gives our customers an indispensable competitive advantage.* "

DR.-ING. PETER STELTER, EXECUTIVE VICE PRESIDENT, TECHNOLOGY MANAGEMENT, KHS GMBH

a background color, which – combined with their font and font color – allows very good legibility and recognition of all screen elements in industrial environments. The other coloring has also been thought through. For example, service screens, trend displays and process screens have defined background colors that ensure quick orientation and operation. The new ClearLine HMI from KHS also uses functional, structural displays instead of semi-realistic, spacial displays. As a result there are, for monitoring tasks in particular, simple and clearly-understandable visualizations.

WELL-THOUGHT-OUT AND STRUCTURED DESIGN

The standardized user interface for all KHS machines consists of the title bar with information on the machine and the user, a status bar, the navigation, the main view, the menu and the machine functions. In the navigation bar, the machines of a production line are depicted by symbols, which portray the functions such as transport, cleaning, filling, labeling, stretch blow molding, sealing, etc. In the main view, detailed information and setting possibilities for the selected production line, machine or components are shown. Within a view, the different display and control elements for control and monitoring are available. For certain tasks, the operators are offered additional, detailed instructions that serve as an explanation and a recommended sequence for the working steps. A machine is ultimately

controlled by the machine functions. Here too, the functions are each shown as a button. In the main menu, the user can select language, help, login etc. and also choose between different main functions such as production, type administration or putting into operation. It is also possible to change settings and make changes to the HMI here.

WORK EVEN MORE EFFICIENTLY

The favorites administration integrated into the KHS ClearLine HMI is another highlight of the user interface. Users can define their favorites individually and thus get to frequently-used views, functions and information more quickly. The help functions are also designed in such a way that employees with little experience and training can also orientate themselves using pictures which supplement the help texts. Messages and problems with a machine or individual components are also displayed very clearly in the status bar. In addition to explanations and information on error or fault rectification, the colored borders provide information on the priority with which a message is to be handled: for example, blue stands for "fault", yellow for "warning" and white for "information".

ROLE-BASED ACCESS CONTROL WITH RFID IDENTIFICATION

Access control is also an important component of the well-thought-out usability concept. KHS uses the user administra-

With zenon, KHS has created intuitive user guidance. The operation, maintenance and management of a production line are shown clearly and simply, and are comprehensible immediately.

KHS Everywhere App by zenon makes it possible for current equipment states, alarms or status messages to be accessible on smartphones or tablet PCs at anytime, anywhere.

tion integrated into zenon for this. Instead of a conventional user hierarchy, role-based access is used. It is therefore ensured that machine operators or maintenance staff have precisely the functionality, overviews and screens that are necessary for them to complete their respective tasks. "The user administration integrated into zenon provides us with precisely what we need to implement our security standards: different user profiles with fine granular possibilities for definition, comprehensive tracing of all activities via an audit trail and saving and archiving of the log files," explains Karsten Vollmer from KHS.

MONITORING WITH A SMARTPHONE

KHS also uses the Everywhere App by zenon, in order to give users the possibility to display data from their HMI/SCADA system on their smartphone directly and in real time. Authentication is carried out using the user administration in zenon. The users of the filling and packaging equipment, as well as management, can therefore get a comprehensive overview of a production line, its individual machines and their respective status. Users will see the corresponding icons of the machines on their smartphone. Information on the machine type, the operating type and the operating status is available in the detail screen. In addition, they can have message texts (alarm messages or neutral messages), the current program (production, maintenance, cleaning, etc.), the drink types and other parameters displayed. "Mobile devices for monitoring and op-

eration in industrial environments offer considerable potential to increase user-friendliness, acceptance and ultimately also productivity in human-machine interaction. Thanks to the integration of the KHS Everywhere App by zenon, we can offer our customers the right information at the right time at the right place," adds Karsten Vollmer from KHS.

MANY AWARDS: CLEARLINE HMI ON THE BASIS OF ZENON

KHS has already received several prestigious awards for the new user concept and the innovative user interface, including "red dot: best of the best", the "iF product design award" and the "iF gold award". Awards from independent institutions are one thing, but even more important is the very positive feedback that KHS is receiving from the market. The first companies to use the innovative ClearLine HMI include, among others, a major brewing group in Germany. Indeed, the system is already in use in many places internationally with great success.