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New perspectives for the automation of thermal processes

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New perspectives for the automation of thermal processes

Klaus Vogelei

Functions and tasks formerly the preserve of process-control and SCADA (supervisory control and data acquisition) can now also be implemented cost-efficiently using smaller, more compact automation units. The combination of high-brilliance displays, high-performance PC technology, serial interfaces, decentralized I/O systems, high-capacity data-base libraries incorporating control and regulation functions, and easy-to-handle engineering and commissioning tools, open up new potentials for high-quality automation.

Driving force behind the development of increasingly compact multi-functional products is the widespread demand for plant and machines that are tailored precisely to the needs and wishes of end users and operating personnel. Hereby, it is just as important that the requirements of the entire procedural chain from planning through projecting and implementation up to commissioning are also taken into account.

All of this leads to reduced costs and increases the competitive edge for all parties involved, which not only simplifies the tasks in the various links of the chain, but also ensures high quality in its execution – simple handling, high operational safety, pre-configured and tested functions, authentic documentation, etc.

The compact automation unit KS 108 easy

The automation unit KS 108 easy (Fig. 1) is a practice-oriented combination of industrial and process controllers, sequencing, visualization, operation, recipe preparation, administration and selection, alarm handling, measurement data recording (datalogger, trends), and communication.

Together with the recommended I/O systems VARIO and/or RL 400, this results in overall automation solutions. Moreover, the use of established function modules from the PMA library permits engineering with a high level of

operational safety to be created in minimum time.

Automatically generated operating dialogs, arranged in a predefined menu structure, provide access to all relevant parameters and data without additional programming work. This greatly reduces the time required for engineering and testing. The operating menu can be called directly from the user-generated plant and process graphics at any time (Fig. 2–5). Commissioning, maintenance, and service of the plant are supported by the BlueDesign® software package. This modern tool provides simple access to process data and parameters during normal operation.

Convenience without extra costs

Although the machine or the process – with all its sequences and requirements – is in the foreground during all planning stages of an automation system, the principles of proportionality must not be ignored, to avoid “swatting a fly with a hammer”.

Fortunately, this conflict between costs on the one hand and necessity on the other, which in the past often meant that useful functions had to be relinquished, is now gradually being resolved. To mention just a few examples:

Recording and trend displays of important process variables and logic states provides valuable information for operating personnel that everything is OK or

that corrective action is required. Additional recorders are not required, if this function is available with just a few mouse clicks, is integrated automatically in an operating menu, and can be called at the push of a button.

Similarly, variables that are e.g. important for product quality can be saved on an external data carrier (USB stick) simply by pressing a key. The stored data are proof that the production process is running correctly, and permits the analysis of a specific period (batch, shift, etc.) to be carried out later with standard software tools, which greatly simplifies causal research in case of a complaint. Additional measures are not necessary.

The transparent listing of alarms and exceeded limits in the sequence of their occurrence provides an overview of critical process conditions, and allows fast fault analysis and localization. Optional marking as “compulsory acknowledgment” highlights specific events, and prompts immediate operator action.

Project or product – a decisive question

Already the way in which application software is generated – and the means used – determine the operational safety of an automation concept right from



Fig. 1: Automation unit KS 108 easy

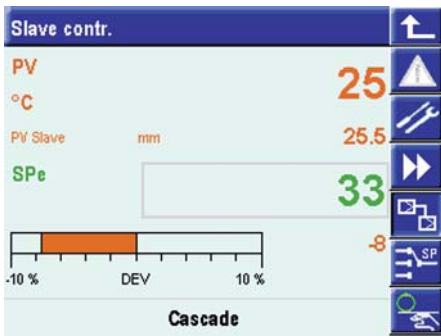


Fig. 2: Controller operation

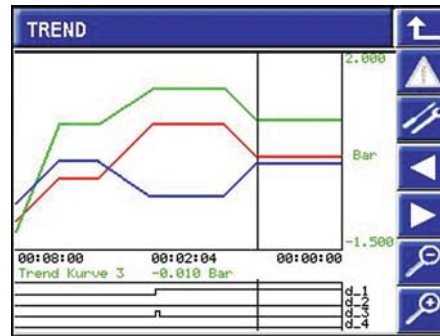


Fig. 4: Trend display

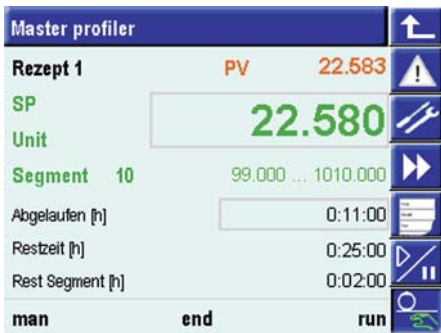


Fig. 3: Programmer operation



Fig. 5: Alarm page

the start. The nature of a *project* is fundamentally different from that of a *product*. By no means are the following reflections intended to suggest that the project-based generation of application software is basically of lesser quality. Nonetheless, it is important to note that per definition, a *project* is unique and unmistakable, whilst a practice-proven product originates from a series with highly varied applicability. What's more, a product is subjected to an extensive type test before delivery to ensure that it complies with the functional description of the data sheet. The costs of all quality assurance measures as well as the subsequent product maintenance are distributed over the entire series, and the widespread applications are proof of uniform quality.

Of course, also a project is subjected to a functional test before commissioning, but this is by no means comparable with an extensive product test.

As every plant is unique, it is obvious that not all the required features and installations can have the character of a product. Nonetheless, the potential fault probability is greatly reduced, if a high proportion of reliable standard elements is used. A few examples for this are:

- A library with preconfigured, practice-proven functions such as controllers, cascades, programmers, trending and logging, alarm processing, selection of parameters and variables, I/O connections, and user-defined macros.
- Operating dialogs that are automatically assigned to each of the above functions, complete with the characteristic parameters (process value, setpoint, output value, auto/manual, cascade, self-tuning, etc.).

- Correspondingly associated configuration dialogs with password protection for various access rights.
- Standard menu guidance that can be enabled selectively for maintenance and service purposes, without having to program a single line of code.

Even the most experienced PLC programming expert will be thankful that this approach saves a great amount of work during the generation of operating dialogs and menu structures, especially in view of the greatly reduced error rate and testing time. In the time saved, the programmer can concentrate on designing the user interface and its underlying functionality, which is so important for the operating personnel.

Operation and monitoring as seen by operating personnel

In the final analysis, the plant's owner couldn't care less whether the project-specific application software has been programmed from scratch or has been assembled from standard elements with the help of a simple graphic editor. If the purchasing price is acceptable, his main concern will be that the plant works reliably, contains a minimum number of latent faults, and can be operated safely and confidently.

For decades, it has been customary to represent a (partial) process by means of the typical front of a PID controller with displays for process value, setpoint, and output value plus the associated operating elements or a programmer. Admittedly, this is a highly abstract way to represent the process to be controlled. However, such displays with detailed



Fig. 6: Plant-related operating pages

information and adjustment options are still important for commissioning, maintenance, and service, and should therefore be accessible only for these purposes.

Good design of the user interface, the HMI (Human Machine Interface), is crucial for safe and confident operation. The HMI should be adapted optimally to the accustomed practices and procedures of the operating personnel, whereby standardized and/or company-specific symbols should be combined with informal expert terminology (Fig. 6).

Consequently, the time gained is best used to design and adapt process and plant graphics to ensure fast identification and orientation. Experience shows that the work required to achieve these aims is frequently underestimated, because clear aims and requirements must first be worked out together. Hereby, not only aesthetic aspects should be taken into account – more important is ensuring fast orientation and confident response of the operating personnel particularly in critical situations.

Powerful tools

Nowadays, modern, powerful and easily operated tools are essential. BlueDesign® is a graphical editor that not only serves to create an Engineering by means of function modules, but also provides a template designer for generating process and plant graphics (Fig. 7).

For the purpose of simulation, the functions, operation, and display of the KS 108 easy are reproduced on the PC's screen. In this way, pretests and modifications of all functions, including the HMI concept, are possible before hot commissioning.

Various structuring aids improve the layout transparency, such as breaking down the Engineering in up to 15 programs, each of which runs in a selectable cycle, or macros for embedding recurring and established functions with a practically unlimited nesting depth.

When the Engineering is uploaded to the KS 108 easy, a packed project file with all the design parameters is also transferred, and saved in a non-volatile memory as an authentic, on-site documentation. This not only permits the Engineering to be down-loaded from

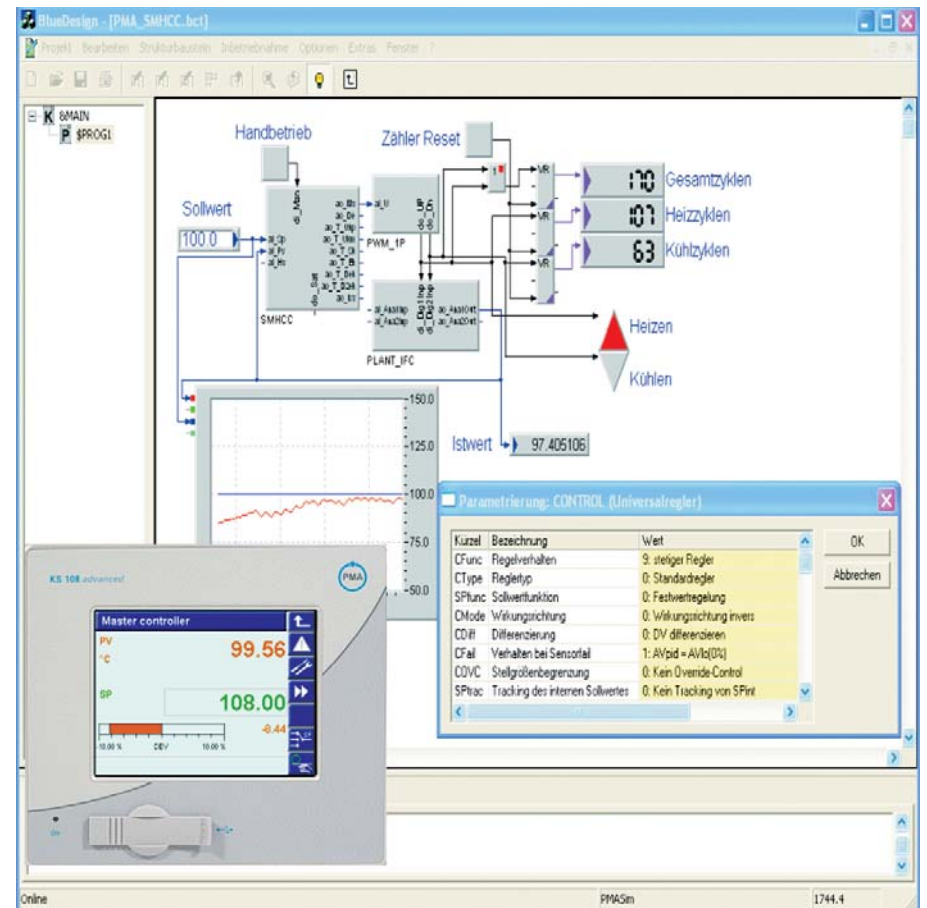


Fig. 7: BlueDesign® Engineering Tool with simulation

the device, e.g. for local modification, but also enables the accustomed layout and all the connections to be displayed as in the original worksheet – a valuable assistance for identification and orientation.

Summary

With PMA's compact automation unit KS 108 easy and the modern engineering tool BlueDesign® with simulation, users now have an extremely convenient solution for solving automation tasks, that can be handled by practically anyone, without the need for special programming know-how.

Applying the logic of criminal investigators, *motive* and *opportunity* have always existed: The need to simplify the work of everyone involved in the project, but primarily the creation of an HMI that is perfectly adapted to the end user's requirements, which ensures fast response and safe operation but without prohibitive costs. Previously, the only thing lacking was an affordable means to achieve a significant improvement at a high quality level.

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