

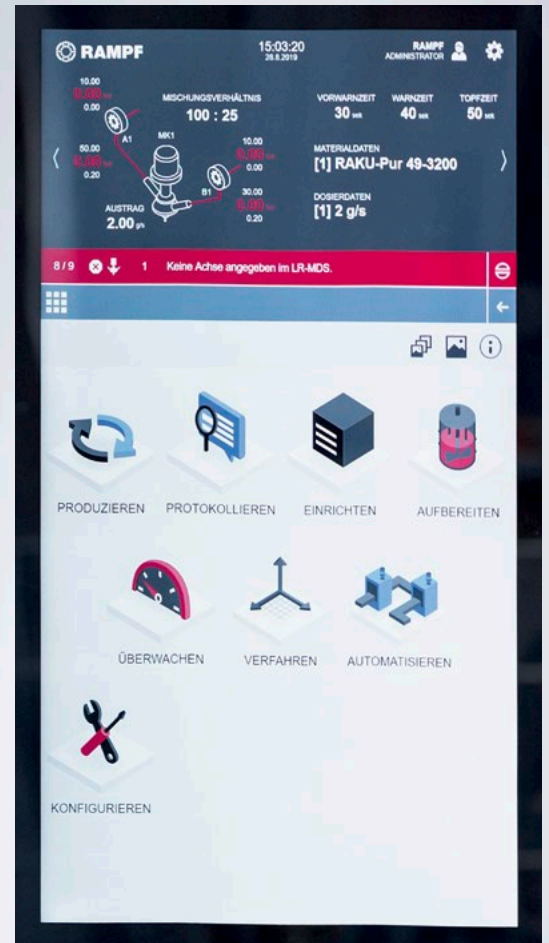
TwinCAT HMI enhances operator interface for dispensing systems and robots

Universal human-machine interface enables custom controls for flexible expansion

RAMPF Production Systems GmbH & Co. KG, based in Zimmern ob Rottweil, Germany, relies extensively on hardware and software from Beckhoff in its high-performance dispensing applications. These systems have a particular focus on TwinCAT HMI, which served as the basis for developing a new, universal operator interface: It allowed the necessary customization work to be completed with relatively little effort using a combination of standard graphical controls and specially created design elements produced with the support of a multimedia company, Feldmann media group AG, in Nuremberg.



A RAMPF DR-CNC dispensing robot connected to dual lines

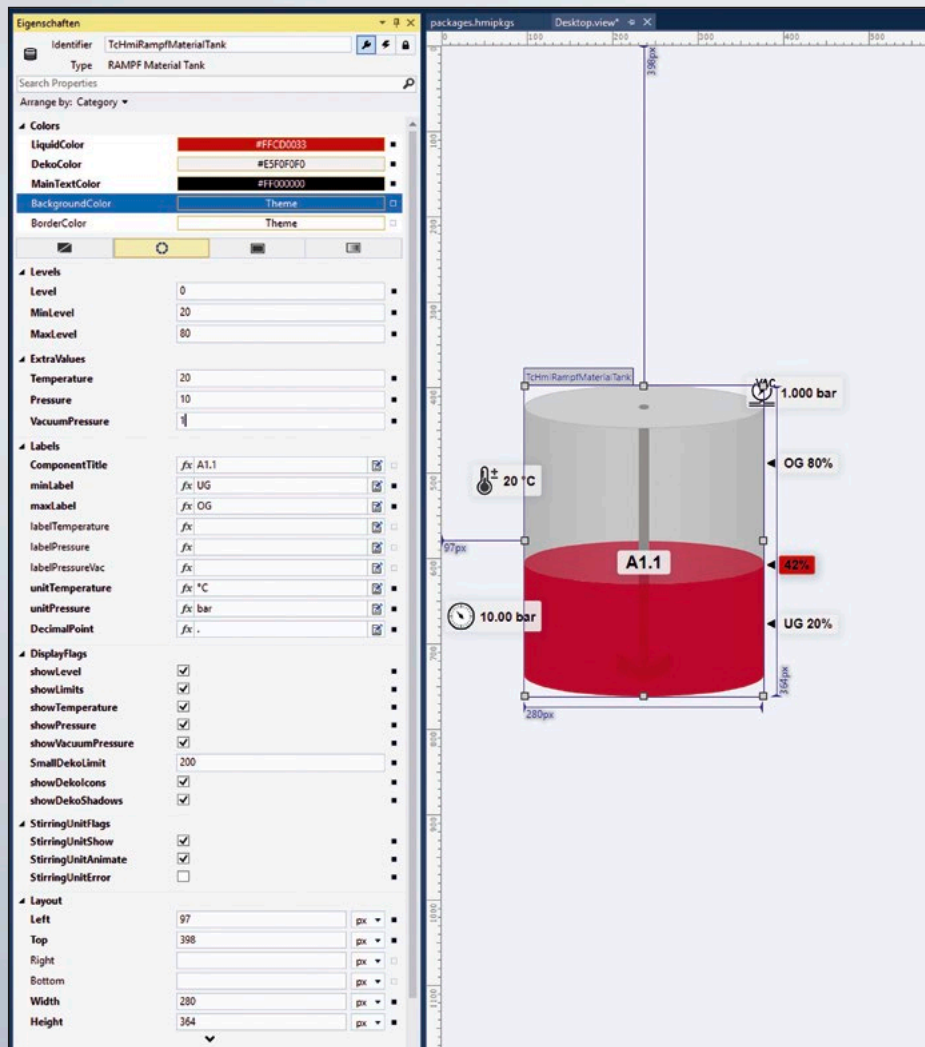


The newly designed HMI for RAMPF dispensing systems and robots

Development of the new HMI was initiated in connection with the DR-CNC dispensing robot, which is optionally available with a comprehensive control technology package from Beckhoff. The automation functionality, CNC chassis motion and precision dispensing technology are all implemented using PC-based control. The system incorporates Beckhoff drive technology, a C6930 control cabinet IPC, a CP2918 multi-touch Control Panel, TwinCAT PLC, NC I, OPC UA and, of course, TwinCAT HMI software. Says Hartmut Storz, Co-Managing Director of RAMPF Production Systems: "The new operator interface built on TwinCAT HMI provides us with a universal platform that will become our new standard. The open communication via OPC UA ensures that not just Beckhoff controllers but third-party systems can be used with it as well." The fundamental goals behind the project, he explains, were to create a unified operator interface capable of integrating with control systems from different vendors and to implement state-of-the-art technology in anticipation

of increasing digitalization. Other important factors were the ability to scale to different display formats, to support smart devices through HTML5 and to enable full touch-based operation.

RAMPF had high requirements when it came to the new HMI's design – including that it could be used completely intuitively without prior training, and that it had to have a modern look and feel. There were other considerations, too, tied to machine functionality. For instance, it had to specifically support CNC operation, which Beckhoff helped simplify. Scalability was also important – to allow the HMI to switch from the standard display size of 18.5 inches to 22 inches, for instance, for use at industry shows. From a technical standpoint, key priorities were to make the HMI quick and easy to set up, yet sufficiently flexible to permit changes and adjustments where necessary; it also had to be fast enough to enable smooth transitions between pages.



Parameterization options available when creating the container control

Advanced, unified HMI projects with an eye to the future

The new operator interface is forward-looking in that it will also work with mobile devices like smartphones and tablets if required. At the same time, it paves the way to greater digitalization in production, which is still in its infancy. For Hartmut Storz, the potential of digital technologies to deliver greater efficiency, speed and reliability in manufacturing processes is still far from fully understood, let alone exhausted: "It's with this in mind that RAMPF Production Systems developed the new operator interface for its dispensing equipment and robots. This easy-to-use tool is central to manufacturing companies' digital strategies." RAMPF's human-machine interface, he continues, can also serve as a basis for developing customer-specific HMI elements, because its modular design significantly reduces the time and effort for programmers at end-user companies.

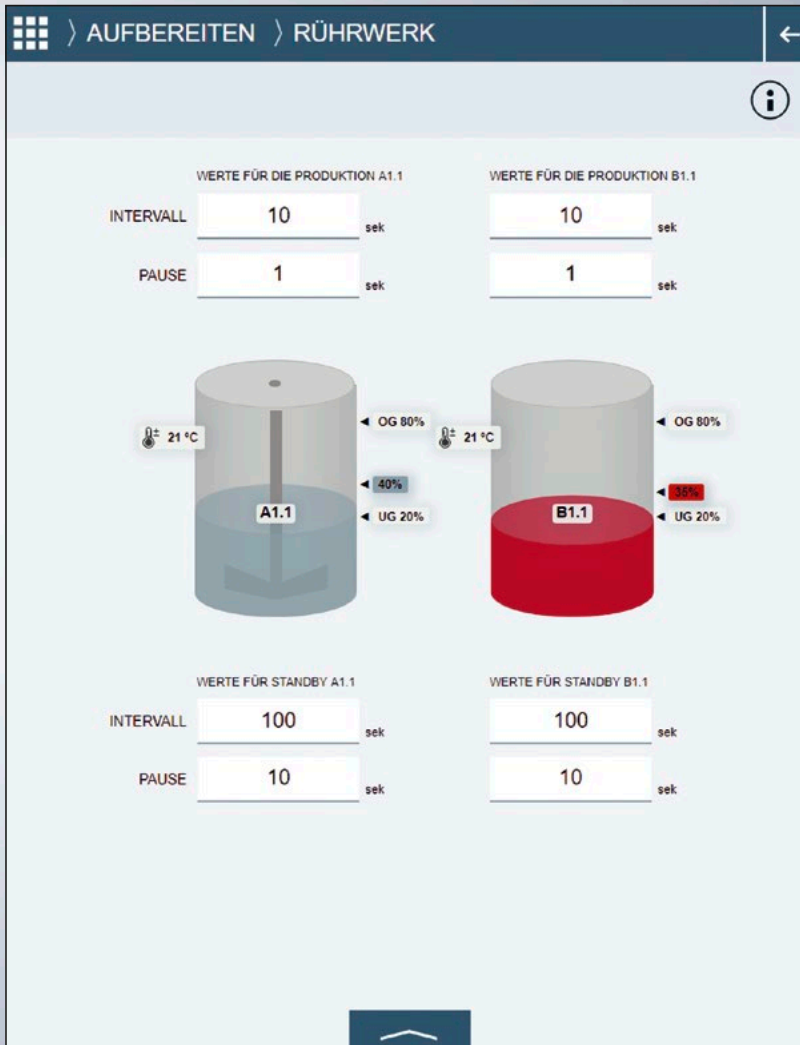
Unifying its various HMI projects creates valuable advantages for RAMPF, as Storz explains: "Given our range of equipment types and customer requirements, we often use different controllers, for instance, or hardware components such as operating panels. Until now, that sometimes involved

having to adapt entire HMI projects, or even start completely from scratch. As a result, we have a number of separate basic HMI projects that would need to be adapted or modified as systems evolve, which in turn would require a lot of maintenance. The HTML5-based TwinCAT HMI and OPC UA eliminate this problem: They allow any HMI computer to be used, provided it can run a browser."

A lot of attention was paid to the elegant visual design, with RAMPF hiring a specialist design company to deliver a solution tailored to its requirements. Not just the visualization was optimized, but the navigation and menu system as well.

Implementing the operator interface in TwinCAT HMI

Important factors driving RAMPF's decision to use TwinCAT HMI were the optimal support for UIs provided by the graphical editor and the openness and functionality that come with integration into a mainstream engineering tool like Visual Studio®. In addition, there was the modern HTML5 technology on which it was based, as Christina Klos, the project manager at Feldmann



A finished custom control for materials management

media group, explains: "The fact that TwinCAT HMI is implemented using modern HTML5 technologies like HTML5 itself, CSS and JavaScript, plus the modularity it offers in the form of custom controls and framework controls, opens up completely new possibilities for multimedia designers like Feldmann media group when it comes to collaborating with HMI developers like RAMPF. Instead of handing over individual graphical elements or style guides, a design provider with the relevant expertise can deliver finished, fully functional UI building blocks in the form of custom controls. From our perspective, this is a big reason to use TwinCAT HMI, especially because there are few suppliers of HTML5-based solutions out there at the moment. What's more, TwinCAT HMI has shown itself to be an exceptionally open and easy-to-adapt system."

Says Hartmut Storz, describing his company's initial experiences with TwinCAT HMI: "RAMPF's software engineers weren't familiar with coding in HTML5, CSS and JavaScript, so they initially made a lot of use of the development environment's standard elements. When it came to the conceptual design for specific applications like materials management, though, we brought in

outside specialists Feldmann media group to help. Once people had acquired some experience with the system and taken additional training, they were soon in a position to create framework controls. In collaboration with Feldmann media group, we then put together the structures for framework controls and produced custom controls with high-quality graphics and dynamic functions. RAMPF now mostly generates its own framework controls."

Key takeaways for HMI developers on using TwinCAT HMI are: The pre-built Beckhoff modules and framework controls make RAMPF's custom controls quick and easy to create and pass on. Depending on the given version, the controls share an identical style, and PLC programmers can easily assign variables to them. In technical terms, HTML5 and responsive design offer big advantages when it comes to scalability and support for different user devices. The WYSIWYG editor is also really useful – when coordinating the HMI with live visualizations, for instance. Another advantage for RAMPF is that, from an equipment operator's perspective, the look and feel is much like using a smartphone, making it quick and easy for all kinds of users to grasp. The clear and consistent menu system, too, designed as graphical tiles, enhances ease-of-use.

Modern HMIs are gaining importance

The era of Industrie 4.0 has only just begun, and Germany's manufacturing sector is set to invest heavily in production process digitalization in the years ahead. Hartmut Storz concludes: "For these investments to pay for themselves, the new production processes and business models that emerge will have to improve productivity and profitability. The new production systems and their operator interfaces are of major importance here. Fully connecting all of the systems and steps involved in production requires taking an integrated view of the entire process and ensuring

that it can be controlled intuitively by the operator in charge. This means that to be fit for Industrie 4.0, HMIs need to be truly industrial-grade, combining maximum functionality with intuitive operation, an integrated safety strategy and durability. When choosing the right HMI, businesses need to go with well-conceived systems that are not just optimized for their specific field of application, but capable of integrating seamlessly with existing IT and OT strategies and therefore with the Industrial Internet of Things (IIoT) as well."

More information:

www.feldmannmediagroup.com

www.rampf-group.com

www.beckhoff.com/twincat-hmi