

Intuitive machine and equipment operation with zenon

Master complexity.

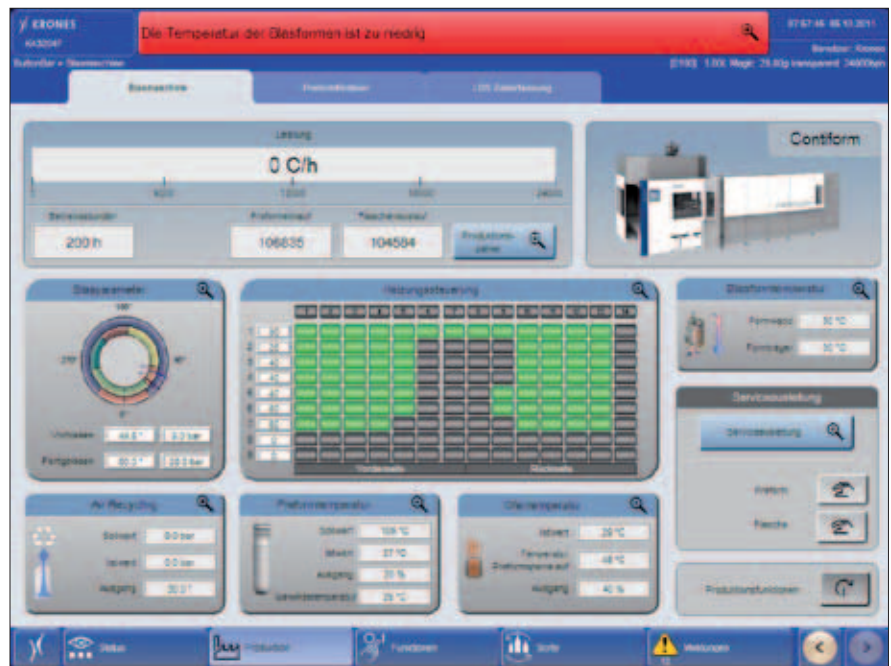
Large facilities need users to be able to record all information quickly and to be able to act accordingly. For continuous process monitoring, all machine and production information must be available with a clear overview. Krones AG has achieved increased quality, safety and productivity for its whole range of machines with a new user interface. The basis of this new user interface is the HMI/SCADA software zenon.



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■ 45 years ago, Krones was able to implement all relevant operational processes with conventional display lamps and switches on an A4-sized control box – approximately one page of a modern touch screen. By the mid-nineties, there were 30 control pages on the Krones touch panel. The touch screen is now much more than a control panel, with 100 to 250 screen pages available on the panels, a third of which are for operation, two thirds of which are for diagnosis. The reason for this is the increased level of au-

tomation and the increasing number of electric drive units. For example, stickering machines must now be more flexible: there are different stickering processes for different materials such as foil or paper, the stickers must be cut and located correctly and the machines must monitor the quality of the processes. The simple and efficient operation of machines and equipment therefore becomes an ever-greater challenge: “With the increasing scope of output and function, the possibilities for using a machine or facility also increase. However, this must not lead to the operator of the machines being unable to cope. The amount of functions and outputs of the machines must take a back seat. The operation of the machines must be designed in such a way that the employee notices nothing of the complexity. The most



COPA-DATA is continuously investing in the graphical capabilities of the HMI/SCADA solution zenon.

important priority is that the operator can complete their tasks efficiently and productively,” explains Robert Giehl, Manager of Control Technology, Research and Development at Krones AG in Neutraubling, Germany.

ZENON – THE BASIS FOR ADVANCED DESIGN

Krones AG had already been using zenon as their HMI/SCADA solution since 2001. zenon is equipped with all the graphical capabilities that are necessary for the modern design of effective interfaces between operators and machines. The focus for continued further development of the HMI/SCADA software is usability research. The results of market studies show that applications with optimized user guidance increase productivity considerably. There are two reasons for this. Firstly, mistakes are minimized due to a clear interface design. Secondly, systems that are designed in a user-friendly manner make it easier to learn and master complex control units.

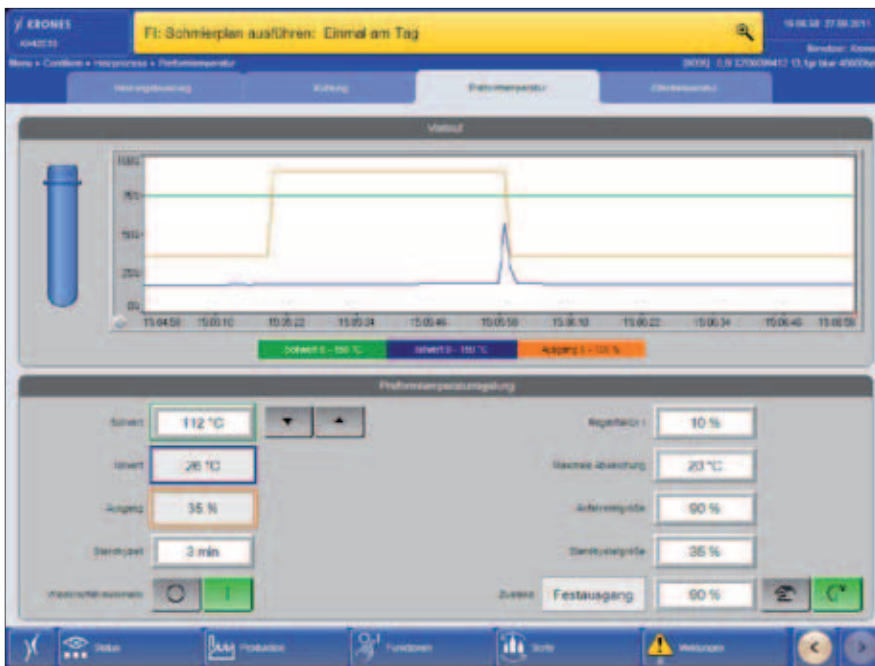
REUSABILITY INCREASES EFFICIENCY

One of the most important basic principles in zenon is the reusability of objects and screen elements. This makes it possible to configure projects very efficiently and to implement subsequent changes centrally and quickly. “For Krones, it is important to develop a consistent corporate design for all touch screens at a central location and to distribute this to different divisions,

so that all machines and facilities can use this user-interface design worldwide,” explains Thomas Stauber, Manager of HMI Systems, Research and Development at Krones AG.

ZENON OFFERS DESIGN FREEDOM

In addition to the multiple reuse of objects, zenon also allows the grouping of attendant elements and the free design and placement of elements. Existing and expandable icon libraries simplify the work of the user interface designer and project engineer to a considerable extent. Because all requirements and links are saved centrally, a consistent look & feel and the efficient adaptation of the design are always ensured. In addition to a comprehensive set of standard elements consisting of fonts, colors, frames and shading, the HMI/SCADA software zenon now offers modern design possibilities such as free template forms, shaded display of elements including transparency, free rotation and universal and asymmetric buttons. Thanks to the integration of the Windows Presentation Foundation (WPF), the person configuring the project can create the user interface according to requirements and in the desired design of the user using XAML files. “For us, zenon is the ideal platform for creating user-friendly and intuitive user interfaces. The HMI/SCADA software allows us to display our requirements for a user interface in conjunction with our own program expansions comprehensively and with the details implemented correctly. We appreciate the design freedom when designing our user inter-



User-friendly visualization of machines, equipment and processes is the key to the optimization of processes.

faces very much,” explains Thomas Stauber. The online language switching and unit switching provides additional ease of use. This way, the zenon applications can be used internationally – without additional development work.

WELL-THOUGHT-OUT VISUALIZATION

In close cooperation with customers, their own service department and external specialists, Krones used the HMI/SCADA solution zenon as the basis for the development of a new user control concept for approximately 50 different types of machines. The new visualization is now more closely orientated towards the individual requirements and knowledge of the users and can be operated more easily and intuitively. The Neutraubling-based company set out four main criteria for the implementation of this new user design:

- ▶ A task-orientated control structure
- ▶ Perception-orientated user guidance and navigation
- ▶ A solution-orientated messaging system
- ▶ An overview of connected machines

WORK IN A TASK-ORIENTATED MANNER

Up to now, the Krones control principle was primarily orientated towards the technical function of the machines. “However, users think in terms of tasks. They have to complete their tasks and one of their tasks is to maintain production,” explains Robert Giehl. The new user interface provides all functions, and the attendant information such as process values, in a task-ori-

entated manner – be it an energy monitor, production statistics or an overview of the parameters. If changes occur – such as a change to process values, for example – the user can react to this quickly and thus safeguard the process and product quality.

INTUITIVE NAVIGATION, QUICK ORIENTATION

The user guidance of the Krones machines was previously constructed as a menu tree that guided the user from side to side and from function to function – a widespread concept. Now, the user interface comprises a total of three navigation levels. The user can find all functions that they need to complete their task on the first page.

MEANINGFUL CONTROL ELEMENTS

Krones has also revised the controls and icons that were previously in use. Colored elements now aid optimum orientation to the user interface and the correct interpretation of the controls. The new design of ‘icons plus text’ helps users to select the desired function in the main navigation bar. “Tests prove that optimum controls should be a combination of icons and text. Although symbols need to be used, if they are used alone, they can often be unclear or misleading. In addition, there are few international standards,” adds Timo Pronold, Usability Engineer at Krones AG. “A combination of text and icons makes it possible for the user to learn quickly. For an experienced user, the icon is a quickly-recognized characteristic.”

“*The flexibility and openness of zenon makes it possible for us to develop in new ways and implement ergonomic solutions – for users and maintenance staff.*”

**ROBERT GIEHRL, MANAGER OF CONTROL TECHNOLOGY,
RESEARCH AND DEVELOPMENT AT KRONES AG**

QUICK DIAGNOSIS, QUICK TROUBLESHOOTING

One of the most significant technical developments in the operation of Krones machines is the solution-orientated message system for troubleshooting and diagnosis. The new message management allows simple navigation and quick switching between the message list, message description and a graphical overview of locations with a problem. The structured message descriptions provide the employee with clearly understandable and traceable information – who can rectify the problem, what type of problem it is and where it is. Robert Giehl from Krones says: “The texts must be adapted to the knowledge and experience of the user in terms of simplicity and conciseness – not aimed at a technician who develops machine visualization. The key is to give the user instructions on what they actually have to do, based on the current status of the machines or events.” He uses an example to explain: in previous HMI versions, the user would receive a message, for example, “Series production error - bottle width measurement”. Now, the message system has been divided into four parts: the user receives clear information that bottles are being rejected. They are also informed of the cause, for example: the bottle width of several consecutive bottles exceeded the defined limit values. In addition, the error screen and the reference designation state the actual location and thus allow easy localization (such a reference designator/electronic symbol can be an electrical construction element, assembly or components of electrical equipment). In addition, extensive instructions explain the action to take in detail. The message system for the different Krones machine types comprises between 500 and 5,000 main messages, supplemented with dynamic additional text and critical process values.

CONSISTENCY ENSURES EFFICIENCY

The machine overview provides the user with information and functions for all machines at each control terminal. At the press of a button, all production-related functions are activated and attendant machines, such as blow-molding machines, stickering machines or filling machines can be connected or disconnected in the ErgoBloc. Furthermore, the status display will also provide information on the consumable materials and production values. The use of zenon now makes it possible to operate machines from the whole Krones product range with uniform machine visualization – including filling systems, labeling systems, plastic systems, process systems, packaging and palleting systems, inspection systems, cleaning systems, pasteurization systems and transport systems. A consistent look & feel at all control stations makes it possible for the user to easily find their feet. There is therefore no time-consuming training sessions or long periods of induction for machine operation and maintenance.

FURTHER INDIVIDUALIZATION AS A TREND

The trend is already moving towards individualization of task-orientated user interfaces. Timo Pronold from Krones says: “In the long term, users will be able to compile their user interfaces according to their individual wishes and requirements – simply by dragging and dropping. They will no longer need to worry about the technical functions or data that is involved. For them, all that matters is the information and functions required to complete their individual tasks optimally. This will be the next evolutionary stage.” ■■■