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TECHNOLOGY REPORT

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Variable data finishing system keeps pace with digital-printing technology

Sprint Variable Data Finishing System transforms variable print material to finished product at 1,500 ft/min

By Deirdre Ryder, VITS International

Digital-printing technology has made huge gains in recent years, in terms of both speed and flexibility. As a result, manufacturers of printing finishing systems have faced challenges to match that growth with new innovation.

VITS International, a Blauvelt, New York-based global supplier of variable repeat sheeting and finishing systems for the printing, packaging, digital and converting industries, recognized that the digital-printing market needed industrial-strength finishing systems that could deliver the speed, flexibility and ultra-precise registration control to sustain commercial printing production rates. To meet that need, VITS developed the Sprint Variable Data Finishing System, created with a complete, state-of-the-art electric drive and control platform from Bosch Rexroth.

DIGITAL PRINTING DRIVES INNOVATION

Similar to web offset printing, digital inkjet printers are capable of high-speed web-fed output with speeds reaching near-commercial rates of 700 to 1,000 ft/min (FPM). However, digital printing supports variable data printing: it can dynamically vary the content being produced—not just the number of pages for a given product, but variable imaging and significant variations in page dimensions. While this provides new abilities for customization, it vastly complicates how the printed web roll is finished. Finishing systems need to be able to cut, collate and assemble the pages into a final readable piece in the most logical order.

The complexity—high speeds plus variable data printing—was viewed as an important opportunity for VITS. We decided to take a leading role in developing robust, industrial-strength finishing systems that have the technical capacity, speed and sophistication to support both offline and inline finishing with the highest quality.

SPRINT SYSTEM SUPPORTS IN-LINE AND OFF-LINE FINISHING

The Sprint Variable Data Finishing System transforms variable print material to finished product at production rates up to 1,500 FPM. It utilizes patented Clear Channel registration control technology to enable cutting thousands of pages per hour while keeping ultra-precise page registration not previously possible with comparable finishing systems.

"Our printing customers wanted to be able to produce much larger products at much faster rates of speed," says Kim Markovich, VITS International director of product applications and regional sales and marketing manager. "Particularly for the direct-mail marketplace, being able to finish multiple webs and multiple ribbons and accomplish perfect register control meant that our printing customers could take on more work and be more productive."

We developed the Sprint system to support two variations: in-line systems, which receive and finish a single web coming directly from

FINISHING
Figure 1: The VITS variable data multi-web finishing system supports two variations: in-line systems, which receive and finish a single web coming directly from the digital printer, and off-line multi-web finishing, which enables the processing of multiple webs into a single finished signature or book.

the digital printer, and off-line multi-web finishing, which enables the processing of multiple webs into a single finished signature or book (Figure 1).

The team at VITS knew that the controls and drive technology it chose for the Sprint system must have the highest levels of versatility and sophistication—one of the key reasons the team chose Rexroth. "As we looked at the challenges, we came to the conclusion that only Bosch Rexroth would be able to provide the precise control technology we needed," says John Salamone, director of new product development for VITS.

ULTRA-PRECISE MULTI-WEB REGISTRATION CONTROL

The Sprint Finishing System consists of modular, independently driven components controlled by a central Rexroth IndraMotion MLC motion control platform. The in-line Sprint system configuration typically has 10 to 12 driven axes, while the more advanced multi-web offline version can have up to 30 driven axes.

Each Sprint module performs specific functions to convert a printed web into a completed book or direct mail piece, and each utilizes a specific set of Rexroth IndraDrive servo drives and proven IndraDyn servo motors.

In the off-line multi-web system, multiple paper rolls are mounted on register splicers that feed the web continuously to the VITS automatic constant-tension infeed. The infeed delivers precise gain/tension control to the web.

The web then passes through an angle bar system that slits it in half and repositions one half over the other, before travelling to a ribbon-gathering station and then over a folder element to fold the ribbons in half.

Once the fold is complete, the web travels through a shear-slitting module where the folded web can

STITCHING
Figure 2: Once the fold is complete, the web travels through a shear-slitting module where the folded web can be trimmed, and then into the variable data rotary cutter that cuts each page to size and collates/stacks the finished product for the next process, such as final binding or saddle stitching.

be trimmed, and then into the variable data rotary cutter that cuts each page to size and collates/stacks the finished product for the next process, such as final binding or saddle stitching (Figure 2).

Maintaining absolute registration control of multiple webs, so that every page in every signature is cut to exactly the same dimension, was one of the most significant technical hurdles the team faced.

"Nothing is ever printed perfectly—the length of print can vary by plus or minus ten-thousandths of an inch from page to page," says Salamone. "That doesn't sound like much, but after a hundred pages the registration can be off significantly."

VITS enlisted Bruce Parks of Parks Consulting International (www.parksconsulting.net), a systems integrator with extensive experience using Rexroth printing system controls, to help develop the Sprint automation solution. "The Rexroth drives have a large amount of intelligence built in," says Parks. "So we use the drives to maintain registration on the web in a dynamic fashion, which then frees up the processing power of the central IndraMotion MLC controller."

All drives maintain synchronization with a virtual master. Tension zones are created between individual drives in each module to maintain optimal tension when variations occur as webs merge, split and are cut. Groups of drives are also created, allowing adjustments to be made as a group to bring the web into proper register with the virtual master.

The team used the industry-specific IndraMotion for Printing version of Rexroth's IndraMotion MLC system as the automation platform, featuring IEC 61131-compliant motion-logic controls and PLCopen function blocks along with extensive software libraries for printing and converting functions.

"IndraMotion for Printing provides engineering tools that work right out of the box to accomplish most of the web handling tasks," says Parks. "We then used

Rexroth's PLCopen function blocks as the starting point to build the special camming profiles and functions we needed for the proprietary VITS Clear Channel registration capability."

ROTARY CUTTING CHIP CONTROL

The other major challenge for the Sprint team was having a rotary cutter that could handle variable data—infinitely variable image sizes ranging from 5 to 25 inches—and be configured to cut different-width chips—the blank space between pages on the web roll—all with the push of a button, rather than a time-consuming changeover.

In the rotary-cutter module, two knives cut the chip out; the knives are separated by the width of the chip, and the cutting needs to be synchronized with the speed of the web through the system. "Our camming process allows us to cut variable-size products with multiple knives and still maintain chip size because we always synchronize with the web speed through the cutting zone," Salamone says.

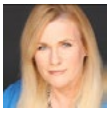
The Clear Channel register control provides faster size changes, as well as cut tolerances never before provided by standard finishing systems, which is a competitive advantage for both VITS International and its customers that choose the system.

COLLABORATION CHEMISTRY

This is the first system we've produced using a complete Bosch Rexroth drive and control platform—a decision that was made after a thorough evaluation.

We had a great relationship with our previous supplier who was a close business partner and was always there to work through any issues. With Bosch Rexroth, we found similar values and commitment. More importantly, it was the technology that allowed us to develop our equipment much faster, with world-class accuracy that none of our competitors have. We now have Rexroth-equipped machines located all around the world. Their performance and reliability is good; they are working flawlessly.

It has turned out to be the best decision for our growth and our future to work with Rexroth. We could not imagine doing what we are doing now without their technology and their capabilities. With a lot of input from our team and the right technology, we were able to solve the challenges we encountered. It took all three partners—Bosch Rexroth, VITS International and Parks Consulting International—to go from ideas to working solutions. ◻



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A quicker path to custom test benches

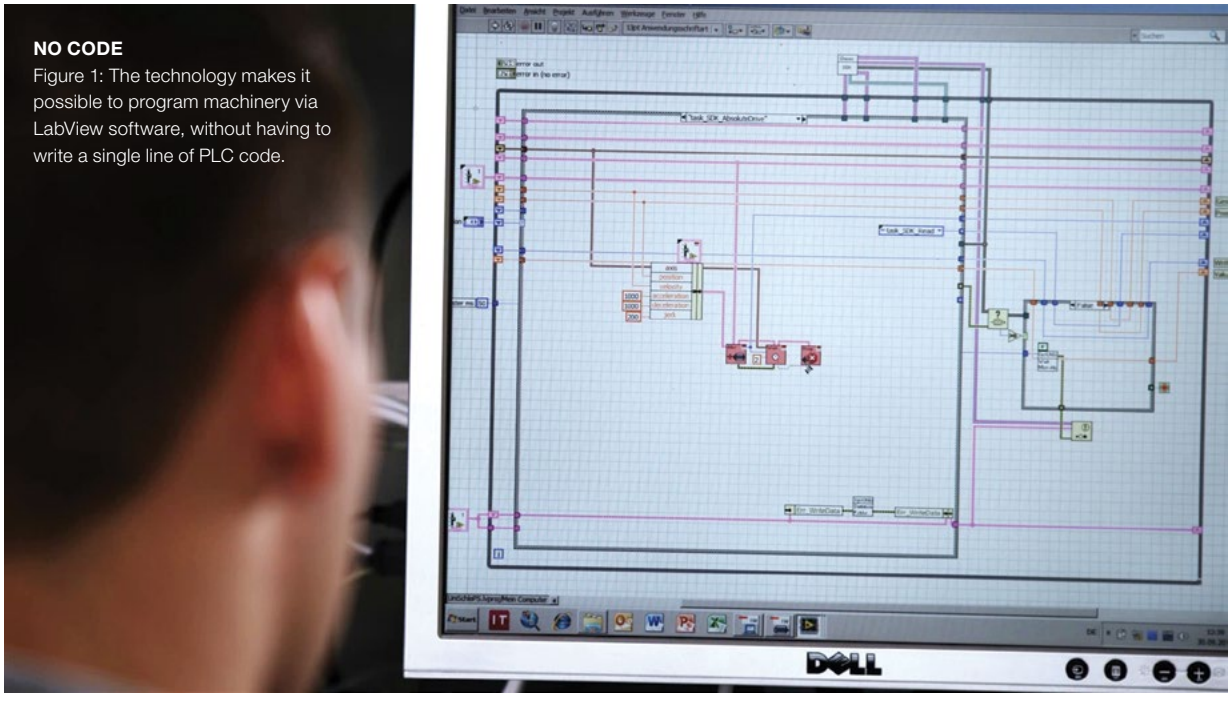
Kraus Automatisierungs-Technik can program made-to-order test benches for its customers, without having to write a single line of PLC code

By Stefan Besendorf, KAT

◻ Quality is why companies put their faith in automated testing processes, including regular lifecycle verification, fatigue testing and materials inspections. The machine builder has to match the testing units and instrumentation to the needs of each individual customer.

Many employ National Instruments' LabView software for this function. This graphic programming system is always used whenever it's necessary to acquire and process measurement data and to integrate the instrumentation needed for inspection purposes (Figure 1).

"How long is the lifecycle of a component, given what it can withstand and how it's manufactured?" asks Dr. Ralf Koeppe, vice president of engineering and manufacturing for electric drives and controls at Bosch Rexroth. "This can only be answered by special



NO CODE
Figure 1: The technology makes it possible to program machinery via LabView software, without having to write a single line of PLC code.

measuring and testing machines. Not only do they test prototypes, but in large-scale series production, they test series components over and over again in order to guarantee 100% quality."

ONE TASK, ONE USER INTERFACE

At Kraus Automatisierungs-Technik (KAT) in Hassfurt, Germany, in Lower Franconia, we manufacture test benches for the automotive industry and other sectors. They're used to test mechanical elements' service lives under the most realistic conditions possible.

Until recently, the employees at KAT, in addition to programming using LabView, also had to write a PLC program for the actual operation of the machine. This was both complex and time-consuming. In addition, the programmers had to have in-depth knowledge of both systems and had to use two separate user interfaces. That is why KAT sought an integrative solution to write programs for test bench automation without having to leave LabView (Figure 2).

At KAT we have this option now with Rexroth's Open Core Engineering (OCE). Its new Open Core Interface (OCI) technology makes it possible to program machinery via the LabView software, without having to write a single line of PLC code. With the adoption of Open Core Engineering, we are now working with fewer user interfaces. That is both efficient and minimizes the risk of error. A single programmer has the entire project under his own control. This means that we are far more flexible in manpower planning. Seamless and complete inclusion of the control and drive function in the LabView development environment makes it possible for programming using LabView only. This simplifies and accelerates the commissioning of customized testing equipment and instrumentation.

KAT's customers also profit from OCE. They can use LabView to make modifications to a testing machine themselves, without being familiar with PLC.

OCE translates programming languages for machine control. "When people of different nations

PROGRAM FROM THE BEGINNING
Figure 2: Developer Uwe Schweinfest at KAT can program machines from beginning to end.

work in a team, they must first agree on a common language," explains Koeppe. "Only then can they coordinate tasks and come to mutual agreements. The same applies for machines and IT systems. For the first time, high-level language-based applications on external devices have access to all the functions of the control units and drives."

Thus, applications based on C/C++, for example, can run in the real-time environment of the control unit. That is why the OCE software portfolio includes interface technology through which Bosch Rexroth now brings together the worlds of automation and IT. The OCI automatically makes a variety of programming languages available to the control unit. The result is machinery manufacturers can program with modern higher-level languages without having to write a single line of PLC. This reduces the programming efforts by up to 50% as one of the first OCI applications shows.

"In the software of these machines, the program LabView has been established worldwide," says Koeppe. "It's designed exactly for the requirements around the industrial measuring and testing. The only disadvantage until now is that, in addition to LabView, the machine manufacturers must program machine controls and coordinate the two programs with one another. There are no standard interfaces for this, which lead to extra time and effort. The specialists for LabView and for PLC had to agree at first and then write their respective programs and then test them to see if they would actually work hand in hand."

OCI has facilitated the work of the programmers considerably, explains Koeppe. "A programmer now uses LabView to produce the software for the tests and the movement processes of the machine without needing to write a single line of PLC code," he says. "This eliminates double work and

error-prone interface programming. Rexroth is providing libraries with more than 550 virtual instruments. These translate the LabView commands for the PLC controls."

OEM machine builders such as KAT are already using OCI to their benefit, to reduce engineering efforts and to reduce their delivery times. With the same team, the company can now program twice as many machines.

REDUCED COMPLEXITY

This degree of efficiency when programming instrumentation and test systems using the Open Core Interface is achieved by Rexroth with the aid of a software development kit (SDK). With its help, and in conjunction with the Rexroth IndraMotion MLC and IndraLogic XLC control systems, users can access control functions right from the application program. The programmer uses a supplementary package to import these libraries into LabView and thus has more than 550 virtual instruments (VIs) at hand. KAT uses this new freedom, for instance, to execute the jog mode, but also for travel at velocity, position regulation or switching on and off the corresponding drive regulator in LabView. The signals generated by the sensors and actuators, wired to the PLC input and output modules, are available immediately.

"Everything is programmed from beginning to end," explains Uwe Schweinfest, a developer at KAT. "We only have to integrate the VIs into a class. That lets us form chains of steps for the actual machine processes. And we can re-utilize our work in later projects without major effort."

OCE was distinguished in 2013 with the Deutsche Messe Hermes Award technology prize. OCE connects the previously separate PLC and IT worlds by offering an integrated solution consisting of open standards, software tools, function toolkits and the OCI. To achieve this, Rexroth has opened the control core to provide expanded access.

"Now, with a variety of high-level languages and operating systems, machinery manufacturers can create independent individual functions, which run parallel to the firmware directly on the control unit or on external devices," says Koeppe. "With this capability, machinery manufacturers can now, for example, also fully integrate smart devices into automation and take advantage of their operational interface capabilities." ◻

Stefan Besendorf is CEO at Kraus Automatisierungs-Technik. Contact him at info@kat-gmbh.de.

Commission machines with the swipe of a finger

Gestures and motions can be used on mobile devices to operate equipment.

By Niko Glaub, Glaub Automation

◻ Glaub Automation & Engineering is one of the first system integrators to implement gesture commands for control in manufacturing. In a building used by Glaub Salzgitter, Germany, Matthias Fleischer, software developer, is standing in front of a three-axis system with a gripper arm. The software developer has a tablet PC in his hand and its display shows a schematic depiction of the axes. Fleischer places his thumbs on two marked spots and tilts the tablet PC. As if by magic, the system of axes and the gripper arm move. The more the mobile device is tilted, the faster the movement. As soon as he removes either of his thumbs, the system stops.

"Smartphones and tablet PCs are our companions in the consumer digital world, providing access to and interaction with

consumer services like electronic plane ticketing, bank transfers or navigation systems," explains Dr. Ralf Koeppe, vice president electric drives and controls at Bosch Rexroth. "Millions of apps for all kinds of situations can be used with the simple swipe of a finger, drastically improving the user experience of today's communication and IT devices. Now the door is open for the world of machinery. With the software technology, Open Core Engineering, and its interface technology, Open Core Interface, Bosch Rexroth allows machinery manufacturers to use smart devices for commissioning, diagnosis and operation."

FAMILIAR INTERFACE
Figure 1: Instead of a computer mouse and keyboard, two fingers are enough to flip through the pages, zoom or confirm. This simple operation is now in high demand with machine operators, greatly reducing training efforts.

At first, smartphones and tablet PCs were considered to be toys for geeks. But they have revolutionized everyday life. Billions of people use them to retrieve information from random locations, download small application programs, shop online and increasingly control their household technology. Instead of a computer mouse and keyboard, two fingers are enough to flip through the pages, zoom or confirm. This simple operation is now in high demand with machine operators. And their training efforts can be reduced considerably (Figure 1).

"The interface technology provides easy and powerful access to the world of IT devices, the ease of use and the mobility of smartphones and tablet PCs," says Koeppe. "Machine manufacturers program their operating and diagnostic surfaces as apps in a programming environment on the operating systems of the smart devices. Open Core Interface ensures that machine control understands and carries out the orders of these application programs directly. No programming of the controls is necessary. This is a great innovation considering that the programming and control interface typical in today's market only understand programming languages of the world of automation."

APPS FOR IOS AND ANDROID

The first apps for commissioning and operating machines show how smart devices are facilitating the approach to machine functions. For example, Glaub Automation uses the acceleration sensors of tablet PCs to program axle movements. Until now, when a commissioning engineer wanted to move an axle, he had to enter data: the distance, the terminal position, the acceleration, the maximum speed and the braking before the terminal position.

In the app developed by Glaub Automation, the operator sets his two thumbs onto two stylized finger prints on the display of the tablet PCs. Then he tilts the device to the side and the axle moves. The stronger the tilt, the stronger the drive accelerates. As soon as a

FINGERTIP CONTROL
Figure 2: To control this triaxial system, Glaub uses a control and diagnostics app for iOS and Android in order to obtain initial experience and get to know more about how the technology functions.

thumb releases the finger prints, the axle stops. In other apps, the commissioning engineer moves the controller on the display in order to determine the acceleration.

To control its triaxial system, Glaub Automation uses a control and diagnostics app for iOS and Android in order to obtain initial experience and get to know more about how the technology functions (Figure 2). With its Open Core Engineering concept, Bosch Rexroth is setting something significant in motion. It's assuming a leadership role when merging the world of manufacturing with the IT infrastructure used in offices. It's unleashing all the advantages we know today in the control of mobile devices.

Direct access to the control functions and to the variables in the PLC is implemented by Glaub with the help of three high-level languages: C++, Objective-C and Java. "Now I can shift complex logic away from the PLC," explains Glaub's Fleischer. "This is a great help, since some programming in high-level languages is far simpler than using the ladder diagram, instruction list or structured text." When developing the app, Glaub Automation placed great emphasis on a simple and intuitive user interface. A toolbar at the edge of the screen lets users access the most frequently used main menus. These include manual operation, automatic operation, starting page, moving to the home position and adjustments.

Various submenus can be selected from each main menu. In manual operation, for instance, users can select from a number of different modes in order to move the axes to a defined position. In addition to machine movements controlled by the accelerometers integrated into the smart device, the user can also control the system of axes with gestures executed on the touchscreen. There is also a diagnosis button in the header for the app.

EASY INTERFACE
Figure 3: Machinery manufacturers can now, for example, also fully integrate smart devices into automation and take advantage of the operational interface capabilities.

The operator can use this button to obtain information on the states of the axes and the controls; the operator can have individual parameters for the drives shown or can read out the log file.

"Implementing these functions was amazingly simple," explains Fleischer. "After configuring and programming the PLC with Rexroth's IndraWorks engineering tool, we only had to integrate the header and library files provided." Thus developers, after just a few hours of work, were able to start programming the functions in the high-level languages Objective-C or Java.

INTUITIVE OPERATION

Since users are already familiar with dealing with smart devices in their personal lives, they have instant rapport with the new control concepts using apps. We are now in a position to realize very simple machine control concepts. That will save training costs for the machine's owner. In addition, we can largely do away with language-based components in operator prompts, and that is interesting for the industrial environment in a worldwide production network.

As a system integrator for Bosch Rexroth, Glaub Automation has already implemented a successful Open Core Engineering application for a customer. The company developed a Windows application for a manufacturer of roller and axle dynamometers for vehicles. Here Rexroth supplied the control and drive technology, while Glaub Automation developed the user interface, based on the C++ language. "It accesses the controls directly via the Open Core Interface," explains Rexroth's Koeppe.

"Thus the technician can generate even complex motion patterns and then transfer them to individual axes. During testing, variables like torque, joint- or Cartesian velocity and position can be varied and visualized for up to three axles, with two wheels each. In concrete terms, up to six servo axles can be controlled separately. It will even be possible to implement this user interface as an app on a smart device, without having to modify the current program sequence for the PLC."

AN EXCITING FUTURE

The diagnosis of machinery is also becoming considerably faster and simpler through the use of smart devices. "Maintenance technicians can, with the respective authorizations, dial into different machines in sequence using wireless technology," says Rexroth's Koeppe. "They retrieve all diagnostic data with one user interface from any location. Navigation occurs through the swipe of a finger. In the case of an error, they can even change parameters and then fix a machine stop."

In 2013, Open Core Engineering received the Deutsche Messe 2013 Hermes Award technology prize. Open Core Engineering connects the previously separate PLC and IT worlds by offering an integrated solution consisting of open standards, software tools, function toolkits and the Open Core Interface. To achieve this, Rexroth has opened the control core to provide expanded access. "With a variety of high-level languages and operating systems, machinery manufacturers can create independent, individual functions, which run parallel to the firmware directly on the control unit or on external devices," explains Koeppe. With this capability, machinery manufacturers can now, for example, also fully integrate smart devices into automation and take advantage of the operational interface capabilities.

"I see major opportunities in manufacturing automation using Open Core Engineering," predicts Glaub. "It lets us create user interfaces for machines that don't scare operators away, but instead are fun to use (Figure 3). This means greater employee motivation. Seen against the background provided by Open Core Engineering, we are looking forward to an exciting future. The topic of connected industry came at just the right time, since it offers us a huge playing field and lots of potential that we're looking forward to using." ◻

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In the app developed by Glaub Automation, the operator sets his two thumbs onto two stylized finger prints on the display of the tablet PCs. Then he tilts the device to the side and the axle moves.

Factory of the future

Decentralized automation, digital twins, IoT gateways, open standards and 5G communications combine to accelerate where manufacturing is headed

By Dr. Heiner Lang, Hans Michael Krause and Dr. Gunther May, Bosch Rexroth

Four walls, a roof and the factory floor—there will not be many more fixed components than that in the factory of the future. Machines and systems communicate to a large extent wirelessly; the production equipment prepares itself independently and flexibly for new orders thanks to the variable layout. Greatly reduced setup times allow for greater variety, in extreme cases even down to lot size of one. Typical examples of the new mobility that's necessary are autonomous transport systems, which move around the factory, driven by cabinet-free drive technology, performing work on the product during transport, thus adding value.

DECENTRALIZED AND CONNECTED AUTOMATION

As a logical consequence of changing factory layouts, we will see more decentralized automation designs that defy the hierarchy of the classical automation pyramid using distributed intelligence and interoperability.

Why is this necessary? Because users need maximum flexibility when it comes to configuring and reconfiguring their equipment in order to set up and remove functionalities as required, according to the principle of plug and work.

With the increased connectivity requirements for the components, electrification and hybridization are seeing a significant increase in their roles. In the factory of the future, it will no longer suffice to automate classical hydraulics, pneumatics and manual mechanics. Rather, they are experiencing a revaluation by expanding their range of functions with the ability to communicate via the digital bus.

MARKETPLACES FOR DIGITAL TWINS

In a future scenario that's interesting for mechanical engineers, digital twins could be made available from automation components but also via a marketplace in order to bring them into the simulation environment with a single click.

As a result, original equipment manufacturers (OEMs) could parameterize the automation immediately, test it and put the entire model into virtual operation quickly and safely. In addition, the marketplace could become a product lifecycle management (PLM) platform, where all digital twins for current and past solutions are available.

To prepare for this scenario, OEMs must seek a dialog with customers to jointly define the exact requirements for the simulation models.

IOT GATEWAY SOFTWARE AND OPEN STANDARDS

To achieve continuous improvements in production using the digital twin, the real operating data from the assembly line can be compared with its simulation. This allows the quality of the manufacturing process to be monitored in real time and the maintenance to be modeled and optimized based on the current condition. IoT gateway software installed on a pocket-sized box PC can collect data from the controller via the Industry 4.0 standard OPC UA and transfer it to a higher-level IT system for visualization and analysis using 5G technology. With regard to the investment security of IoT solutions, many OEMs consistently rely on open standards such as OPC UA.

5G COMMUNICATIONS

The factory of the future will need speed, intelligence and flexibility; and that's exactly what 5G communications will deliver. When 5G rolls out, it will disrupt the way products are manufactured. It may even change the way factories are built.

Imagine the possibilities. Here are some of the applications coming our way.

Machine-to-machine interactivity will depend on 5G and will be an important element of increased distributed intelligence on the factory floor. Smart equipment will be able to communicate with other related parts of the process and improve processes overall.

Closed-loop control systems that need to work reliably and in real time can operate within a designated slice of the local 5G network, without creating any communications interference with other nearby equipment.

Wireless sensors on process machinery will be able to monitor not just operating temperature but vibration and sound, triggering an alert if anything falls outside of set margins.

Autonomous guided vehicles (AGVs) are more viable with 5G. They'll use cloud-based intelligence to deliver materials within the factory as they're needed. They'll even be able to synchronize with one another to share large loads.

Augmented reality (AR) can bring greater insight to people in production. For instance, workers can wear AR glasses and see real-time information layered on top of the equipment in front of them, so they can check its status. If there's a problem, their viewpoint could be streamed over 5G to a remote expert who can annotate the image, perhaps pointing to a meter that needs to be checked.

ADVANTAGES OF 5G

5G is up to 10 times faster than the speeds we have now. It's high-performance; it can work in real time; and it sets high reliability standards. It's set up to deliver the machine-type communication manufacturing needs. Wireless connectivity reduces expense and physical maintenance, and it also removes the trip hazards you can get with cabling.

Dedicated high-frequency wavebands reduce the chances of signal interference between systems. 5G enables network slicing, which in turn makes it possible to build application-specific virtual networks. It may arrive with an integrated localization solution that avoids the need for separate solutions. □

Dr. Heiner Lang is CEO of the Automation and Electrification Solutions business unit at Bosch Rexroth. Hans Michael Krause is director, market and product management, PLC and IoT systems, at Bosch Rexroth. Dr. Gunther May is director of engineering, firmware and connectivity at Bosch Rexroth.

Factory of the Future

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Is it possible to gain the benefits of Industry 4.0 or the IoT with your current production equipment? The answer is yes! With Rexroth's IoT Gateway you can network both new and existing machines easily and cost-effectively. Our precisely coordinated combination of control hardware and software for implementing IT applications lets you collect sensor and process data, transmit it to MES, cloud applications or local machine state monitoring systems – all without intervening in the automation logic. Optimize your production processes and product quality today.

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