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The B&R Technology Magazine

Packaging

The birth of the adaptive machine

OPC UA over TSN Unified standard for the IIoT

Decentralized drives One machine – Countless possibilities

Digital twin Faster to a finished machine

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It's time...

Our behavior as consumers can be quite a struggle for manufacturers. A quick post from a social media influencer sends a flock of followers to the online shops – and before long the virtual shelves are empty. Such sudden fluctuations in order volume are a difficult challenge for producers of consumer goods.

...for a new generation of machinery

It's time for a whole new breed of manufacturing technology: the adaptive machine. A machine able to change formats at the push of a button – or even produce a variety of products side by side. A machine that adapts to accommodate new products. In our cover story, you'll learn more about what makes a machine adaptive and what it all means for the future of manufacturing.

...for a new *automotion*

It's not only machines and industries that need to adapt to new challenges – the time to change comes for customer magazines as well. As the new chief editor of *automotion*, it will be especially important for me to ensure that change is a positive one. I would like to fill the magazine with exciting new features and content that make it even more interesting for you.

...for a new communication standard

Take a look at our new column, *Expert Q&A*, and learn what networking specialist Stefan Bina has to say in response to the most important questions on the topic of OPC UA over TSN. There's so much new, even the news has news: Learn all about all our latest products in a convenient new overview.

The lifeblood of any magazine is its readers – so I want to hear from you at automotion@br-automation.com. What interests you, what moves you, what questions would you like answered? Let's take this chance to make *automotion* "the adaptive magazine".

Happy reading,

Carola Schwankner
Corporate Communications Editor, B&R

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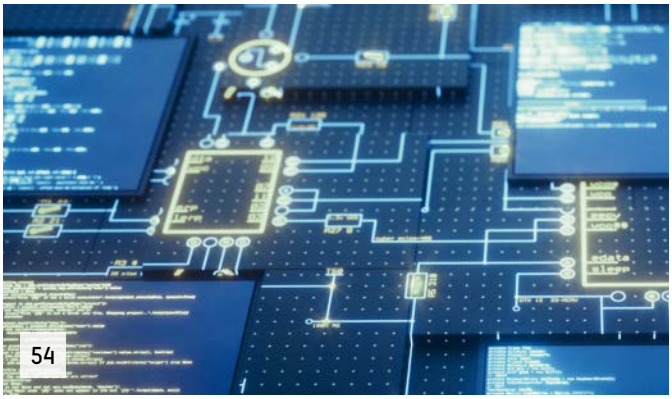
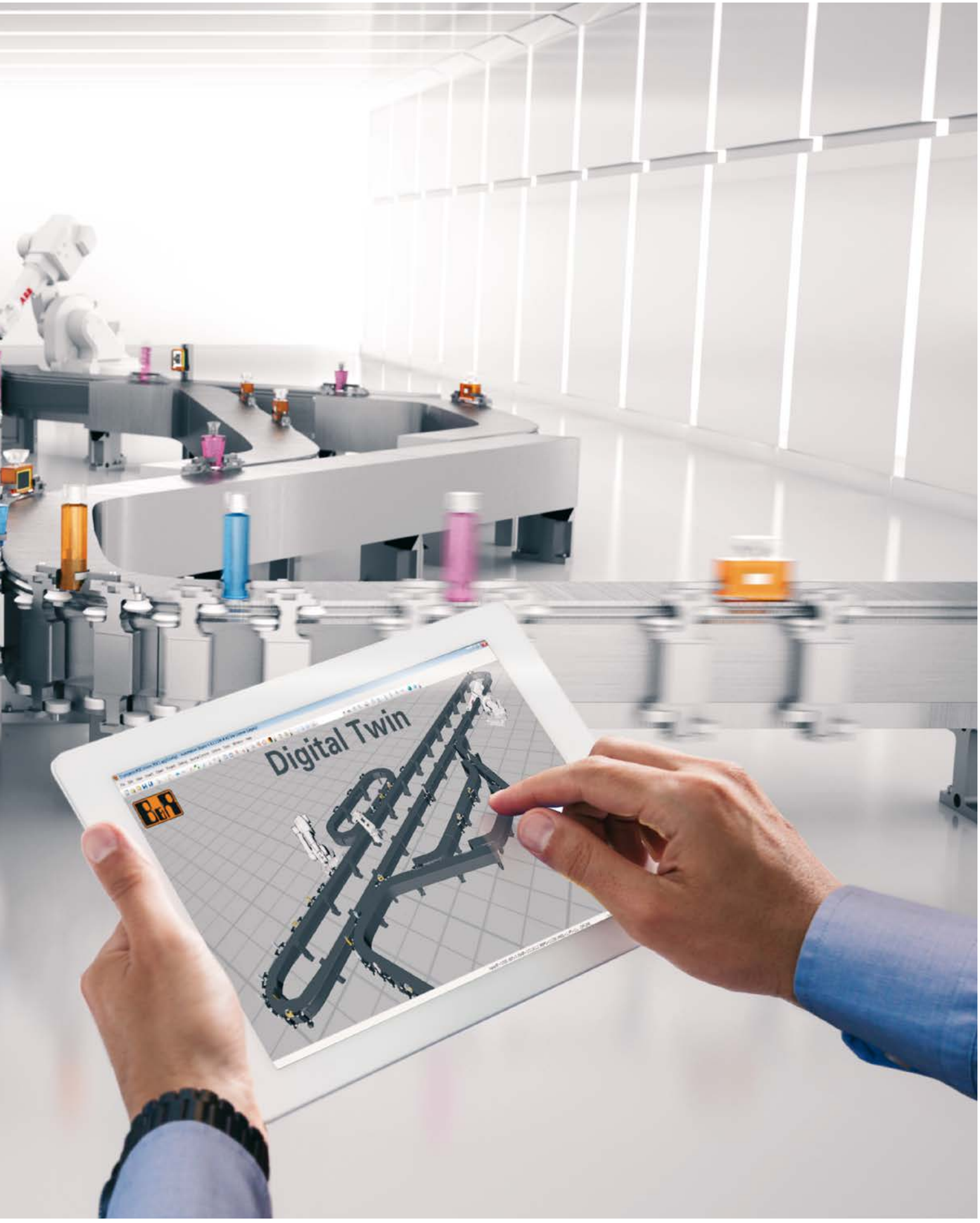


The birth of the adaptive machine

Smaller batch sizes, shorter lifecycles and online shopping present numerous new challenges for manufacturers of packaged consumer goods. Mastering these new challenges calls for an entirely new breed of manufacturing technology: the adaptive machine.

Photo: B&R


Digital Twin

A new generation of consumers calls for a new generation of manufacturing technology.

A popular influencer plugging a particular product on Instagram is all it takes to send demand through the roof. In the next hour alone, thousands of consumers rush to order the coveted new item. Within 24 hours, the online shops have all been cleared out. As wholesalers rush to replenish their stock – manufacturers' options are limited: there is simply no way to fill the flood of orders in such a short time.

"Until recently this may have seemed an unlikely scenario," says Wlady Martino, industry expert for the packaging industry at B&R. "But it's becoming an increasingly routine experience we're hearing about from more and more producers. Clearly, we've reached a point where conventional machines can no longer keep up with the requirements of the manufacturing industry – and ultimately with consumer demand."

Four new challenges

Martino has identified a four key challenges facing manufacturers of packaged consumer goods in particular:

- Rapid SKU proliferation
- Increasingly variable batch sizes
- Unpredictable demand fluctuation
- Shorter product lifecycles

"The whole world is talking about batch size one as the greatest challenge facing manufacturing," says Martino. "But when I talk to machine builders and operators, it's more than just the batch size they're worried about. More often it's the combination of having to produce more product variants in drastically varying batch sizes on really short notice."

Another factor is the lifecycle of those products. In the past, any given product would be produced and packaged in an absolutely uniform way for years on end. These days, however, that time can be down to a matter of months. Seasonal and special offer goods are often only produced for a few weeks at a time. "And then there is the extreme case where you have individual products that are completely personalized," adds Martino. Each is produced only a single time – in a batch size of one.

Four qualities of the adaptive machine

Packaging machines have grown increasingly flexible over the years, but even this flexibility is no longer sufficient for the new requirements. What's needed is an entirely new breed of manufacturing technology. Martino: "We call it the adaptive machine." An adaptive machine is defined by four key qualities:

- Profitable small-batch production
- Zero-downtime changeover
- Ready for unknown future products
- Accelerated product time to market

As SKUs proliferate and batch sizes become more volatile, changeover times have an increasingly pivotal impact on a machine's availability and productivity. An adaptive machine is able to change

Photos: B&R

formats at the push of a button – or even produce a variety of products side by side. "Since new and altered products are being added all the time, an adaptive machine also needs to be ready to produce products that didn't exist at the time it was built," says Martino. That's where the name adaptive machine comes from – the machine simply adapts to solve whatever challenge you place before it. This has a massive impact on the time to market for new products.

Four technologies for implementation

The adaptive machine draws from a combination of new and existing technologies. The defining components are:

- Track-based transport
- Machine vision
- Integrated robotics
- Digital twins

The way conventional discrete manufacturing machinery works is almost exclusively sequential. That is, a conveyor belt moves the products through a sequence of processing stations with rigidly synchronized timing. Martino is more than convinced: "That's missing fundamental capabilities you need for an adaptive machine." Instead, the new breed of machine will be built around intelligent track-based transport systems that move each product through the line individually. These systems have the added benefit of allowing you to set up multiple instances of time-intensive stations, easily splitting up the flow of products between them and then merging them back together down the line. "With an intelligent track system, it is even possible to clamp a product between two shuttles and transport it that way," adds Martino. That means each product can be a different shape and size without any need for mechanical changeover. The software simply adjusts the distance between the two shuttles automatically to accommodate each product.

Wlady Martino
Packaging Expert, B&R

"It's called an adaptive machine because it simply adapts to solve whatever challenge you place before it."

The eye of the machine

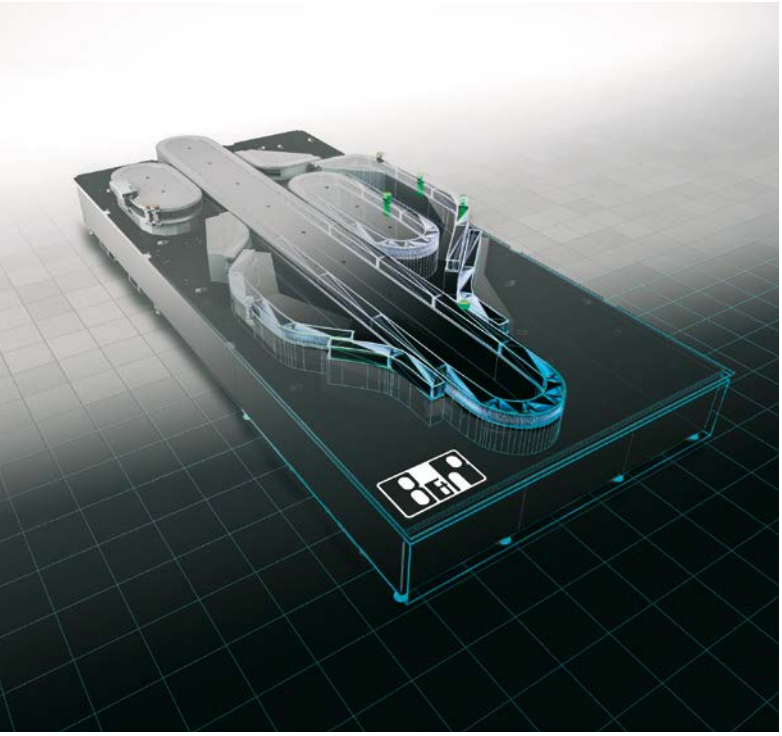
For production to run smoothly, you need to know with complete reliability that each product will be where it needs to be at any given time. When both the products and their packaging are constantly changing, however, it would be far too much effort to make mechanical adjustments manually each time.

"But there is a solution to this challenge," notes Martino. An intelligent machine vision system can automatically recognize the shape, size and orientation of a product and pass that information on to a robot in less than a millisecond. The robot picks up the product at lightning speed, turns it as needed and then places it gently on a track system shuttle.

Digital twin – The virtual prototype

"When you bring all this hardware technology together in the same system, you suddenly have a world of new ways you can manufacture a product," says Martino. To get the full potential of what the hardware is capable of, however, you need the right software to go along with it. In addition to an intuitive, user-friendly engineering environment, Martino says there is one software solution that is particularly important: simulation. "Digital twin technology plays a central role in eliminating both changeover downtime and hardware prototyping," he says. The digital twin makes it possible to simulate the entire manufacturing process before the physical equipment even exists. This gives you the chance to identify any potential issues and correct them in advance.

"With an adaptive machine, consumer goods producers can respond to changing requirements rapidly and in a way that is commercially viable," says Martino, summarizing the advantages of the new machine type. "Manufacturers will no longer lose sleep at the whim of a social media influencer." ←



Digital twins can virtually eliminate changeover downtime and hardware prototyping.

Decoupled transport system

Flexible, gentle product transport

Short product lifecycles and an unbroken trend towards individualization are increasingly pushing conventional assembly and production machines to their limits. The matter is further complicated by the need to accommodate new packaging types and materials. With its new machine, German packaging machine builder Wolf shows how B&R technology can move products through the line with unprecedented flexibility and gentle handling.

"Major retail chains and global players in the packaging industry are aiming to complete the transition to environmentally friendly packaging within the next few years," says Markus Schmachtel, head of design and engineering at Wolf. Since it was founded in 1988, Wolf has delivered more than 3,000 filling and packaging machines, making quite a name for itself especially in the food industry. Looking back on his equally long career in packaging technology, Schmachtel is able to recall many upheavals along the way. "Typically, a design engineer will try solve new requirements with a mechanical approach. As the variety of packaging types and materials continues to grow, however, packaging machines need transport solutions that are substantially more flexible and gentle on the product than the purely mechanical chain driven conveyors that have been prevalent thus far.

Wolf offers a vertical form fill seal (FFS) machine with easy changeover between all commonly used bag types, including flat or gusseted bags as well stand-up bags with sealed edges. Until now, a top closing machine connected to the FFS machine has transported the products using coupled chains, which feature pusher dog attachments that form compartments for the bags. With this design, the bags are pushed along in a standing position together with the entire transport mechanism, all synchronized with the timing of the FFS machine. As the bags move, the bottom glides over the base plate of the transport system.

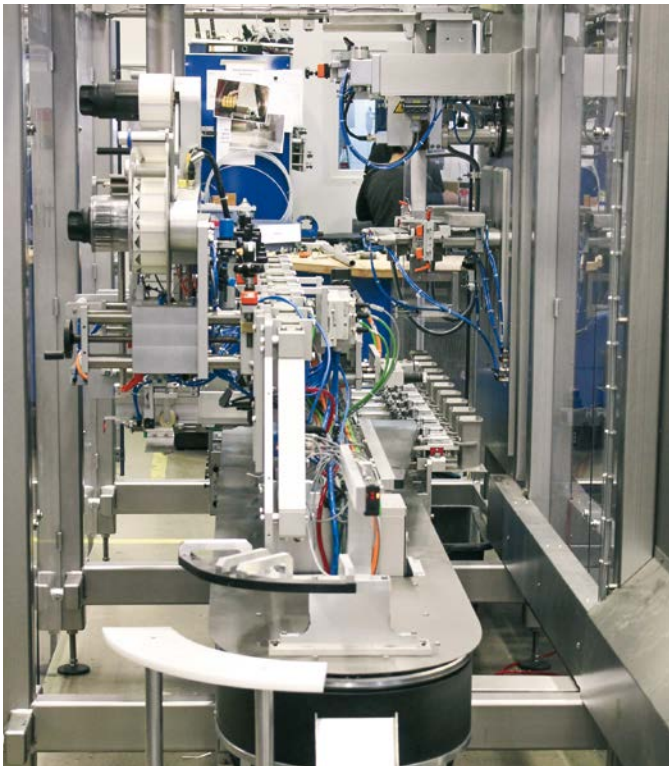
Gentle transport of sensitive eco-packaging

For a combination of marketing and environmental reasons, paper is gaining in popularity as a packaging material. Especially at higher transport speeds, however, the bottoms of paper bags could be subjected to too much strain, or the bags themselves could become deformed due to shearing forces. Coarse and stiff paper types are particularly susceptible to these problems. "You can minimize the problem with the bags deforming by putting a special coating on the affected surfaces," explains Schmachtel. "But that wears off over time and contaminates the production environment. An increasing number of companies are even banning such coatings from their production halls, so our customers are sure to appreciate a product transport solution that is virtually wear-free."

To be prepared for the challenges that lie ahead, Wolf decided to develop a new top closing machine. A variety of decoupled transport systems were tested with regard to payload, shuttle handling and supplier support. B&R's long-stator linear motor based SuperTrak system – specially designed for the higher performance range – prevailed in the end. In combination with one or two FFS machines and a corresponding dosing unit – the goal for the single variant of the top closing machine was to be capable of producing, filling and sealing up to 80 bags per minute. For the duplex variant, the goal was up to 130 bags per minute.

Changeover with minimal effort

A further goal was for the machine to be able to handle a wide range of bag types, materials and closure methods with as little effort as possible for changeover. This would enable plant operators to react flexibly to market requirements and to choose from a variety of closure variants such as label closure, gable closure, rider top or clip closure. In order to do this, the bags that have



Wolf developed its top closing machine especially for the higher performance range with a decoupled transport solution based on B&R's SuperTrak.

Photo: Wolf Verpackungsmaschinen GmbH

The transport system of the top closing machine moves each of the bags to the processing stations individually.

Thanks to SuperTrak's freely programmable movement profiles, designers have more freedom in how to arrange the processing stations, and can skip or add stations as necessary.

been formed, filled and sealed by the FFS machine must be handed off to the transport system of the top closing machine, which takes them to the various processing stations. In the case of a block bottom bag with label closure, these stations would form the top, press it, cut it, seal it and fold it over to make a compact bag without any unnecessary space at the top. Finally, the folded top is attached to the block-shaped bag with a label.

Independent shuttles for maximum flexibility

Unlike a chain driven conveyor with fixed coupling, the SuperTrak system transports the bags in cartridges mounted on independently controlled shuttles. This allows the shuttles to pass through the processing stations of the top closing machine independently of the rate they leave the FFS machine.

"Since the bags are carried through the machine in the cartridges, there are no shearing forces on the bottom of the bag," explains Schmachtel. "Each shuttle can be programmed and controlled individually. This enables us to tailor the movement profiles to different packaging types and contents, which allows us to produce more efficiently and gently than ever before."

The shuttles can also travel backwards. Wolf's designers used this option to incorporate a vibratory movement into the movement profile of the top closing machine. "This eliminates the need for a separate station that vibrates the bags in order to compress bulk material. The space that is saved can be put to other use. The vibration process no longer has to be completed within a certain timeframe, so it can be implemented more gently and/or more effectively. Users can also implement different movement profiles with custom vibration functions for different product variants."

Increased output

Thanks to the freely programmable movement profiles, designers have more freedom in how to arrange the processing stations, and can skip or add stations as necessary. One way to take advantage of this is to double up time-critical stations in order to boost output or hit a target cycle time. You can do this without needing to have two of every other station as well, as you would with a fixed chain conveyor system.

The programmable movement profiles also make it possible to process multiple packaging types or materials on the same line with minimal added effort, simply by of adding or skipping processing steps for certain bags. This makes the SuperTrak-based top closing machine the ideal counterpart to Wolf's flexible FFS machine: "SuperTrak makes it possible to boost output or produce product variants with minimal added costs," adds Schmachtel. "It

Photos: Wolf Verpackungsmaschinen GmbH

Markus Schmachtel
Head of Design and Engineering, Wolf

"Each shuttle can be programmed and controlled individually. This enables us to tailor the movement profiles to different packaging types and contents, which allows us to produce more efficiently and gently than ever before."

also makes it easier to integrate into the user's production line, and the customizable movement profiles give us more freedom with regard to where we position the transfer stations for the FFS machine or packer. The entire system layout is really easy to adapt to the situation on site." The modular design of the guide rails of the high-speed SuperTrak system gives the machine builder additional degrees of freedom in designing the machine layout. "We can easily lengthen or shorten the top closing machine and adjust the number of shuttles as required," says Schmachtel. "The flexibility to change the overall direction of movement makes it easy to adapt to new requirements."

System layout with many degrees of freedom

In the first new-generation machine built by Wolf, a simple SuperTrak oval, consisting of two 180° curved segments and six straight segments, each one meter long, was sufficient to meet the specifications. This is in large part because SuperTrak's curved segments can also be used for processing. Wolf even planned in sufficient space reserves to accommodate additional stations in the future – even in later phases of the system's lifecycle.

"B&R's simulator tool allowed us to check in advance whether the current design and any future expansions would be able to meet the target cycle time. We were able identify just the right number of shuttles and parallel processing stations to handle a respective bag type. That way we can avoid unnecessary investments and minimize development risks," reasons Schmachtel. The high power efficiency of the system also reduces operator costs. With the SuperTrak solution, the only thing that needs to be moved are the shuttles and bag cartridges. That's considerably less mass than with a permanently coupled transport system, which means less power is needed for acceleration and braking. Braking energy is also recovered and used to accelerate the shuttles.

With SuperTrak, the only thing that needs to be moved are the shuttles and bag cartridges – considerably less mass than with permanently coupled transport – which means less power is needed for acceleration and braking.

Fertile ground for innovations

The potential of the new transport solution is far from exhausted and gives Wolf room for future innovations, as Schmachtel is pleased to point out: "We have only begun to explore the possibilities of SuperTrak. It would be possible, for example, to have two shuttles grip a bag and open it as it travels between stations or to combine shuttles for an increased payload. Things like that open up exciting new possibilities to design groundbreaking new filling and packaging machines." ←

SuperTrak

SuperTrak has been specially developed for 24/7 operation in harsh industrial environments. It is reliable, safe and supports very high payloads. SuperTrak also optimizes changeover times when manufacturing multiple products on the same line. As soon as the operator chooses a different option, the transport system automatically adapts the flow of products. The shuttles can be replaced easily without having to disassemble the track. This results in a very low mean repair time and increases the productivity of the entire plant.

Machine vision

The inspector is on the case

With the goal of making inspection more flexible and efficient, while at the same time saving costs – Christ Packing Systems knew it would have to look beyond light curtains and conventional cameras for its new fully automated horizontal case packer, CaseTeq. Instead, the packaging machine specialist turned to the fully integrated machine vision system from B&R.

Photo: Stock

"We offer product presence verification as a standard feature of our packaging machines. However, the type and scope of inspection this requires varies greatly depending on the customer, the product being packaged and the machine type," explains Timo Bochtler, head of electrical engineering at Christ Packing Systems. "In the past, we've used two different inspection systems for our horizontal and vertical case packers (top and side loaders): light curtains and conventional camera systems."

On a vertical case packer, bundle control can be implemented quite simply and cost-effectively using a light curtain: When a layer of products is pushed from the stacking area into the carton, the beams of the light curtain verify that no products are missing. The curtain is oriented with the beams perpendicular to the layer. If the layer is complete, the light beams will remain interrupted for a certain period of time as the layer is pushed through. If a product is missing and the beams are able to pass through, the change in beam interruption time causes an error message.

Light curtain: Simple but inflexible

In addition to the low hardware costs, inspection with a light curtain offers a further advantage: When changing to a different format, the user can easily adapt the inspection process to the new conditions via the operator interface. All they have to do is set the start and end position (width) of the stack, as well as the number of required beams and the corresponding beam interruption time. However, a few test runs must first be completed before actual full-scale production can begin. These are needed to confirm whether the selected light beam configuration delivers reliable results. If the layer contains rounded products, there will be gaps between them that allow the beams through – triggering an error message. To avoid that, the

The CaseTeq case packer from Christ is a powerful, fully automatic horizontal system for erecting, packing and closing pre-glued shipping cases. Cameras from B&R will now be performing various inspection tasks.

The CaseTeq machine from Christ is more flexible, manageable and user friendly thanks to integrated machine vision from B&R.

operator needs to disable the respective beams. "Sometimes you even have to disable two beams on top of each other to keep production running smoothly. But, whenever you do that, you also reduce the quality of the verification results," Bochtler knows from experience. "You also run the risk of operators forgetting to re-enable the beams when they change formats." Either way, light curtains have difficulties scanning layers of many small products and dealing with unexpected changes in requirements.

Traditional camera: complex, cumbersome, expensive

The horizontal case packing process does not allow for the use of a light curtain. So far, Christ has therefore used a camera mounted on the pick-and-place axis to verify packing completeness on its horizontal case packer. For image processing, Christ took the classical approach with a system made up of a camera, a lens, an image processing system (generally a PC), special image processing software, and lighting elements as needed. This solution is more complex and expensive than a light curtain, but provides additional flexibility, performance and reliability. It is also able to perform bundle checks and other more complex inspections, such as recognizing positions and patterns or reading codes and text.

The downside of the camera solution is the hefty price tag for all that hardware and software. Another factor that should not be underestimated is the added time and effort for the machine's software developers: traditionally, machine vision has been a standalone system, so the programmers would have to learn to work with proprietary software and additional interfaces. There are also strict limitations to how well the image processing software can be integrated into the machine application. On top of that, anyone who uses the image processing software requires special training. For the manufacturer, this usually means relying on third-party support. Also of great significance for those involved: The system needs to be calibrated in the field after installation and every time a piece of hardware is been replaced. "We're skilled mechanical engineers, but we are not camera specialists. We don't have the experience to know which situations will require lighting which won't," says Bochtler, focusing on another critical aspect of conventional camera solutions. A machine builder who tries to cut costs by going without lighting runs the risk of having to retrofit lights later on. On the other hand, if they install lights that turn out not to be required, the investment would be wasted. In short, all the inspection solutions Christ had tried in the past had come with unpredictable risks and hidden costs.

The solution: Integrated machine vision from B&R

When B&R first presented its integrated machine vision system to the Christ management team, they took notice immediately. The reason is fairly easy to see: Woven neatly into the B&R Automation Studio engineering software, the vision system is exceptionally approachable and manageable for the machine builder and their developers. From the comfort of their familiar automation environment, they have access to all the camera functions they need and easily integrate them into the machine application. No specialist image processing know-how is required, so introductory training is kept to a minimum.

The comprehensive portfolio offers the right combination for any set of requirements. It includes an array of different camera types with integrated lighting, a variety of resolutions and accessories

Photos: Christ Packing Systems

Timo Bochtler
Head of Electrical Engineering, Christ Packing Systems

"The vision package from B&R has everything we need. With their scalable solution, we're able to replace the separate control systems we used to need with a single, fully integrated solution for machine vision. On top of being more economical, it adds valuable flexibility and reliability to the inspection process. At the same time, it reduces the risk of unpleasant surprises for us and our customers."

Woven neatly into the B&R Automation Studio engineering software, the vision system is exceptionally approachable and manageable for the machine builder and their developers.

such as external lighting. What truly sets the solution apart is the level of integration: all the components are connected by a common network and controlled by the same application. That's what makes it possible to synchronize the flash and shutter timing in the sub-microsecond range and make the most efficient utilization of the LED components.

Scalable and easy to use

In circumstances that require just one specific image processing function, such as reading a QR code or position detection, the Smart Sensor version of B&R's camera is the right choice. Unlike many other devices in its class, there is no need to install extra camera hardware for each function that is required. Instead, the user simply configures the desired Smart Sensor function as needed in the Automation Studio engineering environment. In cases that call for multiple functions, it's easy to upgrade to a more powerful Smart Camera. Any application software, parameters and models that have already been developed can continue to be used. The camera and lens come factory calibrated, so there's no need to repeat this step when commissioning the B&R vision product. Installation could hardly be easier, because the camera gets all the settings automatically from the controller.

Changeover at the push of a button

The tightly integrated B&R solution has advantages for the user as well. All the parameters, including the focus setting, can be saved as recipes and loaded at the push of a button to accommodate a new case format. "Even if the data for a product or case format is not yet available, that's no problem. You just need to teach it a new product and enter how the products are arranged in the layer. The system handles the rest. That's one of my favorite parts," admits Bochtler. Implementing rapid product changeover is even easier when the machine controller is also from B&R, Christ was happy to learn. The system configuration and recipe management system can then be integrated directly into the HMI application. The familiar tools of the Automation Studio environment can be used for diagnostics. B&R's mapp Vision software component gives the programmers access to the HALCON machine vision library from MVTec. This library is full of field-proven, ready-to-use algorithms for position detection, completeness verification, quality assessment, measurement and identification. "They make it easy for automation specialists like us to implement machine vision solutions on our own after only a brief introduction," says Bochtler happily.

New inspection solutions

Because of the advantages offered by the B&R vision system, Christ decided to introduce its first fully automated horizontal case packer with layer completeness verification performed using the new machine vision solution from B&R. The company plans to add new inspection tasks based on the B&R system in the near future with the ultimate goal of converting all of its secondary packaging machines to the new technology.

"The vision package from B&R has everything we need. With their scalable solution, we're able to replace the separate control systems we used to need with a single, fully integrated solution for machine vision," explains Bochtler. "On top of being more economical, it adds valuable flexibility and reliability to the inspection process. At the same time, it reduces the risk of unpleasant surprises for us and our customers" ←

Track technology

Leaving traditional production lines behind

On bottling and primary packaging lines, direct contact between the machine and the things we put on our kitchen table is inevitable. That's why these processes are subjected to the absolute highest hygiene standards – and it's also why any equipment used must lend itself to easy and thorough cleaning. These requirements often present a stumbling block for innovative new solutions.

The IP69K-rated ACOPOStrak is built for high-pressure washdown cleaning using hot water up to 80°C and fully protected against dust ingress.

Photo: B&R

Completely enclosed stainless steel housing prevents even the tiniest ambient particulate matter from penetrating into the interior of the shuttles and track segments.

Production and packaging machinery used in the food and beverage industry must not only be easy to clean, but also highly resistant to aggressive substances. Powerful cleaning agents and scalding hot water are extremely effective at killing bacteria and germs – but over time can take their toll on machine components. These challenges are further compounded as the individualization trend gains momentum in the food and beverage industry. Machine builders and operators are under pressure to produce goods efficiently in small batch sizes. "Consumers have shown a willingness to pay a premium for personalized products," explains Johannes Vitzthum, product manager for track technology at B&R. "And food and beverages are no exception." Real implementation of mass customization, however, has generally been hindered by one core fact that applies in every industry: Whenever you increase a system's flexibility, you generally decrease its overall equipment effectiveness (OEE). "Producers run the very real risk that individualization will come at the cost of profitability," says Vitzthum.

Economical production

The goal of mass customization is therefore to keep the three factors of OEE – availability, performance and quality – at a level consistent with what can be achieved in mass production. In addition, manufacturers seek to maximize their return on investment (ROI) and to minimize their time to market (TTM) for new and improved products. "This is the only way to make mass customization a worthwhile investment," continues Vitzthum. The obvious focus is on digitalization and software; but optimizing the way products are transported through the line is also a crucial part of the equation. This is exactly where intelligent track systems play an essential role in getting products to market faster and helping producers remain competitive. Track systems contain permanent magnets and other components, however, that must never come into contact with water or other liquids. This has so far made track systems out of bounds for the food and beverage industry. "The time has now come to equip food and beverage machinery to meet the new demands of its market," says Vitzthum.

Washdown-protected track system

B&R is now offering its intelligent ACOPOStrak system with IP69K protection. "The shuttles and segments of the new washdown variant are constructed of stainless steel, securely welded and resistant to corrosion," explains Vitzthum. The IP69K-rated ACOPOStrak is

Photos: B&R

Johannes Vitzthum
Product manager for track technology at B&R

"The shuttles and segments on the new IP69K-rated ACOPOStrak are made of stainless steel, securely welded and thus resistant to corrosion."

ACOPOStrak
B&R's flexible and intelligent ACOPOStrak system enables economical mass customization down to batch size one. At a speed of more than four meters per second, workpieces travel between processing stations on independently controlled shuttles. Electromagnetic diverters split and merge product flows, opening up endless possibilities for machine builders and operators to implement fully automated production of individualized products.

built for high-pressure washdown cleaning using hot water up to 80°C and fully protected against dust ingress. Completely enclosed stainless steel housing prevents even the tiniest ambient particulate matter from penetrating into the interior of the shuttles and track segments. This keeps the permanent magnets perfectly safe, even during washdown. This high level of protection also makes it possible to transport corrosive products or operate the ACOPOStrak in corrosive atmospheres such as salt spray. What's more, all surfaces are chemically resistant. Aggressive cleaning agents are no problem for the IP69K-protected ACOPOStrak system.

Mass customized food and beverages
What all of this means is that full-scale mass customization is now open for business, even under the demanding constraints of the food and beverage industry. "You're now able to install our intelligent track system in stand-up pouch filling machines, for example," says Vitzthum. "And that opens up some very exciting possibilities for product individualization." Stand-up pouches are primarily used for liquid and semi-liquid products, such as fruit purees and energy gels. Consumers can now create their own custom mixes – and ACOPOStrak ensures that the order is filled with mass-production efficiency and produced in accordance with the most stringent hygiene standards.

Split and merge product flows
ACOPOStrak makes it possible to group mass-produced items such as bottled drinks into custom six-packs on the fly – three bottles of orange juice, two of apple and one cranberry juice – without any changes to the hardware. The magic that allows this to happen is the track system's unique high-speed diverter solution, which is purely electromagnetic and thus fully immune to mechanical wear. "Diverters split and merge product flows while the shuttles are running at full speed – without any impact on productivity," underscores Vitzthum.

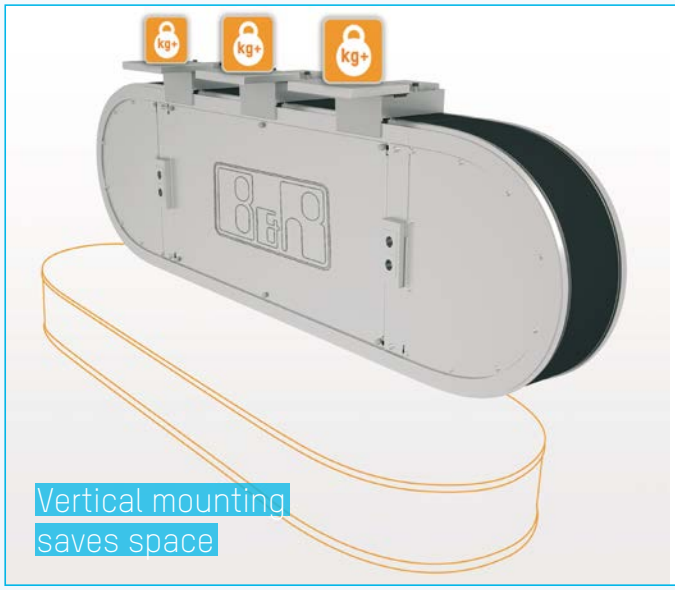
Modular machinery
Track-based transport makes machines more modular and flexible. They can easily be expanded simply by adding on new track segments and parallel processing stations for a substantial boost in productivity. B&R's IP69K-rated ACOPOStrak now allows industries with strict cleaning and hygienic requirements to enjoy all the benefits of the adaptive machine. ←

News

Full safety following network failure

Blackout mode enables high machine availability

The B&R drive technology portfolio now offers a Blackout mode that ensures safe machine control in the event of a network failure. Machine downtime can be avoided without costly redundancy solutions to ensure maximum machine availability. The Blackout function enables the safe variants of B&R servo drives (ACOPOSmulti, ACOPOSmotor or ACOPOS P3) to continue operation in the event of a network failure. Safety functionality remains intact.

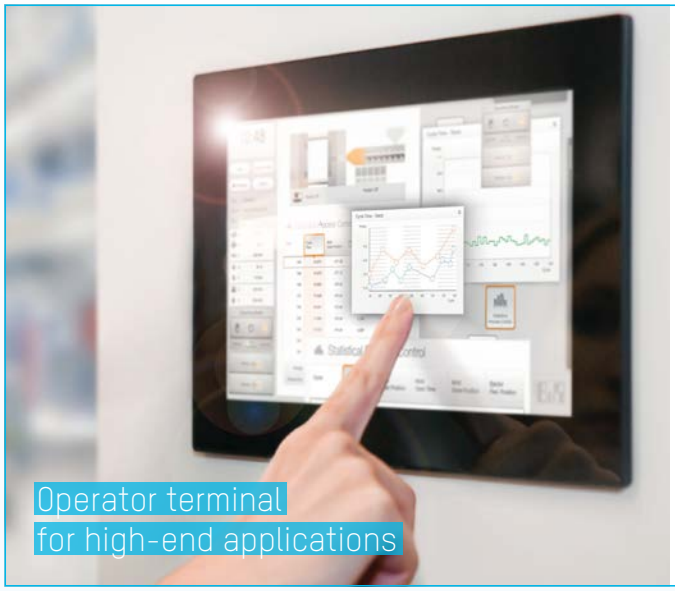


Vertical mounting saves space

New vertical-mount SuperTrak

B&R's intelligent track system SuperTrak is now available in a vertical-mount variant. This helps to optimize the output per square meter of floor space. If products are only transported on the upper side of the SuperTrak, the weight is supported directly by the rollers, so the shuttles can handle a higher payload. The SuperTrak power electronics have been repositioned, making them readily accessible from the front even when mounted vertically for easy installation. The connections between SuperTrak segments have also been reinforced to ensure mechanical rigidity and maximum stability and reliability in the vertical orientation.

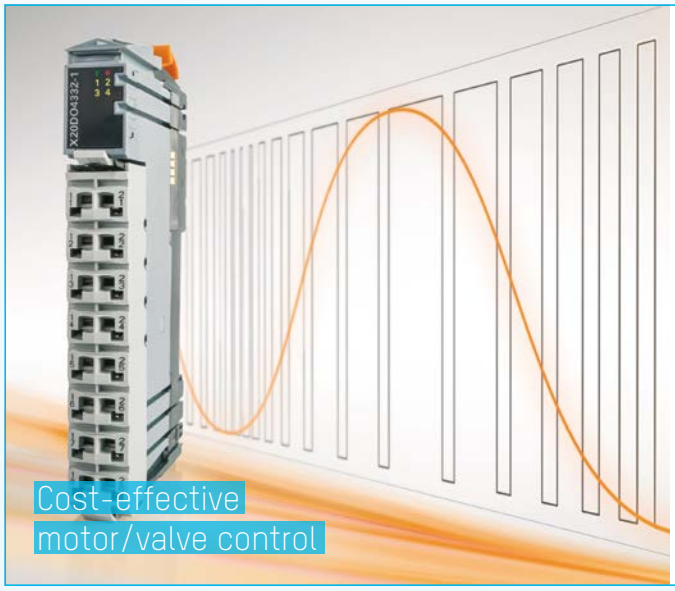
Photos: B&R



Operator terminal
for high-end applications

Impressive Power Panel for demanding web-based HMI

B&R has added the powerful T80 operator terminal to its Power Panel T-Series. A high-performance Intel Atom processor enables versatile, dynamic web-based HMI solutions. The elegant glass screen makes the Power Panels the perfect accent for a high-end machine design. The glass screen has integrated edge protection to endure harsh everyday operation. The shallow installation depth makes the devices easy to mount in either a control cabinet or swing arm system. The projected capacitive multi-touch screen responds precisely and reliably, even when operated while wearing thick leather gloves. The devices are available with display diagonals ranging from 7" to 15.6".



Cost-effective
motor/valve control

New digital output module with pulse width modulation

B&R's new digital output module X20DO4332-1 has integrated pulse width modulation and is a cost-effective alternative to motor modules. In addition, the module offers a dither function that prevents valves from sticking. Pulse width modulation (PWM) is mainly used for controlling larger loads, such as motors. Instead of using electronics to regulate a continuous input voltage down to the desired motor voltage, the motor is controlled by the width of the switching pulses. This process saves a considerable amount of energy.

"The focus is on the customer

The integration of ABB robots into the B&R automation system is enabling entirely new approaches to machine automation. To learn more about the first large scale joint project between B&R and ABB, we spoke to Gregor Kumm, Head of Strategy & Portfolio Development, Robotics & Discrete Automation at ABB, and Stefan Schönegger, Vice President of Strategy and Innovation at B&R. We wanted to know what impact this will have on the future of manufacturing.

Mr. Kumm, the robotics market continues to surge. Why is that?

Gregor Kumm (ABB): It comes down to the key requirements for the factory of the future. As production batches shrink down to the infamous batch size one, the limitations of conventional manufacturing technology make themselves painfully known. Lines lack the flexibility to handle product variation, and changeover is too slow to reach a commercially viable level of productivity. That's where robots can help immensely.

Stefan Schönegger (B&R): That's precisely the reason our customers – primarily those who build machines in series – are increasingly interested in robotics. And it's why we will now be selling ABB robots directly to our customers.

OEMs can already buy robots. Why do they need a new sales channel?

Schönegger: Because the task of integrating and programming the robot can be very resource-intensive, especially for small and midsized OEMs. There are three reasons for that: The first is that many machines depend on extremely fast, precisely timed processes. To additionally coordinate these processes with an external device is a daunting if not impossible challenge. The second reason is that the average PLC programmer is not familiar with the tools and programming languages used to develop robotics applications. And third, dealing with an additional supplier consumes additional time and resources. But now, OEMs have a single source they can turn to for both robotics and machine control.

So does B&R's new solution replace ABB's classic robotics offering?

Schönegger: Not at all. There are countless applications that are more robot-centric, like automotive welding, and those will remain the domain of our colleagues in ABB's other robotics business units.

So where do you draw the line between classic ABB robotics and what B&R is offering?

Kumm: That's easy. If the whole process centers around the robot – like Stefan's welding example – then you're dealing with a classic robotics application. But if the robot only plays a supporting role – like sorting out defects at full production speed – that's what B&R's machine-centric robotics is all about. The customers are different as well. Machine-centric robotics is aimed at B&R's traditional audience: manufacturing OEMs. Robot-centric solutions, on the other hand, are typically used by systems integrators and end users: typical ABB customers. Together with the team from B&R, ABB is now able to address each group's unique demands without compromise.

What's the development process like for one of these new solutions?

Schönegger: The process begins with the customer and their needs. We got together

Photos: B&R, ABB

and their needs"

and took a good look at what those needs are and what opportunities we have to best meet them.

Kumm: B&R typically serves OEMs, and providing their customers direct, comprehensive consultation and support is what they do best. It was clear to us that B&R would be the sales channel of choice when these customers are looking for robotics as well. They should be able to get their robotics and machine control from a single source.

What obstacles did you encounter along the way?

Schönegger: In addition to the technical considerations of how to best integrate the robots into our automation environment, the more important questions were things like: How do we organize the supply chain? What kind of service packages should we offer? We went to great lengths to ensure we do these things in a way that gives our customers the greatest possible benefit. I'm confident that together we'll be able to that very well.

Kumm: That's right, the technical side was pretty straightforward. In the end it was all about optimizing communication between B&R servo drives and the motors in our robots. That's what B&R and ABB engineering teams have been working on. With that nearing completion, we're now entering an intensive testing phase.

When will OEMs be able to buy the new solution from B&R?

Schönegger: The testing will take some time. Each robot that we offer will first undergo six months of fatigue testing. That's important, because it's how we can guarantee our customers that their robots, controllers and drive system will all work together flawlessly. We're just starting pilot operation, and the first round of robots will be available in series by the end of the year.

Thank you for the interview! ←

Stefan Schönegger, **Vice President - Product Strategy & Innovation, B&R**

Gregor Kumm, **Head of Strategy & Portfolio Development, Robotics & Discrete Automation, ABB**

Digital twin

Faster to a finished machine

Manufacturing OEMs are faced with the challenge of building increasingly customized, specialized machines – and getting them up and running as fast as possible. With no time to spend wrapped up in testing, how can they get their machines to market faster? The answer: using simulation and digital twin technology.

MapleSim is a highly efficient simulation tool used to create detailed models of machine components.

Photo: B&R

We've all been there: You get to the end of a long and frustrating project only to discover it doesn't meet the specified requirements or work the way it was intended. Suddenly, you're back to the drawing board. These situations are particularly devastating when you've just spent months and months building a very complex, very expensive machine. If developers were instead able to test a virtual version of the machine in advance, they could identify potential errors and correct them before the machine is ever built. When a customer orders a new machine, they want it to be up and performing as expected as soon as possible. Nobody can afford to get to the unveiling of a finished machine, only to discover that fails to deliver on the original requirements. Neither the

From MapleSim, they can export an FMU to transfer the model along with all the equations and CAD data to B&R's Automation Studio engineering environment.

machine builder, who has now developed an entire machine for free, so to speak, nor the machine operator, who is now unable to start production until a new machine is built.

Digital machine testing

To avoid ending up in this dead-end street, machine builders rely on simulation. Different simulation tools can be used to create digital twins of individual mechanisms, entire machines, or even complex plants and use them to test all sorts of different manufacturing processes. "A good idea is only good if it actually works in practice," says Kurt Zehetleitner, head of B&R's simulation and model-based development team. "Simulation and digital twins give you the tools you need to make good ideas work – quickly, easily and inexpensively." A digital twin is an exact digital duplicate of a real machine. It behaves and functions exactly like its sibling. This eliminates the need to build hardware prototypes as the machine is being developed. The real, physical machine is not built until everything is functioning smoothly in virtual form, performing just as the customer imagined it. That saves time and money.

Digitizing an idea

Depending on the task at hand, there are a variety of simulation tools available. B&R makes full use of all the possibilities: "The scope of simulation tools we've built into our systems covers the entire development process from start to finish," says Zehetleitner. In the earliest phase of development, the focus is on individual functions and mechanisms – the fundamental concepts behind the machine. MapleSim is the ideal simulation tool for that. "We've had very good experiences with MapleSim in this area," says Zehetleitner. "It's a very efficient way to make very detailed models of machine components along with the torque and other forces that affect dimensioning."

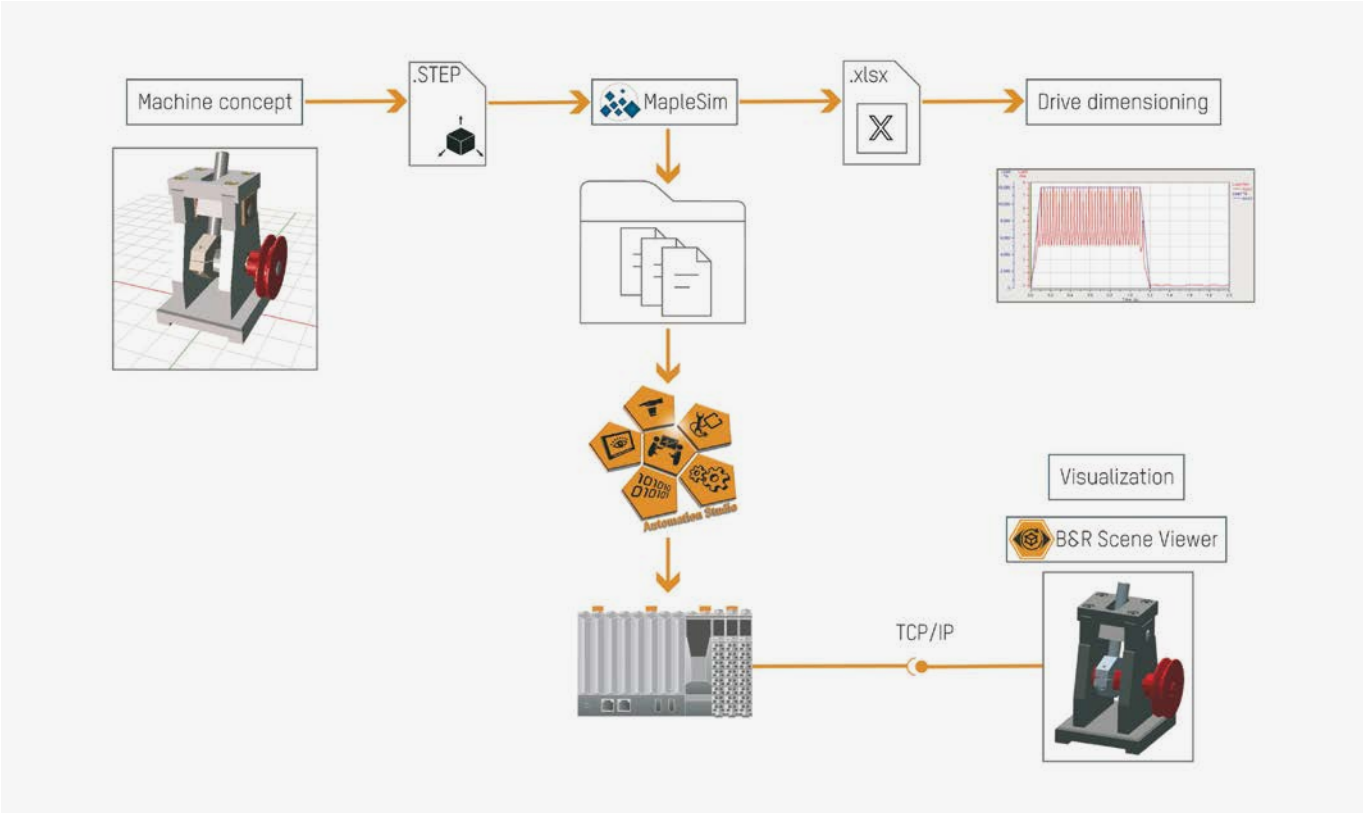
When the developer imports the CAD data for a mechanical part into MapleSim, all the information needed to create a digital model comes right along with it. They can easily define which parts should be moveable without having to work directly with all the complex calculations themselves – that's MapleSim's specialty. Movement sequences and pivot points can be defined with a few clicks of the mouse.

Quickly and easily, the developer specifies exactly how the component will be able to move. All the forces that affect the machine are also simulated, so it's easy to test all sorts of load scenarios. Even scenarios that would otherwise consume time and resources or be unsafe or impossible to perform on a real machine. At a glance, the developer can see whether or not the machine can handle a given load.

Selecting components

Once the digital twin of the machine component has been completely set up and all movement profiles have been defined, the next step is to select the corresponding motors and drives. To do this, B&R has coupled MapleSim with the SERVOsoft drive sizing

Photos: B&R



FMUs can be exported from MapleSim to transfer the model – along with all the equations and CAD data – to B&R's Automation Studio engineering environment.

tool. "All of B&R's products are available in SERVOsoft. Once it gets the information from MapleSim, the drive sizing tool recommends all the drives that would be suitable for the model. Undersized or oversized automation components are a thing of the past," explains Zehetleitner.

Parallel development of hardware and software

FMUs can be exported from MapleSim to transfer the model – along with all the equations and CAD data – to B&R's Automation Studio engineering environment. "You're able to develop the software and hardware in parallel before any single part of the machine has actually been built," says Zehetleitner. The data can be easily updated with any necessary adjustments. Since all the systems are interconnected, the digital twin adapts along with it. This process not only saves a ton of time, it also reduces the cost of prototyping. The developer tests the automation software for the digital model of the machine directly on their laptop with no need for real hardware. Once they are satisfied with the results of the simulation, they can transfer the software to the actual controller. Thanks to B&R Scene Viewer, they are able to view a 3D visualization of the digital twin as they test and optimize the solution's hardware and software components. An actual prototype is not built until every process in the machine is running smoothly. "B&R Scene Viewer also comes in handy throughout the development process for giving the customer periodic previews of how the machine will move when controlled by the machine software. This way, the machine builder can be confident that the final result will reflect the customer's expectations," says Zehetleitner.

Kurt Zehetleitner
Simulation and Model-based Development, B&R

"The scope of simulation tools we've built into our systems covers the entire development process start to finish."

New machine generation born from a digital twin

A digital twin doesn't stop being useful once the machine is built and out the door. It can be used throughout commissioning and even later for online troubleshooting. Software updates and potential solutions can be tested first on the digital model – and only transferred to the real machine once they're working smoothly. And beyond that, the digital twin and control software continue to serve as a platform for ongoing optimization of the machine and development of future generations. ←

Independently controlled workpiece carriers

The bullet train of automation

Maximum flexibility: a quality that manufacturers are requesting with increasingly high-priority from their OEM suppliers. Plants where products are moved with rigid timing between coupled subsystems do not provide this flexibility, whereas independently controlled workpiece carriers (WPC) can make all the difference. The added flexibility can bring enormous benefits for both manufacturers and their OEM suppliers. That's what plant builder K&S has proven with its new assembly machine featuring B&R's long-stator linear motor transport system, SuperTrak.

K&S will now be offering an expandable assembly line designed to accommodate multiple variants of innovative medical technology components.

Photo: K&S Anlagenbau GmbH

Shortly before an already completed assembly line was scheduled for delivery, K&S sales colleagues Michael Fritsch and Simone Schuster received a phone call informing them of an urgent change: the system would need to produce a second variant of the medical technology component it had been designed and built for.

Flexibility is the key

Last-minute changes like this come with the territory, says Fritsch: "We design solutions that are tailored to each customer's needs. Those needs can change unexpectedly, however, since the products being assembled are entirely new. We start designing the machine at a time when there are still a lot of unknowns about the product's final specifications." K&S has to be prepared to adapt to changes throughout the entire project and beyond.

K&S first opened its doors in 1990 as a tool manufacturer. As changing requirements called for more flexibility, the company expanded its focus and now offers complete packages for automation. The portfolio includes a wide range of system modules for punching, bending, assembling, welding and soldering. The modules are designed to be used in rigidly timed circular and linear production lines with output quantities up to 100 million units per year. K&S has also developed high-speed feeding solutions and tape-and-reel packaging machines. "We've created them as standardized modules, so they can be easily rearranged to add or remove process steps," explains Fritsch.

The rigid timing of the conventional workpiece carrier systems widely used in production and assembly lines limits the potential for flexibility. In these systems, the maximum output is always de-

The ability to control the shuttle-mounted workpiece carriers independently makes the assembly line highly flexible.

termined by the slowest processing station. To create a second variant of the line with a higher output, you would have to add a second instance of every single processing station – even stations that could otherwise easily run at a faster rate within the overall cycle time. In such cases, independently controlled workpiece carriers driven by long-stator linear motors open up new dimensions of system flexibility for plant builders and their customers.

Higher flexibility with SuperTrak

When the above-mentioned medical technology producer turned to K&S for an assembly line to produce a new flow component, K&S began the search for an optimal solution. To gain the freedom to send workpiece carriers to different processing stations as needed, K&S decided to use the independently controlled shuttles of B&R's long-stator linear motor based SuperTrak transport system. "The customer was clear that they wanted a state-of-the-art assembly line that would stand up to future challenges," recalls Schuster. "But when we started, we still had no idea what specific variants it would need to assemble." Nor did they know what specific demands the assembly and quality assurance processes would place on the machine. That meant they would have to build enough flexibility into the system for it to easily adapt to different processing or output requirements.

No pre-production required

K&S designed the system to be released in two stages. The first stage would be designed to fill the predicted market demand, with the option to upgrade to twice the output. "Producers would typically use a pre-production assembly in such cases, but that's not necessary anymore," notes Fritsch. K&S used a closed, oval-shaped track consisting of two 180-degree curved segments and eight straight segments (1 meter each) from B&R's SuperTrak system, mounted on a stable, 6-meter long machine base. This setup offers enough space for about 20 standard modules from K&S. In the first-stage variant, 14 of those stations are occupied.

Integrated collision avoidance

Shuttles holding custom workpiece carriers are guided through processing stations located around the oval-shaped track. The values for direction, acceleration, speed and target position can

Simone Schuster and Michael Fritsch
Sales Team, K&S Anlagenbau GmbH

"Independent control of workpiece transport implemented with B&R's long-stator linear motor solution allows us to respond with much more flexibility as our customers' needs evolve over the entire lifecycle of a system."

Photos: K&S Anlagenbau GmbH

The combination of K&S's modular processing stations and B&R's SuperTrak transport solution enables K&S to react flexibly to changing requirements and customer requests.

be programmed individually for each shuttle. Integrated collision avoidance prevents the shuttles from direct contact with each other and ensures automatic and safe queuing in front of the process stations. It's possible to skip certain processing stations, stop at additional stations or move to multiple positions within a given station to produce a different product variant or expand the system with minimal effort. This gives the customer the advantage of being able to adjust output over the first few phases of the product lifecycle.

Higher output with hardly any work

SuperTrak brings the customer even more savings when they chose to increase the output of their system. In many applications, it's only a small number of stations that are really time critical. SuperTrak makes it easy to boost output in a quick and cost-effective way simply by doubling up these time-critical stations and adding a few more shuttles. Machine builders also benefit from SuperTrak's flexibility. If they plan in sufficient extra space, they're able to make any changes that become necessary throughout any stage of the project with relatively little effort. "That really payed off when we received that last minute request to equip the line for an additional product," recalls the K&S team. All that was needed were a few more shuttles and an additional processing station.

Quality assurance at its best

K&S took advantage of the flexibility offered by the independently controlled shuttles to boost the availability of the assembly line. For quality assurance, the inspection stations are checked regularly using special dummy workpieces. In systems with rigidly linked workpiece carriers, an operator usually has to perform this step manually. That means disrupting the entire production process, so it is done as infrequently as possible. With SuperTrak, the dummies are software-controlled – they're automatically added to the carriers at a pick-and-place station and then transported to the processing station to be tested. Once the test has been completed, the dummy is taken back to the pick-and-place station and removed from the line. Without the need for manual intervention, the system is more available. Since the automated tests using SuperTrak have so little impact on productivity, they can be performed more frequently – and that increases process reliability. On top of that, faulty workpieces are prevented from causing downstream damage. They are sent directly from the testing station to the removal station without stopping at any assembly stations along the way.

B&R as a reliable partner

"Due to their numerous advantages, we have used long-stator linear motor systems to transport workpiece carriers in other lines before. Yet, this medical equipment assembly line is the first time we've used such a system from B&R," says Fritsch. One reason K&S decided on B&R was the availability of two long-stator linear motor systems, SuperTrak and ACOPOStrak. The B&R portfolio also makes it easy to create perfectly orchestrated complete solutions where it's possible to do things like synchronize other motion control axes with the shuttle movements. All in all, K&S enjoys new dimensions in design freedom and can respond to its customers' needs with much more flexibility. ←

SuperTrak makes it possible to define separately if and how each shuttle should approach each processing station.

OPC UA over TSN – Unified standard for the IIoT

It seems everyone these days is talking about OPC UA and TSN. For many machine builders and plant operators, however, it remains unclear what specific advantages stand to be gained from using these technologies in their own equipment and facilities. In this two-part series, networking specialist Stefan Bina will shed some light on the matter by answering some of the most important questions about OPC UA over TSN and its role in the future of industrial IoT communication.

Why is OPC UA over TSN necessary?

OPC UA over TSN enables secure-by-design modular machine concepts and flexible production architectures on the shop floor. These will help users streamline their machines and plants for economical batch-size-one production.

Additionally, it offers secure insight into manufacturing processes for ongoing performance optimizations and predictive maintenance – without disturbing machine operations.

Why do I need OPC UA in the first place?

Today's proprietary fieldbus systems communicate using raw data – just zeros and ones. Without the corresponding tables, devices on the network don't know how to interpret that data. That makes it impossible to achieve the kind of seamless communication required in the Industrial Internet of Things (IIoT). With its information model, OPC UA enriches the raw data with semantic descriptions. These give it context and meaning, so any device or person that receives the information can correctly interpret it without any further explanation. OPC UA offers so-called methods that enable direct interaction with assets. Machines can query each other to find out what kind of services, interfaces and capabilities they provide – which enables them to interact more efficiently and autonomously.

Why is it necessary to combine OPC UA with TSN?

TSN's determinism allows machine-to-machine OPC UA communication to better synchronize a multi-vendor plant floor. The same holds true for device-level communication within the machines themselves. OPC UA provides a standardized way to structure data. It adds semantics for any kind of asset and provides it in a secure manner. TSN is the infrastructure, the highway that OPC UA drives on in a deterministic way. Without the interoperability provided by OPC UA over TSN, these multi-vendor communications would have to be hard-coded – adding exorbitant development costs and canceling out any gains in flexibility. On top of that, OPC UA over TSN guarantees continuous insight without disturbing machine operations.

What role does OPC UA over TSN play in Industrial IoT applications?

Industrial IoT applications are data driven – information is their lifeblood. OPC UA over TSN adds a vast array of sensors, actuators and other automation devices to the available pool of information by extending the semantic self-description of the OPC UA information model down to the field level.

The Industrial IoT promises us an ability to design efficient and effective production processes that are at the same time cheaper and easier to commission and maintain. It also promises to allow profitable mass customization of products.

Networking specialist Stefan Bina answers some of the most important questions about OPC UA over TSN and its role in the future of industrial communication.

Did you know that OPC UA over TSN...

... ensures vendor-independent interoperability for industrial applications, today and tomorrow?

... is supported by all the major automation suppliers?

... is 100% open, significantly faster and secure?

... offers increased OEE and more freedom for innovation?

... helps lower overall operating costs and optimize service and maintenance?

Photos: B&R

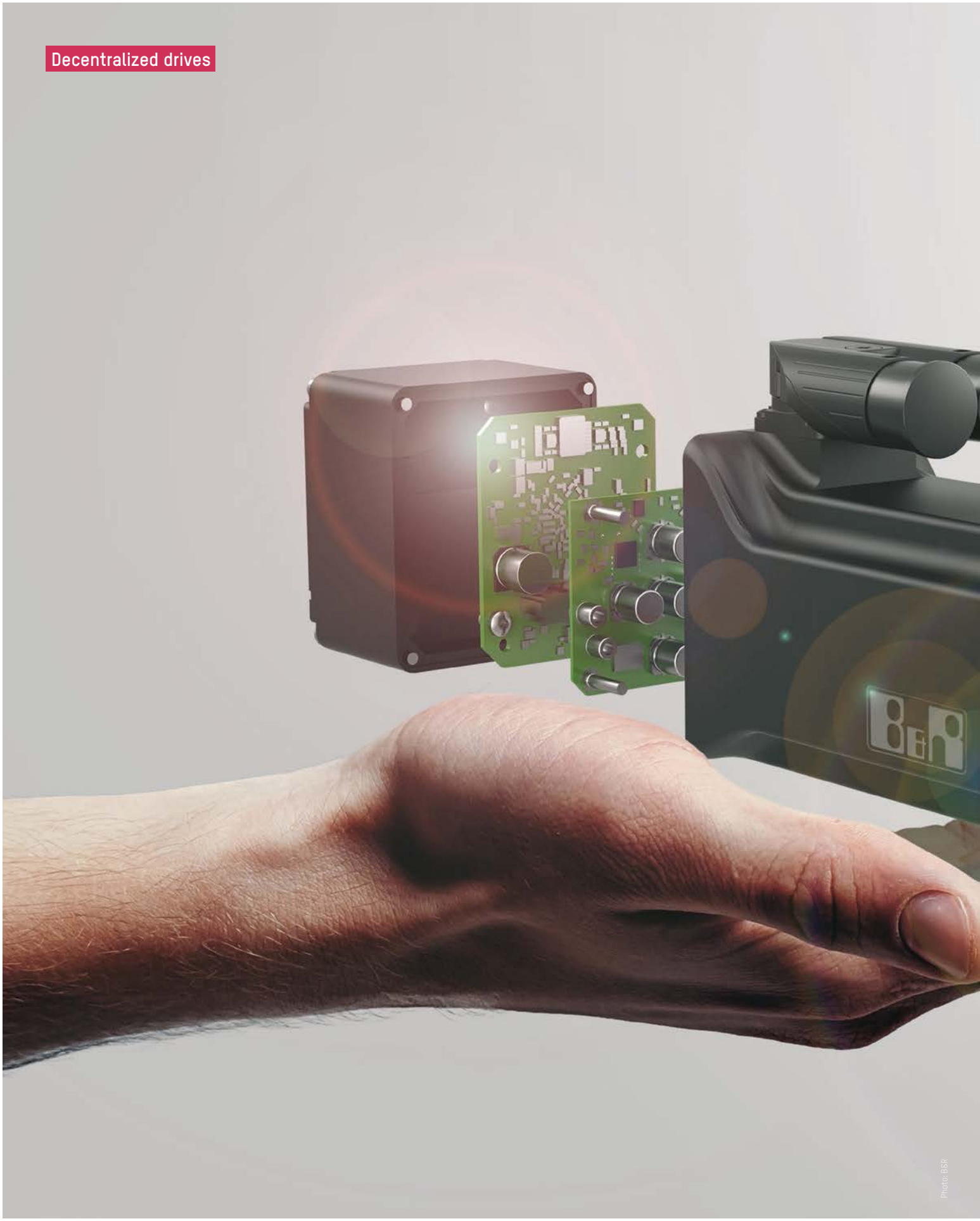


Photo: B&R

One machine – Countless possibilities

The manufacturing industry requires machines that adapt to different products with little to no downtime or retooling. With today's automation technology, the dream of having one machine able to manufacture many different products is becoming a reality.

The extremely compact new servo drives from B&R are ideal as an integrated drive solution for modular machine designs.

When it comes to innovative industrial machinery, the key word is flexibility. For manufacturing companies, much of their success depends on being able to react quickly to changing market requirements and bring new products to market in a short time. The perfect machine would adapt with the same speed and ease that we see when Hollywood transforms an ordinary car into a futuristic robot. More adaptive machines mean shorter time-to-market and more profitable production of small batch sizes and personalized products. These days, a social media post can cause a sudden spike in demand that fades again just as quickly. Conventional machines are usually designed to produce one specific product. If demand for a certain product goes up, the manufacturer needs new machines to produce it. Even if they were able to obtain new equipment fast enough to meet the rapid fluctuations in consumer demand, continually retooling is a costly and time consuming approach and occupies valuable floor space with machines that will soon be obsolete. The solution: flexible machines that adapt to accommodate new products. For that to be possible, the machines must be constructed of modules – self-contained mechatronic units – that can be connected or removed at any time with minimal impact on the control cabinet.

Wilfried Guerry
B&R product manager for drive technology

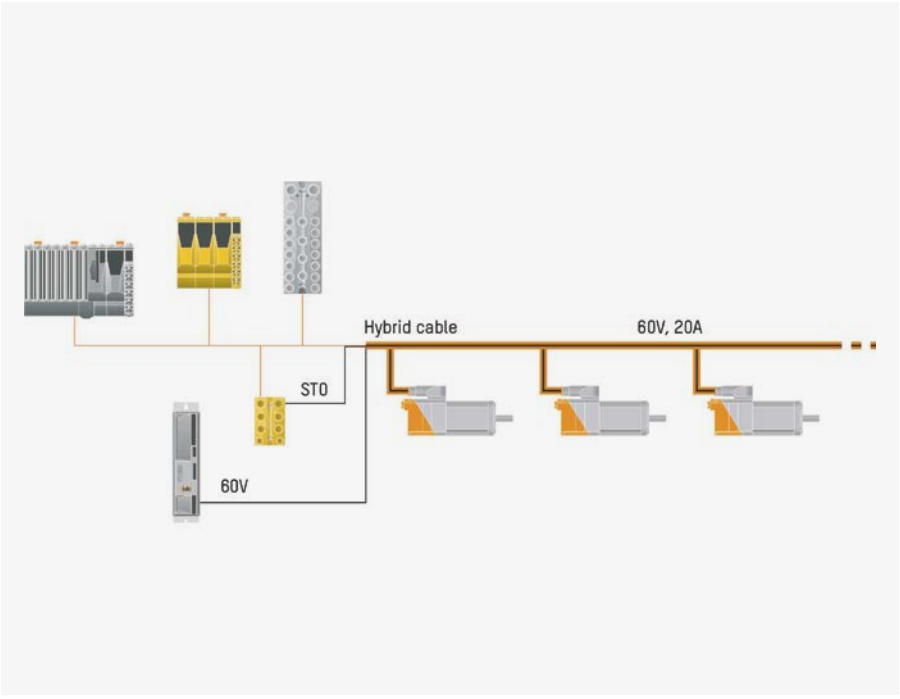
"To enable rapid changeover from one product to another, each machine module needs to have its own integrated motion control solution. In other words: compact servo drives are an essential requirement for modular machines."

Fast product changeover

"To enable rapid changeover from one product to another, each machine module needs to have its own integrated motion control solution. In other words: compact servo drives are an essential requirement for modular machines," says Wilfried Guerry, B&R product manager for drive technology. This drive solution is mounted directly to the frame of the machine, in effect distributing the automation throughout the machine rather than concentrating it in the control cabinet. This decentralized approach for modular machines reduces the amount of hardware needed in the control cabinet and saves space. "That allows you to use a much smaller control cabinet, and greatly simplifies cabling. What you get is a machine with a much smaller footprint," emphasizes Guerry. You can also cut back on the complex cabinet cooling system or eliminate it entirely.

Compact powerhouse

B&R's ACOPOSmotor is a distributed drive technology solution that makes machines more flexible. "With the ACOPOS series' extremely compact new servo drives, we're perfectly equipped to meet machine builders' demands for greater flexibility," emphasizes Guerry. At just 60 x 90 mm, the IP65-rated motor-drive combinations are



The compact ACOPOSmotors do not require an additional servo drive and are easy to incorporate into the POWERLINK network.

The new ACOPOSmotor variants feature unique 300° swivel connectors that make installation easier.

Photos: B&R

perfectly suited for installation on the frame of the machine. They cover a performance range up to 350 W and have an integrated servo drive that enables control loops as fast as 50 µs. "ACOPOSmotor helps build machines the can easily adapt to different products," says Guerry.

Quickly up and running

Modern manufacturing equipment needs to be not only flexible but also quick to set up and put into operation. "Even with entire machines, we're seeing increasing demand for basically plug-and-play levels of operational readiness immediately after delivery," reports Guerry. That's no simple task, since the machines have to be disassembled for transport and reassembled on site. The small ACOPOSmotor drives are connected via a hybrid cable that provides both the power supply and network communication with POWERLINK. That's only one cable that needs to be run to the control cabinet. "The B&R products offer two connections for the hybrid cables. What's special about them is that they swivel with 300° of freedom. That's a huge help during installation," says Guerry.

Reduced cabling

The simplified startup using the single-cable solution of the ACOPOS motor results in significant cost savings. "The amount of cabling can be reduced by up to 90% compared to conventional servo drives," says Guerry. Additional ACOPOSmotor units can easily be connected with daisy chaining. "This cuts back on both the time and the manpower needed for cabling," notes Guerry. What's more, simplifying the cabling also makes is much less prone to errors.

Drive control optimization

To implement continuous improvement for machines and production processes, you first need to collect all the available data from the machine. "With ACOPOSmotor, it's possible to query motor data like speed, torque and voltage in real time and collect it in the cloud," explains Guerry. The servo drive sends the data to the cloud via an edge device using a communication protocol such as OPC UA. Once processed, the data can be used to optimize product quality or to reduce energy consumption. Such a comparatively small component can make an enormous difference: "The smallest ACOPOSmotor has roughly the same dimensions as a credit card," says Guerry. The devices are ideally suited for modular designs, help to streamline commissioning, allow process data acquisition and contribute to more compact and adaptive machinery. ←

ACOPOSmotor

With its extremely compact new ACOPOSmotor units, B&R offers an integrated motor-drive solution that delivers up to 335 W with a motor flange size of only 60 mm. The drives operate over a wide voltage range from 24 to 60 VDC and have the STO safety function integrated as standard. In addition, the devices do not require a fan or heat sink and are therefore low-maintenance and easy to clean.

ACOPOSmotor units support easy daisy-chaining for a substantial reduction in cabling.

High-performance web control

Premium printing with futuristic flexibility

What used to be the exclusive domain of offset printers is now possible with an inkjet printer: The Canon ProStream makes high-quality printing more flexible and profitable than traditionally possible with web offset printers. This revolution has been made possible by dynamic drives and a high-speed web control solution from B&R.

Photo: Canon Production Printing

The ProStream from Canon Production Printing: web inkjet with premium quality and substrate flexibility.

Controlling web tension is particularly challenging when working with coated paper, due to the smooth surface.

Glossy magazines, fine art prints and advertising brochures are as nice to handle as they are to look at. That's because they are made from paper that is coated with a mixture of pigments and binders and smoothed by rollers. This surface-finished paper gives the printed products fine detail and brilliant color. It was designed and optimized for offset printing presses, though, and until now that has been the only option. Conventional inkjet printers cannot use coated paper, because the pigments in the ink don't adhere to its smooth surface and the printed image is easily smeared. As a result, inkjet printers have traditionally been relegated to use for printed products with lower quality requirements, where uncoated papers can be used. For high-quality production, only offset technology offered the necessary productivity and cost efficiency.

But with the new Canon ProStream, the rules are changing. With its new polymer-based ink technology and optimized non-contact air drying, Canon's latest printer is the first web inkjet system able to print on virtually any glossy, silk or matt coated paper – delivering quality and productivity equal to or better than offset printing. Inkjet has one other key advantage over offset: As a purely digital printing process, it can produce completely variable images without having to set up the machine for each new print job like with an offset printer. With inkjet, even the shortest runs become profitable and can be processed quickly. This opens up flexible new business models that prepare printing companies for a future where services like print-on-demand and product personalization are transforming the way we use printed products for advertising and communication.

Same level of print quality and productivity

Printer specialist Canon, based in Japan and with R&D and production in Poing near Munich, challenged itself to create a digital printing system able to match the quality and productivity of offset printing. The result was the ProStream printer, introduced in 2017. Designed from the ground up for digital web printing, this inkjet system can print on a wide range of materials – including coated paper. The Canon ProStream meets the quality requirements of the "Process Standard Offset Printing" with an effective monthly print output of up to 35 million A4 pages. Unlike the offset process, however, it can print variable data, which enables it to produce short runs or personalized products as cost-effectively as a full-scale industrial campaign. To meet this requirement profile, the Canon developers had to dig deep into their proverbial toolbox. In addition to a novel polymer ink technology and an optimized no-contact air drying system, the solution also makes use of state-of-the-art print heads and a high-performance web control system. It was also the first member of the Canon portfolio to feature a B&R hardware platform for web control. The B&R system controls five servo motors, which drive the rollers that maintain the required web tension as they move the paper through the machine. One of the most difficult challenges to solve when working with coated paper is web tension control, due to the smooth surface.

B&R selected as motion control partner

"Before the project started, we defined a comprehensive requirements profile for the drive system and put a select group of candidates through their paces," explains Sebastian Karrer, international product manager at Canon Production Printing in Poing. "After that, there was no doubt that B&R would be the right technology partner for us." In consultation with B&R experts, the printer specialist selected servo drives from the ACOPOSmulti series and a PLC from the X20 system. In combination with B&R servo motors, this formed a motion control solution for the ProStream that enabled the engineers to achieve the high levels of precision,

Photos: Canon Production Printing

The print machine specialist relies on ACOPOSmulti servo drives for its ProStream printer.

The drying process produces flammable vapors. On the ProStream, these vapors are monitored using integrated safety technology from B&R.

responsiveness and consistency that underpin the ProStream's high print quality. For web tension control, the programmers selected a standard PI control function from the B&R library. "After exploring various potential approaches with B&R's experts, we decided for the PLCopen variant. It offers us the most freedom in how we set up the controller," recalls Johann Bartosch, control software developer at Canon Production Printing.

Full control for the user

"The openness of B&R's technology lines up well with our own philosophy, and was a strong argument in their favor," adds Karrer. "They showed us a variety of options and helped us build up the know-how we need to work with the solution we selected and continue to develop it further." For example, Canon was able to easily transfer alarms – provided by the B&R drive system in XML format – to the alarm system of the printer control unit. The high level of integration offered by B&R systems also helped save valuable engineering time and allowed Canon to concentrate on the essentials. "Values from the safety controller and the safe I/Os are automatically available in B&R's universal engineering environment, Automation Studio," notes Bartosch. "Our past experience with other providers has been that the software landscape is much more fragmented, which means more work for us."

Less risk, lower costs

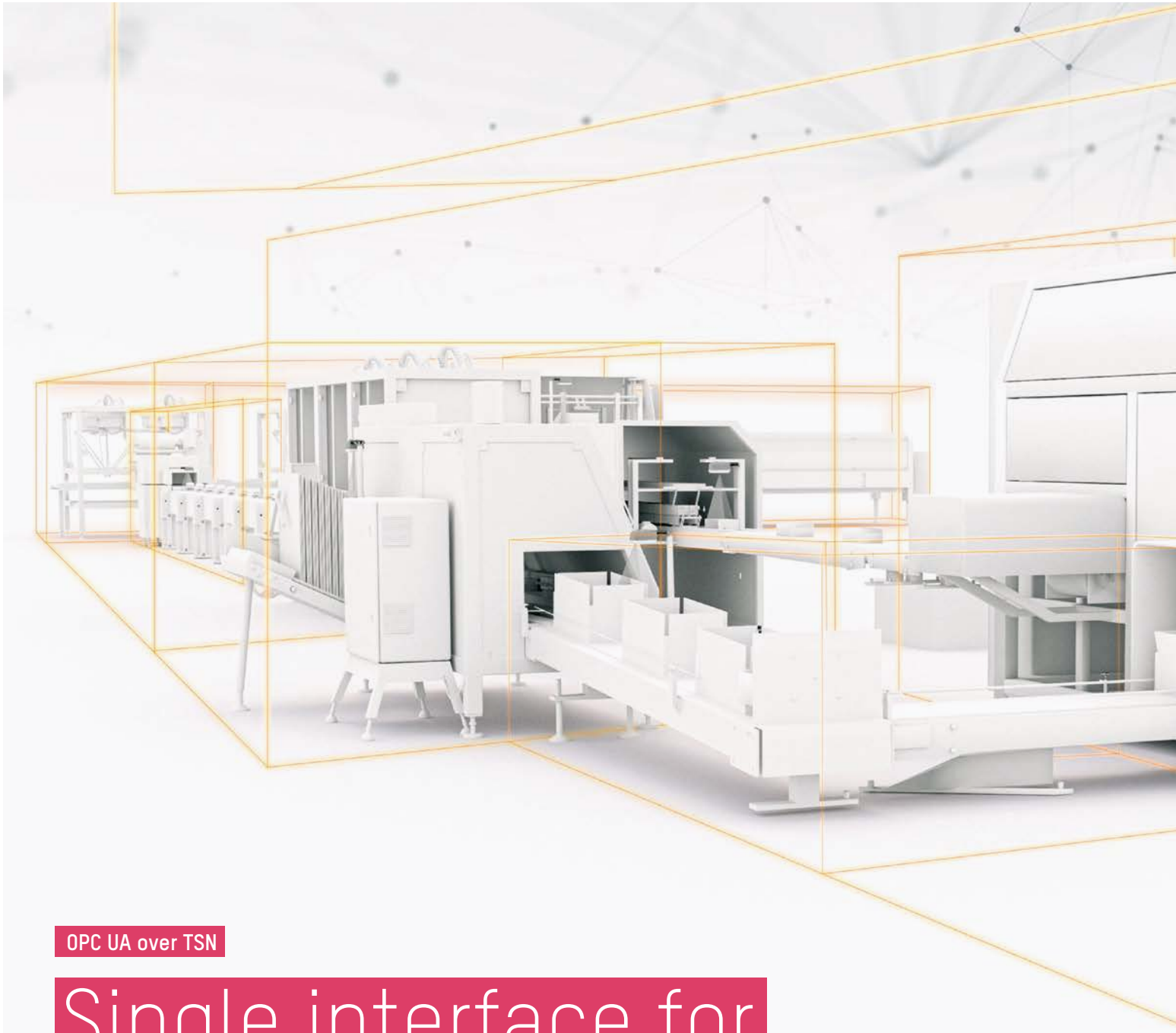
By using B&R safety technology, Canon hoped to achieve the Machinery Directive conformity required for web printing machines like the ProStream with a manageable amount of effort. This has been confirmed in practice, as the software expert reports: "The simple fact that we use B&R safety technology was enough to get us off on the right foot with the inspector from the occupational safety association. He was immediately confident that the conformity assessment would run smoothly. And it turned out he was right."

One of the ways Canon uses B&R's integrated safety technology is to keep flammable vapors, such as those that occur during drying, at a non-critical level. This is done using fans run by induction motors, which are controlled by ACOPOSmulti drives operating in frequency inverter mode rather than using dedicated inverters. By eliminating the need for an additional device type, this simplifies spare parts stocking and procurement. As a result, the total cost of the ProStream is lower, despite the higher purchase price for the servo drives.

Spare parts inventory is further simplified by B&R's highly reliable delivery. "Since the first ProStream in November 2017, we've been measuring B&R's delivery performance – as we do with all our suppliers. At 100%, they stand out clearly above the competition. That's a particularly important factor for us, because with a machine like the ProStream we serve about 90% of the entire print market, so we anticipate high demand," says a very satisfied Karrer. ←

Sebastian Karrer
International Product Manager, Canon Production Printing

"With 100% reliable delivery, B&R stands out clearly above the competition."



OPC UA over TSN

Single interface for seamless connectivity

To implement their increasingly complex production processes, builders and operators of cutting-edge manufacturing systems will rely on a new generation of automation solutions.

The new generation will replace the disparate multitude of proprietary systems with a single solution for seamless connectivity.

Photo: B&R

Industrial manufacturing is evolving from pure mass production towards levels of individualization that can no longer be handled by traditional lines designed to churn out huge quantities of a single product. To deal with shrinking batch sizes economically, they need smaller, more modular production units they can easily adapt and reconfigure – at any time and with minimal effort. Even within these modular production units, the increasingly complex tasks being per-

Leading manufacturers of automation and information technology are making the move to vendor-agnostic communication with OPC UA over TSN. B&R offers an extensive portfolio of products that support OPC UA over TSN communication.

formed require a greater number and variety of high-tech components. Despite being built by different manufacturers, these components must talk to each other to get the data they need.

The critical link for a quantum leap

The pivotal stepping stone on the path to adaptive manufacturing will be a shift to a vendor-agnostic communication. "To make the leap to innovations like mass customization and batch size one," says B&R's IIoT Network Solutions Product Manager Konstantin Klein, "you need a uniform, real-time capable network that offers full interoperability and unifies IT standards with those of industrial manufacturing."

Single interface

For seamless connectivity, you need open communication with real-time capability. "The days when machine builders were forced to commit to a proprietary protocol are over," says Klein. The new generation will replace the disparate multitude of proprietary systems with a single solution that exchanges standardized data seamlessly between all the nodes in the network. With only a single interface to work with, the entire engineering process is simplified dra-

Photo: B&R

tion. OPC UA over TSN dispenses with all of that. Unlike other protocols that transmit only raw data, this solution enriches that data with semantics that can be easily understood by any node in the network. This eliminates all types of potential sources of error and makes it easier to implement flexible, adaptable machine concepts.

Plug and produce

An OPC UA information model is created containing all the relevant data for each device. That means you can quickly connect any drive to any machine, for example, regardless of what manufacturer it comes from. Maintenance and upgrades are simplified substantially.

High speed, sub-microsecond precision

A unified interface and protocol is only half of the equation, however. Cycle time and bandwidth play an equally important role. Time-critical applications, such as synchronizing a robot with an intelligent track system, require cycle times down to the microsecond range. OPC UA over TSN delivers 18x more performance than conventional solutions. "OPC UA over TSN offers enough performance to solve all today's and tomorrow's applications," emphasizes Klein. To enable this performance leap, the Ethernet standard on which the communication solution is based has been extended to include Time Sensitive Networking (TSN). "The TSN extension guarantees deterministic transmission in large convergent networks that bridge the divide between OT and IT systems," says Klein. Whether fast and centralized or intelligent and distributed, drive solutions can be adapted to the needs of the application more easily with OPC UA over TSN than with any other solution. The result is a boost in both productivity and product quality.

Feld level to the cloud

Based on a Gigabit Ethernet physical layer, OPC UA over TSN enabled products offer significantly higher bandwidths. Live operating data can be collected and shared with higher-level systems. "It's a seamless link from the field level to the cloud," says Klein. Advanced IIoT solutions like condition monitoring and predictive maintenance can leverage live feedback to extend component life and boost system availability.

Cybersecurity in multi-vendor systems

When you connect a machine network to the cloud, one of the primary concerns becomes cybersecurity. OPC UA over TSN offers the possibility to ensure security across networks made up of equipment from different manufacturers. Digital certificates based on the X.509 standard can be used in the OPC UA over TSN system to ensure secure, reliable exchange of data.

"The security features of OPC UA over TSN offer built-in protection," says Klein. By fully integrating OPC UA over TSN into its hardware and software, B&R offers manufacturing OEMs vendor-agnostic interoperability that makes them more agile than ever. Producers will finally be able to create the kinds of modular solutions they need to achieve batch-size-one productivity. "What seemed like a pipe dream only a few years ago is now a reality," declares Klein: "A single network cable for seamlessly connected manufacturing."

Complete portfolio

B&R offers an extensive product portfolio of products that support OPC UA over TSN communication. It includes X20 PLCs, an OPC UA over TSN bus controller and a TSN machine switch as well as industrial and panel PCs. ←

matically. Raw data is enriched with standardized semantic descriptions that allow automatic interpretation of systems, devices and variables. Leading manufacturers of automation and IT technology are making the move to vendor-agnostic communication with OPC UA over TSN. Until now, machine builders have gone to great effort and expense defining a multitude of interfaces and incorporating all their system informa-

Konstantin Klein
Industrial IoT Network Solutions, B&R

"What seemed like a pipe dream only a few years ago is now a reality: A single network cable for seamlessly connected manufacturing."

Technical modernization

Future looking up for Prague's lookout tower

With a steadily increasing flow of tourists, it's important to have an infrastructure that takes them safely, reliably and quickly from A to B. In Prague, automation technology from B&R now helps them visit one of its major attractions without the crowds and long waits.

Together, PEG and B&R developed a concept for a new and improved cable car system.

The Czech Republic's capital city of Prague is one of the most popular tourist destinations in Europe. As the number of visitors continues to increase, the city's infrastructure – particularly around the most popular attractions – must continually be upgraded and expanded. The daily strain of mass tourism has also taken its toll on the cable railway that carries visitors up the hill to the Petřín Lookout Tower, one of the city's main attractions. Prague-based PEG was therefore tasked with giving it a complete overhaul. With the newly installed B&R controls and HMI technology, the cable car is now more safe and efficient. PEG is a system integrator based in Prague. To modernize the cable car, PEG turned to its trusted partner B&R. "We've always had positive experiences with B&R as a supplier. So it was natural for us to rely on them once again for this big project," says PEG Software Manager Jan Maštera. "In terms of both technology and price, the Austrian automation specialist was best choice for us."

Standing the test of time

The famous cable car to the Petřín Lookout Tower was built in 1891. During the 100 years of cable railway operation it has been modernized twice because of the technological progress. Obtaining replacement parts was also becoming increasingly difficult. "We transport around two million guests each year," reports Pavel Kejha, the cable car's operations manager. "In 2018, the time had come to renew the aging drive and control system. It's important to us that we get our guests up to the tower quickly and safely." And so it was clear that they needed a powerful, more reliable new system. The new system would need to be much easier to upgrade to meet future requirements. It was also important to provide cable car conductors more sophisticated, intuitive controls. As always, a key concern during the modernization project was safety. The new system would need to transport the guests up the hill safely and reliably. Together, PEG and B&R developed a concept for a new and improved cable car system. "We have experience with comparable systems in both Austria and the Czech Republic," says Martin Větrovský, project manager from B&R Czech Republic. "Our advanced mapp View HMI system follows the HTML5 standard and fully satisfied all the requirements." Inside the control room of the cable car, the system runs on two touch screen panels: a large 24" panel for the conductor and a smaller 15" panel for operation via the control cabinet.

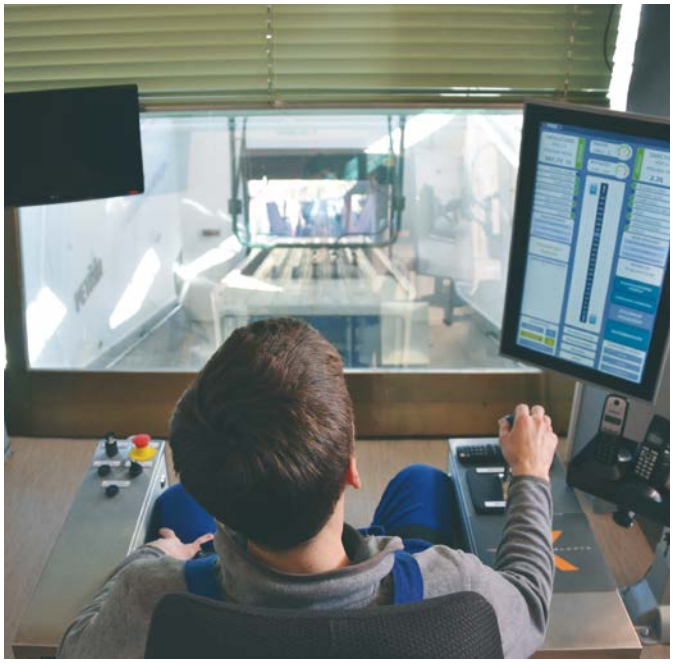
Jan Maštera
Software Manager, PEG

"We've always had positive experiences with B&R as a supplier. So it was natural for us to rely on them once again for this big project."

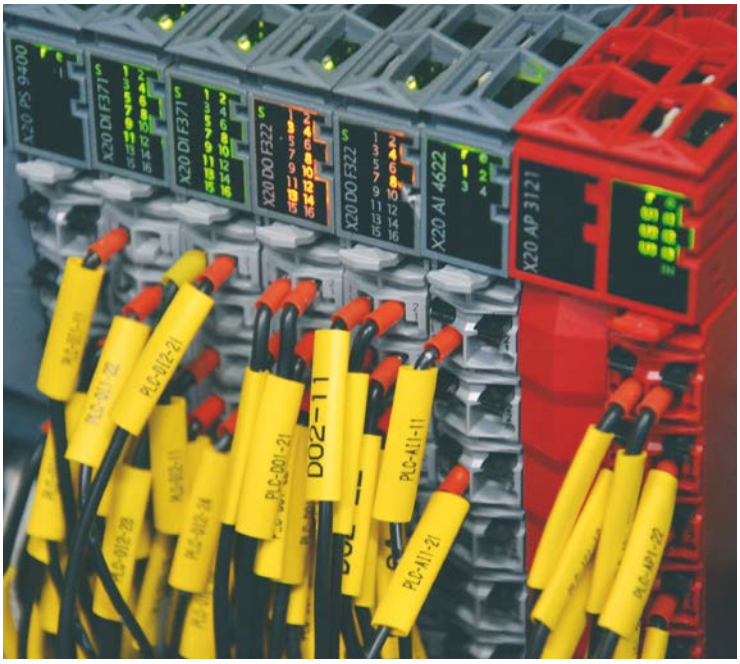
Safety comes first

"Our cable car completes its journey up and down the Petřín hill more than 80 times a day. We transport as many as 1,400 people per hour," notes Kejha. "So, of course, passenger safety is our top priority." Fault protection on the control computer continuously monitors the state of whole technology. The control computer sends commands like start, stop or speed setpoints to an autonomous controller via the MODBUS RTU protocol. The safety system can detect and report more than 100 abnormal states, providing

Photo: PEG



"The mapp View HMI makes interacting with the new system much more clear and intuitive, which is great news for the conductor," says Maštera.



Modernized using state-of-the-art B&R hardware and software, the cable car system is now more powerful and reliable.

Pavel Novák
Project Architect, PEG

"The new solution detects faults sooner for increased reliability and delivers more computational power."

the conductor with a complete overview of what's going on with the system. The safety system differentiates between three categories of faults. Depending on the category of the fault, the controller sends one of three different commands. In the event of acute danger, a command is sent to apply an emergency brake to stop the cable car. If unexpected obstacles are encountered along the way, a command is sent to stop the cable car before it reaches the affected track segment. The third type of fault is one that does not endanger operation. The safety system simply reports a warning that notifies operators so that they can perform the necessary maintenance.

Technological advantage with B&R

Centralized data acquisition with the X20 control system collects and evaluates large volumes of data. Any faults are quickly localized and corrected. The new design also helps limit the extent of damage: If a fault occurs in one part of the system, it doesn't cause damage in subsequent parts. This increases reliability while simultaneously minimizing the amount of downtime in the event of a problem. "The new solution detects faults sooner for increased reliability and delivers more computational power," says Project Architect Pavel Novák. "The newly installed system has better diagnostics, and the mapp View HMI is much cleaner and more intuitive, which is great news for the conductor."

The days of aging infrastructure and long lines of tourists wrapping around Prague's Petřín hill are over. With B&R technology, the cable car operator has made a decisive leap forward. A system that can be updated and expanded at any time is sure to always be up to date. "The only thing left of the original electrical system is the motor. The rest of the system has been replaced and upgraded," says Kejha. "This solution puts us right at the cutting edge of today's technology. And it puts us in a position that we can continue to build on into the future." ←

Pavel Kejha
Cable Car Operations Manager

"Our cable car completes its journey up and down the Petřín hill more than 80 times a day. We transport as many as 1,400 people per hour, so passenger safety is our top priority."

Mobile automation

Autonomous agriculture

If you imagine an agricultural landscape, you probably picture a field being worked by a farmer on his tractor. As the world's population continues to grow, however, there will be at least one big change to this scenario: While the special relationship between farmers and their equipment will continue, the machines out on the field will be handling much of the work on their own.

The answer to the productivity paradox is autonomous agricultural vehicles. They operate with centimeter precision – and they do it for hours on end.


H 05
AUTONOMOUS HARVESTER CONTROL
COORD
Y+
X–
X+
AREA
Y–
ROWS
8
GPS
SPEED ENERGY
75%
56 %
SETUP
RUN
STOP

B&R's PC for mobile machinery has an Intel processor with a wide range of scalability – from Celeron to Core i7.

By 2050, the world's population will reach around nine billion people[1]. And one thing they all have in common is that they all must eat. That presents a substantial challenge for the agricultural industry. Farmers need to get more yield from fewer acres, while at the same time struggling to find sufficient skilled labor. The answer is autonomous equipment. Even the most skilled tractor jockey is no match for a machine's tireless precision. Autonomous agricultural equipment delivers centimeter-level accuracy for hours on end – and that's exactly what's needed on the farm of the future.

More yield from less field

Losses in potato crop can be avoided by sowing them precisely in the middle of a mound of soil. An autonomous machine can be programmed to ensure that every single potato in the entire field is planted exactly right. Not only that: it does it quickly and never stops for breaks.

Conserve resources

In addition to their extreme precision, autonomous agricultural equipment also has benefits in terms of resource utilization. Fertilizers and pesticides can be targeted directly at the crop, as opposed to blanket application over the entire field. "That helps farmers boost their yield while also keeping their costs down, since each plant gets exactly the dose it needs," explains Stefan Taxer, B&R's product manager for mobile automation. It's also a relief for the environment. Time and labor-intensive tasks like plowing and weeding are also prime candidates for machines to handle. "Autonomous equipment is an answer to the shortage of skilled labor in agriculture," emphasizes Taxer. Machines also save workers from strenuous and monotonous tasks.

Data collection and evaluation

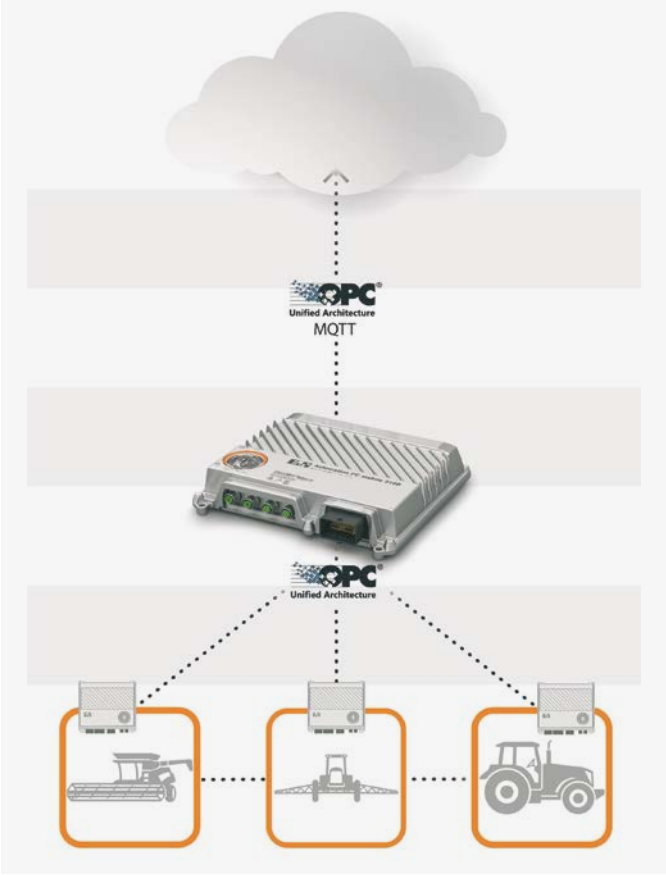
For farming equipment to perform all this work autonomously, it must collect data from a variety of sensors. It must also be able to process that data. "Computing power is a key requirement for any autonomous machine," says Taxer. Standard control systems like those used to automate production machinery are not enough. Big gains in productivity can be attained through big data analytics. Give an au-

Stefan Taxer
Product Manager – Mobile Automation, B&R

"From hardware to software to a uniform, open communication standard – with B&R as a technology partner, today's most advanced smart farming practices are easily within reach."

Photo: B&R

1. Projection by the Food and Agriculture Organization (FAO) of the United Nations



Its high performance makes it optimally suited for smart machines that communicate with each other and with the cloud.

tonomous tractor access to data from weather stations, for example, and it can determine when conditions will be best to perform a given task. If changes in the weather pose a problem, it can stop automatically and pick right back up again when the situation improves.

PC for mobile machinery

To provide the processing power needed for analytics and running autonomous processes, B&R offers a specially designed PC for mobile machinery. "The PC has an Intel processor with a wide range of scalability – from Celeron to Core i7," says Taxer. Intel technology delivers high performance with low power consumption for optimal energy efficiency. "You won't find another product on the mobile equipment market that offers this kind of processing power and modularity in compact PC form," notes Taxer. B&R is able to draw from 40 years of experience in automation and PC production for industrial manufacturing. The PC is specially designed to perform in harsh environments. With IP69K protection, it can be used in a temperature range of -40°C to +85°C. The completely enclosed housing is fanless and highly resistant to shock and vibration. A specially designed temperature management solution protects the processor from overheating, while also ensuring that it works flawlessly in cold temperatures.

Sharing data between machines

For machines to form a network and communicate with each other, they must exchange data. A combine harvester with a tractor and trailer following alongside it, for example, can keep track of the tractor's speed and steering data in order to make optimal use of the available loading space while also minimizing seed waste. The machines use special protocols to talk to each other. B&R offers the widely used protocols MQTT and AMQP. They allow data packets to be transferred reliably even in cases where the network connection has low bandwidth or is intermittently unavailable. "From hardware to software to a uniform, open communication standard – with B&R as a technology partner, today's most advanced smart farming practices are easily within reach," says Taxer.

From the field to the cloud

The data collected by autonomous equipment can provide a wealth of information through appropriate analysis. Comparing the yield from multiple harvesters, for example, can help identify potential for optimization in the way future crops are sown or fertilized. "In such a scenario, the B&R PC serves as an edge controller, allowing the machine to send data to a cloud," explains Taxer. An edge controller is a device used to collect large volumes of data from a variety of machines. It compresses and aggregates the data and prepares it for storage in the cloud.

Predictive maintenance

The data collected by the PC can also be shared with other systems for remote maintenance and predictive maintenance. "B&R offers a pre-installed, pre-configured package that makes implementing predictive maintenance more straightforward than ever," says Taxer. This makes it possible to predict and schedule machines' maintenance requirements and substantially boost their availability. ←

Specially designed for harsh environments

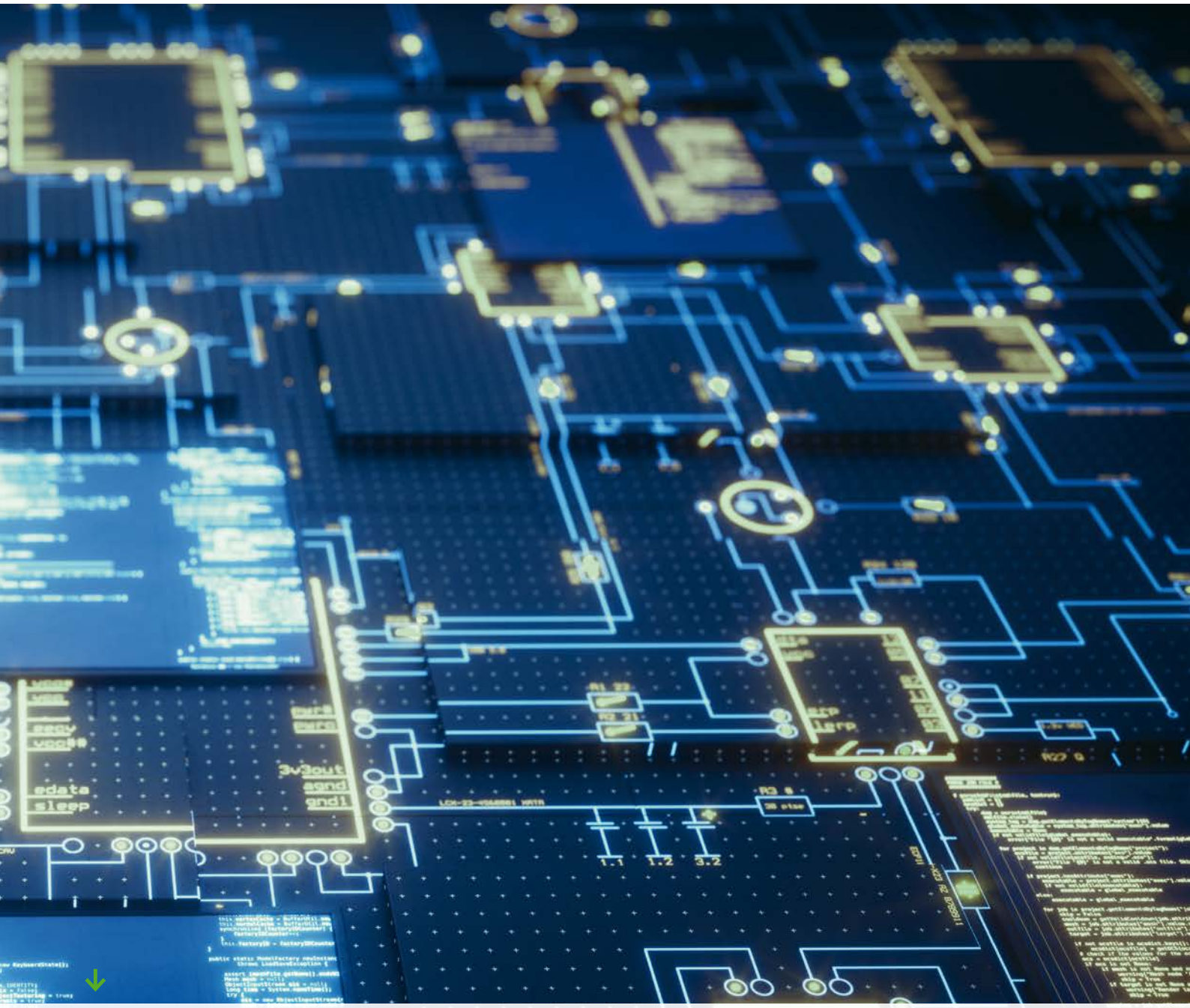
B&R's PC for mobile machinery offers high-performance processing for agricultural equipment and other machinery operated in harsh environments. It supports standard operating systems like Windows 10 IoT Enterprise and Linux, and also features 16 GB of RAM and a TPM module. The PC can handle operating temperatures from -40 to +85°C and is resistant to vibration, shock, salt, UV light and oil. Moisture and condensation are no problem either. A special vent with a Gore-Tex membrane prevents moisture from entering the PC housing while allowing condensation to easily escape. The PC is insensitive to voltage fluctuations. In addition to a broad standard voltage range from 9 to 32 V, it also has integrated load dump protection. This compensates for peaks in the supply voltage to protect the electronics and ensure uninterrupted operation.

Connected manufacturing

Smart supply chain connectivity

When factories are able to achieve seamless connectivity all the way from field-level sensors to the cloud, there is a convergence between the operational technology (OT) on their shop floor and the information technology (IT) of their ERP systems. This opens up a a holistic view into their processes and operations that can be extremely powerful and valuable. With B&R and its commitment to open source technology, EIM Solutions is able to help its customers drive value both within their factories and across their supply networks.

Photo: B&R



Building a smart factory from scratch is one thing, but implementing such fundamental changes in a brownfield environment is an exponentially greater challenge. EIM Solutions is a certified SAP Gold partner who provides solutions that help transform factories into smart, connected, adaptive enterprises. To help factories – both brownfield and greenfield – achieve seamless vertical connectivity, EIM Solutions chose B&R and the open source communication solutions POWERLINK and OPC UA.

Managing capacity to optimize costs

Today, factories are looking beyond automating individual machines or lines and focusing on how to more effectively manage capacity and inventory. "With Supply Chain Hub, we enable factories to bring their own inventories as well as those of their vendors and suppliers all into the same picture." explains EIM's managing director, Rajagopalan Babu. "This reduces dependencies and makes the process smarter, more connected and more efficient." EIM's software suite integrates all levels of the supply chain and is used successfully in an array of industries.

Digitized factories

"We can help any enterprise with a manufacturing facility improve its productivity," says Babu. "To be profitable, an enterprise has to be automated, optimized and digitized – not only on the shop floor but all throughout the supply chain." Machines produce large amounts of data, which must be captured, analyzed and converted into actionable information. Factory owners who are able to correlate this information with accurate data about their supply chain and inventory levels have an upper hand in planning and optimization to reduce costs and wastage.

"In addition, a factory only benefits if all the data it collects about productivity, machine capacity, supply chain inventories, raw materials, work force, availability and customer orders is linked with ERP systems," he says. "That is essential for the factory to calculate costs and stay profitable."

X20 systems and POWERLINK communication allow real-time data acquisition from machines and easy incorporation of energy and condition monitoring.

ERP systems are more than just execution systems, yet their enormous potential as a planning aid has so far been restricted by the lack of a vertial connection to the shop floor. EIM Solutions has enabled manufacturing operations to easily integrate their ERP with the shop floor using open source connectivity mechanisms and B&R technology. Supply Chain Hub makes information easy to access by providing a single web interface for suppliers and vendors. It is designed to reduce working capital and enable significant improvements in operating efficiency.

Open standard for vertical connectivity

The task of integrating machines on a production floor presents a variety of complex challenges. Among them are the prevalence of proprietary networks and different control systems throughout the factory. Babu notes: "Integrating machines on a single line is challenging enough, and we had the task of integrating machines on 20 lines." They overcame this challenge using OPC UA to achieve seamless vertical connectivity from the shop floor up to the ERP system. "We have made it a priority to maximize the use of open source solutions," adds Babu. "That not only provides us independence of operation but also reduces the total cost of ownership." The time and cost of connection and testing are drastically reduced.

To achieve real-time deterministic data collection on the shop floor, EIM Solutions uses vendor-independent POWERLINK communication. The combination of POWERLINK and OPC UA offers a completely open-source communication architecture from the machines to the ERP systems.

Operating data and machine health at a glance

On the factory floor, EIM Solutions uses a B&R Automation PC 2100 running Linux, with openPOWERLINK implemented as a Managing Node (MN). Coupled with B&R X20 I/O modules, this enables data acquisition from legacy machines combined with energy and condition monitoring. Some of the most important data to obtain from any production line includes the machines' output, availability and capacity. It is crucial to have a reliable system that is capable of gathering this data in real time. "POWERLINK provides us with ideal communication and ensures complete reliability of data transmission on the shop floor," says Babu. The OPC UA support on the Automation PC enabled connectivity to both the ERP and cloud systems. The combination of Linux, POWERLINK and OPC UA provides EIM the full benefit of vendor independence and open architectures. "B&R's robust, reliable Automation PC and X20 I/O modules helped us incorporate these open source solutions with minimal time and effort," Babu adds.

The smart factory partner

EIM Solutions has worked with B&R to implement smart factory solutions around the globe. "As our automation and digitalization partner, B&R helps us transform processes and proactively manage all aspects of manufacturing operations – live and in real-time." says Babu. ←

Rajagopalan Babu
Managing Director, EIM Solutions Pvt. Ltd

"The combination of POWERLINK and OPC UA offers a completely open-source communication architecture from the machines to the ERP systems. With B&R as our automation and digitalization partner, we're able to transform processes and proactively manage all aspects of manufacturing operations in real-time."

The B&R solution enables seamless connectivity from field-level control to the ERP system and the cloud.

Photos: B&R

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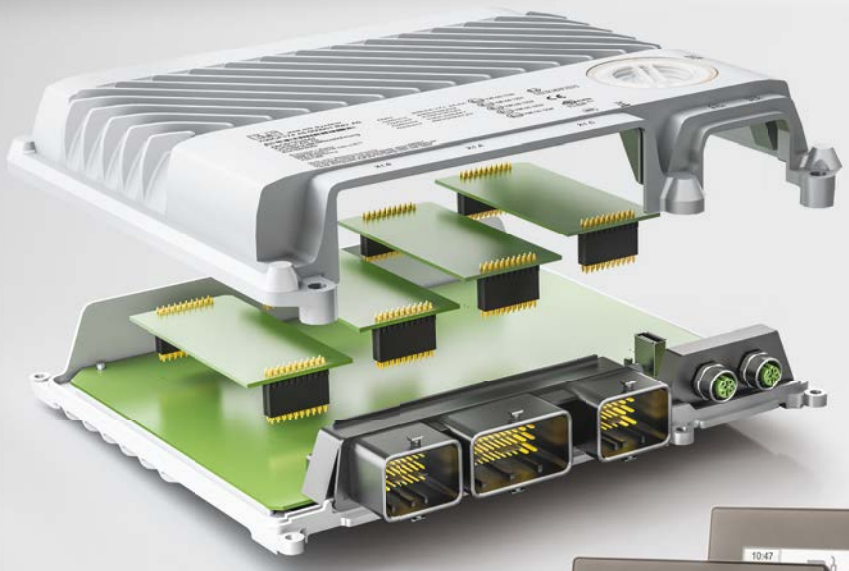

- Easy handling
- Integrated safety
- Faster development

OPC UA open SAFETY mapp TECHNOLOGY

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A MEMBER OF THE ABB GROUP

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