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The B&R technology magazine

Digital twins

In perfect harmony

ACOPOStrak Seamless productivity

Cloud-based control The future of the PLC?

Jörg Theis The new CEO's inspirations and aspirations

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editorial

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B&R Strasse 1, 5142 Eggelsberg, Austria
Tel.: +43 (0) 7748/6586-0
automotion@br-automation.com

CEO: Jörg Theis

Chief Editor: Carola Schwankner
Editors: Craig Potter, Maria Gruber
Authors in this issue:
Stefan Hensel, Carola Schwankner, Craig Potter, Patricia Wimmer, Chris Harduwar, Franz Roßmann, Olivier Rambaldelli, Pooja Patil, Huazhen Song, Dr. Christian Daniel
Graphic design, layout & typesetting:
Lisa Spitzwieser

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Better together:
The machine and its digital twin

In this issue of B&R's technology magazine, the digital twin takes center stage. Conceived in a simulation tool and raised on a diet of real-time operating data, digital twins live in the control cabinet as virtual copies of their machines.

But what real benefits do these marvels of digitalization offer for the builders and operators of those machines? In our cover story, simulation expert Isabella Laasch explains the role played by a digital twin throughout every phase of a machine's lifecycle – from development and commissioning to production and optimization.

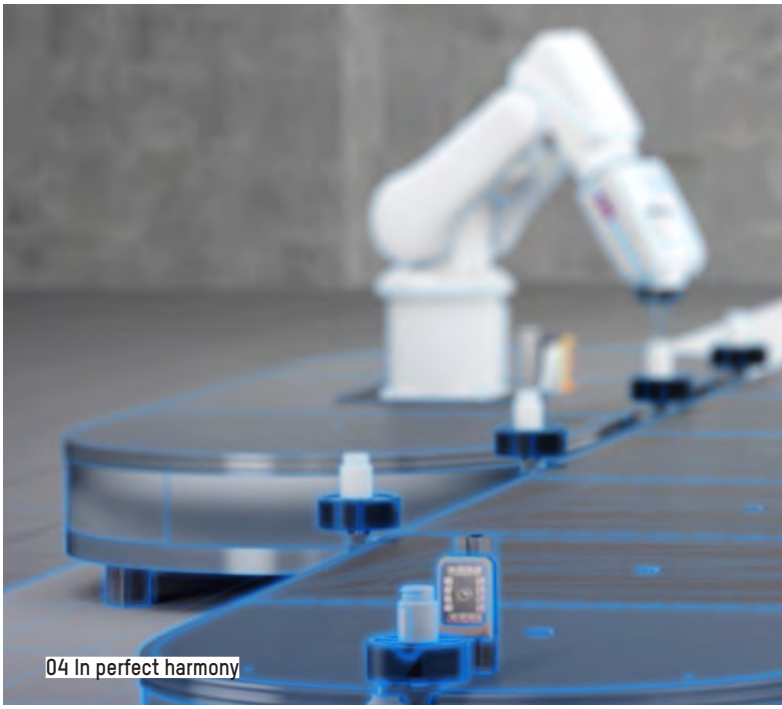
You'll also hear from experts at our simulation partners. Beate Freyer, managing director of machineering, explains how digital twins are used in daily operation, while ISG business manager Dr. Christian Daniel tells us how to create digital twins from an assembly kit of modular components. In a particularly interesting case study, you'll learn how Niigon was able to reduce its machine's cycle time by 25% without replacing any hardware – using only the power of simulation based on the MapleSim software.

We also sat down with our new CEO – not virtually but live and in person. Get to know Jörg Theis in our in-depth interview, and discover what he finds so fascinating about B&R employees. Theis also reveals where he sees the company in five years and what role the new Automation Campus at its Austrian headquarters will play in that future.

Happy reading,

Carola Schwankner
Corporate Editor, B&R

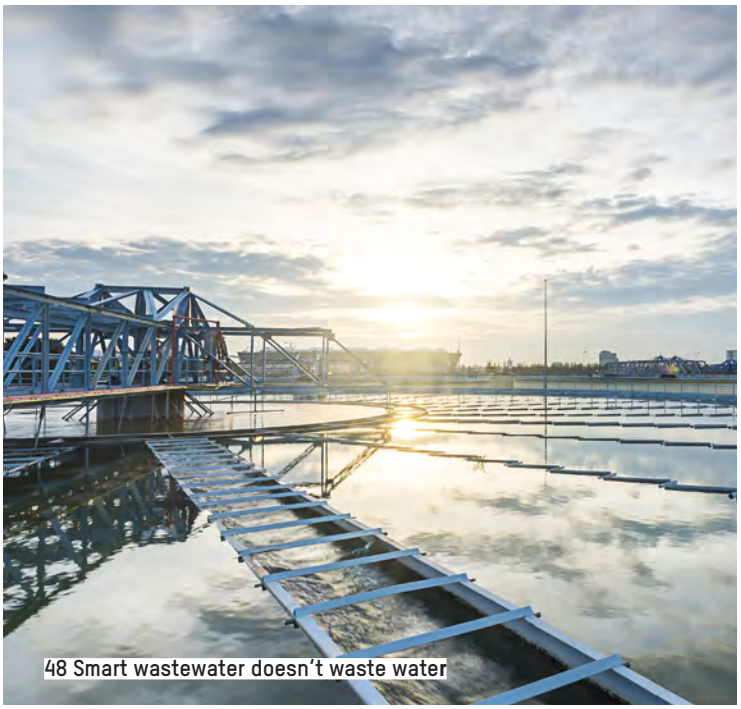
24 CEO Jörg Theis: "B&R employees love a good challenge."



04 In perfect harmony

Spotlight on: Simulation and digital twins

B&R technology in action



48 Smart wastewater doesn't waste water

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Ideas & Insights

Digital twins

In perfect harmony

"The whole is greater than the sum of its parts."
What Aristotle knew in ancient Greece is truer than ever in the age of smart factories and Industry 4.0. After all, a machine is much more than just a pile of hardware and software components. Only when the parts work together in perfect harmony can the whole reach its true potential. Achieving and maintaining that harmony is where simulation can make all the difference.

What role does simulation play in building plants and machinery? "The answer is simple," says B&R's product manager for simulation, Isabella Laasch. "It's a key that unlocks efficiency at every phase in a machine's lifecycle."

As machines grow increasingly complex, the interplay between their mechanical, electrical and automation components becomes increasingly difficult to orchestrate. Throughout development and commissioning and during operation, the behavior of the machine needs to be tested and adapted. Doing that on a real physical system can be costly, time consuming or, in many cases, simply impossible.

Finding flaws: The sooner the better

Even during the first phase of its lifecycle – development – the machine goes through multiple stages. Serious defects can creep in at any point along the way. The "Rule of Ten" states that the cost of correcting these defects increases by a factor of 10 for each stage of development they pass undetected. In other words: the sooner you are able to correct defects, the faster and cheaper it becomes to develop the machine.

Any flaws that don't get caught during development will become evident when it comes time to commission the prototype. "If you get all the way to commissioning and problems start popping up one after another, that's a nightmare," says Laasch. "Not only have you already gone to the expense of building a prototype, you now have to devote valuable development resources to troubleshooting." If the hardware is damaged, there will also be additional expenses and potential delays waiting for replacement parts. In the worst case, contractual penalties may even be incurred if the new machine can't be delivered on time.

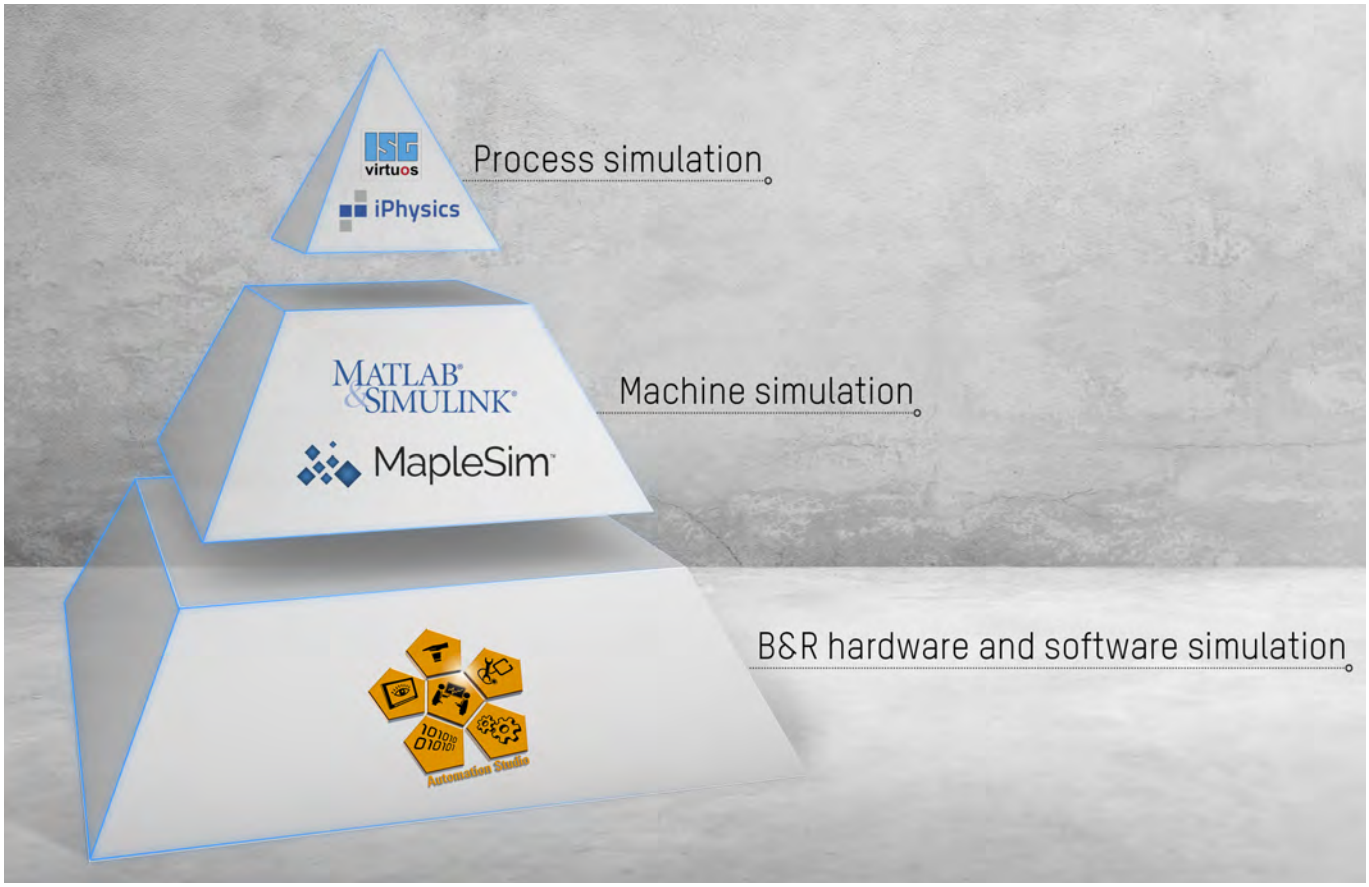
Photos: B&R, MathWorks

Testing anytime: Simulation is key

"So what we need is a way to work with a digital model of the machine at every phase in its lifecycle," says Laasch. "And the way to do that is through simulation." When you replicate every aspect of the machine in a virtual simulation environment, you create a digital twin. With the help of the digital twin, it becomes easy to see during development how different components will interact later on – or even validate the behavior of the entire machine with virtual commissioning.

Philipp Wallner
Industry Manager, MathWorks

"Model-based development helps ensure early on that the machine will work as intended – thereby minimizing the risk of failure. Simulation models form the basis for the design phase, virtual commissioning and digital twins. An investment in simulation typically pays for itself within the first year."



With the simulation tools ISG-virtuos (ISG), iPhysics (machineering), MATLAB/Simulink (MathWorks) and MapleSim (Maplesoft), B&R has integrated tools into its automation system to suit every application.

Close cooperation: Simulation at every level

Machine builders have a wide variety of simulation tools to choose from. Some specialize in modeling machine hardware, while others simulate physical processes. B&R has integrated a full selection of tools into its automation system through many years of cooperation with companies that specialize in simulation.

"Thanks to partners like MathWorks, Maplesoft, machineering and ISG, we're able to offer an array of simulation options and have the right solution for each application," explains Laasch. "The main thing here is that our customers are free to choose the simulation tool that best suits their machine. And whatever they choose, they know it will work seamlessly with the central B&R development environment."

The right tools: For any requirement

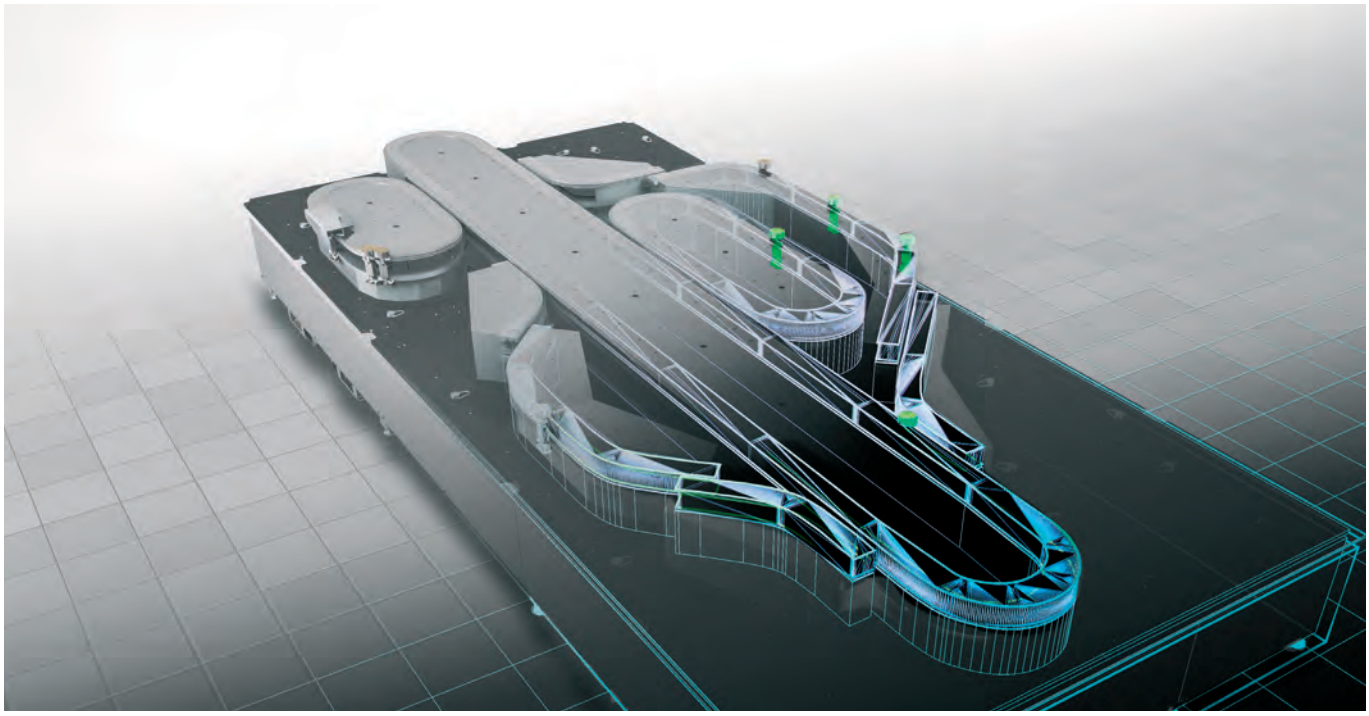
The simulation software from Maplesoft and MathWorks, for example, makes it easy to create detailed models of

Chris Harduwar

VP of Business Development, Maplesoft

"When machine builders face performance issues, they need a quick fix that doesn't eat away at their profit margins. Dynamic, physics-based digital twins allow them to detect problems in their designs and figure out how to solve these problems without additional hardware costs."

Photos: B&R, Maplesoft, machineering



With the help of the digital twin, it becomes easy to see during development how different components will interact later on – or even validate the behavior of the entire machine with virtual commissioning.

machine components and simulate torque and other forces needed for design and sizing. It's easy to simulate all types of different load conditions and perform testing that, on a physical system, would take many hours and tie up extensive resources. With physical testing, there's also the risk of overloading and damaging valuable hardware. In the simulation, on the other hand, you can see at a glance whether or not the machine can handle a given load.

When it comes to simulation of processes, that's where the tools from machineering and ISG come into play. They show the dynamic behavior of an entire machine in 3D. All the dynamic factors that influence the flow of material can be tested in real time using the digital twin. The machine builder gets instant visual feedback about how the behavior of the system is affected by different combinations of machine components. It also becomes possible to detect issues early that could otherwise result in downtime.

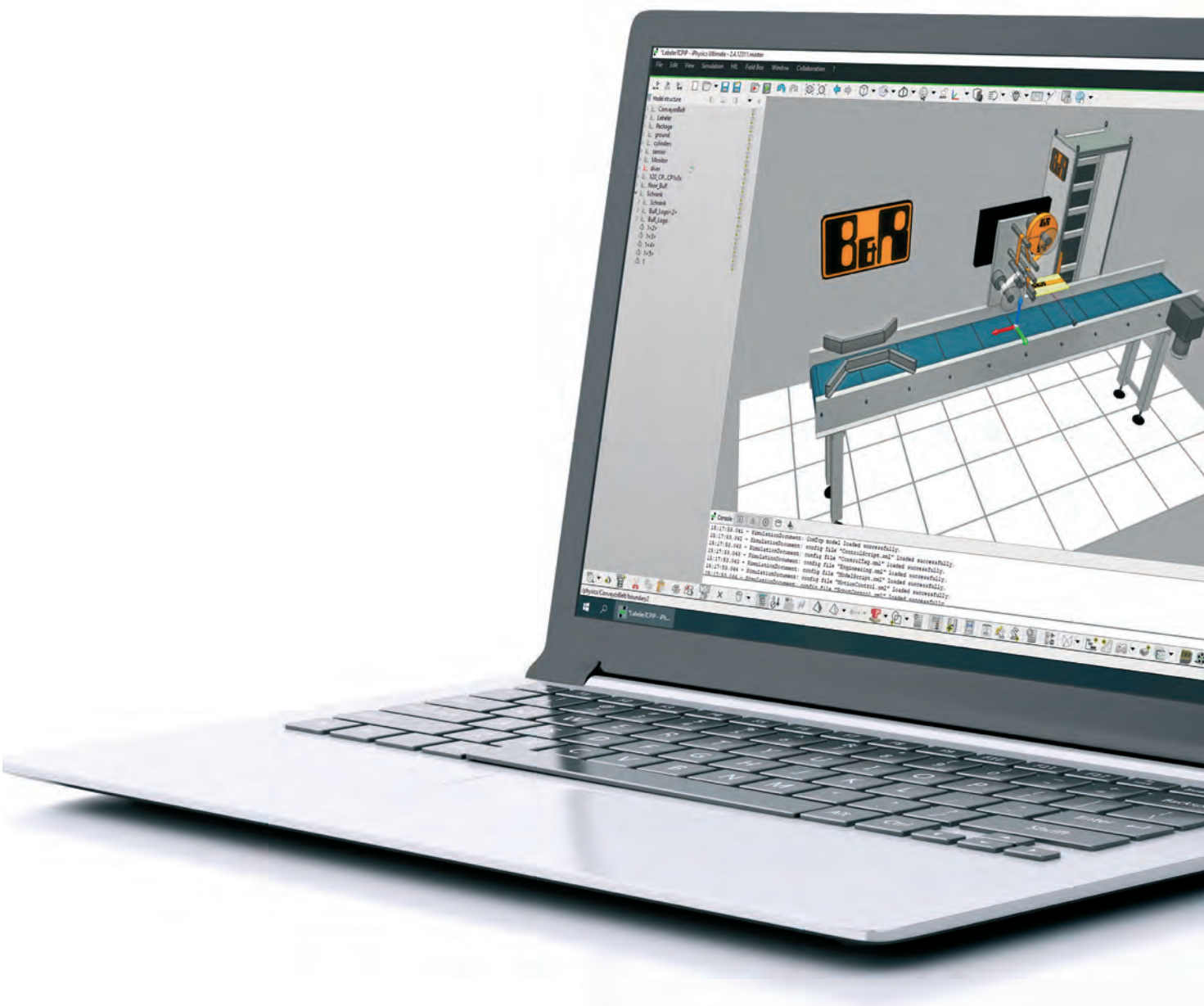
Real-time data: Powerful predictive maintenance

Even after the machine has been developed and deployed, the digital twin is not done adding value. In the control cabinet it continues to run as a virtual copy of the machine, using real-time operating data to make accurate forecasts about the health and remaining service life of the machine's components. "If the behavior of the real machine deviates from that of the digital twin – because of a worn out bearing, for example – the difference is detected immediately," Laasch explains. The collected data is used for predictive maintenance, fault documentation, remote maintenance systems and more.

Dr. Georg Wünsch

Managing Director, machineering GmbH & Co. KG

"Our iPhysics simulation software provides consistency across engineering disciplines – from MCAD, ECAD and automation to production and after sales service. With the additional connection of AR and VR systems, complex mechatronic machines are completely secured at all times."



Simulation tools like machineering's iPhysics cover the area of process simulation and show the dynamic behavior of a complete machine in 3D.

Dr. Christian Daniel
Business Manager - Simulation Technology, ISG Industrielle Steuerungstechnik GmbH

"If you configure simulation scenarios as digital twins using virtual, reusable components from a library, then they can also be used by the plant operator for production optimizations, retrofits and as a basis for innovative training and service concepts."

Photos: B&R, ISG

Virtual preview: Reduced training time
Having a digital replica of the machine also opens up new possibilities for training machine operators and service technicians. The ability to work with the HMI or the machine itself before it actually arrives on site dramatically shortens their learning curve.

Another increasingly popular use for digital twins is in digital showrooms, where OEMs can present new machines to potential customers at any time, even outside of events and trade fairs. With the help of augmented reality headsets, the audience can experience the digital machine in a realistic environment. All types of "what-if" scenarios can be explored during planning and development – delivering all the insight with none of the risk.

Data-driven improvements: Insight for innovation
"The digital twin accompanies a machine for its entire life," says Laasch. "But it also spans machine generations – by serving as the basis for future upgrades and improvements." A machine builder can apply insight gained during operation to optimize the system, using the simulation model to safely test any planned modifications. This minimizes downtime when implementing upgrades and accelerates development of the next machine generation. ←

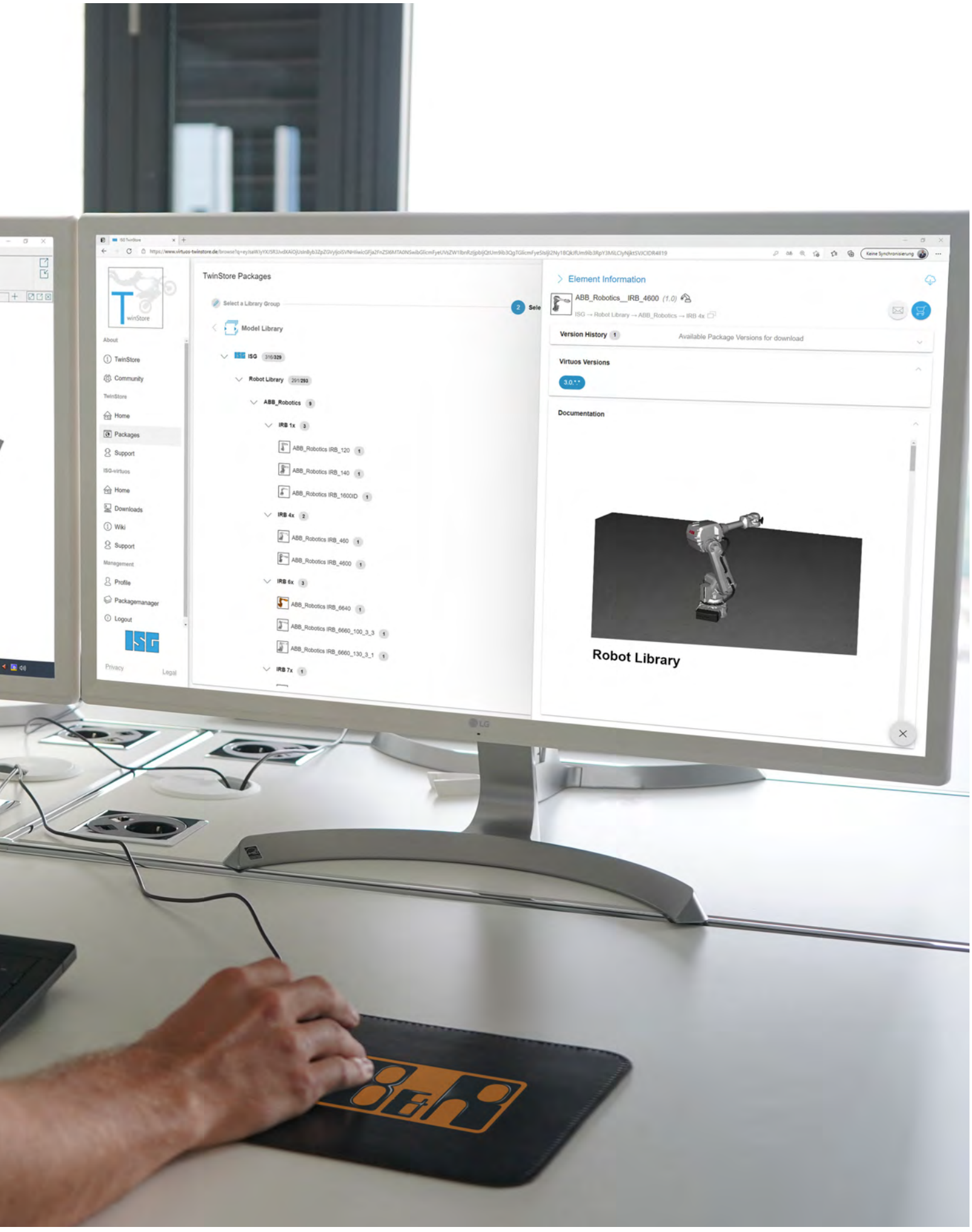
Isabella Laasch
Product Manager - Simulation, B&R

"In cooperation with partners like MathWorks, Maplesoft, machineering and ISG, we offer an array of simulation options and have the right solution for every application. Our customers are free to choose which simulation tool is best suited for their machine. And whatever they choose, they know it will work seamlessly with the central B&R development environment."

Simulation

The digital twin assembly kit

From mechanical design and controls programming to validation and virtual commissioning – machine and plant builders have discovered many ways that simulation can help minimize development risk. Those benefits multiply if the simulations can easily be adapted and reused in future projects. That's exactly the promise of a new solution from B&R and ISG.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Key requirements of a simulation:

- → **Test the control application** – just like on a real machine, without any new programming
- → **Test the whole system** – including intelligent fieldbus components, functional safety and real production data
- → **Test "what-if" scenarios** – what happens if a sensor fails suddenly or missing parts are identified
- → **Run as a digital twin** – for continued process optimization during ramp-up and operation
- → **Provide a library of simulation models** – to match the modular structure of the machine

Complete platform

A look at the requirements reveals that the value a machine builder gets from a digital twin is closely tied to how accurately it matches its physical counterpart. ISG and B&R have co-developed a simulation solution that meets all these requirements while at the same time offering the flexibility to be used in a variety of applications. It's based on the ISG-virtuos simulation platform. "We've created a complete simulation platform able to handle a wide variety of applications," says Christian Daniel, business manager for simulation technology at ISG.

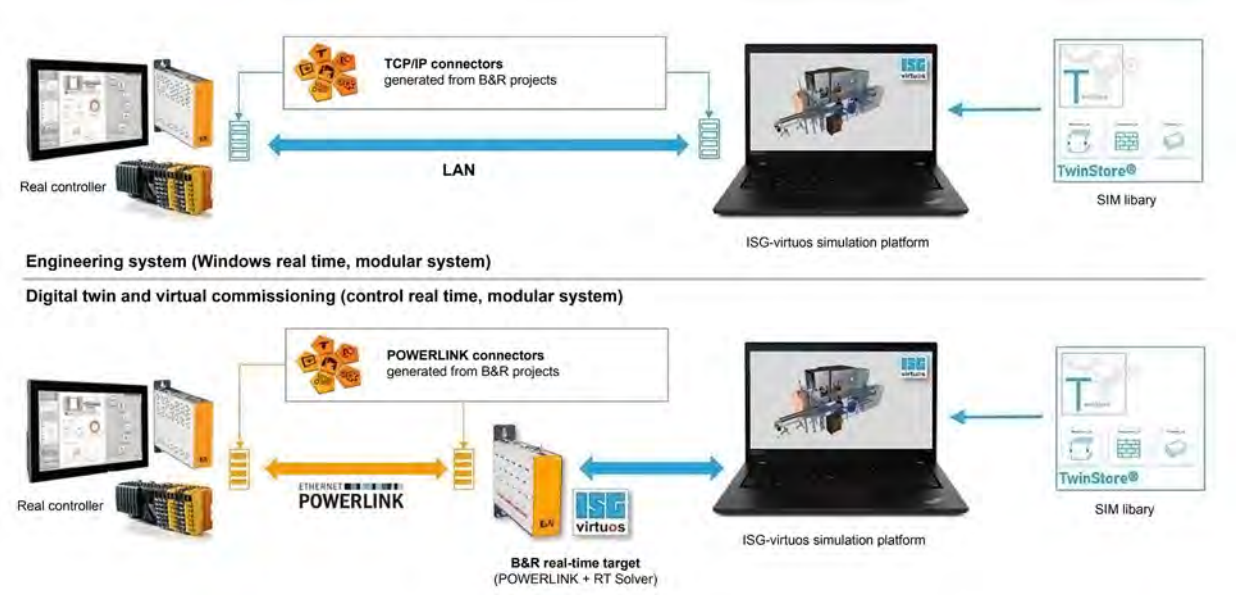
The real controller can be connected to the simulation platform via TCP/IP or in real time via POWERLINK. Either way, communication originates from the application project in B&R's Automation Studio engineering environment, so developers can perform virtual commissioning using the existing control application without any new programming.

Build your own scenario

The ISG-B&R simulation solution also lets developers quickly configure simulation scenarios from a library of modular components. They can create a set of components that matches the modular structure of a packaging line, for example. "You don't get the full benefit of an investment in simulation if you have to redo all the groundwork for each new project," knows Daniel. "It's much better if you're able to create an assembly kit of modular components you can draw from again and again."

Simulation scenarios are created for each unique application by assembling a variety of virtual devices, assemblies and systems. Each virtual component is an exact representation of its physical counterpart – from parameters and interfaces to control behavior. "Developers can create a library of virtual components that accurately model the mechatronic behavior of their modular machine components," says Daniel. "Machine builders then use these virtual components to generate custom configurations."

Photos: ISG



The simulation platform and real controller can be connected either via TCP/IP or real-time POWERLINK.

Templates and reusable components save time

The new solution from ISG and B&R offers three levels of automation for configuring simulation scenarios – manual, template-based or completely automated. "What's really special about the solution," explains Daniel, "is that you can conduct reproducible system tests including POWERLINK with perfectly accurate timing behavior and build simulation scenarios from a library of reusable virtual components."

To get meaningful results, the control system must be tested in conjunction with fieldbus components and put into operation in the context of a full system test. "With the complete simulation solution from B&R and ISG, that's exactly what is possible," says Daniel. "It ticks all the boxes for what a perfect tool should do and offers machine builders maximum return on their investment in simulation." ←

Dr. Christian Daniel

Business Manager - Simulation Technology, ISG Industrielle Steuerungstechnik GmbH

"Developers can create a library of virtual components that accurately model the mechatronic behavior of their modular machine components."

Simulation with ACOPOStrak Designer

"A whole new level of usability"

Track-based product transport opens up new possibilities in machine design. Until now, designing a track system and testing its feasibility has been a job reserved for trained specialists. But with B&R's new ACOPOStrak Designer, that will be changing in early 2022. The new software tool will simplify the prototyping phase for machine builders, allowing them to test new layouts with drag-and-drop ease and run simulations with a few clicks of the mouse. Not to mention saving them considerable amounts of time and money in the process. To learn exactly how it works, we sat down with Johannes Vitzthum and Isabella Laasch.

Photos: BSR

"All the work you've done in ACOPOStrak Designer is sent to Automation Studio at the push of a button," explains Isabella Laasch.

B&R created ACOPOStrak Designer to simplify the prototyping phase for machine builders. What exactly can they expect from the new software?
Johannes Vitzthum: They can expect the process of conceptual design and planning to get a lot easier and more intuitive. They'll be able to do a lot more experimentation without having to deal with the underlying technology and test all types of different approaches before investing a cent in the construction of a prototype.
Isabella Laasch: First of all, ACOPOStrak Designer lets you test whether your design is fundamentally feasible. It calculates and displays things like contact forces and shuttle movements. Based on those factors, it's possible to calculate the maximum speeds and loads that can be achieved. Then, it's even possible to perform a detailed mechanical and thermal analysis of the ACOPOStrak layout.

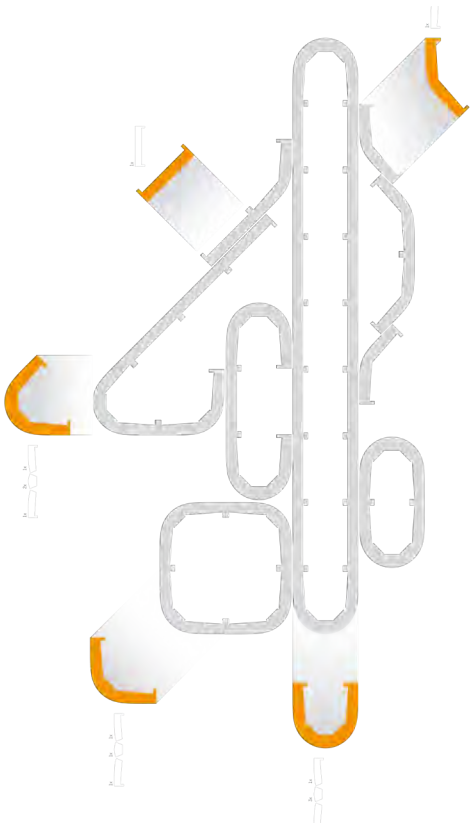
It sounds like really powerful software. What kind of qualifications do you need to have in order to work with it?
Vitzthum: That's the best part: There's absolutely no programming knowledge required. It's exceptionally easy and straight forward to use, despite all the highly complex calculations going on in the background. And you can start laying out your track system right away – without any preliminary work in a development environment.
Laasch: As you design the track layout, an automatic logic check runs in the background. You know immediately whether or not the setup will work in reality, so you can avoid time-consuming layout changes down the road.

Can you give me an example of how that logic check works in practice?
Laasch: You just arrange the track layout how you want it and define parameters like the mass and position of your products. ACOPOStrak Designer knows automatically whether the shuttles will be able to handle the desired product or if there are any changes needed in the layout. Then, it's possible to analyze how the product's mass and center of gravity affect the motion profile. You can begin tweaking the efficiency of the line at a very early phase of development. Shuttles, product holders and the products themselves can all be perfectly coordinated for optimum transport through the production hall.

Photos: B&R

So, ACOPOStrak Designer shows me a virtual representation of my track system and tells me whether it will function correctly in terms of logic and physics. What comes after that?
Laasch: Once you've finished laying out your track system in ACOPOStrak Designer, the data can be sent to the B&R Automation Studio engineering environment for the next steps in development. All the work you've done so far is sent to Automation Studio at the push of a button. The application developer can get right to work programming the machine controls.
Vitzthum: ACOPOStrak Designer isn't just for machine developers, by the way. Sales representatives can also use it to show prospective customers the different approaches that could be taken for their machine – all with just a few clicks and no in-depth programming. The software provides all the information needed to demonstrate a potential new ACOPOStrak machine directly to the decision-makers.

B&R also offers mapp Trak software. What's the difference between mapp Trak and ACOPOStrak Designer?
Vitzthum: In ACOPOStrak Designer, you can view and test a track layout without any programming knowledge whatsoever. So it gives you a preliminary step prior to programming that has never existed before. With our mapp Trak software, on the other hand, developers create the machine software itself. They use it to define the logic of the motion profiles and the interactions of the shuttles with each other and with external sensors and actuators. Yet, even in mapp Trak, complex topics like collision avoidance are handled by the software in the background, so all you need to do is specify how the processes should work.
Laasch: With ACOPOStrak Designer, B&R offers a whole new level of usability. To me that's the biggest advantage. It's so easy to use – even without any special training – that you can brainstorm all kinds of wild ideas without any big investment or development overhead.



ACOPOStrak Designer makes it easy to test different track layouts without any programming.

When we launch ACOPOStrak Designer early next year, we will have the perfect complement to our mapp Trak solution. The two tools work hand in hand to provide the optimal conditions for implementing new machine concepts with ACOPOStrak.

We can't wait to try it – thanks for your time! ←

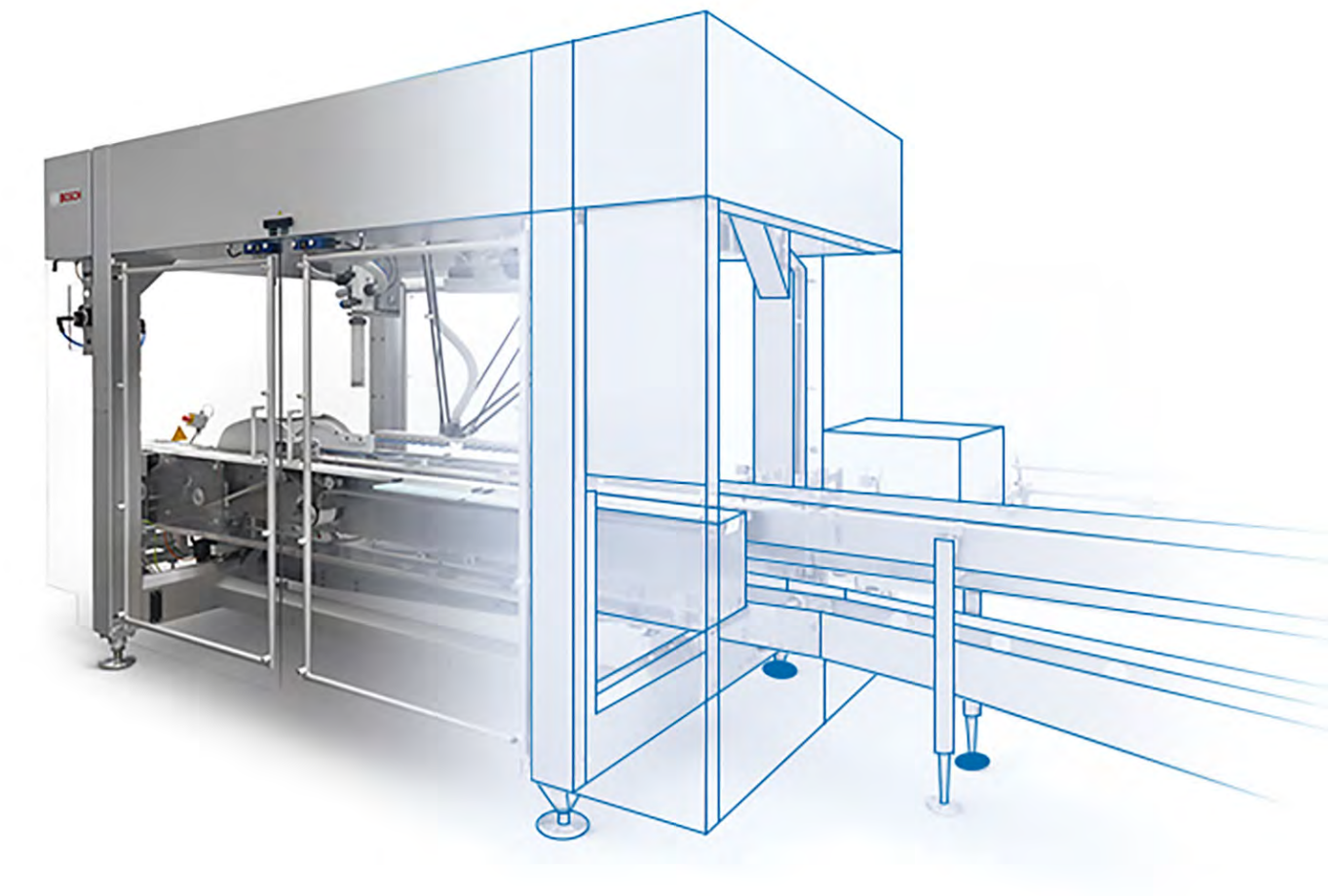
ACOPOStrak – The flexible track system for maximum equipment effectiveness

B&R's flexible and intelligent ACOPOStrak system enables mass customization down to batch size one. At speeds of more than four meters per second, workpieces are carried from station to station 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.

Digital twins

"No more unpleasant surprises"

Digital twins help optimize a machine's value-added processes and ensure smooth operation from start to finish. We sat down with Beate Freyer, managing director of the simulation company machineering, to take a closer look at how digital twins are used during everyday operation.



Photos: Syntegon Technology GmbH, machineering GmbH & Co. KG

"The digital twin provides all the data you need to keep a machine running smoothly at all times," says Beate Freyer, managing director of machineering.

What can digital twins contribute to the everyday operation of a machine?
Beate Freyer: With a digital twin in your control cabinet, you've always got access to a real-time model of your running equipment. Any adjustments or optimizations you might be considering can be implemented quickly and safely. You can try out your planned changes on the digital twin in advance. Only once you've settled on the right solution is everything transferred to the physical system. That saves not only time, but also the cost of performing those steps on the machine itself.

What's it like for a machine operator working with a digital twin? What information do they get?
Freyer: The digital twin provides all the data you need in order to keep a machine running smoothly at all times. As an operator, you can easily run through all your machine processes and calculate complex geometric models. You can test them all virtually and then transfer them to the real machine. And that means you don't have to worry about any unpleasant surprises. Not only that, but you can even look forward in time and see any potential collisions so you can take action in time to avoid them.

And how does the digital twin end up in the control cabinet?
Freyer: With our solution, the machine operator receives what we call a Digital Twin Box along with their new machine. That box contains all the relevant data for the machine. As soon as the real line is up and running, so is its digital twin – a virtual copy of what's happening on the plant floor in real time, fed by live operating data. So you can integrate it into any standard manufacturing system.

So is a digital twin always just for an individual machine, or are there benefits for an entire plant as well?
Freyer: Oh certainly. For plants with multiple interconnected lines, you can use data from machines and processes to create a process image for analysis. To make this possible, status data is exchanged between the real machines and their digital twins constantly during operation. The operator gets a bird's eye view of their production processes and can compare key parameters of the virtual plant against those of the real one. For example, they can fast-forward through process steps or make forecasts about material wear and downtime. Buffer times, stock levels and machine utilization levels can also be viewed and optimized in real time.

The digital twin

Digital twins are based on simulation models that have been assigned all the characteristics and functions of the real machine – from the physical properties of the materials used to the machine's sensors as well as all the movements and dynamic properties of the actual machine. Inefficiencies and malfunctions can be identified and corrected early to optimize machine availability and performance.

Virtual commissioning

Upgrade hardware or upgrade performance?

When production requirements change, the first answer is often to scale up performance by retooling machinery with new hardware. This approach is costly, time-consuming, and – in the age of digital twins and virtual commissioning – quite possibly unnecessary. Niigon recently proved that the right combination of automation technology and simulation-based design can get more out of existing machines without any new hardware at all.

Niigon's new injection molding machine had just entered production when the end user made a shocking revelation: the throughput would need to be substantially higher than originally specified. In its current configuration, however, running the machine at higher speeds would cause unwanted oscillations when the mold was closing. Niigon's engineers concluded that a hardware solution would require replacing hydraulic components with electric counterparts – at the cost of new parts, hundreds of engineering hours and significant losses in machine downtime. As long-time users of B&R technology, Niigon suspected that virtual machine commissioning might pose a potential solution to this challenge.

The virtual alternative

Hoping to find a better path to the required machine performance, Niigon turned to Maplesoft, a leading provider of simulation and virtual commissioning solutions. Maplesoft's MapleSim modeling and simulation tool works seamlessly with B&R's Automation Studio engineering environment thanks to many years of cooperation between the two companies.

“You’ll never get the best out of your mechanical system without simulation.”

Marc Ricke

Working in their familiar development environment, Niigon’s engineers would be able to test a variety of optimization strategies on a virtual model of their machine and push the machine to its limits without any risk of damage. Once a suitable strategy had been developed, the physical machine could simply be updated with the new software via remote access. To get results as fast as possible, Niigon enlisted the services of Maplesoft Engineering Solutions. In the end, developing and implementing a simulation-based machine upgrade was as easy as 1-2-3.

A performance upgrade is as easy as 1-2-3

1. Develop the model
2. Optimize the code
3. Update the machine

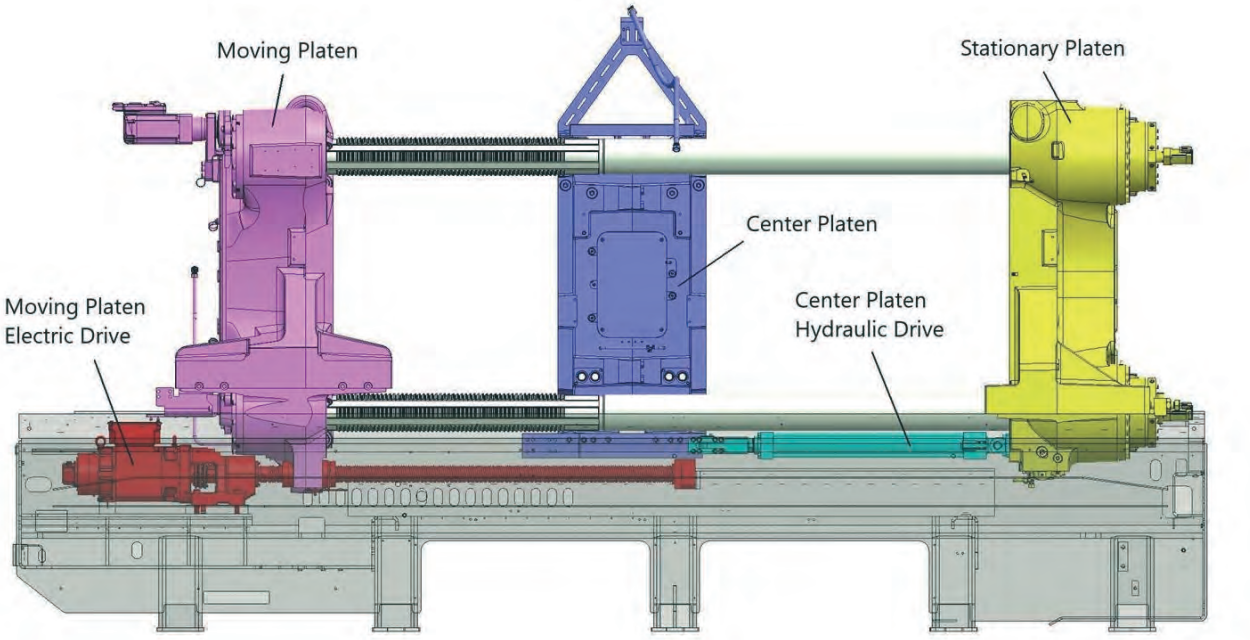
Step 1: Develop the model
To simulate the physical machine with high fidelity, key components including its hydraulic and mechanical systems were modeled in the multidomain MapleSim environment. Utilizing operational data from the physical machine, Maplesoft was able to create a dynamic model that accurately replicated the behavior of the physical machine, including the problematic oscillations.

They could now use this model – known as a digital twin – to investigate the cause of the oscillations and simulate a variety of strategies to eliminate them.

Step 2: Optimize the code
Niigon was now ready to use their simulation model to develop new, optimized control code for the machine. Since Niigon uses B&R’s Automation Studio for control design, it was easy to import the MapleSim models for virtual commissioning. With the B&R MapleSim Connector linking the MapleSim model to Automation Studio, Niigon was able to simulate the impact of its control code on the digital twin in real time.

Step 3: Update the machine
After implementing two major optimization strategies, Niigon successfully reduced the cycle time of its machine by over 25% and effectively eliminated the oscillation issues during production. "We initially thought this would be impossible to do with software alone," recalls Yongchuan Fan, the leading senior controls designer for the project. "When we saw the results, it was just unbelievable."

Photos: Niigon, iStock.com/marchmeena29



Niigon's new N550 Stack/Cube machine offers a unique combination of hydraulic and electric actuation that helps keep costs low.

The future of virtual commissioning at Niigon

In a matter of months, machine simulation went from a hardly-considered option to an important tool for future engineering developments at Niigon. Marc Ricke, Niigon's controls engineer and IT manager, is confident in the added performance that simulation can bring to the product line: "We cut the machine's cycle time by 25% at less than a quarter the cost of a hardware solution. For me, it's a total no-brainer: You'll never get the best out of your mechanical system without simulation."

In future virtual commissioning projects, Niigon will continue to rely on Maplesoft Engineering Solutions for consulting, training and software, and B&R will continue to play a central role in automating the next generation of injection molding machines. "The excellent quality of service we received from Maplesoft's engineers, and the easy workflow between MapleSim and Automation Studio will help us offer our customers machines that achieve faster speeds with less expensive hardware," says Ricke.

What's next for Niigon? While they can't say exactly what is under development, simulation and digital twin development will certainly have a place in Niigon's engineering toolbox going forward. "In the early days of CAD modeling, there were some people who thought they'd be fine without it, yet today there's absolutely no debating its necessity," notes Ricke. "I expect that two years from now people here will look at simulation the same way." ←

Marc Ricke
Controlls Engineering & IT Manager, Niigon

"We cut the machine's cycle time by 25% at less than a quarter the cost of a hardware solution. For me, it's a total no-brainer: You'll never get the best out of your mechanical system without simulation."

Interview with B&R CEO Jörg Theis

"B&R employees love a good challenge"

Jörg Theis has been CEO of B&R since April 1st, 2021. In this interview, the 51-year-old reveals what fascinates him about his employees, where he sees the company five years from now and what other ABB divisions might learn from B&R.

Do you recall the first time you ever heard of B&R?
Jörg Theis: It was more than twenty years ago. I was working for a large automation supplier at the time, and it didn't take long for me to catch on that there was a competitor in Austria with a certain advantage over others in the industry: employees with a unique passion.

How do you mean?
Theis: B&R employees love a good challenge. When others are ready to throw in the towel and say "it just can't be done" – that's when B&R people's eyes light up, and they roll up their sleeves and say "watch me". We know our technology is ready to handle whatever we ask of it, and we're driven to tackle customer requirements that may not seem feasible at first glance. It's a cheeky attitude that fascinated me back then. And now that I get to experience it firsthand every day, I find it extremely inspiring.

I noticed you just said "we" – Do you already feel like you're 100% B&R?
Theis: Absolutely. I was received with open arms, and I feel right at home. That's really important to me: It's not a healthy sign for a company if the CEO doesn't feel like a part of the whole.

Yet you've spent nearly your entire professional life at ABB. Will that have an impact on the B&R brand?
Theis: The B&R brand stands strong on the market and the company is in a great position. So there's no reason to go fixing things that aren't broken. In cases where it makes sense, we will take internal processes and structures that have proven themselves at ABB and apply them here – that's something that has already begun over the past few years. For example, we've created a department to handle health, safety and environmental issues. These are topics that have always been important at B&R, and with a whole department behind them they will get even more attention.

How else can B&R benefit from ABB as a parent company?
Theis: I don't necessarily see it as a one-way street – the benefits can definitely be mutual. I actually consider that one of my most important responsibilities: to build a bridge between a large concern like ABB and a mid-sized company like B&R.

What does that mean exactly?
Theis: I try to combine the best of both worlds. Look at ABB: A huge multinational with employees in nearly every

Jörg Theis: "My goal is for B&R to be known worldwide as a top player in the automation industry."

country on Earth who are familiar with the local industries and cultures. That makes it a lot easier for B&R to gain a foothold in new markets and countries. On the other hand, you have B&R's agility and customer-focus – that's the DNA of the company and something I certainly aim to protect and uphold. These happen to be areas where other ABB divisions could learn something from B&R as well. And then there are areas where we intersect at a product level and can work together on joint solutions. Machine-Centric Robotics is a perfect example of that.

What topics are keeping you the busiest these days?
Theis: Of the many topics, there are two that stand out: One is the strategic development of the company, and the other is the component shortage. The current situation on the electronic component market is causing delays in our ability to fulfill some orders. It's painful for me to see that, and we're doing all we can to mitigate the impact of the shortage on our customers.

And the strategic development of the company? Where do you see B&R in five years?
Theis: My goal is for B&R to be known worldwide as a top player in the automation industry. What I would like to see in five years is that, whenever a company – anywhere in the world – is looking to automate a machine or plant, they have B&R high on their short list every time. So what we're doing right now is evaluating what steps it will take to get us there. The way I see it, one of the keys will be staying on the front lines of the digital transformation. That's an area where we'll be making some serious investments in the coming years.

I'm getting the sense you'd like to make B&R more international. What are the implications of that for its headquarters in Austria?
Theis: Our headquarters in Eggelsberg are, quite literally, set in stone. Particularly the closeness between R&D and production is a clear advantage for the location. At the same time, we will become more global and will no longer be concentrating all of our know-how there. We've already begun the process of making many of our teams more international. We're maintaining the first development teams in other countries, and our product management team is no longer centered in Eggelsberg. With Luca Galluzzi as our CSO, we even have a member of executive management stationed outside Austria.

Thanks to the opportunities for online collaboration we have today, these arrangements work very naturally. And our customers gain from it too, because we're always able to put the best person on the job, regardless of where they're sitting. It's a strategy we will continue going forward.

The big new Automation Campus in Eggelsberg is set to open soon. Is there still a need for such a building complex in light of this internationalization strategy?
Theis: Definitely. Over the past few months, several hundred employees have already moved into the campus, and we're currently looking to add another 200 employees in Eggelsberg alone. But the Automation Campus is much more than just a building complex full of offices, laboratories and training facilities: it is also the place where we come together with our customers and partners to shape the future of manufacturing.

Could you elaborate on that?
Theis: Sure, what I mean is this: Machines are growing more complex by the day, and their role in the production line is increasingly intertwined with other machines and higher-level systems they need to communicate and interact with.

Photos: B&R

"The Automation Campus is much more than just a building complex. It's also where we come together with our customers and partners to shape the future of manufacturing," says Theis.

A lone machine builder working in isolation hardly stands a chance of meeting all these requirements. That's why, as an automation partner, we find ourselves more and more often sitting around a table with machine builders and plant operators to develop concepts for how to orchestrate the production process. Intelligent transport systems like ACOPOS 6D and ACOPOStrak play a central role in many of these concepts, because they enable seamless transitions between previously isolated processes.

What else do you have planned for the Automation Campus?
Theis: We'll of course continue to expand and develop our renowned training academy. Talks are also underway to host events for associations, partners and research institutions. These are steps that take us towards the goal of establishing Eggelsberg and B&R as an international hub for automation technology – so that we can continue to provide our customers the very best automation the world has to offer.

Very exciting, thanks for your time! ←

About Jörg Theis

Jörg Theis holds a degree in chemical engineering from the Aachen University of Applied Sciences. He has worked for ABB for more than 23 years, most recently as Division Unit Manager Process Automation for Energy Industries in Singapore. He took over as CEO of B&R on April 1st, 2021. Theis recently moved to Eggelsberg, Austria – home of B&R's headquarters – with his wife and two children.

Product news

Machine vision gets four times faster

Quad-core output boost

B&R has dramatically accelerated execution of all types of machine vision applications. A new quad-core processor and just-in-time compiler help the Smart Sensor complete vision tasks up to four times faster. Machine builders can substantially increase the output of their machines without having to use expensive dedicated PCs for machine vision.

With the latest Steady version of the HALCON library, B&R's machine vision system now has a just-in-time (JIT) compiler that generates executable machine code when the application is loaded, rather than interpreting it later at runtime.

Perfect motion control for every application

More motors to choose from with Hiperface DSL Safety

The safety functions of the B&R ACOPOS P3 servo drive are now also available for motors with a safe Hiperface DSL encoder. Machine builders now have a broader selection of motors when implementing safe motion control applications.

Hiperface DSL Safety has established itself on the market alongside EnDat 2.2 Safety as a leading industry standard for safe data transfer between motors and servo drives. Just like EnDat 2.2, HDSL Safety is compatible with all B&R safety functions. That includes functions such as Safely Limited Speed (SLS), Safe Operating Stop (SOS) and Safe Limited Increment (SLI).

Photos: B&R

More resistant for more applications

Maritime certifications for X20 system

Using B&R automation technology in maritime environments is now easier and more flexible than ever thanks to additional certifications by DNV, KR, LR and ABS for the X20 control and I/O system. B&R has also expanded the temperature and input voltage ranges of the X20 system.

Life at sea puts extreme demands on automation components, so certification authorities subject them to intensive testing. Following certification by Germanischer Lloyd (GL), the addition of type examination certificates from Det Norske Veritas (DNV), Korean Register (KR), Lloyd's Register (LR) and the American Bureau of Shipping (ABS) further attests to the extreme resilience of the X20 control and I/O system.

Soft-Start for extruders and injection molders

Heat up temperature zones gently and evenly

B&R's mapp Temperature software package provides a new pre-programmed way to get manufacturing systems up to temperature. At the push of a button, the Soft-Start function heats up machine components gently to minimize heating element fatigue – without any of the tedious programming that used to be involved. Homogeneous heating reduces mechanical stresses and allows for controlled evaporation of liquid residues in the machine.

With mapp Temperature's Soft-Start function, equipment such as filtration systems, extruders and injection molding machines can be brought to operating temperature quickly and easily. This is done either by targeted heating with limited power or by using a defined temperature gradient to heat up all zones synchronously.

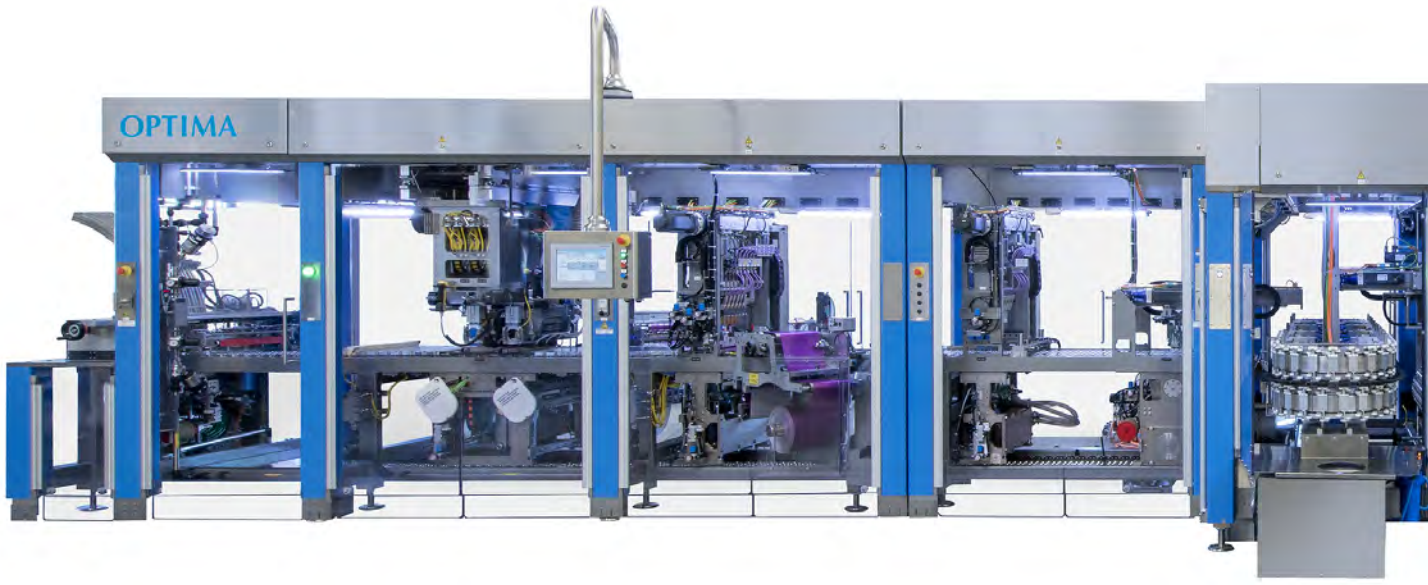
Flexible product grouping

Mind the gap

Connecting individual machine modules to form a continuous line can be a lot of work and take up a lot of space. Optima has succeeded in joining a filling and packaging machine in a way that perfectly dovetails the two processes. It's made possible by a unique solution featuring B&R's intelligent ACOPOStrak transport system.

"For us machine builders, connecting different machine modules is always particularly challenging," says Andreas Dreschner, technical sales manager at Optima. When Optima kicked off the project in the spring of 2019, they evaluated possible transport systems to interface between the filling and packaging units. "For our application, there was no other system that offered the same kind of flexibility or met our requirements for speed and dynamics the way ACOPOStrak does," explains Dreschner.

The new application was used for the first time in a filling and packaging line for a Dutch food retailer to produce single-serve aluminum coffee capsules. Each shuttle was equipped with a product carrier to hold one coffee capsule, which means that each capsule can be moved through the line entirely independently of the rest. That makes it possible to group together any number of capsules on the fly during transport.



ACOPOStrak enabled Optima to shorten the transition between its filing and packaging machines by nearly four meters.

Seamless production flow

"One challenge with this application were the gaps that arise during the manufacturing process," says Dreschner. That happens, for example, when capsules are rejected for failing to pass quality inspection. Since even a slight deviation in weight, an imperfect seal or minor offset in the position of the lid can cause a capsule to be rejected, plant operators assume a reject rate of around 0.2 to 0.3 percent. "The capsules are typically packed in cartons of ten or more, so that ultimately leads to an even larger percentage of defective cartons."

ACOPOStrak receives groups of twelve capsules, and by the time they reach the packaging infeed, they've been regrouped in sets of fifteen.

Thanks to the ability of ACOPOStrak shuttles to move independently, any gaps in the production flow can easily be closed. Any capsules that fail to pass quality inspection are sorted out right away. "ACOPOStrak immediately moves up the next capsule, and the flow of products continues without missing a beat," Dreschner explains.

Flexible grouping

After filling and sealing the coffee capsules, the filling line passes on twelve capsules at a time for the next production step. The infeed of the packaging line, on the other hand, has fifteen lanes. Here, again, the production line benefits from the flexible shuttles of the B&R transport system. ACOPOStrak receives groups of twelve capsules from the filling machine, and by the time they reach the packaging infeed, they've been regrouped in sets of fifteen.

Configure sets on the fly

Different sets of products to be packaged together are usually arranged using feed screws, feed wheels, belts and chains. For the machine to produce a different set configuration, the hardware needs to be modified by hand. With Optima's system, the shuttles make it drastically easier to change between sets. The configurations can be changed on the fly during operation, simply by selecting the corresponding recipe on the operator terminal.

Photos: Optima

Advantages of ACOPOStrak grouping

- Footprint savings
- Flexible grouping
- Gapless product flow
- High throughput
- Gentle product transport
- Food-grade design

Four meters saved

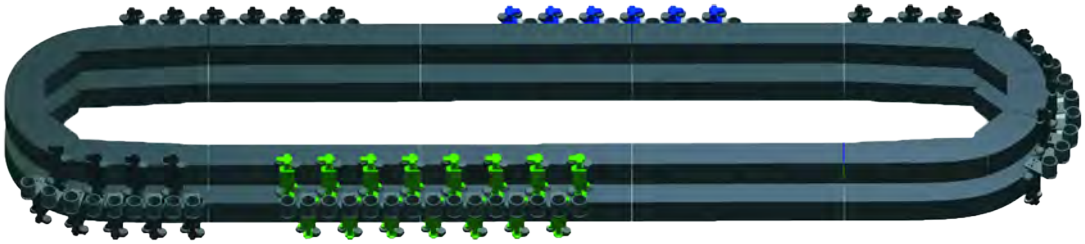
In terms of footprint, Optima's innovative solution has a clear advantage over systems that use conventional technology for product grouping. "With a conventional construction using screws, the grouping function requires a machine frame with two fields, each 220 centimeters long," explains Dreschner. "The new ACOPOStrak solution, however, adds just 80 centimeters to the overall length of the system, so it's almost four meters shorter than before."

Nevertheless, it achieves a higher throughput than its conventional counterpart: The Dutch food retailer produces and packages 720 capsules in 72 cartons every minute. There are a total of 80 shuttles in circulation. They are distributed over two separate, stacked oval tracks, each 7.2 meters long. The shuttles accelerate at 30 m/s² and reach top speeds of up to 2.6 m/s.

One reason for the division into two tracks was the required spacing between the products of under 50 mm, although the shuttles themselves are already 50 mm wide. The track ovals and the product carriers are therefore designed in such a way that the grippers of the upper oval and those of the lower oval come to rest alternately at the same level. At this level, the product carriers are each only about 40 mm wide, so the required product spacing of under 50 mm can be achieved.

Gentle transport

Despite the dynamic performance, the handling of the capsules is remarkably gentle. "Compared to a conventional grouping process, we have significantly reduced the number of production steps," says Dreschner. "The product carriers also prevent the capsules from bumping into each other during regrouping." ACOPOStrak is therefore particularly well suited for sensitive products like the high-end single-serve aluminum coffee capsules.



Simulation software was used to check and confirm the viability of the concept.

Targeted engineering through simulation
The intelligent simulation options offered by B&R's engineering software were a great help in developing the machine. "The ability to run simulations on our initial concept is how we realized early on that one track would not be enough," Dreschner says.

"After splitting it into two tracks and repeating the simulation, we were able to move forward with confidence that the transport process would run as planned and that we would hit the customer's performance targets without any unpleasant surprises late in the project." The additional effort for the simulation was minimal. Optima was able to take all the process rules created for the simulation and apply them in the real machine application at the push of a button.

Competitive advantage through innovative technology
The modular design, simple implementation of the shuttle movement, and support from B&R experts all helped to shorten Optima's learning curve with the new technology. "ACOPOStrak was still partially in prototype status at the beginning of the first project," notes Dreschner. "The cooperation between everyone involved was just right. From the software developers all the way up to top management – everyone at every level had their eyes on the same goal. That's what enabled us to get the system fit for industrial use in a short time." The efforts have paid off: The first system delivered is already running smoothly 24/7 to the satisfaction of all concerned.

And not only that: "The solution is a true milestone for us, and really has that 'wow factor' for anyone who sees it in action," Dreschner reports. "There's nothing else like it in our market. It strikes a particular nerve with private label manufacturers, who have to produce for a variety of different customers and have always yearned for exactly the kind of on-the-fly grouping flexibility that we can now offer." ←

Andreas Dreschner
Technical Sales Manager, Optima

"For our application, there was no other system that offered the same kind of flexibility or met our requirements for speed and dynamics the way ACOPOStrak does."

Photos: Optima, B&R

Product news

Easy implementation of safety functions

CANopen Safety for X90 safety controllers

B&R is simplifying the implementation of safety functions on mobile machinery by equipping its X90 safety controllers with the CANopen Safety protocol.

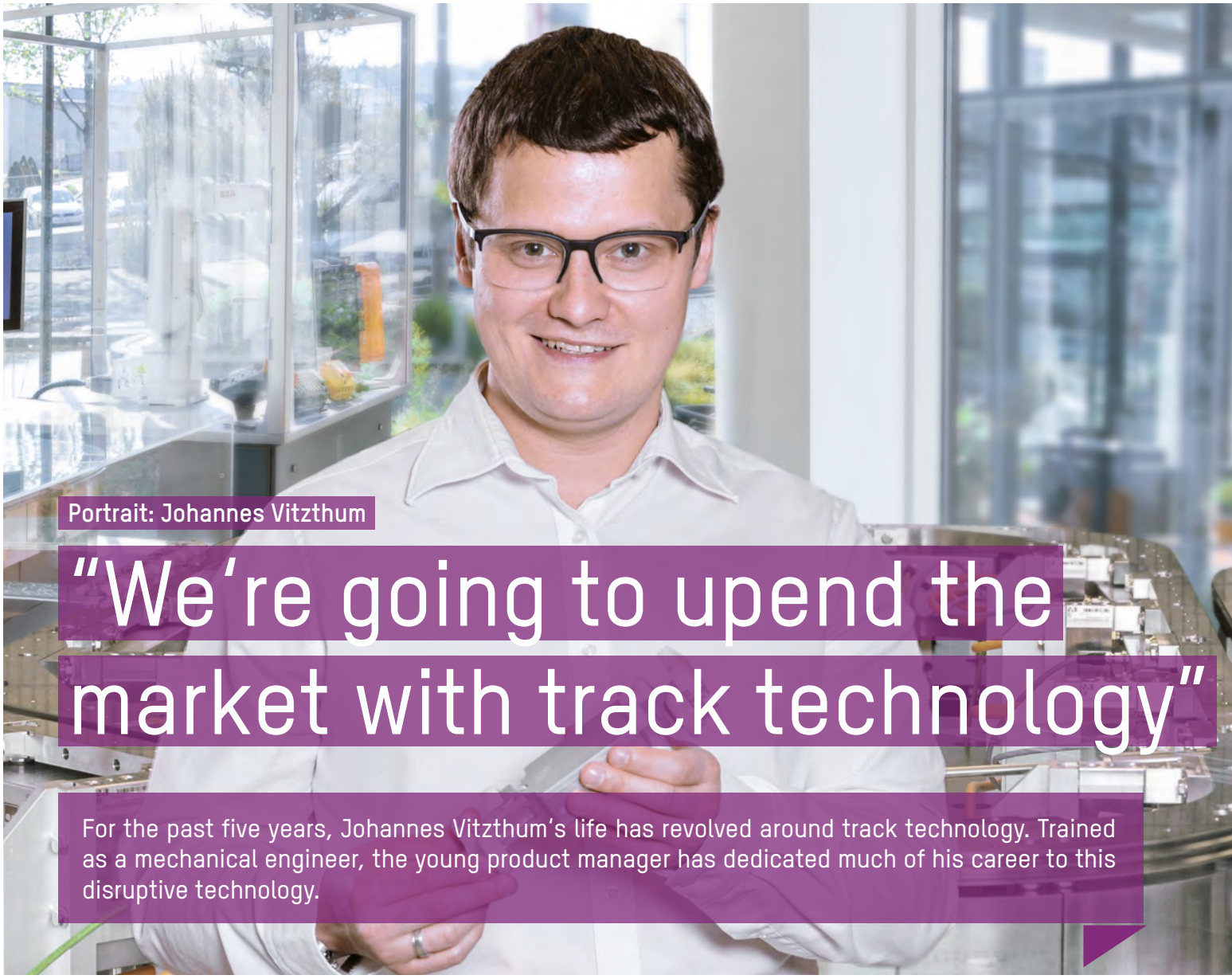
CANopen Safety provides secure data transfer in accordance with SIL 2, fulfilling a significant requirement for machine safety certification. CANopen Safety is available via a simple software update and requires no new control hardware. Following the software update, CANopen Safety devices such as joysticks can be connected directly to existing B&R X90 controllers.

Big performance in a small package

Compact drives minimize machine footprint

B&R has added two particularly compact variants to its integrated motor-drive solution. Equipped with powerful processors, the new devices are perfect for applications where tight synchronization and positioning precision are paramount. With the new options, the ACOPOSmotor portfolio now covers a power range from 283 W to 2.3 kW.

A powerful processor gives the ACOPOSmotor variants a fast internal cycle time of 50 µs for current, speed and position control. This makes them the right choice for highly dynamic processes where high-speed movements must be synchronized with impeccable precision.



Portrait: Johannes Vitzthum

"We're going to upend the market with track technology"

For the past five years, Johannes Vitzthum's life has revolved around track technology. Trained as a mechanical engineer, the young product manager has dedicated much of his career to this disruptive technology.

"When I walk down the supermarket aisle and look at the shelves full of food," says Vitzthum, "I often have to smile." That's because he knows the important role played by track technology in producing and packaging many of the products he sees. "I can't help feeling a tinge of pride as I reach for the coffee, the chocolate or the mozzarella," he chuckles.

Faster, cheaper, more flexible

As B&R's product manager for track technology, Vitzthum is very familiar with the challenges facing the manufacturing industry: "What manufacturing systems all have in common is they need to be faster, cheaper and more flexible," he says. "And that's exactly what track-based product transport makes possible." What fascinates him most about the disruptive technology? Its versatility. "You can really let your imagination run wild on a new machine concept, and almost every time tracks offer a way to make it happen. That makes my day-to-day work as product manager incredibly exciting."

With a master's degree in mechanical engineering and a bachelor's in business administration, Vitzthum has the ideal qualifications for product management. "My academic background has really helped me identify with our customers' struggles and offer constructive advice at eye level."

B&R customers are always supported by a multidisciplinary team of experts able to see their solution from every angle. But it's not only the customers who benefit from this well-rounded teamwork; Vitzthum also greatly appreciates the tight collaboration. "It gives me great insight into different areas of the company and helps me see the bigger pic-

Photos: B&R

ture," he says. "Our products all work together seamlessly to solve our customers' challenges – so it's only natural that our people do the same."

Role in the revolution
Vitzthum knew right away that track technology was right for him: "On my first company tour after joining B&R, I was shown a SuperTrak system and I knew instantly: This technology is going to upend the market and I want to be a part of that."

To hone his skills for the unique challenges of B&R's customers, Vitzthum began his B&R career by completing the company's immersive Engineering Camp training program. "I look back on those four months very fondly," he says. "It was a really exciting time – but also exhausting and challenging. I learned an incredible amount that I still benefit from today, and above all I expanded my knowledge of programming." He then began as an application engineer, working with customers to implement modern, flexible machines.

Tracks are no niche product
Track systems have assumed an important role in today's manufacturing systems and are used in many industries around the world. "Tracks have taken me to almost every continent: a trade fair in Australia, a customer visit in Japan, a product presentation in the US," says Vitzthum. He is confident that the technology will continue to gain momentum and enjoy long-term success.

Tracks are not a niche product, he points out, and they bring many advantages to all types of applications. Especially with the integration of tracks into its automation system, B&R offers a complete solution that allows machine builders to optimally meet their customers' requirements – and raise machine productivity to a whole new level.

What the future holds
"I don't have a crystal ball," says Vitzthum, "but I do know that humanity and consumer behavior are changing at an accelerating rate. To keep pace, the manufacturing industry will have to continually reinvent itself." Track systems are just the thing for that, he notes, because of the sheer endless possibilities they offer for new machine concepts. "I love to explore new ideas and approaches and I'm always up for a challenge. My motto is: nothing is impossible. That's why track technology is such a good fit for me." ←

Snapshot

What I studied:
Mechanical engineering, Technical University of Munich

What I do at B&R:
Product manager for ACOPOStrak

What fascinates me most about my work:
"Tracks are a really tangible product that offers clear and immediate added value. The technology is also still young and is poised to seriously upend the market – and I'm excited to play a role in that revolution. That's why, for me, it was love at first sight for this disruptive technology. You can really let your imagination run wild on a new machine concept, and almost every time tracks offer a way to make it happen. That makes my work incredibly exciting."

Test bench design

Flexible automation put to the test

Test benches for commercial vehicles have to cover a very wide range of different scenarios. Traditionally, preparing for each new test has involved a considerable amount of mechanical setup and additional programming. Together with B&R, enders has developed a solution that allows the testing equipment to adapt flexibly to new test scenarios – without any rewiring or reprogramming.

The company F. X. Meiller subjects its famous dump truck solutions to a broad spectrum of quality assurance tests – from small-scale material testing to comprehensive load testing on completed dump truck assemblies.

Recently, Meiller commissioned enders to develop a flexible new test bench control system to replace an existing one that was getting on in years. For one thing, the sensors, valve actuators and other outputs had to be rewired for each new test. For another, the controller could only store one test sequence at a time. Every time they wanted to change the test sequence, they had to reload the data onto the controller.

Furthermore, it wasn't possible to create new test sequences during operation, because that required direct access to the control program. Measurement data had to be recorded using an external device. The old control system also didn't provide any opportunity for remote monitoring or maintenance of the testing process.

In an emergency, the test bench could be shut down by hitting the emergency stop or triggered by basic threshold value monitoring – but there was no way to monitor and interpret complex correlations between measurement results.

Weaknesses of the replaced test bench:

- Mechanical setup for each new test
- No storage of multiple test sequences on the PLC
- Needed to interrupt testing to access application
- No internal storage of measurements
- No remote monitoring of test processes

Advantages of test bench with mapp Sequence:

- No programming knowledge required
- Fast and easy switching between tests
- Offline programming for uninterrupted testing
- Recording of relevant data and measurements
- Remote access with defined user profiles

Adapt test sequences flexibly

To develop the new test bench controller, enders relied on longtime partner B&R. "For us, B&R was the clear choice because the solution had to be as flexible as possible," explains Riccardo Princiotto, head of predevelopment at enders. "And with the modular software components from mapp Technology, we were able to do just that."

mapp Technology saves application developers a lot of programming work by providing many frequently required functions as pre-programmed modular components. Rather than coding from scratch, they configure the functions with only a few mouse clicks.

"Of all the options in B&R's toolbox, the mapp Sequence component was particularly helpful for our test bench application," says Princiotto. mapp Sequence made it easy for enders to embed the functionality of a configurable step sequencer or dynamic state machine seamlessly into the test bench software. Test engineers can open and modify an existing sequence in an editor or create a new one from scratch – all without any programming knowledge.

Since they can work in the editor offline on a laptop or PC, there's no need to interrupt ongoing testing to create new sequences. New sequences can be created right on the HMI screen or offline on a PC – or they can be provided along with the finished test bench in a custom sequence file.

"Test engineers can use mapp Sequence to create custom test sequences at any time, or load and modify existing ones," says Princiotto. "That makes it super easy for them to adapt the test bench to new scenarios, without needing to know anything about PLC programming."

As a result, Meiller can move much more quickly from one test to the next, and handle test sequences of any complexity. "mapp Sequence is the perfect tool any time you're creating an automation solution that needs to be easily adapted to individual requirements," Princiotto adds.

New test scenarios with no programming

Each test scenario is configured as a sequence of steps to be executed in a defined order. Creating them could hardly be easier. For each step, the operator defines one or more actions – or commands – along with the conditions under which they are to be executed.

"Operators can also define when a sequence should be aborted," notes Princiotto. "For example when the oil temperature exceeds a defined value." The operator defines the steps for each sequence and saves them on the controller for later use. In Meiller's case, around 30 sequences with an average of ten steps each were prepared for use in the test bench.

Fast results

Before starting a test sequence, the software checks whether all the specified signal sources, including the emergency stop, are connected. Since it's not always feasible to know the exact abort conditions for each signal in advance, enders has integrated a teaching function. During an initial test run, this function evaluates and displays complex correlations.

Based on this information, upper and lower limits can be defined for each signal value, which can then be used as abort criteria for the test sequence. These limits are monitored constantly during the testing process and displayed live along with the signal curves.

Photos: enders GmbH; Meiller

Enders GmbH supports companies in the development of technical products, plants, manufacturing processes, complete vehicles and digitalization. The company's customers come from the fields of plant and process technology, construction machinery and special-purpose vehicles, agricultural technology, additive manufacturing, health care, commercial vehicles and automotive sectors for B2B and B2C markets. As a B&R Qualified Partner, enders has many years of experience with B&R as its preferred technology for the automation of manufacturing systems, mobile machinery and test benches.

Test engineers can use the editor to create new test sequences without any programming knowledge.

Teaching is performed using the controller's web-based user interface, which enders created using the configurable widgets of B&R's mapp View HMI solution. mapp View makes it easy to create powerful, intuitive user interfaces without having to deal with the underlying web technology.

This technology is encapsulated in widgets, which are simply dragged and dropped into place and configured. "The mapp components and widgets noticeably reduce the time it takes to program basic machine functions and HMI software," Princiotto explains. "It really makes a substantial difference, even in a relatively small project like a test bench controller."

No rewiring

The control hardware for the test bench is housed in a compact, wheeled frame. The control application runs on a PLC from the X20 system, while the HMI application is displayed on a Power Panel T80 terminal with a 10.1" multi-touch display and robust glass screen.

A variety of X20 I/O modules are used to acquire signals and control actuators. The digital and analog inputs and outputs are internally hardwired and accessible via connectors on the rear of the test bench controller. Thanks to optimized wiring and sophisticated sensor technology, the internal wiring doesn't need to be adapted for different test scenarios.

Maintenance from a distance

The previous test bench solution lacked access to important data for analysis and diagnostics. With the B&R controller, all the data is now recorded and stored for later evaluation. Different profiles and roles can be defined to manage user access. One such profile is set up specifically for remote access and unlocks a corresponding overview in the user interface.

All the relevant information about the testing process is collected by the X20 controller and displayed for the user in the HMI application. If problems occur in the field, the test sequence can also be terminated remotely. New test sequences can be created and loaded onto the controller at any time, where they are immediately available for use on site. "B&R's mapp Technology and control hardware made the task of implementing the test bench control system exceptionally efficient," says Princiotto with satisfaction. ←

Riccardo Princiotto

Head of Predevelopment, enders GmbH

"B&R's mapp Technology and control hardware made the task of implementing the test bench control system exceptionally efficient."

Packaging industry

Converting goes digital

Fickle consumers and creative marketers are forcing packaging companies to produce smaller batches with more frequent stops for setup and adjustment. To add the necessary flexibility without sacrificing productivity, they need machines that reduce manual operations, improve operator assistance and provide helpful performance indicators. Packaging printing and converting machine manufacturer DCM-ATN has just what they're looking for with its highly automated smart machines based on B&R's technological innovations.

The ongoing trend toward smaller batch sizes and more volatile demand fluctuations entails new challenges for packaging converters. Many of them are now looking for solutions to reduce setup times and track machine performance. Machine builder DCM-ATN, whose machines convert flexible plastic materials and cardboard into bags, packs and sleeves, has begun developing a new generation of smart machines.

One of them is a fully automated slitter-winder – the SuperTigre – which, at the time of writing, is just about to be launched onto the market. In parallel, DCM-ATN has also been developing an edge-connectivity solution to enable machine supervision and comprehensive performance analysis.

Reducing manual operations and material waste

"From our long experience with B&R as an automation partner, we knew that we could rely on them again for our latest developments," explains Matthieu Lorchel, export business engineer at DCM-ATN. "In particular their motion control expertise and integrated solutions that combine configuration, programming and diagnostics in a single software tool have helped us take big steps in reducing manual operations and improving operator guidance."

Thanks to efficient collaboration with B&R to implement their latest solutions, DCM-ATN was able to equip its new-generation slitter rewinder with an array of new automatic features that maximize productivity. The SuperTigre offers automated positioning of the web-guide camera as well as automated slit positioning, tape application, cross cutting, reel change, slit reel unloading and core positioning.

Web-based HMI makes machines more friendly

When handling smaller batches, operators have much more interaction with the machine. This makes the operator terminal and HMI design even more important. "We wanted to make the SuperTigre's operator interface as simple as a smartphone," explains Alexandre Métay, DCM-ATN's head of automation. "So we were looking for a software solution that would allow us to create web-based applications, as well as a multitouch operator terminal that would support them."

Métay found a perfect match for these requirements in B&R's Power Panel series of operator terminals and its mapp View solution, which enables developers with no knowledge of web programming to create powerful, intuitive web-based HMI applications. "That really made things easy for our automation engineers," he recalls, "because all they have to do is drag and drop the widgets into place and then configure them."

ConnectiVision: Machine monitoring software from DCM-ATN based on B&R's Edge Controller solution.

Edge monitoring for all machines
To gain efficiency in volatile markets, packaging printers and converters also need to collect, process and visualize production data to better assess the performance of their machinery and teams. That's why DCM developed ConnectiVision, a comprehensive monitoring system based on a B&R Edge Controller PC.

The ConnectiVision solution is available for all DCM-ATN machines. It offers a variety of modules, including one for monitoring machine activity, one for generating reports and one for remote monitoring of machine performance from a tablet, smartphone or PC.

Always near the customer
Like B&R, DCM-ATN is strongly focused on customer support. "Maintenance responsibility now lies on the equipment supplier's side," explains Lorchel. "That makes customer service quality essential in our markets." DCM-ATN offers service contracts that cover technical support and maintenance.

To successfully deploy these services worldwide, the company relies on technical staff based in Europe, America and Asia as well as on B&R's international network. "With 85 percent of our turnover coming from export sales, B&R's global presence and high-quality support are a real asset for our business model," says Lorchel. "Our staff includes twelve different nationalities, and we found a perfect match for that culture of international collaboration in our partnership with B&R."

mapp View
The web-based operator interface developed by DCM-ATN makes slitter-winders much easier to set up and operate. It was created using drag-and-drop widgets in B&R's mapp View HMI solution, which requires no knowledge of the underlying web technology.

Edge Controller
DCM-ATM has developed a comprehensive machine monitoring and supervision interface using B&R's Edge Controller solution. Packaging converters can use it to collect and view performance data from a PC, tablet or smartphone. ←

Matthieu Lorchel
Export Business Engineer, DCM-ATN

"B&R's global presence and high-quality support are a real asset for our business model."

Photos: DCM-AT, B&R

Product news

Predict the failure, prevent the loss

Health monitoring helps prevent costly downtime

B&R's real-time operating system, Automation Runtime, now automatically logs data about storage media's health to provide machine operators and service personnel early warnings of impending failure. Storage media can be replaced before a crash causes lost data and costly downtime.

"Failure of a storage device can be devastating," says B&R product manager Varad Darji. "Even with a backup, a certain amount of recently changed data and settings are always lost. It can even bring down the entire machine, resulting in expensive lost productivity until an engineer replaces the drive and restores the settings." The new Storage Health Data function is available with an easy update to B&R's Automation Studio engineering environment.

Reliable wear detection

Measurement module for efficient monitoring

With a new bus controller, B&R has added a gate measurement module to its portfolio for efficient monitoring of machinery and processes. The new gate measurement module joins the X67 lineup to help keep manufacturing processes consistent and reduce the rate of rejection, thus increasing both quality and productivity.

By measuring the duration of switching operations with extreme precision, the module is able to detect even the slightest deviations, which can point to component wear, changes in temperature or other environmental factors. It thereby enables efficient, condition-based maintenance strategies.

Mobile automation

Smart wastewater doesn't waste water

Smart city initiatives around the world aim to improve citizens' quality of life while making more efficient use of precious resources like energy and water. Smart wastewater management systems detect impending blockages in time to deploy cleaning vehicles like the state-of-the-art IndiCycler from Aryan Pumps & Enviro Solutions. Featuring a robust mobile controller and modular software from B&R, it does the job efficiently and sustainably by recycling extracted sewage water.

Thousands of years before aqueducts carried water into ancient Rome, the inhabitants of the Indus Valley enjoyed some of the world's first urban sanitation luxuries – running water, indoor plumbing and city-wide sewer and drainage systems. Today, India pays tribute to this millennia-old tradition with smart wastewater systems designed improve the health, safety, comfort and overall quality of life for its citizens.

Clean and sustainable

Cleaning and maintaining these systems is a job for municipal vehicles like the IndiCycler from Aryan Pumps & Enviro Solutions. "One of the primary goals of smart wastewater management is to conserve water," says Aryan's chairman and managing director, Prashant Subhash Sutar. "So it only makes sense that our vehicles treat the precious resource with the same amount of respect." To do that, those vehicles must be equipped with automation technology that performs reliably under the harsh conditions on the road.

Headquartered in Pune, India, Aryan offers a variety of municipal vehicles for solid and liquid waste management as well as firefighting and rescue operations. To keep wastewater flowing smoothly, Aryan has developed a state-of-the-art sewer cleaning vehicle that recycles extracted sewage water and reuses it for subsequent jetting operations. "That's one feature that really makes us stand out from the competition," notes Sutar. It makes the vehicle more efficient and environmentally friendly, both by reducing freshwater consumption and by eliminating extra trips otherwise required to refill the tanks.

Suck, jet, repeat

One of the most efficient and powerful machines of its kind on the international market, the IndiCycler incorporates a state-of-art filter system, positive displacement vacuum pump driven by an auxiliary engine, jetting pump and control system. The entire solution can be mounted on commercial vehicle chassis of different sizes, depending upon the required capacity of the freshwater and sludge tanks.

The IndiCycler performs high-pressure jetting operations to dislodge solid waste and silt that has settled in sewer lines. It is able to desilt and unclog lines ranging from 50 to 900 millimeters in diameter. It also performs suction operations to remove sludge from depths of up to 8 meters. In blow-back operation, silt accumulated in manholes or septic tanks is mixed with water to create a slurry that can then be extracted.

Rugged hardware, modular software

"Especially in the field of waste management, municipal vehicles are very cost competitive, yet demand a decent amount of automation," explains Sutar. "With B&R's robust X90 controller, we were able to save the considerable cost of cabinets and mount it directly on the vehicle." The X90 mobile controller is designed especially for the kind of harsh environment and conditions where the IndiCycler is used, and its voltage range allows it to be powered using the vehicle's battery. "We evaluated many solutions and systems with respect to performance and our technical team was thoroughly impressed with the performance of B&R system for our IndiCycler."

Aryan also made use of B&R's ready-made mapp Technology software components. "That reduced the time and cost of developing and testing the control application and the intuitive

Photos: Aryan Pumps & Enviro Solutions, iStock.com/tuachanwatthana

Cleaning and maintaining smart wastewater systems is a job for municipal vehicles like Aryan's IndiCycler.

HMI system, which is displayed on a mobile touchscreen operator terminal in a rugged stainless steel housing," says Sutar. B&R's integrated development environment, Automation Studio, made it easy for Aryan's developers to create modular software using their preferred language. End users can easily enable and disable options for different machine types via the HMI screen.

"We have been very impressed by both the convenience of B&R's software and the robust performance of its hardware under extreme conditions," concludes Sutar. "Working with B&R came very naturally, and together, we're contributing to a cleaner, more environmentally friendly India." ←

Prashant Subhash Sutar
Managing Director, Aryan Pumps & Enviro Solutions

"We have been very impressed by both the convenience of B&R's software and the robust performance of its hardware under extreme conditions," concludes Sutar. Working with B&R came very naturally, and together, we're contributing to a cleaner, more environmentally friendly India."

The IndiCycler recycles extracted sewage water and reuses it for subsequent jetting operations.

Pharmaceutical production

Where quality and compliance meet digitalization and design

Builders of tomorrow's smart pharmaceutical factories face new requirements that come with digital transformation. As one of China's leading OEMs for the pharmaceutical industry, SMA has developed a new tablet press that meets these needs by pairing connectivity and transparency with functional design and operator convenience. To bridge the divide between compliance, performance and usability, SMA relied on automation partnership with B&R.

The pharmaceutical industry is no stranger to strict requirements, with some of the most closely monitored regulations and standards around. Yet, as pharmaceutical producers build increasingly digital, connected factories, the technical challenges and resulting solutions are growing more complex than ever. That's why SMA set high goals for its new tablet press – not only for the usual performance metrics – but also in terms of functional, operator-friendly design.

In its evaluation of automation technology for the new press, the company also prioritized total cost of operation, including factors such as software reusability and the availability of remote solutions for machine commissioning, service and diagnostics. After several exchanges with the B&R team about project requirements and functional realization, SMA was confident that B&R and its automation system were more than up to the task, and decided to cooperate with B&R on the new tablet press.

Quality comes first
In pharmaceuticals, quality is always priority number one, and so it is the first factor on which pharmaceutical machinery is judged. For a tablet press, quality means the ability to produce tablets of precise and consistent weight and thickness. This is determined in large part by the pressure applied by the upper and lower punches. Getting fast, precise measurements of this pressure is crucial in order to optimize machine performance by making dynamic adjustments to the servo axes of the punches, the upper and lower pre-compression rollers and the fill station.

In the SMA tablet press, this measurement performance is achieved using an X20 analog input module from B&R, which enables 5 kHz / 16-bit sampling with a buffer. Even higher speeds can be achieved using a high-speed FPGA-based processing module featuring B&R's reACTION Technology, which enables cycle times as fast as 1 µs. The reACTION Technology module also supports IEC 61131-3 programming, and eliminates the need for expensive high-speed controllers.

Serving as the automation platform is an Intel Core-i powered, swing-arm mounted B&R Panel PC 3100 that can run Windows and real-time tasks simultaneously. Connected via high-speed real-time POWERLINK, two B&R ACOPOS P3 servo drives deliver precise control for six axes in a third of the cabinet space that would be required for conventional single-axis drives.

Connectivity made easy
In addition to processing power and control precision, modern machines also rely on data connectivity. The smarter the factory, the more equipment on the plant floor needs to be connected to MES/ERP systems for tasks such as financial accounting, order scheduling and quality control. With integrated OPC UA servers and support for PackML communication, B&R's X20 control and I/O system makes it easy for the MES system to configure and access the machine to obtain data about production operations, audit trail, quality and maintenance.

In fact, with OPC UA, not only can equipment be interconnected within factories, B&R controllers can also be used as edge devices that aggregate data and send it to the cloud, where sophisticated machine learning algorithms can be applied. The real-time OEE is measured locally and then sent to the production management system or for cloud monitoring. B&R even offers a ready-made software function that makes it easy to send alarms directly to service technicians on their smartphones.

Modularity brings simplicity
For the FDA/GAMP certification required of all pharmaceutical machinery, SMA was able to rely on B&R's mapp Technology, which encapsulates key functionality in modular, pre-programmed software components. The mapp Audit component made it easy to meet the 21 CFR Part 11 requirements for electronic signature certification and tamper-proof documentation, while mapp User manages user rights and access.

With all configuration and no programming, these mapp functions and others – including recipe management, business intelligence reporting and more – are easy to implement, and substantially accelerated SMA's development process. The mapp View package also gave SMA's developers powerful tools for HMI design. They were able to create a web-based HMI application that displays large amounts of helpful data clearly and intuitively. With OPC UA connectivity, it can be viewed on any PC or smartphone that supports JavaScript and HTML.

Yin Wenping
Chairman and General Manager, SMA

"We really set the bar high for this new machine, but our team of B&R and SMA engineers was more than up to the challenge. That has us really excited for future projects, where we will take on even more of the toughest challenges in smart pharmaceutical production."

Photos: SMA, iStock.com/Jay Yuno

For its new tablet press, SMA set high demands on performance and usability.

Digitalization drives the future

With its B&R automation solution, the new SMA machine achieves very high-speed performance, and users enjoy its digital capabilities along with the attractive and intuitive interface. "We really set the bar high for this new machine, but our team of B&R and SMA engineers was more than up to the challenge," says SMA chairman and general manager, Yin Wenping. "That has us really excited for future projects, where we will take on even more of the toughest challenges in smart pharmaceutical production." ←

Three closing questions

for controls expert Andreas Hager

The Internet of Things, virtualization and 5G are opening up many new possibilities. Will our traditional PLCs soon be moving to the cloud?
Andreas Hager: I can certainly imagine that, in the future, some processes will be controlled from the cloud. Nevertheless, we'll still need hardware on site to handle data transmission. And as soon as there's time-critical synchronization of sensors and actuators involved, the control intelligence itself will also need to be on site. Even with the unprecedented speeds of technologies like 5G and TSN, it's not enough to completely virtualize all machine controls and move them to the cloud.

Can you express that in numbers?
Hager: In a modern machine, when motion control sequences have to be precisely synchronized, we're talking about cycle times of well under one millisecond. Anything higher than that slows down the machine and impacts production efficiency. If we look at 5G, the real latency is currently in the double-digit millisecond range. On top of that, you've got the fluctuations that come with wireless connections. That's a dealbreaker for motion control applications – especially wherever safety is involved.

So will controllers still look the same in five years as they do today?
Hager: Not entirely. The basic functions you find in every PLC will still be the same five years from now. Nevertheless, the Internet of Things and cloud computing are introducing entirely new demands. We'll be needing them to not only control the machine, but also collect and evaluate huge volumes of data and make it ready for higher-level systems. We'll also be using 5G for things like secure remote maintenance. So – far from becoming superfluous – the PLC will actually grow in importance by taking on an additional role: as an edge device connected to the cloud.

Photos: B&R

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B&R
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B&R Strasse 1
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t +43 7748 6586-0
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office@br-automation.com
www.br-automation.com

Your local contact
www.br-automation.com/contact