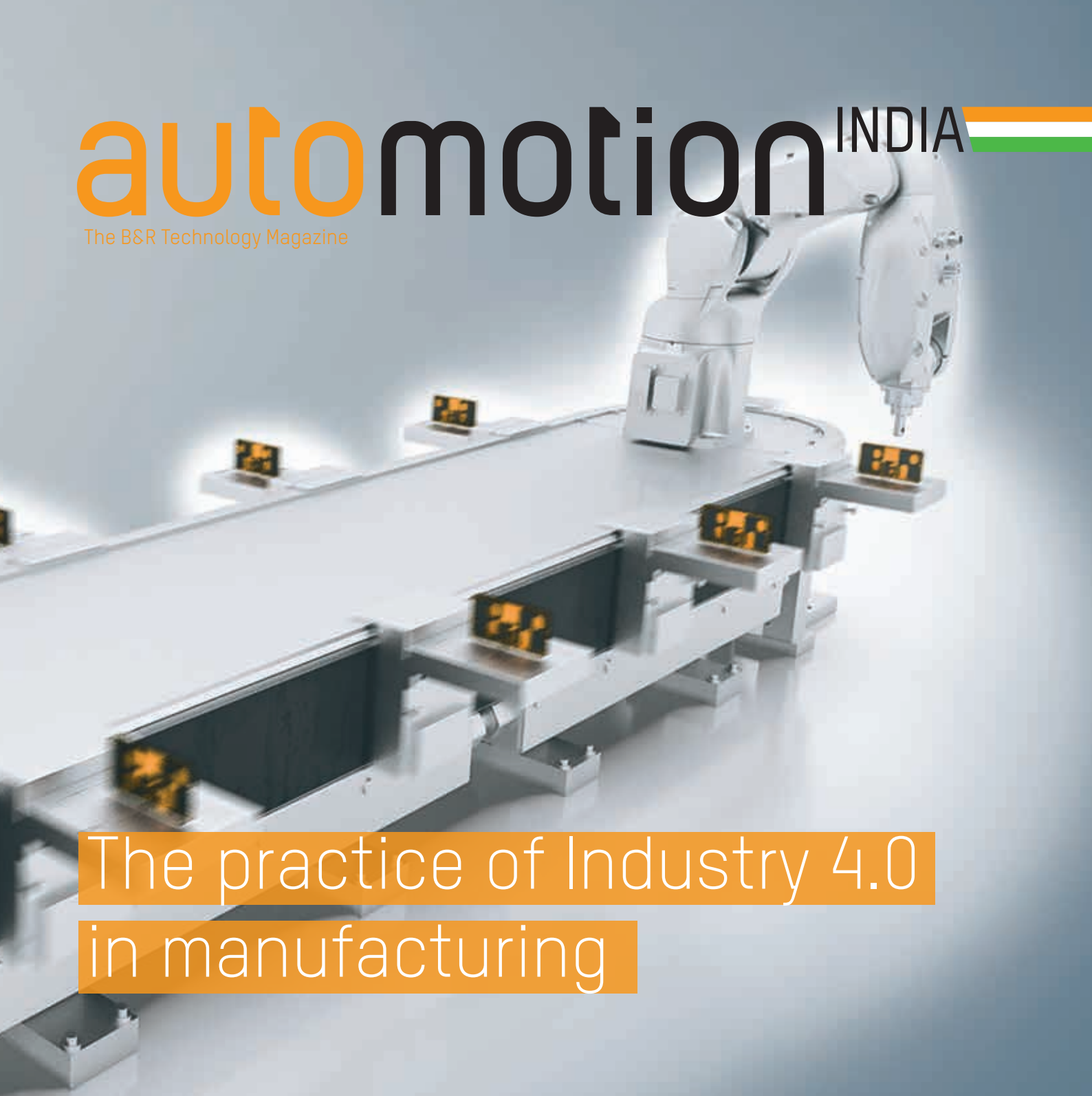
automotion INDIA

The B&R Technology Magazine



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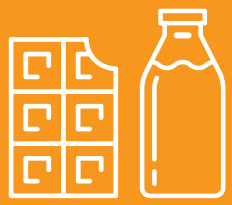

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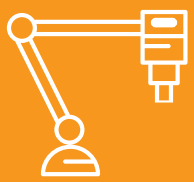

PERFECTION IN AUTOMATION

TEXTILE

METAL

CHEMICAL

PLASTICS

PRINTING

ENERGY

editorial

publishing information

automotion INDIA:
The B&R technology magazine
Second edition

Media owner and publisher:
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Graphic design, layout & typesetting:
Deepak Phegade
Printing: Kala Jyothi Process Pvt Ltd
Hyderabad
Project Execution by: A&D India
www.industr.com
Published at: B&R Industrial Automation Pvt. Ltd.
8, Tara Heights, Wakdewadi,
Pune 411003
Image courtesy: Shutterstock (pgs. 16, 28, 38, 52)

Dear Reader,

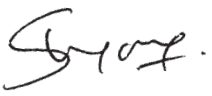
The speed of change brought by technology around us is mesmerising. Be it in our daily lives with Google pop-ups suggesting shorter routes and flight updates or in the automated machinery surrounding us on the shop floor, technology is fascinating at every step of the way.
It was not long ago that we heard about Industry 4.0 in India and today, we are already seeing contests organised around its on-ground implementations in the factories. So, what is driving this dramatic change in our approach towards adoption? Indian manufacturers have realised that automation is not just about replacing human labour with automatic machines, but it is also about bringing flexibility and efficiency in operations, cutting down costs, reducing wastage, safeguarding humans and machines, complying with regulations, and ultimately, staying ahead in the global competition.

B&R, an automation specialist, solves the most complex manufacturing challenges with the help of solutions in connectivity, hardware and software technology. Our scalability+ programme helps users to select the right technology without restricting future expansion needs. Manufacturers need not invest a lump sum amount at the beginning as they can start small and implement their ideas gradually. Machine builders with scalable hardware and software platform can develop different solutions for varied markets in a faster way. B&R enjoys an unmatched position in the market to cater to Indian users. Highly innovative products and rich experience in the industry makes us the right partner for your journey on the path of digital manufacturing.

In this issue, we bring to you success stories from our customers and our latest innovations.

Welcome to the second issue of automotion India.

Happy reading!



Shyam Padwal
Marketing Manager

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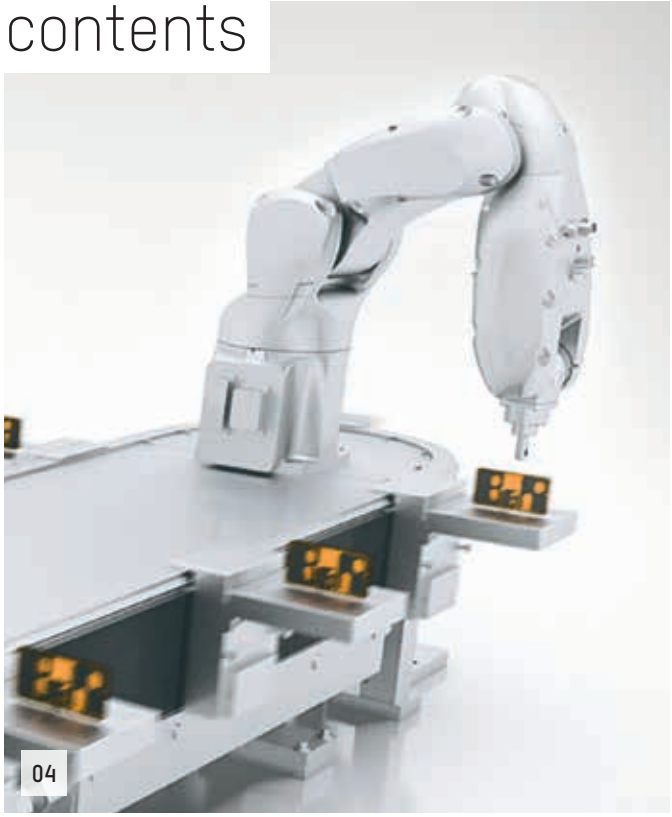
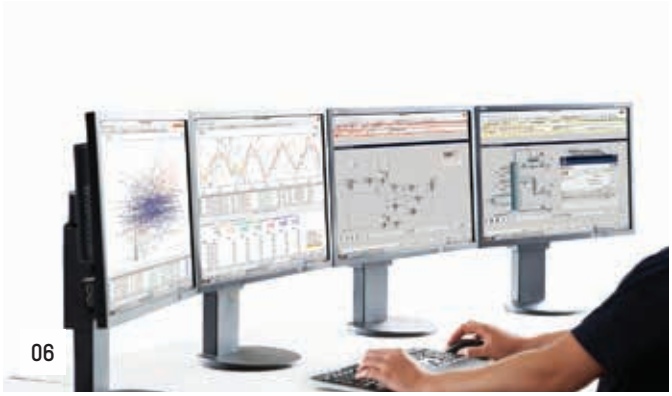




The practice of Industry 4.0 in manufacturing

Industry 4.0 encompasses smart 'things' such as sensors, actuators, controllers and machines, which are then autonomously able to communicate and control one another and take decisions, thus minimising operator interventions. We are observing the convergence of IT and OT in such connected shop floors. Manufacturers clearly understand the benefits accruing from adopting Industry 4.0 and there is an increased eagerness to start implementing. Middleware plays a vital role while enabling the IT and OT convergence, thus streamlining the adoption of Industry 4.0. We, technology providers, are all gearing up to produce components and subsystems to enable this implementation.

Sivaram PV,
Managing Director, B&R India

The above set of statements is largely true, yet misses some vital clues. Industry 4.0 clearly defines the desired benefits. But, these benefits are largely the same as what plant heads and business heads have always wanted – namely OEE, productivity measurement, easier maintenance and thereby, lower downtime, energy measurement and thereby, economising the consumption, flexible manufacturing with small batch sizes and large variety, and so on. So, if the benefits are nearly the same then what is new about Industry 4.0?

There is rapid evolution in technologies – higher computing power available in smaller sized units, easy connectivity among devices, and more intelligent sensors, controllers and actuators. A significant outcome of this is that the industrial controllers for machines and processes, can make more decisions autonomously, and can communicate with super-ordinated systems effectively. The benefits that plant heads and business owners desire can be fulfilled to a greater extent, since information is available more quickly and in greater quantity at the point of need. Then, is there anything missing?

The above presumes that the devices can communicate with each other easily. This needs a set of commonly understood protocols, which are supported by multiple vendors. In short, devices must use open protocols, such as Ethernet POWERLINK, OPC-UA and openSAFETY. Such protocols must satisfy a wide variety of needs such as real-time synchronous communication at field level, safe communication at M2M level and secure communications to the Cloud. The next need is having a capability to collect all the vast amounts of data, convert it into appropriate norms and extract information out of it. This needs something called as 'Middleware', which integrates the applications from shop floor with IT systems. APROL, a plant and factory automation solution from B&R, can also assume the role of middleware.

We also need solutions, which can be implemented in phases. As complete disruptions in the manufacturing process are catastrophic, it is ideally recommended to start small and achieve partial gains before moving on to the next phase. This is important as these transformational systems need an evolution in procedures and practices. It is well known that changes in behaviours and habits need time for internalisation. Hence, we need a system that can be implemented in tandem with the evolution in the processes and procedures in the plant.

To add to this, the evolution of systems is rapid and the prediction horizon is short. We need to look for systems, which are capable of being scaled up regularly, to the latest in hardware and communications, without having to rewrite the costly software. Successful implementation is possible when we minimise the relearning or 'system-shock' to the operating personnel.

In this issue of automotion INDIA, we have a set of implementation stories from a range of industries, where our customers have used B&R products and solutions for the benefit of their customers. Every set of innovation and technology features implemented by B&R has impressed and helped the customer. This has enabled them to stay ahead of technology and gradually progress towards realising the goal of Industry 4.0.

APROL

IIoT ready Distributed Control System

Today, smart and intelligent manufacturing is the need of the hour. Every factory is talking about their needs of having a connected shop floor. This has given rise to the 4th industrial revolution, which comprises of, data analytics, business intelligence, industrial IoT and many other aspects. Digitizing the manufacturing processes is one of the priorities of this industrial revolution, which would help in capturing the value of the internet of things.

Challenges for plant and factory

The plant, factory builders and operators are faced with three primary challenges. The amount of risk and investment needed for a successful implementation, handling humongous data and making existing plants ready for the future. The machines and plants are already generating huge data and with IIoT, the amount of data is expected to further increase exponentially. With the newer greenfield projects, things can be streamlined as the setup is new and the plant can demand newer functionalities and also have a large budget available. On the other hand, to make existing setup involving multiple vendors, networks and systems with a limited budget act as a major deterrent to implement the IIoT solution in the plant. Achieving horizontal and vertical connectivity is essential in a plant and needs common standards for communication. However, the current market scenario is very different with proprietary communication technologies proving a hindrance for complete plant connectivity.

Control system ready for IIoT

Gathering data from the field and sending it to the upper layers without using additional interfaces and providing machine-to-machine connectivity are two major activities, which an IIoT ready control system needs to perform.

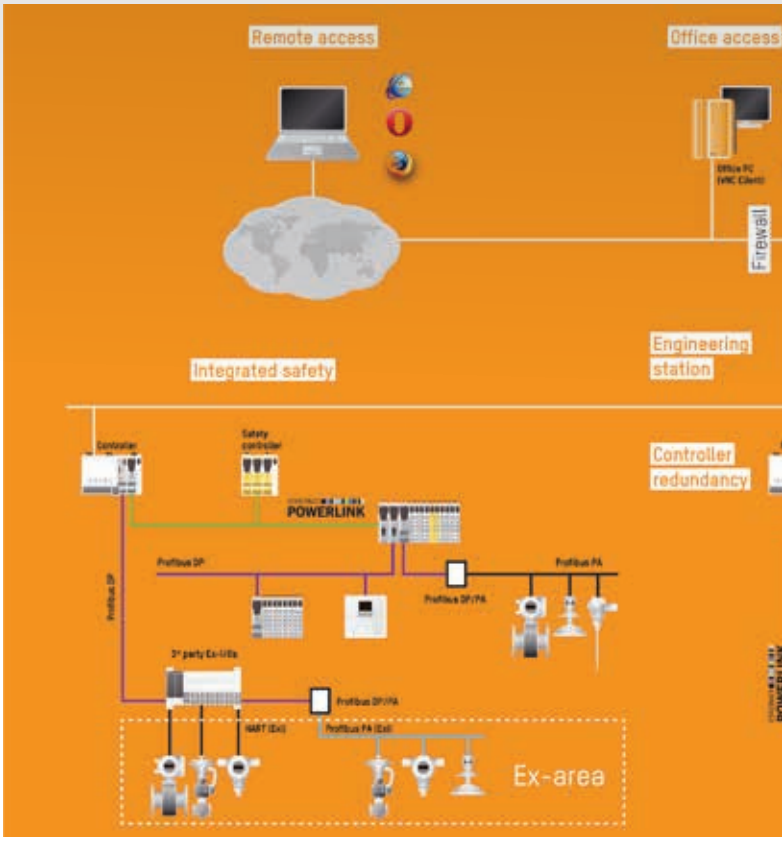
Using available open source solutions is the answer to the current market situation and breaking the shackles of proprietary solutions. This is also a core of the Industry 4.0 approach. OPC Unified Architecture (OPC UA) provides a non-real time communication from various machines to the upper layers as well as facilitates a machine-to-machine communication without hassles using the existing systems and controllers. It has robust security mechanism already in place to meet the IIoT needs of the plants. Safety is another crucial aspect in plants. To have a safe horizontal and vertical communication, openSAFETY has been used in the industry for over a decade for transferring safe data. Plant builders and operators can thus benefit from the safe connectivity from field to the cloud as openSAFETY works on POWERLINK, OPC UA, Modbus, Ethernet, CANopen and any network.

APROL is an open DCS platform from B&R enabling the customers to become IIoT ready. It has numerous features coupled with out-of-the-box solutions making it the undoubted choice for plant builders while considering IIoT implementation.

Scalable architecture

APROL has unique scaling possibilities right from 50 to 500,000 I/O channels. From a basic configuration with a controller and an industrial PC up to a complex client-server system featuring hundreds of

APROL process control - Scalable. Modular. Rugged.
Energy monitoring, condition monitoring and advanced process control, APROL offers out-of-the-box solutions that come preinstalled, preconfigured and ready to use. In a single, consistently easy-to-use platform, APROL unifies process automation, factory automation and infrastructure automation.
As of today, APROL already has over 4000 installations worldwide.



B&R provides complete solutions for a new installation or an existing installation to become IIoT ready

controllers and dozens of runtime servers and operator stations – there is an ideal APROL architecture for any set of requirements. Should those requirements change; the system can be expanded modularly at any time to add new functions. APROL delivers all the advantages of process control without demanding specialist knowledge. These solutions can be expanded into a full-fledged process control system at any time without having to switch to a new system.

Enhancing software experience

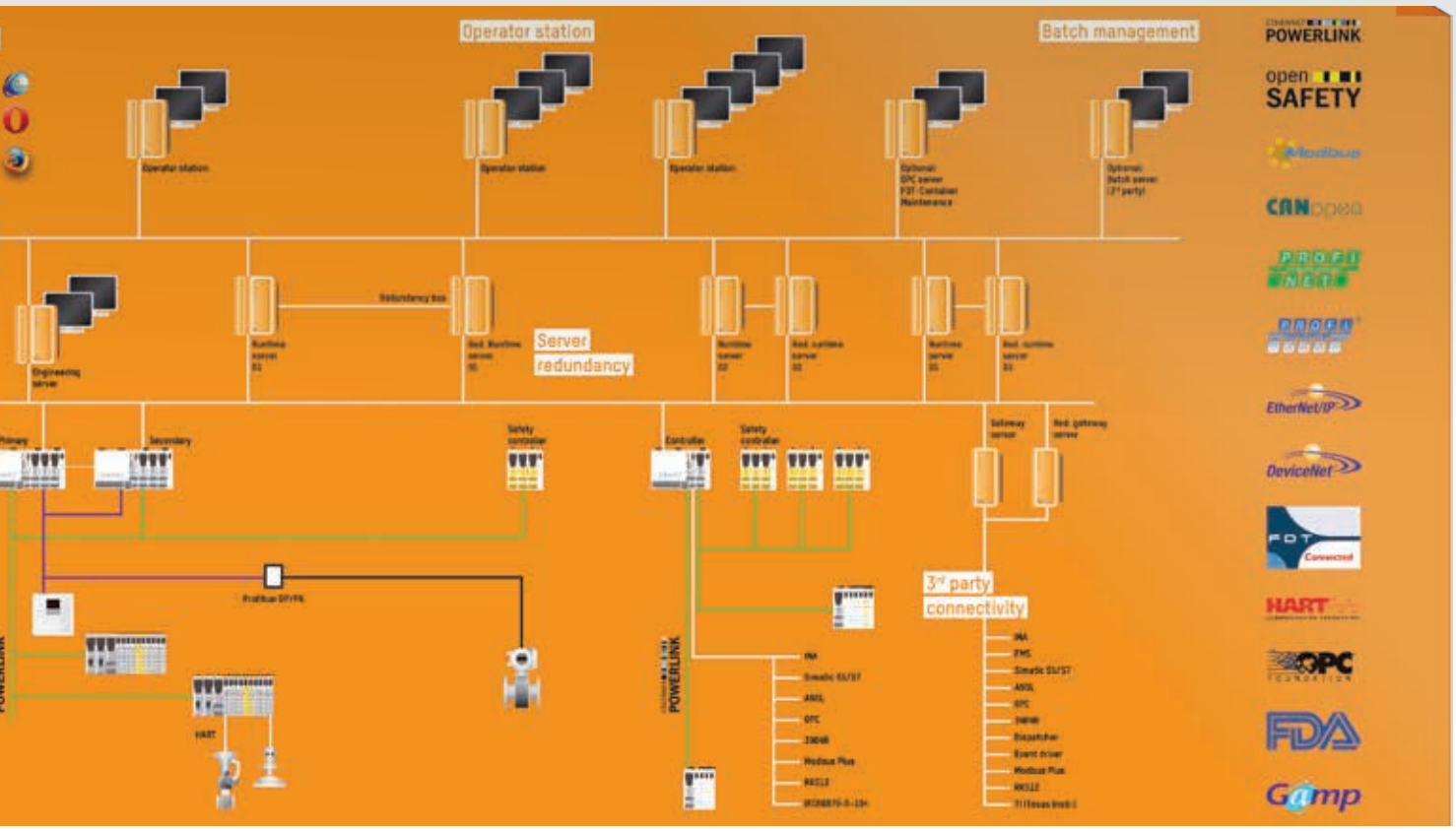
APROL provides close to 100 control modules under the Process Automation Library (PAL) fitting for all disciplines encapsulating all the prepackaged solutions. As of today, APROL already has over 4000 installations worldwide. The software provides possibilities of concurrent engineering along with offline engineering of over 25 engineering clients sitting at various locations. Version management is an integral part of the engineering tool, which creates a new version for each change and provides multiple hardware configurations in one project. This makes the job of the programmer and commissioning engineer extremely easy. APROL leverages open source technologies and offers complete connectivity based on OPC UA, POWERLINK and openSAFETY and offers its customers the perfect tools to meet the high industry requirements.

Redundancy at all levels

APROL provides full transparency and connectivity at all levels. In many processes, high availability must be guaranteed in order to avoid costly downtime. Such plants rely on complete system redundancy. APROL supports redundancy at multiple levels coupled with integrated safety to provide complete scalability. With Ethernet POWERLINK, APROL offers multi-master, media and ring redundancy at the controller level and field level, which has a changeover time of less than 2 POWERLINK cycles. Thus, these controllers having higher availability are able to gather data from the sensors, actuators and many other peripheral devices in real time. APROL enables plant and factory operator's benefits from redundant operator stations on a redundant Ethernet TCP/IP based operator bus. It also supports redundant OPC servers for connecting to 3rd party OPC clients. At the process level, APROL provides the possibility of redundant runtime servers and runtime stations connecting to the controllers through a redundant process bus working on Ethernet TCP/IP. The process bus can also be connected to redundant gateway servers. Along with controller redundancy on field level on Ethernet POWERLINK as well as Profibus DP APROL supports power supply redundancy and cable and ring redundancy.

APROL as a middleware

More and more companies are finding themselves obligated –



whether through legal standards or customer contracts – to provide rigorous documentation of their manufacturing processes. While this phenomena has traditionally been limited to the food, beverage and pharmaceutical industries, today, it has been found that automotive manufacturers, for example, require that their suppliers provide a comprehensive pedigree of each and every component. Not only does a process control system record all relevant production data, it also keeps a history of every operator action and logs every warning or alarm ever generated. It is the perfect tool for the job. B&R's process data acquisition solution, APROL PDA, is available as an integrated feature of the APROL process control system or as a preconfigured standalone package.

Data analytics for creative data exploration

Traditional analysis methods based on rigidly defined reports are gradually giving way to more creative exploratory approaches. When dealing with large data sets whose correlations are not fully understood, exploratory data analysis is an approach that uses graphical visualisations to provide insight and help form hypotheses. With access to data from all sources, the analysis can expose important cause-and-effect relationships. APROL features a comprehensive selection of reporting and analytical tools able to generate custom reports at the push of a button. Designing a custom report is as easy as using drag-and-drop. Ad-hoc reports, dashboards and mobile access with server-side authentication ensure that the information you need is available when and where you need it. Figuring this out does not need specialists with IT knowledge. The analytical and reporting features really round off the APROL automation platform. They are a key part of what makes it the ideal tool for meeting the challenges of the future.

Greenfield or brownfield: Become IIoT ready

B&R provides complete solutions to make new installation as well as existing installation smart and IIoT ready. Gathering data from various controllers on the field and moving it to the MES/ERP or the cloud is realised easily with B&R APROL solutions. For specific applications such as energy monitoring, condition monitoring and advanced process control, APROL offers out-of-the-box solutions that come preinstalled, preconfigured and ready to use. In a single, consistently easy-to-use platform, APROL unifies process automation, factory automation and infrastructure automation.

These enormous benefits of APROL – hardware, software, redundancy and out-of-the-box solutions coupled with open source communication standards such as OPC UA, Ethernet POWERLINK and openSAFETY enable the factories and plants with a smooth IIoT implementation. ←

Interview

David Hemetsberger

International Sales Manager - India, B&R

In conversation with David Hemetsberger, who provides a detailed account of B&R's close cooperation with its customers, helping them build solutions, which are unique and tailored to their exact needs. He also speaks on B&R's comprehensive automation solutions in machine and process control, which provides a strong foundation for perfectly integrated automation that delivers better performance and maximum value.

Q. B&R is undoubtedly a technology leader. Do you owe it to the innovative products you offer?

The automation market is very competitive and it is necessary to stay one-step ahead of competition. B&R is at the forefront when it comes to technology. Our slogan is our mission. The pursuit of Perfection in Automation has inspired and guided B&R for over 35 years. To us, perfection means more than developing the best solutions in industrial automation – it also means developing the best relationships. We build lasting relationships with our customers, partners, employees and suppliers on a foundation of mutual trust and measurable benefits. As a private company, we know the value of stability and sustainable growth. Our hard-earned expertise flows into the development of new products that continually steer the progress of new market trends. That makes us a reliable partner – which is something we take great pride in.

Q. B&R mentions being highly customer focused. How do you justify this?

Over the years, we have seen a great rise in the use of automation in industry with machines becoming smarter and intelligent. With Industry 4.0, I am sure that automation will surely play a significant role in advanced machine concepts and we are looking at a bright future. All the machine builders in a quest to build innovative solutions rely on B&R. This is clear from the fact that market leaders in all industries trust in B&R since many years with over 27,000 plant installations globally.

In a fast growing Indian market, there is a constant need for new consumer products. The "Make in India" campaign announced by the government serves as a great opportunity, which has come at the right time with Industry 4.0. Our APROL, which is a process and factory automation solution, caters to the Industry 4.0 needs of the greenfield and brownfield projects.

Q. You mentioned about customer service as an important element. Please elaborate.

With 180 offices in 75 countries, we are always close to our customers and we understand the importance of providing timely and quality services. Our on-site experts worldwide provide extensive consultation throughout the definition and evaluation phase. They also help our customers with mechatronics support to enable them with an innovative machine design. We also provide our customers with exceptional product customisation

possibilities. We have a robust SAP based tri-level mechanism for customer support. The B&R homepage hosts a slew of customer services – downloads, support, material return, software registration, panel designer, personal uploads, to name a few.

Q. What are your views on customisation? What are your offerings?
B&R has a very powerful and complete portfolio, which covers the demands of the machine builders and plant owners. We provide our customers with possibilities of product customization. One such highly appreciated service is customisation of touch panels enabling our customers to implement their corporate design. Apart from these customised panels, B&R also provides customisation of assembling X20 IO modules. Thus, the customer saves time in assembling the three-part module and further assembling the IO slices for installation in their cabinet. Another vastly sought after customisation feature is in our acclaimed automation PCs, wherein the customer can build his configuration by selecting exact components suiting his requirements. We are able to cater to the individual customer demands by making customised industrial PCs even for an order size of 1. The delivery time remains identical irrespective of the configuration and size of the order. The customer can choose from more than a billion different configurations.

Q. How does B&R offer sales consultation to its customers? How does it differentiate B&R?
To equip our engineers with all the necessary tools, B&R provides a very extensive application-training programme – Engineering Camp. A sales engineer from B&R is primarily an application engineer who has several years of experience in building successful applications in different industries and then moving to the sales team. This aids the customer with having a single point of contact in the form of a sales engineer, who supports them not only in sales but also in application and mechatronics consultation. Customers benefit from the flat company hierarchy at B&R as it empowers the sales engineers for taking decisions. In case of the need for escalation, the process is very short, enabling us to provide quick service to our customers at any given point in time. In addition to this, all our subsidiaries are well connected to the global headquarters as well as to each other. This is very important for customers having installations across the globe. These customers are also allocated key account managers locally and globally, who coordinate amongst them, which facilitates for smooth coordination. ←

Pharmaceuticals

Blister packaging goes ***EXPRESS***

Indian pharmaceutical market is becoming more sophisticated and demanding. On one hand, adhering to regulations is mandatory and on the other hand, newer packaging designs are coming thick and fast amidst increasing pressure on manufacturers to reduce the cost of operations. This trend is posing quite a big challenge to the machine builders, as they need to satisfy the varying needs in increasingly shorter time spans.

Conversely, this new development is seen as an opportunity at IMA-PG India Pvt. Ltd., a Thane-based Indian subsidiary of IMA SpA, the global leader in packaging equipment. "*We at IMA PG recognise that customer demands are a moving target. Demands keep changing and hence, so must our solutions. Our capability to deliver packaging solutions quickly for the complex requirements and at sensible prices, keep us ahead in the competition. Our association with B&R will continue to grow on the premise of achieving faster time to market and high quality automation systems,*" says Prakash Pujare, Director – Design, IMA PG.

Machine in new packaging

Express N, a newly designed blister packaging machine by IMA PG, accomplishes more than one objective. The new machine resulted into far quieter operations, flexibility through quick setup, inherent safety, intuitive operator interface and compliance with the FDA regulatory guidelines.

"*B&R provided innovative as well as truly integrated automation technology. It played a crucial role in achieving tough targets. Multi-axis motion technology and intuitive visualisation transformed the way the machine works on the shopfloor and the way it interacts with the operator,*" states Pujare.

Blister packaging in a nutshell

Blister packaging is a process, which packages products like tablets and capsules in a blister with cavities formed into a base film and then sealed using a thin lid foil. The choice of base film depends upon the degree of protection required by the product against ingress of moisture and exposure to light. These cavities are formed using either thermoformable film or cold forming film. Forming, sealing, feeding, pulling, cutting, non-fill and pinhole detection, and print mark controls are the major stations of this machine. Bottom foil passes through a forming station, which forms the cavity. A feeder unit places the tablets smoothly into the cavities. A sealing station seals lid foil and base film by heat and pressure. A precise temperature control is essential for perfect sealing and ensuring the protection of the drug inside the packaging. A print mark station, which consists of a sensor and an error detection mechanism, maintains accurate position of the

Compact yet powerful Automation PC 2100 integrates motion, controls, visualisation and vision system

Prakash Pujare with his team

pre-printed matter on the lid foil with respect to each blister. A cutting station at the end of the machine cuts the web into individual blisters. A transfer unit is typically added to place these blisters on a conveyor, which then leads to the next line machine i.e. a cartoner machine.

Evolution into mechatronic units

Previous blister-packaging machines built by IMA PG had induction motor as the main prime mover. It also had two servo axis for web advance and feeder oscillation. However, analysis of the customer feedback as well as opinion of internal quality team led to the conclusion that the complex and lengthy mechanical transmission was a source of noise, backlash and imprecise relative shaft positions. Secondly, such a drive and transmission arrangement posed problems for changeover and increase in machine speed for higher productivity. The main motor was replaced by individual servo drives at each station. A shaft-less design allows machine operation to be more noise free, easy to setup a batch change, requires less maintenance and offers greater flexibility in deciding start, stop sequence and positions.

Noise, no more

Increase in the machine speed brings in its own challenges on the stability of the machine mechanics. Machine linkages become the source of vibrations and noise. Noise and vibration are not only irritants and harmful for the operator but can also potentially damage the product. Product quality too can suffer due to adverse effects on sealing and printing, and consequent increase in rejections.

Improving productivity through machine GUI

Automation allows the machine builder to hide the complexities from the operator. One of the key goals at IMA PG for this project was that increased machine performance, easy setting up, and better diagnostics were needed without increasing the operator's interface burden. *"IMA PG team was pleased that B&R provides an open platform to integrate machine control, motion and vision system including pharma code and SAP code reader. Automation PC is*

Prakash Pujare
Director – Design, IMA PG

"We at IMA PG recognise that customer demands are a moving target. Demands keep changing and hence so must our solutions. Our capability to deliver packaging solutions quickly for the complex requirements and at sensible prices, keeps us ahead in the competition. Our association with B&R will continue to grow on the premise of achieving faster time to market and high quality automation systems."

Express N, a newly designed blister packaging machine by IMA PG, accomplished far quieter operations, flexibility for the quick setup, inherent safety, intuitive operator interface and compliance with the FDA regulatory guidelines

Highly intuitive visualisation based on B&R's touch panel is a result of seamless integration of machine operation, vision system and audit trails in compliance with 21 CFR Part 11

capable of running these tasks simultaneously. A single user interface was then sufficient for the whole machine operation. This solved more than one problem for us," stated Ashokkumar Singh, Manager Automation, IMA PG.

Complete redesign with B&R

"*Introducing individual drives and having an integrated HMI for machine operation was necessary to achieve our targets. This required a complete redesign of the machine and we went back to the drawing board for extensive changes to the existing concepts of driving station and controlling of various machine parameters. We evaluated automation solution from B&R in all the categories – controls, HMI, PC and motion technology. We realised that integrated automation concept will be at the core of the solution,*" says Pujare. IMA PG zeroed in on automation PC, APC2100 to implement and integrate machine visualisation and vision system interface. Individual servo axis were selected for all the main stations i.e. forming, sealing, feeding, web indexing and cutting.

More machine intelligence through software

With the regulatory compliance playing a major role, users expect that the machine itself should generate production reports and IT department should handle the user management over factory LAN. Audit trail and data handling were easily achieved with the help of modular application development solution i.e. mapp Technology. With mapp, B&R has brought a revolutionary software concept in the market. The programmer is relieved from routine code development and achieves far better software quality and faster project development owing to the need of just configuring the mapp components. Even for the multi-axis motion control, mapp Technology drastically reduces the complexity of the programme.

PackML ready

OMAC PackML too has been implemented and provided as an optional feature for the customer. With the implementation of PackML, machine states are clearly defined and the user gets a standard interface to connect other line machines. This will be of help to IMA PG for their turnkey solutions of complete production lines including several upstream and downstream machines. "*Our new Express N machine sets the bar very high with respect to the integration of motion, controls, visualisation and vision systems. Machine monitoring, reporting as well as the implementation of PackML makes it a complete state-of-the-art blister packaging machine,*" concludes Pujare. ←

Ashokkumar Singh
Manager Automation, IMA PG

"IMA PG team was pleased that B&R provides an open platform to integrate machine control, motion and vision system including pharma code and SAP code reader. Automation PC is capable of running these tasks simultaneously. A single user interface was then sufficient for the whole machine operation. This solved more than one problem for us."

Life Sciences

New science of filtration

Be it a lab or a process plant of a life science company, filtration units are omnipresent. Fields like biochemistry, microbiology and protein chemistry need filtration techniques to separate, concentrate or purify biomolecules. When it comes to sourcing perfect filtration equipment, Merck is the name that is trusted. "The Life Science business of Merck provides solution in three areas - Research, Applied and Process. Our Indian unit is a centre of excellence for manufac¬turing process solutions and we export over 70% of the equipment to various parts of the world," says Kevin Gorman, Head of Operations- Life Science, Merck India. "At Merck, we continuously strive to scale up the processes by improving the most critical parameter in filtration- which is the flow rate. Our research team is always looking to improve performance by implementing the latest technologies. In India, Merck is working closely with B&R for its filtration equipment. B&R is the supplier of controllers used in our equipment," adds Gorman.

Connected labs

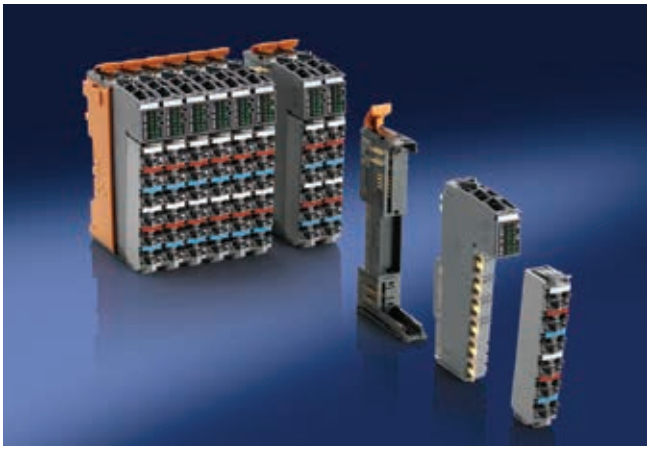
Merck is strongly focusing on digitisation and is investing a lot on Internet of Things (IoT), Big Data, Cloud and Virtual Reality. With the recent acquisition of Sigma-Aldrich, the company becomes a leading player in the life science industry. This will aid the company in delivering the right solutions to the customers quickly. "*It's all about how you connect with your customers and how you solve the industries' most difficult problems. We believe that new technologies will definitely enrich our customer experience. In the connected lab concept, Merck envisions labs which can be better integrated, and operated even remotely, by technology based systems, resulting in improved efficiency, accuracy and economic benefits for our customers. In connected labs, the collection of useful data, flow of data between different devices, data processing and the provision for real time information will be highly efficient,*" states Gorman.

Knack of filtration

Merck is well known for their filtration solutions based on the Tangential Flow Filtration (TFF) technique. Filtration is a separation process used to separate the bio molecules. The filtration unit is equipped with a pump to pressurise the liquid against the membrane. In TFF, the liquid is pumped tangentially along the surface of the membrane, which results in a finer separation process as the residue molecules are swept away with the flow. The company provides several different membranes that suit a wide range of applications. Vessels and piping are also designed as per the scale of operation as desired by the user.

Kevin Gorman with his Bengaluru team. (R – L) Chaya Sridhar, Pratibha Rai & Leelesh K

Applications subject to the FDA's Title 21 CFR Part 11 requirements can be developed faster and with less investment risk using mapp Audit



X20 IOs give clear advantages namely prewiring without the module; hot pluggable electronics and tool free maintenance. The X20 system delivers 50% more component density, perfected connection technology and optimal granularity

More ears to the customer

Merck's Bengaluru team recently received this customer feedback about the challenges in factories as well as labs about not getting enough space for the new installations, "*Our efforts were to find a control system, which significantly reduces the demand for the space in the cabinet. When we saw products from B&R at one of their seminars, we were impressed. Compactness of the B&R hardware was a clear winner. This paved the way for rigorous evaluations at Merck involving numerous presentations, demonstrations and workshops,*" shares Chaya Sridhar, Engineering Manager – Operations. The new TFF machines are equipped with clean-in-place (CIP), steam-in-place (SIP) sequences and advanced analytical instrumentation.

Compact yet powerful hardware

Merck is now using HMI, controller and IOs from B&R. They have finalised on C70 series Power Panel, an HMI with integrated controller and IOs from X20 system. With its well thought-out details and a sophisticated ergonomic design, the X20 system is a state-of-the-art control solution. Depending on the demands and application requirements, the user can choose the necessary components from the X20 System family. This is possible due to the modular nature of the system.

For the IOs, the user selects three basic elements, which combine to form one module: terminal block, electronic module,

Kevin Gorman
Head of Operations- Life Science, Merck India

"Merck continuously strives to see how the processes can be scaled up by improving the most critical parameter in filtration that is flow rate. Our research team is always looking to improve performance by implementing the latest technologies. Merck India is now working closely with B&R for its filtration equipment."

TFF machines are equipped with clean-in-place (CIP), steam-in-place (SIP) sequences and advanced analytical instrumentation

TFF (Tangential Flow Filtration) machine offers several different filtration membranes, vessels, piping options suiting a wide range of applications as desired by the user

Chaya Sridhar
Engineering Manager – Operations

"Though the B&R hardware initially caught our eye, we quickly realised the limitless flexibility of the software tool - Automation Studio. Since we have to comply with regulatory requirements, we had a very close look at the data logging and report generation features in the software. We are now able to introduce B&R's embedded visualisation for the 21 CFR Part 11 compliances. mapp Audit, a modular software component from the latest mapp Technology is at the core of our solution."

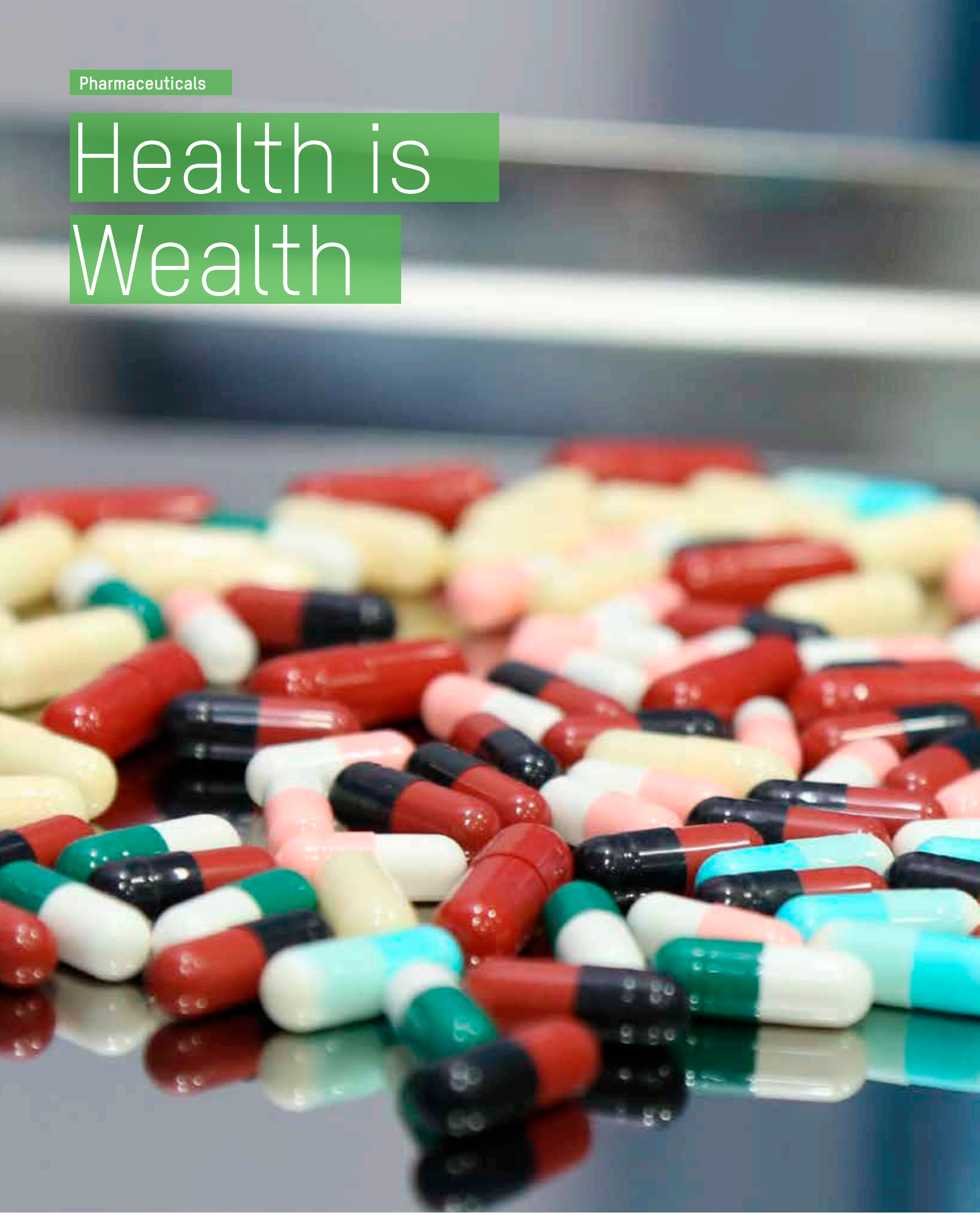
bus module. This modularity results in a system that combines the advantages of both rack and I/O slice systems. The X20 IOs gives clear advantages, namely prewiring without the module; hot pluggable electronics and tool-free maintenance. The X20 system delivers 50% more component density, perfected connection technology and optimal granularity. For example, 16 channels come in a module with a width of 12.5 mm, which allows an unmatched component density. Compact and intelligent Power Panel devices from B&R are the first choice for automating machines and systems with tight space requirements. C70 series Power Panel combines PLC and HMI in one device. Advanced CPUs allow limitless possibilities to cover simple as well as complex applications. Power Panel family consists of a wide range of display sizes, touch screens and/or keypads.

Flexible software for the bright future

"Though the B&R hardware initially caught our eye, we quickly realized the limitless flexibility of the software tool - Automation Studio. Since we have to comply with regulatory requirements, we had a very close look at the data logging and report generation features in the software. We are now able to introduce B&R's embedded visualization for the 21 CFR Part 11 compliances. mapp Audit, a modular software component from the latest mapp Technology is at the core of our solution," says Sridhar. ←

Pharmaceuticals

Health is Wealth



It is rightly said that the greatest wealth is health. Doctors primarily help us in maintaining our health. But it would not be possible for them to do their jobs if it wasn't for those tiny, life-saving capsules. ACG Pam-Pharma Technologies Pvt. Ltd. is a trusted name when it comes to capsule weighing and keeping the weight of the ingredients to the permitted dosage per capsule. With B&R, ACG-Pam provides the best in-class solution to its customer.

ACG-Pam is a member of ACG Worldwide, which has been serving the pharmaceutical industry for five decades. It is the second largest manufacturer of empty hard capsules in the world. They offer a complete range of solutions beginning with empty capsules, granulation and coating, capsule filling, tableting, packaging films, blister packing and carton packing to the end-of-line solutions. ACG-Pam has been pioneering in newer technologies for over forty years, and is helping the pharmaceutical industry address its challenges. The company offers unique capsule filling and tablet compression equipment capable of customised capabilities and containment. To optimise the production processes, ACG-Pam offers 100% capsule checkweighers and other ancillary equipment.

As the pharma industry grows, so does the competition, pushing companies to comply with strict rules and regulations of the US FDA, which regulates almost every facet of prescription drugs, including testing, manufacturing and safety. Hence, each and every capsule manufactured needs to be closely inspected. "*We at ACG-Pam are committed to providing world class machines for FDA approved companies and for those companies eyeing to comply with the US FDA,*" sights Jagadish Kadu, General Manager - Operations, ACG Pam-Pharma Technologies Pvt. Ltd. "*To cater to these rising demands of the market for complying with the US FDA, we launched our ACCURA checkweighing machines in 2013.*"

100,000 capsules/hour

The main motivation of the development of ACCURA for checkweighing was for the users to comply with the US FDA. "*To provide our customers with the best possible machine, we paid attention to the primary customer needs, improving the setup*

B&R's ACOPOS servo drives provide the best in-class precision and accuracy as they are equipped with drive-to-drive communication. These intelligent servo drives run at microsecond cycle times

times, robust product and better hardware and software reliability," mentions Jagadish Kadu. This machine was developed by Scitech Centre, which is the R&D center for ACG Worldwide jointly with ACG-Pam and combining the expertise of B&R. ACCURA checkweighers can be easily integrated with existing high speed encapsulation machine for pre-fill or post-fill checkweighing. Enhancing the quality of capsules, the ACCURA ensures that every capsule is well within compliance limits.

Handling 100,000 capsules/hour, the machine is the fastest capsule weighing application available in the market today. The machine is automated by using the highly efficient and intelligent ACOPOS servo drives. These drives provide the best possible synchronisation on Ethernet POWERLINK.

The machine has a magazine where all the capsules are loaded. A motor is used to load the capsules in the magazine before the machine can be operated. The machine makes use of the 4 servo axes. Capsules from the loader are loaded in the V-pan of the load cell, where the capsules are weighed. Each and every capsule is checked for the weight and then ejected out of the V-pan. The weights are transferred to the SCADA systems via the powerful B&R controller X20CP3585 over Ethernet. If the weight of the capsule is appropriate, it is ejected into the accept-bin else into the reject-bin. Another axis then pushes the capsule on the right track post ejection. All these axes need to be perfectly synchronised for achieving accuracy and precision.

Performance simplified

The X20 controllers provide exceptional performance for necessary decentralised operation coupled with the ACOPOS servo drives. Thanks to multitasking, the user gets complete flexibility and highest performance necessary for such complex applications. The ACOPOS servo drives have inbuilt features such as cross communication and synchronisation down to 0.1µs. These features, combined with the open source, real-time, deterministic Ethernet POWERLINK network, enable the high-speed operations in the machines. B&R's Automation Studio, which is a single tool for programming all the devices, uses IEC-

ACG Worldwide

Jagadish Kadu
General Manager - Operations
ACG Pam-Pharma Technologies

"The level of confidence in our sales and service teams is incredibly high. The B&R hardware robustness and software flexibility has helped us cater to our customers in the best possible manner."

ACCURA checkweighers from ACG Pam-Pharma Technologies Pvt. Ltd. enable users for compliance with the US FDA. They provide exceptional speeds of weighing 100,000capsule/hour at an accuracy of +/- 2mg

61131 programming languages as well as object oriented programming offers unlimited freedom of programming.

"*Owing to the reliable hardware and flexible software, we have used B&R controls on ACCURA checkweigher machines,"* mentions Vinayak Kelkar, Head of Electronics Department, ACG Pam-Pharma Technologies Pvt. Ltd. "*Working with B&R was easy and we were very comfortable. The entire B&R team was very receptive and have exceptional expertise. They offered us excellent support. This expertise combined with the hardware and software facilitated the lowest time to market this machine.*"

Easier way of solving complex applications

B&R has always been at the forefront of effortlessly providing solutions to the most complex applications in any industry. With ACG Worldwide, it was nothing different. The high quality B&R hardware, software and the technical team's excellence made the development and commissioning of the complex ACCURA checkweigher machines easy. The power of B&R systems lies in consistent design of all modules – compatibility in interfaces and inter-operability, matching operating cycles, integrated programming and diagnostics capabilities. All this yields a performance greater than the sum of the parts.

"*The level of confidence in our sales and service teams is incredibly high. The B&R hardware robustness and software flexibility has helped us cater to our customers in the best possible manner,*" asserts Jagadish Kadu. "*Thanks to B&R, we have been able to reduce the buffer for software validations to a great extent. Once the mechanical and electrical teams complete the machine, it just takes a couple of days for testing the machine for quality and then it is ready for dispatch.*"

ACG-Pam has been associated with B&R for a long time for various machines. The technical expertise offered by the B&R teams and the collaborative approach enables the user to become all the more technically competent. ←

Vinayak Kelkar
Head of Electronics Department
ACG Pam-Pharma Technologies

"Working with B&R was easy and we were very comfortable. The entire B&R team was very receptive and have exceptional expertise. They offered us excellent support. This expertise combined with the hardware and software facilitated the lowest time to market this machine."

mapp View

HMI design has never been so easy

B&R is adding numerous new functions that make it easier than ever to create HMI applications using its web-based mapp View HMI system. HMI applications can now be more precisely tailored to user groups or individual users.

mapp View will now support the use of gestures to control HMI applications. Users can simply swipe between HMI screens or use two fingers to zoom in on the details of a trend curve, for example.

Gesture control makes machine operation faster, easier and more intuitive. It also allows for a more modern, streamlined UI design without the clutter of zoom and page navigation buttons.

Two-hand operation also opens up new functional possibilities, such as safeguarding critical input values and preventing unintentional equipment startup. All of the available gestures can be linked to various UI widgets.

The right content for every client

mapp View is designed as a multi-client/multi-user system. A mapp View HMI application will now be able to display individualised content to different users simultaneously and automatically.

It's not necessary to programme each version separately, either. The HMI developer simply defines which user roles should be able to view and/or modify which content. Customised HMI content can be displayed simultaneously on different HMI clients independently of each other. Display content can also be adapted for different types of devices. The manager's tablet can display an aggregated overview of KPIs, while the service technician's laptop provides full access to view and modify machine settings. On tablets, the HMI application will now also switch automatically between portrait and landscape format to match the orientation of the screen.

B&R has implemented a new editor that provides a clear overview of the links between data points and user roles for easy assignment of viewing and modification rights. Complex multi-user applications are now considerably easier to manage and can even be modified during operation.

User-defined widgets mapp
View comes with a large set of standard widgets, as well as themes and styles that allow developers to adapt their appearance to the system design. Now, it is also possible for users to create and save their own widgets. The developer can modify the height, width and style of an existing widget and then save it as a new widget. OEMs can create libraries of their own widgets to be reused for each new machine.

In addition to individual widgets, mapp View users can also save multiple widgets as a group, for example two input fields and a button for username, password and confirmation. This way, frequently used interface elements can be designed once and reused again and again with minimal effort.

In the future, users will also be able to save their defined events, actions and data links along with their widget groups to create small predefined functional units that can be reused at any time.

WYSIWYG editing for entire pages
It will now be even easier to edit entire pages in mapp View. While mapp View has already provided a visual editor for positioning and designing widgets, this convenience will now be available for entire pages as well. This is particularly beneficial when designing HMI applications for a variety of output media.

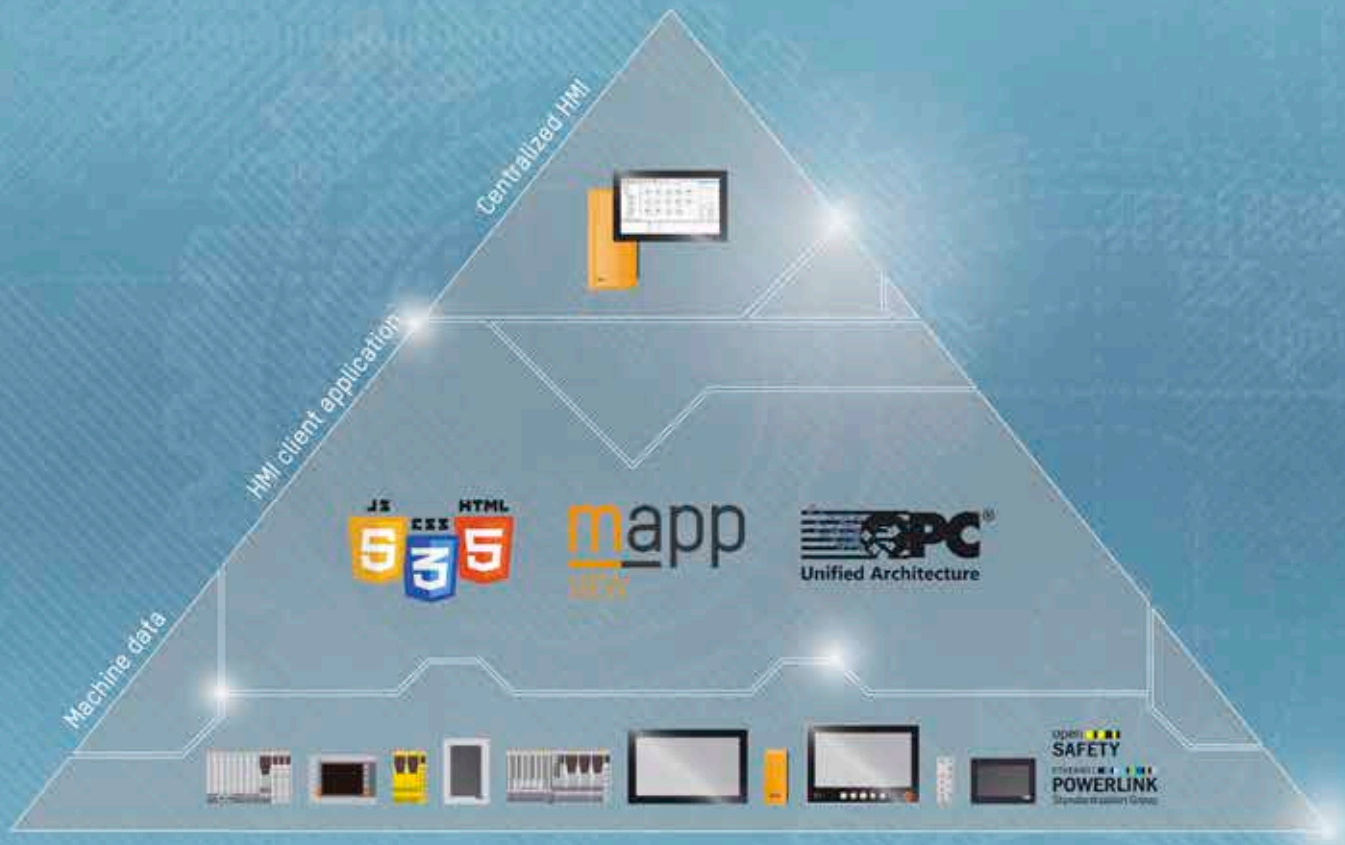
B&R also offers predesigned HMI templates for typical applications. HMI developers can simply open these templates in the new visual editor and quickly adapt them to their needs.

Time-critical operations via HMI application
Special requirements such as manual control of robots or other motion axes require immediate reactions to operator input. To allow these time-critical operations to be performed via the HMI application, B&R will now offer real-time widgets for mapp View.

They use special browser technology to guarantee transmission of signals to the controller within a clearly defined timespan. In many cases, these real-time widgets can eliminate the need for specialised handheld operating devices. There is otherwise no difference in the behaviour of real-time widgets and regular widgets, and they can be used in combination.

Security at all levels
mapp View uses the recognised HTTPS and OPC UA standards for secure data transfer. In combination with the B&R's user role management system, this guarantees that only authorised users are able to make changes. It also ensures that data cannot be accessed from outside the system.

Vendor-independent visualisation
It will now be possible to use data from any OPC UA server directly in mapp View applications. This makes it possible to easily monitor and operate controllers from multiple vendors in a shared HMI environment. ←



Highlights

→ State-of-the-art gesture control
→ Custom content
→ Vendor-independent visualization

Printing

Print it perfect – waste no more

Nobody likes wastage especially in the printing industry, production accuracy draws maximum attention. This is because inaccuracy leads to wastage, which ultimately leads to higher cost of production, delayed deliveries and at the end, dissatisfaction for both the printer as well as for the customer. No wonder the machine builders and technology providers are always on their toes to find newer ways to increase accuracy by implementing innovative processes and technologies. Print mark registration control is one such technology, which aids printing applications enormously.

Improving productivity with registration control

Registration control consists of fibre optic sensors, error detection module and a controller. The sensor continuously tracks the reference mark on the web, sends data to the controller that detects an error and generates command for the actuator to correct the alignment. This not only controls the printing process but also other applications such as cutting, punching, embossing, etc.

Leading the charge

Ecoaxis, a business unit of A.T.E. Enterprises Pvt. Ltd. is one of the leading manufacturers in the Indian market for supplying solutions for the printing industry. A.T.E. is a multifaceted engineering group offering world-class products and solutions in textiles, cooling, wastewater, energy, printing and IoT. AlygnAxis, a registration control system from the company is an indigenous product, which is competing with global brands worldwide. Sensing technology is completely made in India at their Pune factory. "*Our solutions for colour register control help printers enhance print quality and reduce waste, thereby, positively impacting productivity. Customers expect accurate error measurement, millisecond cycle times for generating correction signals, besides rugged and easy to maintain hardware. This is why we opted for open platform based control solution from B&R,*" says Anand Mehta, Vice President, Head – Print & Packaging Equipment (Operations). B&R is a key technology provider for the company's evolving needs and shares a partnership spanning over a decade.

Focusing on the core

Few years back, A.T.E. successfully built its own devices for sensing as well as error detection. However, their development team started facing a challenge with respect to aligning their development with rapidly advancing electronics and software technology. The management team felt the need to brainstorm on how to focus energy on their key competency that is print mark sensing and algorithm for error detection. This led to their decision to outsource the controller hardware.

At the same time, ongoing customer interactions steered to a market insight that their solution should be Industry 4.0 ready. That means register control system must be able to exchange data in real time, connect itself to existing machine controllers and possess vertical connectivity with IT systems installed at the customer factories.

Bringing out the best with collaboration

A.T.E. was confident that B&R could satisfy their needs. After going through a few meetings, their team was able to zero in on APC2100 from B&R - a very compact, rugged yet powerful industrial PC. B&R PCs including APC2100 series products are designed and built to meet industrial customers' demands for maximum robustness, reliability and long-term availability. After all, it is the total cost over a product's life cycle that matters, and that is where the cost advantages of B&R PCs lie.

A.T.E. was also convinced that reACTION Technology from B&R is unparalleled and futuristic. With reACTION Technology, time-critical sub-processes execute directly on the I/O module, which removes limiting factors from the response time equation. Although the

Anand Mehta

Vice President, Head – Print & Packaging Equipment (Operations), A.T.E. Enterprises

Our solutions for colour register control help printers enhance print quality and reduce waste, thereby positively influencing productivity. Customers expect accurate error measurement, millisecond cycle times for generating correction signals, besides rugged and easy to maintain hardware. This is why we opted for open platform based control solution from B&R

AlygnAXIS provides one of the fastest correction signals (output) among register control systems available in the world. Fibre optic sensing together with the B&R control system ensures consistent performance, accurate measurement and excellent control - enabling printers to set a new benchmark in print quality

execution is distributed, the software itself remains centralised, making programming just as straightforward as with conventional control solutions. Programme developed in the Function Block Diagram Editor execute directly on I/O modules from the X20 and X67 series. By eliminating data transmission, this reduces response times to as low as 1 microsecond.

A.T.E. team also learnt that B&R is a strong promoter of open technologies and especially in the areas of communication, rely on open source Ethernet POWERLINK and OPC UA. POWERLINK provides a real-time, deterministic and high performance communication suitable for data exchange from sensor to controller whereas OPC UA further enhances the capability of the system to connect directly into the customer machine network.

Modular-faster-better

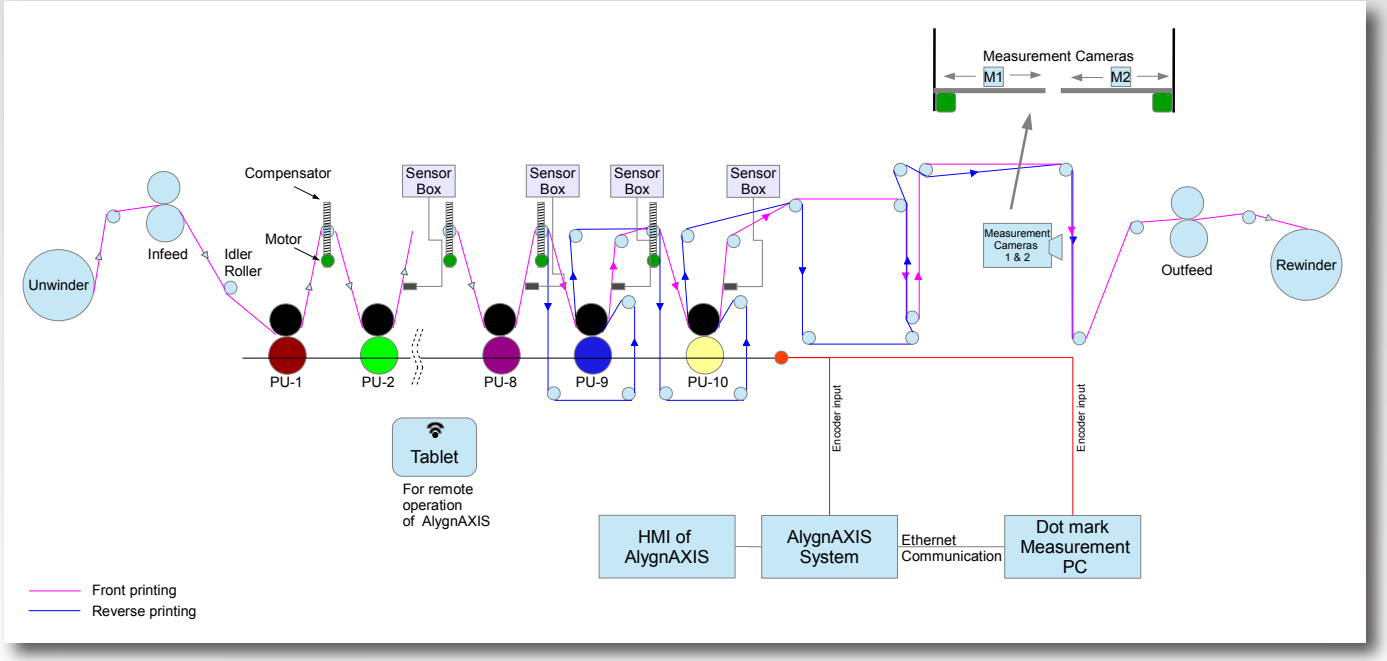
"*B&R has always impressed us with their innovative and unconventional solutions, be it in software with mapp technology or hardware with compact PCs and ultra-fast reACTION technology. This gives us lots of opportunities to think beyond present demands and work on solutions which are future ready,*" says Kartik Bagaria, Dy. General Manager - Systems Development.

Kartik Bagaria

Dy. General Manager - Systems Development, A.T.E. Enterprises

B&R has always impressed us with their innovative and unconventional solutions. Be it in software with mapp technology or hardware with compact PCs and ultra-fast reACTION technology. This gives us lots of opportunities to think beyond present demands and work on solutions, which are future ready.

This new development has resulted in a better solution. AlygnAxis is modular with seamless integration of off-the-shelf and in-house components. Separating error detection and controls provides the extra degree of modularity in the system. The product is now open even for third party control systems. Thus, error detection can be easily integrated into existing machine controller.



Registration control consists of multiple sensors, encoders connected to the central control station

ETHERNET **POWERLINK**

POWERLINK provides uncompromising performance and real-time capabilities based on the established global standard, Ethernet. A transmission speed of 100 Mbit/s and a synchronisation accuracy of +/- 100 ns allow even the most demanding tasks in the areas of control engineering, robotics, CNC and motion control to be combined in a single network.

Ethernet POWERLINK forms the backbone for the data transfer between sensor and the control system. Sensing data is transferred in few µs, which has helped development engineers to assign error-processing algorithms to the controller and not in the sensor itself. With the best-in-class PC, ultrafast reACTION technology and the real-time Ethernet POWERLINK communication, A.T.E. is fully ready to cater to the industry demands even in the future. ←

B&R PCs including APC2100 series products are designed and built to meet industrial customers' demands for maximum robustness, reliability and long-term availability

B&R's reACTION Technology now brings response times down to one microsecond – simply and inexpensively – using standard hardware and software components

FLEXing Muscles

All supermarket and shopping malls have one thing in common – plastic bags, which are branded based on the outlet one visits. Shopping would not be the same without these. These attractive bags are possibly made using the tried-and-tested Rotogravure printing technique. Aim Machintecknik Pvt. Ltd. is a leader of Rotogravure printing machines and to achieve the degree of precision and perfection, the company places its trust in B&R hardware and software platform.

Aim Machintechnik Pvt. Ltd, established in 2003, is an acknowledged performer in plastic converting machinery. Including rotogravure printing machines, the company is also the leading manufacturer and exporter of other plastic converting machines, such as Flexographic printing machine, slitter - rewinder machine and different types of plastic bag making machines.

High speed printing

The rotogravure machine is the first machine in the printing line, which is followed by the slitter and pouching machine. "*We at Aim Machintechnik have the complete expertise in designing and manufacturing of the complete line of printing and pouching machines,*" shares Anil Savsani, Managing Director, Aim Machintechnik.

Depending on customer requirements, the company offers 4, 6 or 8 colour printing with a line speed of 200mtr/min. The press cylinder presses against another cylinder, called gravure cylinder, which is partially dipped in ink colour. The images or the text to be printed are engraved on this cylinder. The number of colours defines the number of stations, which can vary in the range of 4, 6 or 8. Each station has a defined colour concentrate for the printing. Apart from the stations responsible for colour printing, the machine has an infeed and outfeed station. These stations are extremely important as they are responsible for

Rotogravure printing machine – Rototech by Aim Machintechnik running at 200mtr/min provides precision and flexibility

avoiding the variations in printing. These, along with the winder and unwinder, maintain a consistent tension on the material, thus, helping achieve a reliable print quality. A doctor blade removes excess colour from the gravure cylinder before it is allowed to press against the press cylinder. The press cylinder only provides necessary pressure for printing.

When the material passes between the cylinders, the gravure cylinder, which has adequate ink, rubs against it. Due to the pressure applied by the press, the cylinder transfers ink on the material. The pressure applied varies according to the printing material. This material then is allowed to pass through a dryer so as to dry the colour before passing it through the next station having a different colour. Every colour unit is equipped with a dryer and these units are temperature-controlled to maintain the colour quality.

Easier maintenance

The rotogravure machines mechanically couple the stations using gear boxes and uses inverters for driving the motors shafts. Load cells are used to maintain tension on the plastic web, which avoids possible damages to the plastic due to excessive tension. A central processing controller networked on a real time Ethernet-based network controls the entire process.

The machine makes use of the power efficient ACOPOS Inverters, which are synchronised with each other. The parameters needed for the ACOPOS inverters are stored centrally in the controller and are downloaded via Ethernet POWERLINK network during boot

AIM
THE GROWTH IN CONVERTING

Anil Savsani
Managing Director
Aim Machintechnik

"We have been associated with B&R since inception and are very comfortable in working with them. The technical support provided by their teams is exceptional, which has always helped us achieve before-time project completion in all our machines. B&R has been a factor for the electronic advancements in our machine and have consistently supported us in our newer developments."

ACOPOS inverters have the parameters stored in a centralised controller. Drive parameters can be changed from the machine HMI. This reduces the wiring and also saves the time and errors at the end user site in case of unforeseen maintenance

with a possibility to be changed during runtime. The ACOPOS inverters do not need skilled technicians from the machine builder in case the need for replacement arises at end users site. The maintenance teams can simply replace the inverter with a new one and connect the Ethernet POWERLINK cable. Once powered, the parameters are automatically downloaded in the ACOPOS inverter. This relieves the maintenance of the efforts to search manuals and reduces support calls to the machine builder, eventually reducing the overall machine downtime and increasing productivity.

"*B&R inverters provide the best in class synchronization. Handling the ACOPOS inverters and the parameters is easier on the field due to minimum intervention needed from operators and maintenance,*" says Dinesh Mistry, Technical Director, Aim Machintechnik. "*The decentralized architecture followed by the B&R control systems additionally helps us in reducing our wiring, thus, reducing cost and maintenance efforts.*"

Inverters to servos - Effortless

Using the latest C series power panels from B&R, Aim Machintechnik optimises cabinet space by having an integrated controller and HMI, which also results in the best possible response time from field action to graphical display.

The C series system acts as a central storage for the ACOPOS inverter parameters as well as the machine program. With generic motion control, B&R achieves a platform independent motion solution. Thus, the user is free to choose his hardware for future technological upgrades without having the risk of software change. "*The generic motion control concept, thus, will help us in moving from an inverter-based system to a servo-based all-electric system,*" says Mistry "*An all-electric machine will, thus, reduce the mechanical assembly and also provide a short installation time on site,*" he further adds.

The machine has decentralised IO system, also connected on Ethernet POWERLINK. Thus, the B&R system uses a common network for the IOs as well as the ACOPOS inverters. Aim Machintechnik is also able to reduce his wiring effort on the IOs as the IOs can be mounted near the sensors. Hence, only one Ethernet POWERLINK cable runs from the IOs to the C panels and ACOPOS inverters.

Partners in success

"*We have been associated with B&R since inception and we are very comfortable working with them,*" mentions Savsani. "*The technical support provided by their teams is exceptional, which has always helped us achieve before-time project completion in all our machines. The application team in B&R has been supporting us in all our developments and is always willing to take the extra step forward.*"

The machines developed by Aim Machintechnik are sturdy, which complements the B&R hardware and software. Thus, users of these machines not only have mechanical, but also electronical robustness.

"*We look forward to this continued strong partnership fuelling our growth. B&R has been a factor for the electronic advancements in our machine and have consistently supported us in our newer developments,*" says Savsani. ←

Dinesh Mistry
Technical Director
Aim Machintechnik

"The decentralised architecture followed by the B&R control systems additionally helps us in reducing our wiring, thus, reducing cost and maintenance efforts. The generic motion control concept, thus, will help us in moving from an inverter-based system to a servo based all electric system."

Secure Remote Maintenance

The remote maintenance solution from B&R makes diagnosing and maintaining machinery and equipment easier than ever. The solution utilises the latest IT and security standards and allows for significant savings with low investment costs.

Like consumer goods, machines and equipment are now sold in all corners of the world. Modern communication and transportation bring distant locations ever closer together. Modern production and logistics systems enable markets on a global scale.

However, for OEMs, having customers around the world also comes with its share of new challenges. The least of which is when a machine requires maintenance, which only they can perform. To avoid the immense cost of flying service technicians and engineers halfway around the world, OEMs are increasingly relying on remote maintenance.

Simple and secure

With B&R's remote maintenance solution, a service technician can access machines from anywhere in the world to retrieve logbook entries, application data and much more. This is done via a certificate-secured and encrypted VPN connection between the SiteManager on the machine and the GateManager at the machine manufacturer's service centre.

Fast maintenance response times

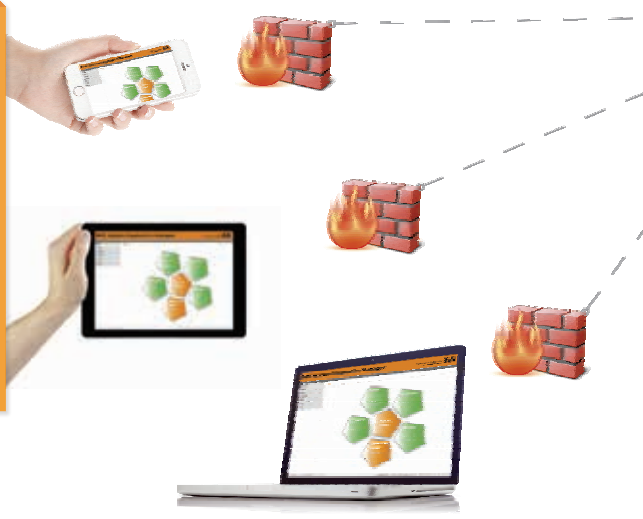
When a customer's equipment or machine isn't working, every minute counts. If a service technician isn't available locally, it can be many hours before an expert is on-site. With the B&R remote maintenance solution, a technician can connect, run diagnostics, adjust parameters and resolve the error – all in a matter of moments.

Remote access & maintenance

Service technicians have the ability to connect with machinery and equipment using software. They can do so via a PC-based system or using a smartphone or tablet (iOS or Android). All access is logged and archived for later traceability.

Highlights

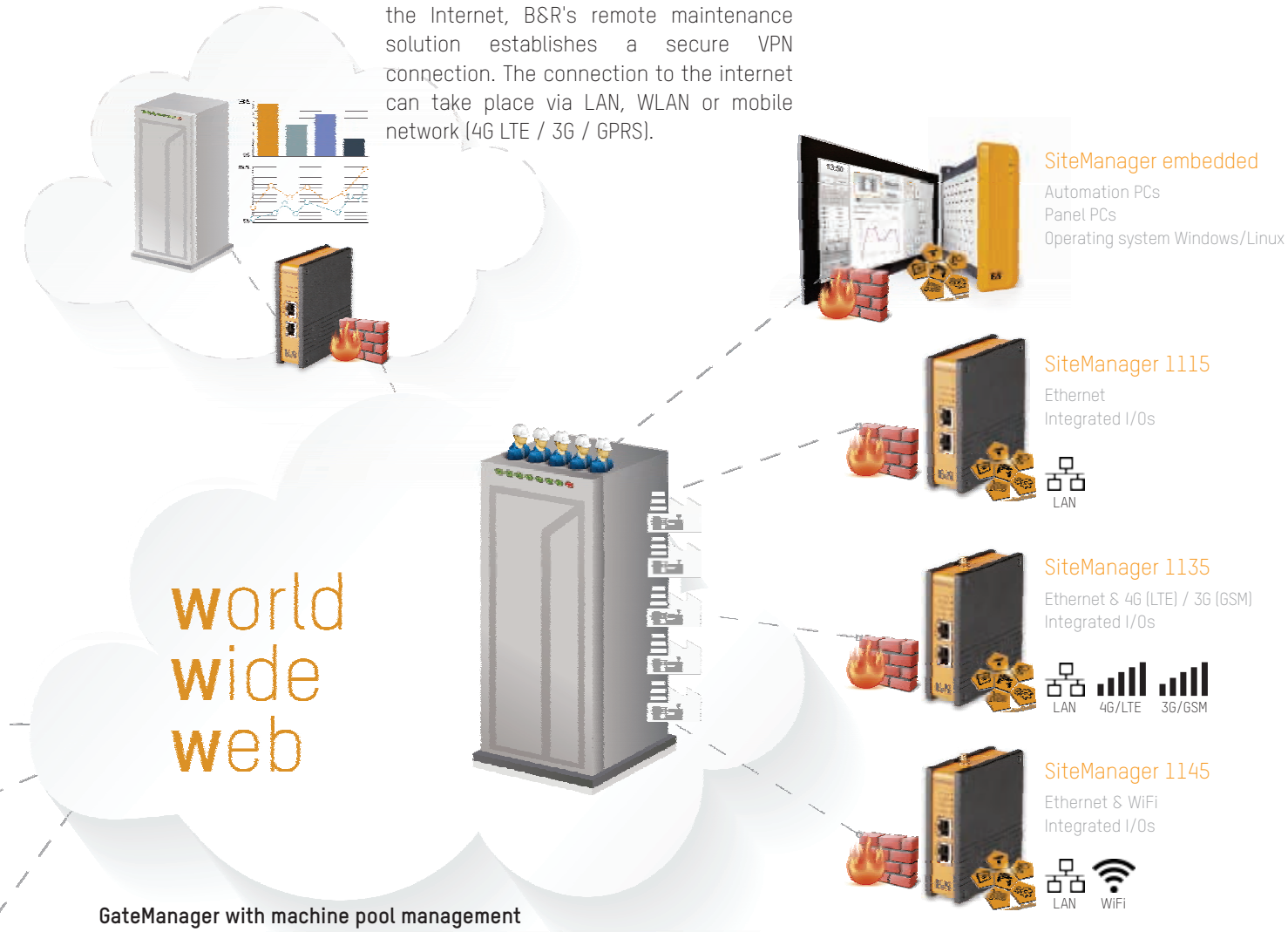
- Diagnostics with Automation Studio and System Diagnostics Manager (SDM)
- Save machine data directly to the cloud
- Access the HMI application directly
- Read logbook entries and application data
- Change machine settings and parameters
- Update programs and firmware



Remote data logging
With EasyLogging, a SiteManager in the log server's network acts as an EasyLogging master. The SiteManagers in the various machines establish permanent connections to this master. An X20 controller can use this connection to transmit data to the log server, for example. LinkManager and EasyLogging connections can occur simultaneously.

SiteManager
A SiteManager provides access to the network via the GateManager. All hardware SiteManager variants are equipped with integrated inputs and outputs as well as at least one Ethernet port. The integrated firewall on the SiteManager controls all access to the machine network. All SiteManager variants are configured in Automation Studio.

Data transfer
To transfer data securely and reliably over the Internet, B&R's remote maintenance solution establishes a secure VPN connection. The connection to the internet can take place via LAN, WLAN or mobile network (4G LTE / 3G / GPRS).



GateManager with machine pool management
For efficient remote maintenance, the B&R solution features a GateManager with integrated machine pool management. This manages machines in the field as well as the access rights of service staff. Machine pool management does not require any special IT know-how. The GateManager can be purchased or leased as an SaaS solution. ←

Quality check in 60 seconds

Automotive vehicle breakdowns are amongst most dreaded, especially when you are on a long drive, or a vacation or heading for an important meeting. No one likes the sight of a broken down vehicle, particularly if they are traveling in it. The engine of the car is the heart and the ECUs are the brain of the car. The manufacturers pay special attention to the engine quality and even a minor defect detected in it during manufacturing leads to its rejection. Such are the stringent tests every engine undergoes before its assembly. When it comes to designing of a manufacturing line from assembly to end of line testing, all manufacturers place their trust in PARI. With complete automation solutions provided by B&R under one roof, PARI automates these world-class manufacturing lines with B&R controls.

Source: KADIA

PARI, with its solid engineering strength provides complete solutions, from conceptualising, designing, manufacturing, implementing and supporting advanced factory automation systems. The company began operations in 1990, having provided over 600 automated solutions worldwide.

"*Engine assembly and testing lines have amongst the highest focus and attention of the manufacturers,*" says Abhijit Phatak, Functional Head, Software Development & Solutions. "*We provide excellent quality manufacturing lines with basic quality checks in-built in the assembly stations. The testing stations designed by our engineers surpass all the quality needs of the customer.*"

Engine performance, Uncompromised

"*Car manufacturing has gone beyond the design and assembly of different components inside a well-designed exterior frame. Maintaining high-quality in every aspect through rigorous quality checks has become a de-facto for all manufacturers as the quality affects the overall performance,*" mentions Atul Patwardhan, Functional Head - Controls Design, PARI.

PARI has set up manufacturing lines at Mahindra and B&R was the undoubted choice for Industrial PCs, IPV applications and torque to

In process verification machine adding a new dimension to engine testing

Abhijit Phatak
Functional Head - Software Development & Solutions, PARI

"Changing customer demand is driving Industry 4.0, Big Data and analytics at PARI. With innovative solutions – hardware, software together with the technical expertise, B&R serves as our perfect automation partner."

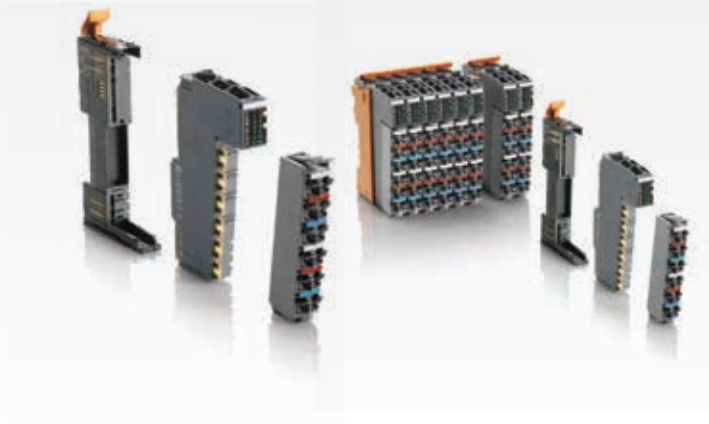
turn applications. The In process verification (IPV) machine is used in the automotive manufacturing lines for testing the engine without having to unload the engine from the line. The testing jig is on the line and the engine stays on the pallet carrying it during assembly. This reduces the manual effort and time needed for loading and unloading the engine and moving it to an off- the-line testing jig. In one assembly line, there are multiple IPV machines. A single IPV machine could have single or multiple stations for testing.

The IPV machine checks for consistent performance of assembly of crankshaft, connecting rods and pistons, piston protrusion and gasket. The IPV machine has to perform two major parts, primarily handle the testing and secondarily communicate with the central controller on the line. Communication with the central controller is necessary for receiving commands to start and stop testing and to provide the test results for next actions steps. Once the engine is at the testing jig, a motor couples with the engine shaft, which is controlled by the central controller. The testing sequence begins when the central controller provides the necessary commands over a network to the IPV machine controller. The main controller switches on the coupled motor, which rotates the engine shaft and piston. The IPV controller is required to trace the encoder rotations against the torque generated by the piston against its walls. Once the test completes, the testing data is stored in the controller as well as transferred to the central controller along with the test results. The torque values are compared with the threshold values and at any given point if the actual torque values exceed the threshold, the engine fails the test. In case the engines fails the test, it is moved to the rejection line where the reason for the fault is checked and if possible corrected and sent again for test on the IPV machine. In case the engines pass the tests, they move ahead for the next set of tests.

PPC2100: Unprecedented performance

PARI uses the powerful and compact panel PCs from B&R for controlling the IPV machines. "*Selection of the PPC2100 was very easy for us, as it is compact and scalable," says Phatak. "The modular PPC2100 design enables us to upgrade the size of the display at any point in time.*"

The PPC2100 is capable of running Windows as well as a real time operating system ARWin. The user is thus able to run programs on windows and the real time operating system provides a deterministic solution for machine operation. The data collected from the test results, while testing are saved in the USB drive



More than just I/O's: Teamed up with other B&R components, the X20 System achieves its full potential and allows the implementation of applications with unimagined performance and flexibility

Maximum performance comes in very small packages. This innovative PC design is based on Intel Bay Trail architecture, whose single-, dual- and quad-core processor technology represents a milestone for embedded systems – all while offering an optimal price/performance ratio

connected to the PPC2100. The PPC2100 has no cables in the cabinet and all the cards are placed on PCI slots. It works on 24 VDC, and all the components are mounted on a heat sink to enable heat dissipations without the need of a fan.

B&R PCs and panel PCs are the best-in-class industrial PCs available in the market with the lowest failure rate. The platform independent software development in B&R enables hardware changes without the need to change the software. This allows the user to move from a PC-based solution to a controller-based solution in no time.

Decentralized intelligence

"*B&R's X20 remote IO's have the capability of decentralised intelligence, thus, avoiding the need of using individual controllers for every station and transferring the data to a central station as followed by other prevalent data acquisition systems. B&R definitely scores over these systems in remote data gathering,*" quotes Phatak. "*Other data acquisition systems need special skills for developing block diagrams, whereas B&R uses standards IEC programming languages, which equip any programmer to easily program the system. The programming coupled with X20 series of remote IO's makes our control cabinet compact and at the same time increasing modularity of our systems.*"

The IPV machine makes use of the X20 remote IO's from B&R, communicating with the PPC2100 on a real-time deterministic communication network Ethernet POWERLINK. Each testing station needs local IO's, which communicate to the PPC2100. These intelligent IO's acquire data, analyse it and then send it to the controller. This makes the IPV machine modular, and adding a new station means just addition of additional remote X20 IO's and an Ethernet POWERLINK cable. This modularity provides for reduction in wiring, associated noise and easier maintenance. With a sampling rate of 50µs, the X20AI2636 has a buffer that stores the acquired samples during testing.

The X20 systems is a three-part module, comprising of base, electronics and terminal. This makes the wiring, commissioning and maintenance very easy.

Futuristic approach

"*Changing customer demand is driving Industry 4.0, Big Data and analytics at PARI,*" mentions Phatak. "*With the rising customer demands, we at PARI, consistently work towards flexibility, scalability and enhancing customer-experience through our solutions. B&R equips us with the necessary technology and expertise to satisfy these demands.*"

Apart from basic machine performance and quality output, manufacturing units are demanding energy and condition data. Robot and human collaboration is also slowly increasing in the industry. "*With innovative solutions – hardware, software together with the technical expertise, B&R serves as our perfect automation partner,*" adds Phatak. ←

Atul Patwardhan
Functional Head - Controls Design, PARI

"Car manufacturing has gone beyond the design and assembly of different components inside a well-designed exterior frame. Maintaining high quality in every aspect through rigorous quality checks has become a de-facto for all manufacturers as the quality affects the overall performance."

Interview

Mahindra & Mahindra

The B&R team visited Mahindra & Mahindra's Chakan unit, where we met Amarendra Panditrao - DGM Projects; Rajesh Patole - Manager Projects – CME; Rajesh Khanolkar - DGM Manufacturing ETA; Manohar Pawar - DGM Maintenance, the team behind high tech assembly lines at their spectacular manufacturing hub. Read on...

Tell us about Mahindra group and your Chakan facility.

Khanolkar: Mahindra is a diversified group. Our core business is automobiles, farm equipment and allied businesses. The Chakan plant was set-up with the vision to manufacture all the Mahindra vehicles from two wheelers to trucks. Owing to its high tech set-up, this unit manufacturers most of the new platforms and started to manufacturer engines, even for external clients. With ample land at its disposal and basic infrastructure already in place, the management wishes to scale-up production from its current planned capacity of 3 Lakhs vehicles to 6 Lakhs vehicles in coming years.

What are your views about smart manufacturing? What does it takes to build such a capability?

Khanolkar: Since the product life cycles are getting shorter and shorter, thanks to changing consumer demands, we need to have a great deal of flexibility in manufacturing. Production lines need to be set-up much faster with limited resources and skills, thereby, improving productivity. Hence, competencies not only in R&D, but also in manufacturing, are going to be a key differentiator for a successful organisation. We rely on long-term partnerships for better solutions and, hence, expect expert recommendations from B&R about future automation technologies and trends in manufacturing.

Controllers, touch panels as well as industrial PCs from B&R are running successfully on various assembly lines at Mahindra & Mahindra Chakan unit. Compact yet rugged hardware as well as flexible controls software made the choice very clear.

Patole: I strongly believe that flexible manufacturing needs foundation of robust and reliable equipment. Being on a path towards smart manufacturing, we are bringing IT and automation together and have implemented various measures like integration of production machines with manufacturing execution system (MES). We have standardised on industrial PCs from B&R as they are truly industrial grade and we have a very positive experience.

What are your key decision criteria for selecting an equipment vendor?

Panditrao: For us, the most critical criteria is scalability of the equipment. As we are in a phase of rapid expansion, it is required to effortlessly expand and modify commissioned assets. We do not prefer buying new equipment for the expansion. Project department considers current as well as future requirement from all the stakeholders like R&D, productions and maintenance to come up with specifications for vendors. It makes us feel proud that we are able to develop vendors who align with our goals and together we build scalable production lines. B&R is one such technology partner and I appreciate the quality of their products. Now, we are planning for increased training sessions on B&R systems.

Please share some insights about the installation of B&R.

Patole: Since 2013, we have standardised on B&R for powertrain lines. We are using industrial PCs - APC910 and HMIs with built-in PLC- Power Panels. "We have separate controllers for every small machine operations supplied by various machine builders. I wish that a more powerful controller could replace all these smaller and dedicated controllers. This will avoid tiresome integration and maintenance of the devices. We look forward to explore advanced integrated controls and open communication standards, such as OPC UA with B&R."

How do you see the role of maintenance in achieving production goals? What are the key areas being focused?

Pawar: Today, maintenance assumes even greater role of being the most dependable function to keep any factory running. We need to change our focus from reactive to

proactive and repair to reliability approach for maintenance. At Mahindra, we have already implemented Time Based Maintenance (TBM) practices by having maintenance schedules to fix problems in advance. However, we are already planning to implement more sophisticated approach i.e. Condition Based Maintenance (CBM). CBM will help us reduce downtime, as the equipment need not be turned off periodically. For technologies, like CBM, which has far-reaching effects, maintenance department has to get involved right at the specifications phase. For example, we were involved at the time of finalisation of B&R for our assembly lines. We are thankful to B&R for their continuous support as well as for their rugged and reliable systems. It was a significant change; however, today we feel very confident and are assured with our decision.

We have commissioned an Ethernet-based communication backbone throughout the factory, which provides flexible topologies to reduce wiring and achieve better diagnostics. In addition to our regular CLITA procedures i.e. cleaning, lubrication, inspection, retightening, we have implemented concept of Q component wherein we monitor those critical parameters, which might lead to either failure or rejection of the production component. Now, we have local servers installed, which maps the actual values of the critical parameters with the desired values. Future machines will become more intelligent and allow us to capture and analyse the data within itself. It will reduce the communication load and processing time at the server level and reduce requirement of storage.

Do you think it is this all about the latest technology?

Pawar: In the age of Industry 4.0 and smart manufacturing, we need to focus equally on the 'people' aspect. Maintenance personnel not only need to look into the equipment, but also understand hardware, software and communication technologies. We need to nurture passion and talent of the workforce even though it is a challenge to continuously enhance their functional capabilities. We are already working on our strategy. We have a subject matter expert as well as centre of excellence for each type of critical equipment. This member is not only responsible for the maintenance, but also looks into its obsolescence cycle, future up-gradation and ensure its full availability for production.
The pace at which technology is progressing unfortunately we are not seeing similar developments in the skill development. Corporates as well government must focus equally on the technology and human-side equation. ←

Amarendra Panditrao
DGM Projects
Mahindra Heavy Engines Ltd.

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Rajesh Patole
Manager Projects - CME
Mahindra & Mahindra Ltd.

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Rajesh Khanolkar
DGM Manufacturing ETA
Mahindra Vehicle Manufacturers Ltd.

Production lines need to be set-up much faster with limited resources and skills, thereby, improving productivity. Hence, competencies not only in R&D, but also in manufacturing, are going to be a key differentiator for a successful organisation. We rely on long-term partnerships for better solutions and, hence, expect expert recommendations from B&R about future automation technologies and trends in manufacturing.

Manohar Pawar
DGM Maintenance
Mahindra Vehicle Manufacturers Ltd.

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Advanced automation solutions for mobile machinery

The modular X90 control and I/O system brings all the functionality of a B&R automation solution to mobile machinery as well. Customers benefit from an easy-to-operate development environment, high-performance real-time operating system and ready-made software components. It has never been easier to implement automation solutions for vehicles and heavy equipment used in construction, agriculture, forestry and municipal applications.

The heart of the X90 controller from B&R is a powerful ARM processor with up to 48 multifunction I/O channels. Standard features also include interfaces for CAN, Ethernet and the real-time POWERLINK bus system.

The extremely robust die-cast aluminium housing provides space for up to four additional option boards. They make it possible to add additional I/O channels and interfaces, such as USB, CAN, RS485 or RS232. Option boards also simplify the integration of functions from the B&R technology toolbox, making it extremely easy to implement things like intelligent condition monitoring systems.

All products in the X90 family are designed for use in harsh industrial environments. They can handle operating temperatures from -40 to +85°C (housing surface) and are resistant to vibration, shock up to 50 g, salt, UV light and oil. The housing provides IP69K protection.

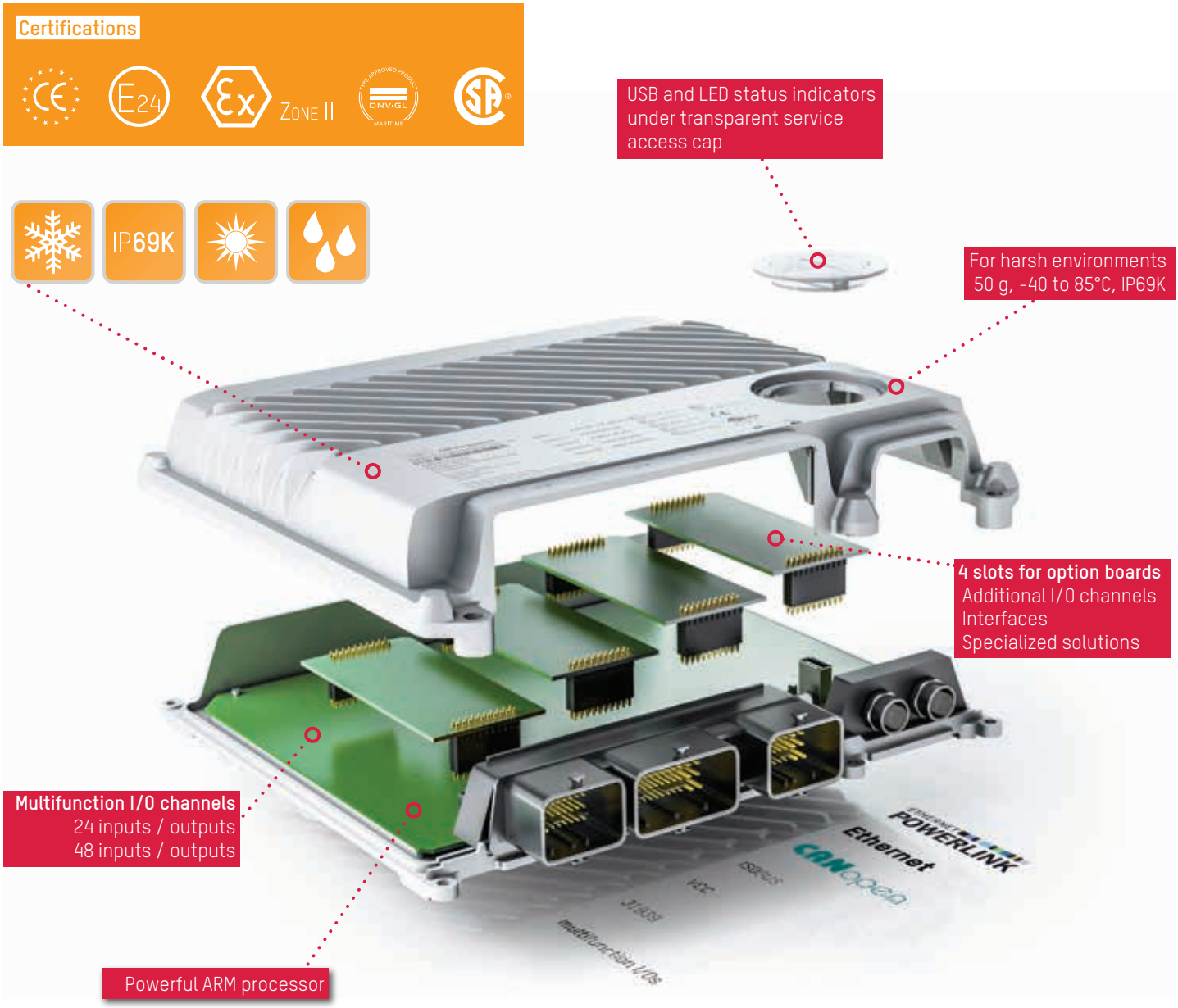
Efficient engineering

The X90 system fits seamlessly into the other systems offered by B&R. With the Automation Studio development tool and real-time Automation Runtime operating system, manufacturers of mobile machinery can take advantage of over 35 years of expertise in control technology. The benefits range from extensive diagnostics and simulation features fully integrated in the system to a web-based HTML5 HMI solution and interfaces to higher-level systems.

B&R hardware and software are completely decoupled. As a result, application software is developed once and can then be re-used across multiple platforms and hardware generations. Together with guaranteed long-term availability of all hardware components, this means maximum security for your investment.

Develop 3 times faster

An important component of B&R automation solutions is the mapp software framework. It's preprogrammed, modular components make it possible to reduce the time needed to develop application software by an average of 67%. And since the blocks are tested and maintained by B&R, the costs for maintenance and service are reduced as well.



In addition to basic mapp components for things like alarm monitoring or user/role management, there are also components available that are dedicated solely to mobile automation. mapp J1939, for example, makes easy to integrate all types of diesel engines into B&R applications. This mapp component is configured with just a few settings – and without having to write a single line of code. Regardless of the manufacturer of the engine, important data, such as speed and engine temperature is passed on to the application in the proper form.

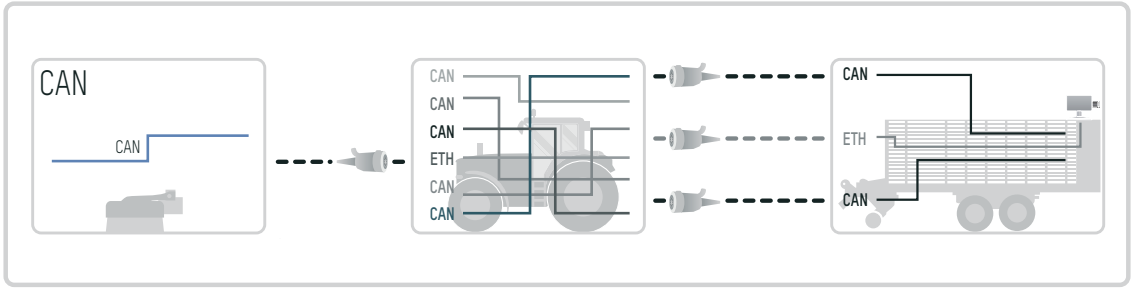
A mapp component is also available for specific engine parameters, such as Tier 4 functions. It can be used to incorporate all parameters of J1939-based sensors or truck chassis into the application.

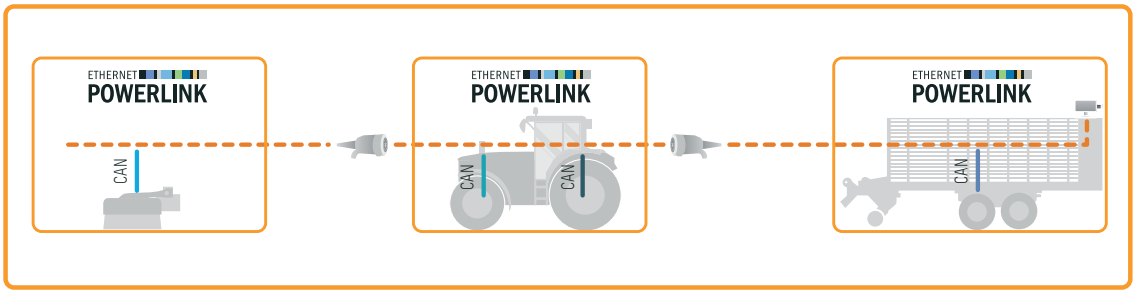
Highlights

→ Flexible and modular
→ For harsh enviroments
→ Part of an extensive family of products

Smooth transition to real-time Ethernet

B&R hardware for mobile automation comes equipped with CAN and POWERLINK interfaces. Since POWERLINK is based in part on CANopen technology, it provides a smooth transition for converting construction and agricultural equipment to an Industrial Ethernet solution. POWERLINK substantially reduces network complexity and enables entirely new system design concepts. Centralised software management, distributed drive control or integration of camera signals can easily be incorporated. Complementing it with openSAFETY adds an open source safety protocol certified up to SIL 3 / PL e. ←





Real-time applications

- → Master-Slave connection
- → M2M communication

Diagnostics and service

- → System diagnostics
- → Software updates

High bandwidth

- → HMI
- → Video

Safety and security

- → openSAFETY integrated
- → Open standard

Fully compatible

- → J1939, ISOBUS
- → Flexible network topologies

Low cost of ownership

- → Standard Ethernet cables
- → Open and patent-free

SuperTrak

Next generation industrial transport technology

A smart move toward mass customisation

Consumers are willing to pay a premium for personalised products. At the same time, increasingly responsive production technology is making it possible to create them under mass production conditions without a corresponding increase in unit cost. For manufacturers, the resulting margin boost is an enticing prospect. B&R's intelligent SuperTrack system is the reliable, industrial-grade transport solution for flexible production lines that enable mass customisation.

"*Customised products have added value for consumers,*" says Robert Kickinger, Mechatronic Technologies Manager, B&R, "*so they're willing to pay more for them.*" That's what makes things like custom photo albums, which customers can create online and have delivered straight to their door, such an interesting business model. Rather than pay the lowest possible price for a traditional photo album with sleeves or adhesive pages, consumers prefer to pay several times more for a personalised item. For the manufacturer, however, these customised products must meet one condition: "*They need to be suitable for highly automated mass production,*" notes Kickinger, "*or else the unit costs are too high to be profitable.*"

One in a million, not one of a million

The transition from simple reproduction to customer-specific production is already complete within the printing industry. The shift was facilitated in large part by the advent of industrial digital printing, which eliminated the pre-press stage and enabled the development of highly flexible post-press machinery.

Automated post-press equipment processes the variable output of a digital printing press and allows batch-size-one production of custom photo books with mass-production efficiency. But, if this works so well in the printing industry, what's taking it so long to catch on in other areas?

Consumers are willing to pay a premium for personalised products. This makes customisation an interesting prospect for manufacturers – but only if it can be done with mass-production efficiency.

On machines that produce windows in a variety of sizes, manual changeover eats up valuable production time. An intelligent transport system allows the changeover to be fully automated and controlled via software.

The crux of custom production

What many segments still lack is the necessary production machinery, though the race to achieve added value through product personalisation is already well underway. The trend past decorative personalisation toward products with custom geometric dimensions is sweeping across numerous industries – but at this point still involves manual intervention at numerous steps along the way.

The machine still has to be stopped to change over between product variants, eating up valuable production time and squandering the benefits of mass production. Window manufacturing is a perfect example of this. In addition to a range of standard sizes, today's builders are also able to order windows with custom dimensions. "*Production of the individual window components is efficiently automated,*" notes Kickinger, "*except that every changeover requires a worker to step in and adjust the size from, say, 130 to 140 centimeters.*"

Toward mass customisation

At least in terms of production machinery, there are still some obstacles to be cleared on the road to mass customisation. "*The only way to achieve mass-production levels of efficiency is with automated responsiveness,*" explains Kickinger. Advances in technology now offer the means to do this.

Modern IT systems make it possible for the customer to interact directly with the manufacturing process and trigger production simply by placing an order.

Automated, software-controlled changeover processes provide the kind of responsiveness that makes production profitable even at batch size one.

"*When you combine these two possibilities, you're able to manufacture customised products under mass production conditions without a corresponding increase in unit cost,*" says Kickinger. "*What we're looking at is a whole new generation of production technology.*"

It all rides on product transport

Flexible batch-size-one manufacturing operations need machinery that can adapt automatically without operator intervention. The frame of a 140-centimetre window is larger than that of a 130-centimetre window, and the machine must be able to account for this size difference. An intelligent transport system is an ideal way to implement a motion control solution with this level of responsiveness. Unlike conventional belts with rigid timing, an intelligent transport system conveys each product individually – with variable target positions, speeds and clearances.

The devil's in the details

"*Such transport systems are surprisingly scarce in modern plants considering the actual level of demand there is for them,*" says Kickinger. The technological maturity of what is currently available on the market may have a lot to do with this. "*The existing technology has severe shortcomings when faced with industrial conditions.*" The task of adjusting the guide rollers, for example, can often be extremely time consuming. Some systems have insufficient load capacity; others lack the necessary safety functions.

"*Although what they need is true integration, many manufacturers struggle with complex system architectures that require gateway modules,*" reports Kickinger. The guideway and other components are prone to wear, resulting in frequent service downtime. These flawed implementations have stunted the growth of what is an otherwise a vital technology.

Industrial transport technology

ATS SuperTrak from B&R has been specially developed for 24/7 operation in harsh industrial environments. The system is reliable, safe and remarkably service-friendly. "*The fact that shuttles can easily be replaced without having to disassemble the track is a huge advantage of the B&R system,*" explains Kickinger. This results in a very low mean repair time and increases the productivity of the entire line.

SuperTrak, robotics and CNC systems collaborate with exceptional flexibility and precision: Production technology for batch-size-one perfection

Automation Studio – the SuperTrak programming tool
Like all B&R solutions, SuperTrak is programmed in the Automation Studio software development environment. Software developers can take advantage of ready-to-use libraries and function blocks to configure shuttle movements.

Seamless integration of CNC and robotics
Hard real-time synchronisation between shuttles and all types of servo axes, CNC and robotics systems guarantees high quality production output. SuperTrak dovetails perfectly with robotics and other CNC-controlled components to form an automated production unit.

Rapid changeover
SuperTrak optimises the changeover times for different products manufactured on the same line. As soon as a new option is selected on the operator panel or via a production planning system, the transport system automatically switches over to the new product. Extended downtime for mechanical changeover between products is either reduced substantially or eliminated entirely. With its high load capacity, SuperTrak can handle heavier products as well.

Programmed in Automation Studio
Like all B&R solutions, SuperTrak is programmed in the Automation Studio software development environment. Software developers can take advantage of ready-to-use libraries and function blocks to configure shuttle movements.

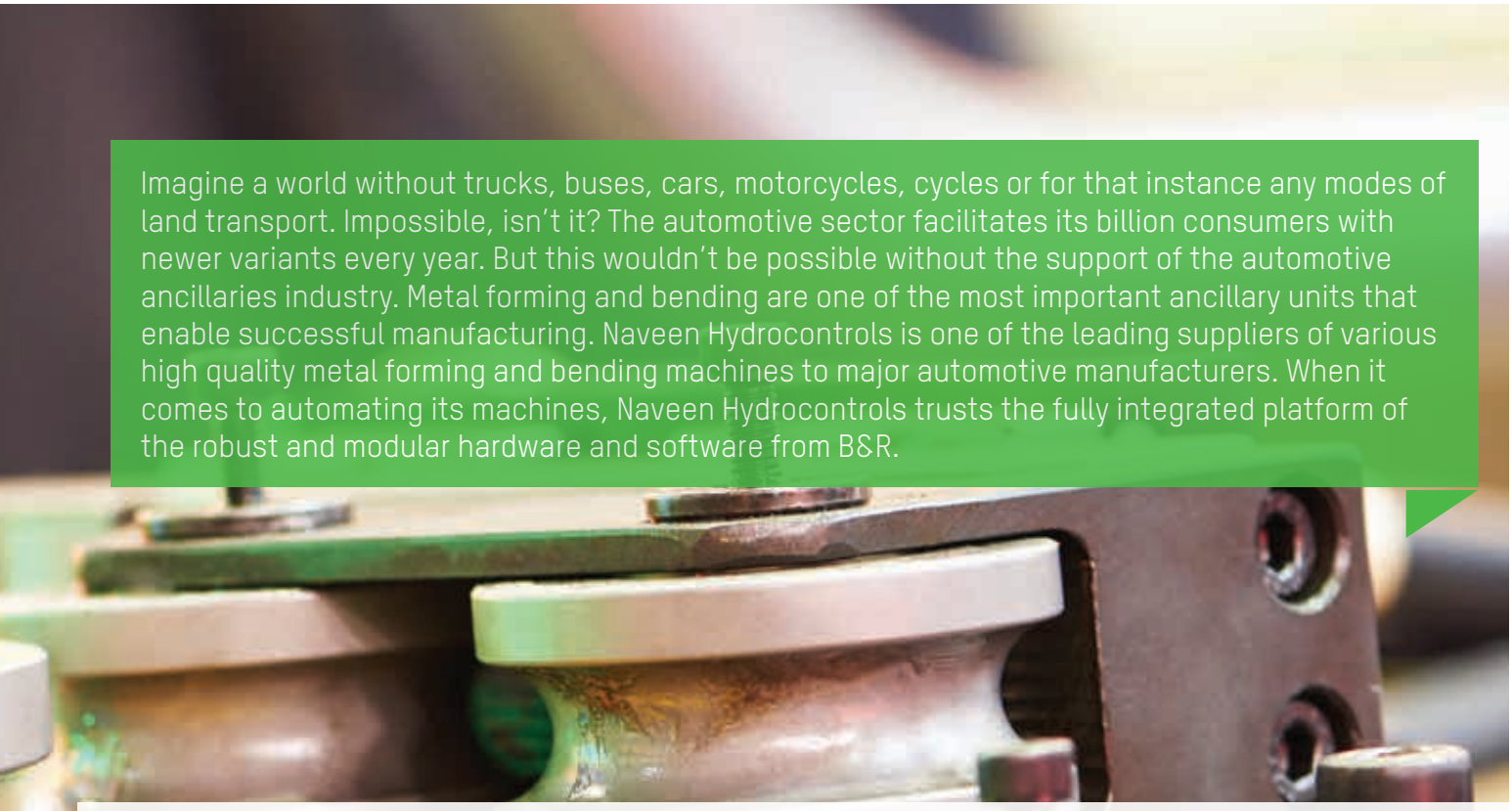
On the demand side, the product personalisation trend is driven by consumer expectations – particularly among a generation of digital natives. On the supply side, the continuing evolution of mechatronics is giving rise to a new generation of production technology for mass customisation. "*SuperTrak delivers the reliable, industrial-grade motion control that will advance this highly-responsive production technology to its rightful place in the smart factory landscape,*" concludes Kickinger. ←

Robert Kickinger
Manager - Mechatronic Technologies, B&R

"SuperTrak from B&R delivers the reliable, industrial-grade motion control it takes to implement highly responsive production technology that enables mass customisation"

Metal

Excellence in Bending



Imagine a world without trucks, buses, cars, motorcycles, cycles or for that instance any modes of land transport. Impossible, isn't it? The automotive sector facilitates its billion consumers with newer variants every year. But this wouldn't be possible without the support of the automotive ancillaries industry. Metal forming and bending are one of the most important ancillary units that enable successful manufacturing. Naveen Hydrocontrols is one of the leading suppliers of various high quality metal forming and bending machines to major automotive manufacturers. When it comes to automating its machines, Naveen Hydrocontrols trusts the fully integrated platform of the robust and modular hardware and software from B&R.

Founded in the year 2003 by S B Nandeppagoudar, Naveen Hydrocontrols is one of the leading manufacturers, suppliers and exporters of high performing machines and equipment, such as CNC tube bending machines, CNC wire bending, hydraulic press, tube end forming machines, tooling for tube bending and end forming and tube benders.

With creative and cost-effective solutions through quality products, Naveen Hydrocontrols continuously strives towards enhancement of products, services and improving customer satisfaction. "*Our technocrats and engineers make use of innovative methodologies to fabricate the high precision machines,*" says Nandeppagoudar. "*We work towards improving our range of machines in terms of performance and quality. With B&R, we are able to provide technologically advanced cost-effective solutions to our customer and are able to stay one step ahead of competition,*" he adds

CNC-based pipe bending

The CNC pipe bending machine makes use of the rotary draw method for bending, which provides the needed precision. This enables bending with a constant centre line radius and wall thickness. Due to the presence of efficient tooling and close loop control, the material fibres are unaffected. The machine is capable of multiple bends with multiple radii.

The machine also supports bidirectional bending with a possibility of adding 8 dies. The extended lateral axis and vertical axis enables the LH bending and RH bending, whereas the regular push turn bend axes are used in moving the job to the desired position for bending. These machines make use of the perfectly synchronised ACOPOS multi, which helps Naveen Hydrocontrols to reduce his wiring efforts and achieve a decentralised architecture.

Automated loading and unloading

Plant operators are often faced with the issue of handling unskilled manpower leading to wastage. Human errors also account for major rejections. "*With this in mind, we have introduced the automated loading and unloading process in our CNC pipe bending machines,*" says Nandeppagoudar. Automated machines, thus, help in reducing wastage, human errors and, thus, increase productivity.

The modular hardware and software programming has helped Naveen Hydrocontrols in making their systems modular not only from the electronic point of view but also from the mechanical point of view. The loading and unloading mechanisms are a feature offered by Naveen, which can be selected by any customer. This system is able to adapt to any older version of his machines too.

One network for entire system

To achieve a deterministic performance down to the network level Naveen Hydrocontrols places their trust in POWERLINK for satisfying their needs of a fast and deterministic network. They are now able to connect various sensors, drives and I/Os on the network, which enables them in easier programming, diagnostics and maintenance. These devices are configured directly via Automation Studio, which is a single tool for all B&R products.

"*Automation Studio and Ethernet POWERLINK have helped us in building a complete integrated machine,*" mentions Nandeppagoudar. "*Ethernet POWERLINK has a very low cycle time with multiple axes synchronisation with nanosecond accuracy.*" This integrated approach helped Naveen Hydrocontrols deliver machines with higher productivity and faster speeds.

Naveen Hydrocontrols

S.B. Nandeppagoudar
Owner, Naveen Hydrocontrols

"B&R helped us with a complete scalable solution. We, thus, benefited from the latest hardware and technological advances innovated by B&R without software modifications. This assisted us in achieving a shortest time to market."

Decentralized control

Naveen Hydrocontrols uses B&R Automation PC 2100 as a central control. The APC runs dual operating systems – Windows and ARWin. The Windows runs Naveen Bend Pro, which is a 3D software tool developed by Naveen Hydrocontrols capable of reading .dwg and .igs files. The software converts designs into a CNC G code, which is read by ARWin and executed, thus, saving the operators the need to program in the event of a new job or new design. There is a seamless transfer between Windows and ARWin. APC 2100 also permits Naveen Hydrocontrols to drastically reduce his cabinet space.

ARWin is a real time operating system, which helps in running the time critical machine operations irrespective of the upper Windows. ARWin coupled with Ethernet POWERLINK provides a deterministic system from operating system to network. Naveen Hydrocontrols are always focused on offering their customer a technologically advanced machine using cutting-edge technology from B&R.

The CNC 25 PTX V2R3X pipe bending machine equipped with automated loading and unloading

The new drive generation from B&R provides a universal solution for any machine manufacturing automation task with a modular cooling design. It is a new milestone on the path to "Perfection in Automation"

Drag & Drop – Hardware configuration has never been so easy. The System Designer feature in Automation Studio 4 helps lay out your hardware quickly and accurately

B&R hardware together with the Automation Studio software development environment made programming of various machines extremely simple. The ability of Automation Studio to create re-usable, modular code and function blocks irrespective of the hardware has given Naveen Hydrocontrol's customer new machines and features with a short time to market. Automation Studio's support for integrating third party devices via POWERLINK further adds to the ease of configuration.

Benefiting from Scalability+

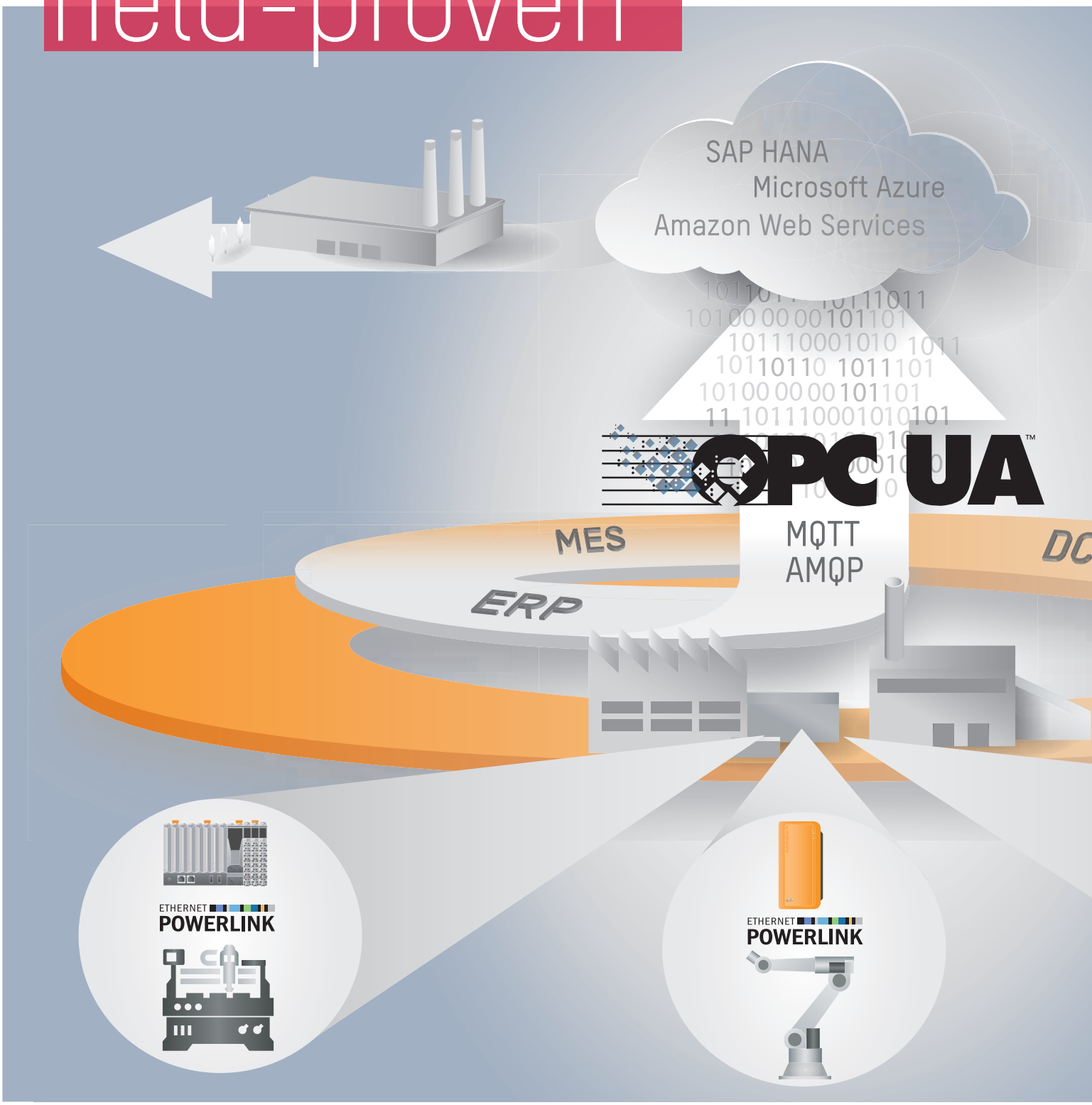
Upgrading hardware systems has never been easier. Every OEM is faced with the dreaded problems of hardware changes, may it be due to obsolescence or making uses of newer features and technologies. Over the past decade Naveen, too, has used several hardware systems from B&R that include Controllers with ACOPOS drives, Power Panels with ACOPOS drives and APC with ACOPOS Multi drives. Even after several hardware changes, the software was not changed. With the Automation Studio, user develops the software and then has the possibility to just link the software blocks to the selected controller from B&R without any changes. "*B&R helped us with a complete scalable solution. We, thus, benefited from the latest hardware and technological advances innovated by B&R without software modifications. This helped us in achieving the shortest time to market,*" emphasises Nandeppagoudar.

Partnership over a decade and counting

Naveen Hydrocontrols has been working with B&R since inception and has many more plans in place with the automation solution provider to enhance the flexibility of its machines. "*We owe part of our growth to B&R and their technologically-advanced hardware and software, which complement our expertise in machines,*" mentions Nandeppagoudar. "B&R has consistently supported us over the past decade and have always helped us stay one step ahead of our competitors."

Over 500 different machines manufactured by Naveen Hydrocontrols are completely automated by B&R. Naveen Hydrocontrols trust in B&Rs expertise along with the hardware and software to reap the full benefits of the integrated automation. ←

Field-tested, field-proven



OEMs and system integrators have high hopes for OPC UA TSN. So far, those hopes have been based on theoretical concepts and technologies still under development –but not any longer. Together with its partner companies, B&R has proven the ability of OPC UA TSN to meet communication requirements from the line level up to the ERP level under real-world conditions.

Over the past few months, B&R has performed intensive field testing together with TSN network specialist TTTech. "*The results are impressive,*" reports Sebastian Sachse, Technical Manager, B&R's Open Automation business unit. "*In some aspects, OPC UA TSN has even outperformed our expectations.*"

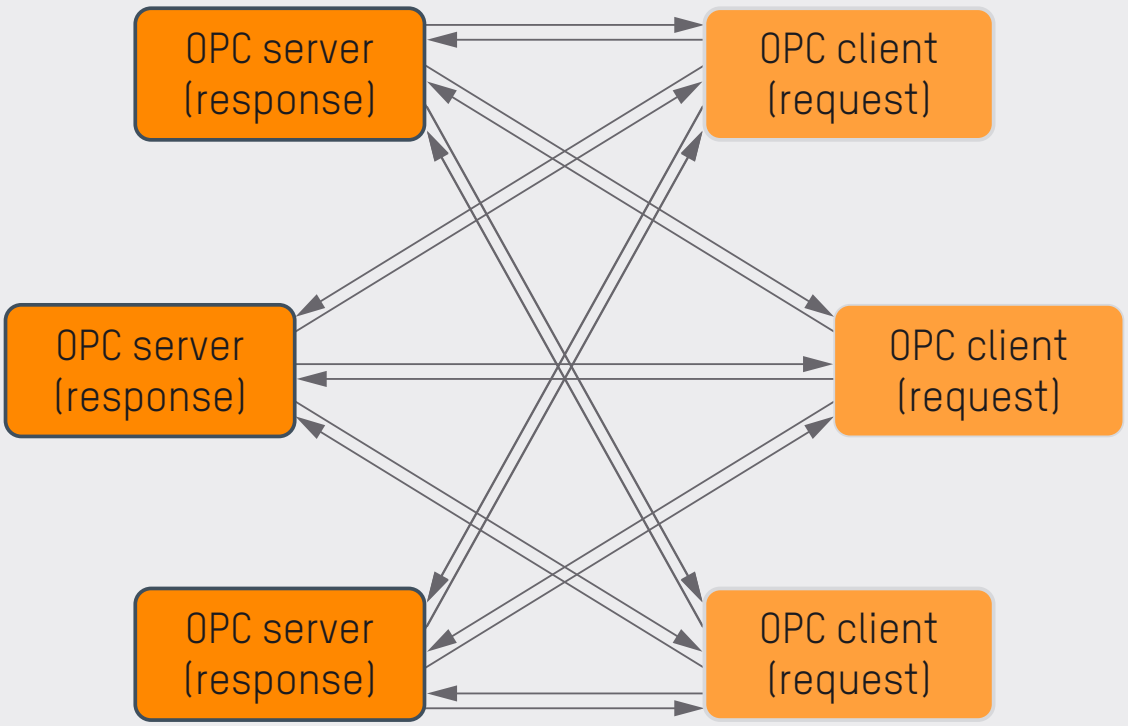
Time-critical applications at the line level, such as synchronisation of conveyor belts with various other equipment, require cycle times as low as two milliseconds. "*We've gone even lower than that on our test installations,*" says Sachse. With jitter measurements as low as 100 nanoseconds, the results were on par with the best fieldbus systems on the market today.

Networks without borders

"*The other impressive thing about our test installations is their stability,*" emphasises Sachse. "*After all, we're working with technology so new that its IEEE specification hasn't even been completed yet.*" B&R's test installations will soon join those of other participants in the IIC's TSN Testbed to examine the interoperability of components on a multi-vendor OPC UA network with TSN. Other TSN Testbed participants included: National Instruments, Cisco, Schneider, Bosch, GE, Intel and TTTech.

Low resource intensity

Pivotal criteria for practical OPC UA applications will be its code size and resource requirements. "*If OPC UA were only able to run on powerful industrial PCs and controllers, use in machinery and equipment would be out of the question,*" explains Sachse. By implementing OPC UA on a bus controller from its X20 system, B&R has clearly demonstrated the feasibility of I/O-level applications for OPC UA servers and clients. "*It proves that OPC UA is perfectly scalable to any conceivable task at the line-level and beyond.*"



With a client-server mechanism, a client requests information and receives a response from a server

Reduced network traffic

With its bus controller implementation, B&R has also tested an important new feature of the OPC UA specification. The publisher- subscriber (pub/sub) model plays a key role in allowing OPC UA TSN to achieve the necessary performance.

Until now, OPC UA has used a client/server mechanism, where a client requests information and receives a response from a server. On networks with large numbers of nodes, traffic increases disproportionately and impairs the performance of the system.

The publisher-subscriber model, in contrast, enables one-to-many and many-to-many communication. A server sends its data to the network (publish) and every client can receive this data (subscribe). This eliminates the need for a permanent connection between client and server, which is particularly resource intensive.

B&R is actively participating in the OPC Foundation working group developing the specification for OPC UA's publisher-subscriber model. "*I expect the specification to be completed by the end of the year – and rapidly implemented by many manufacturers soon thereafter,*" says Sachse.

OPC UA as a standard

The momentum behind the OPC UA movement is evident in the number of standards organisations basing their work on the vendor-independent protocol. EUROMAP, the leading developer of global standards for the plastics industry, recently defined OPC UA as the basis for two new EUROMAP interfaces, and more are on the way.

The umbrella organisation for the packaging industry, OMAC, will also be integrating OPC UA into its PackML standard and is already working on specific implementations. "*It really is astonishing how quickly such well-established industry standards are now turning to OPC UA,*" says Sachse. "*The performance demonstrated by our field testing with OPC UA TSN confirms that they're moving in the right direction,*" he adds.

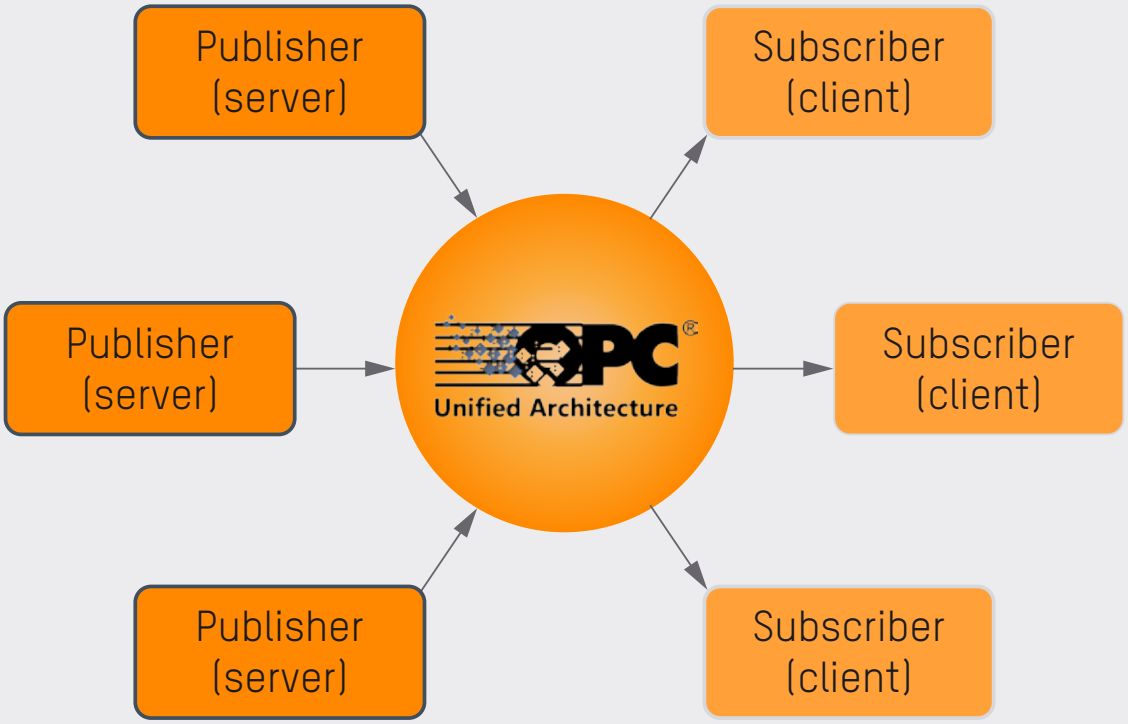
The IIC and its TSN Testbed

The Industrial Internet Consortium (IIC) aims to enable the intelligent networking of machinery, equipment and facilities. One of the primary goals of founders GE, IBM, Intel and Schneider is to accelerate adoption of the Internet of Things (IoT).

To identify which technologies are best suited to IoT applications, the IIC organises testbed groups, where these technologies are evaluated on multi-vendor test installations. B&R has been an IIC member since 2006 and is participating in the TSN Testbed, where the combination of TSN and OPC UA is being evaluated for the first time in an industrial environment.

OPC UA TSN

From a technical standpoint, it would certainly be feasible to add real-time capability to OPC UA itself, but doing so would involve considerable effort and would still have disadvantages. That's why a large group of automation and robotics manufacturers have joined forces to move in a different direction. OPC UA will take advantage of Time Sensitive Networking (TSN).



With a publish-subscribe model, a server sends its data to the network (publish) and every client can receive this data (subscribe)

TSN is a set of extensions currently in development that will later be included in the IEEE 802.1 standard. The goal is to provide real-time data transmission over Ethernet. A significant advantage of the TSN standard is that the automotive industry is behind it. That means that the required semiconductor components will be available very quickly and relatively inexpensively.

The amount of data being transmitted in automobiles has skyrocketed in the past several years. Conventional bus systems don't have nearly the bandwidth to handle it. The first step for the automotive industry was adoption of the 802.1 AVB (Audio Video Bridging) standard, which enables synchronised, prioritised streaming of audio and video files. This allows images from rear view cameras mounted on the back bumper to be transferred via Ethernet.

To pursue the goal of reaching new industries and broadening the spectrum of applications, the AVB working group became the TSN initiative. The automotive industry would also like to handle all control tasks and applications that require functional safety over Ethernet. For this to be possible, they will need cycle times in the real-time range and deterministic network behavior. These are the exact same requirements faced in the automation of production lines.

OPC UA TSN bridges the gap between the IPbased world of IT and the field of factory automation. OPC UA TSN is the perfect solution for all applications in factory automation. With sub-millisecond synchronisation, it offers sufficient precision for tasks, such as line synchronisation, SCADA system integration, basic control tasks or even conveyor belt operation and I/O integration.

With OPC UA extending its reach to the level of line automation in the coming years, there will be some dramatic changes to the architecture of machinery and equipment. It will likely mean the end of factory-level fieldbus systems as we know them today. ←

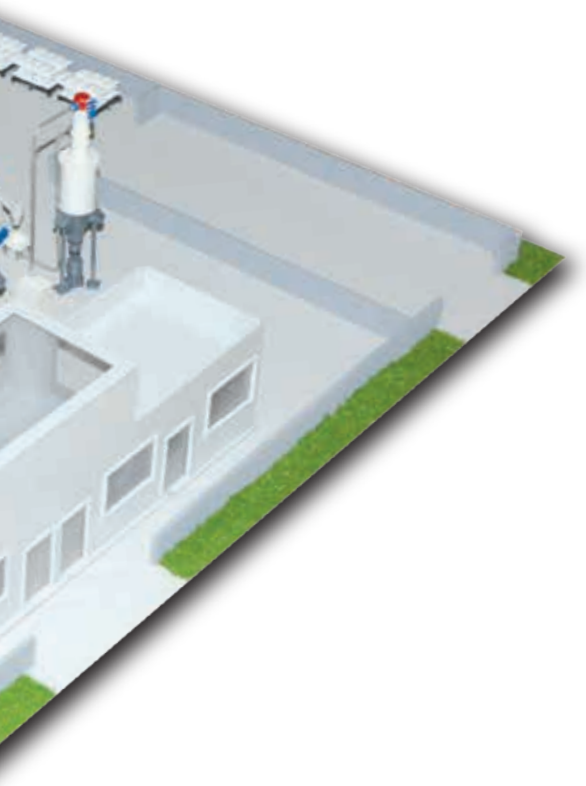
Sebastian Sachse
Technology Manager, Open Automation
"OPC UA TSN has outperformed our expectations."

Ninad Deshpande
Specialist – Open Technologies, B&R India
"Open technologies have caught the eye of Indian manufacturers and OEMs with an increased willingness to adopt such technologies in order to reap the benefits of interoperability, machine-to-machine communication and connectivity to higher levels. OPC UA is set to accelerate adoption of IIoT, enabling convergence of IT and OT."

Plastics

Material handling with care

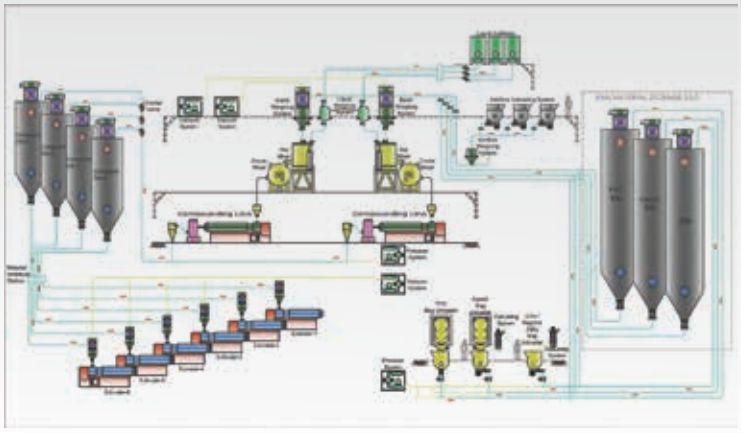
The use of plastics in our daily lives is increasing exponentially. Indian car manufacturers use an average of 30kg of plastics in one car compared to an astounding 90kg in the western countries. This increased use of plastic is a driving force for increasing the production capacity. With increased production come critical challenges of precise formulation, sophisticated automation and precise batching. Prasad Pneucon Solutions Pvt. Ltd. not only provide fully automated bulk material handling solutions for the plastic industry, but also enable a dust-free, healthy and clean working environment in plants. B&R was the obvious choice for these applications by Pneucon, owing to the complete range of solutions and expertise.



Pneucon a group company under Prasad Group, plays a pivotal role in plastics auxiliary equipment industry. Headquartered in Ahmedabad, Prasad Group was incorporated in 1984. To provide top quality products and excellent technical services is its long-term commitments to all the loyal customers. Pneucon Solution is a project company who is a perfect partner to optimise bulk solids handling with the most cost effective automation. "*Whether it is a completely new plant or expansion, restructuring or up-gradation, we have everything the user needs from one source,*" says Dhruv Shah, Executive Director, Prasad Pneucon Solutions Pvt. Ltd. "*Since inception, we provide competence in material handling system with a focus on Economy through Automation,*" he says.

Cleaner shop floor

A production unit in the plastic industry is plagued with dusty environments due to the type of raw materials used. However, with dusty, unclean environments the production units consistently face a labour crunch. "*To handle these multiple challenges, providing cleaner and healthier working environment, increasing productivity and reducing dependencies on labour, we at Pneucon, provide completely automated systems for the bulk material handling,*" mentions Mehul Parmar, Manager – Electrical & Electronics. "*This keeps the shopfloor neat, clean and dust free. The spillage and wastage of raw material caused due to human handling is also totally eliminated.*"



Overview of the cable compounding process

Silos are used for storing the mixture

No human intervention

Masterbatch and compound play a prominent role in processing of plastic. The raw material received in the plant is typically in bags and fed to the unloading stations. Unloading systems sometimes deploy additional mechanisms, such as de-dusting systems based on the type of raw material used. Pouring powered material generally generates fumes and dust. The de-dusting systems attached to the neck of the unloader help in sucking out such fumes and dust particles when unloading a bag filled with powder, making the workplace healthier. The next station in the process is batch-weighing system, which accurately weighs the material. Material transportation from one station to another is done through pipes with the help of a suction mechanism. Various liquid additives are mixed with these raw materials, which too need to be weighed in liquid weighing systems. Various parameters decide the discharge of the weighed material components in to a hot mixture. The hot mixture does not have any heaters but the mixer rotates at high speeds generating heat due to friction, which could even reach boiling temperatures. A cooler mixture is the next station, which cools down the mixture to near ambient temperature. Silos are used for storing the mixture. The final step is the distribution of this material to various line machines in the production plant. Being a continuous process, stoppages during operation leads to enormous losses and hence special attention is given towards a 24x7 operation.

Adding value to handling system

"*Understanding the project and implementing it accurately requires special skills. Our expertise and experience in complete project management is the mantra behind our success,*" says Dhruv Shah. "*We provide the world's largest cable compounding automation system with a throughput of 12tons/hr, which consists of 4 mixers of 500kg batch each. All leading wire manufacturers trust Pneucon for automating their bulk handling systems.*"

Pneucon engineers visit the customer site for understanding the process needs, type of components manufactured and type of raw material handled. The design team makes a complete layout together with the installation guidelines of various components. These diagrams include the exact location of the equipment, such as Silos, hot mixer, cooling mixer, weighing systems and other peripherals, piping distances, piping support and all other installation details. This not only enables the plant user to get an overview of the installed system in his plant, but also makes the life of the commissioning engineer very easy. "*Post installation, we aim to equip the user with all the technical know-how of the system and tips on system maintenance. This reduces the downtime and makes operating the system simple. We provide a mix of classroom and on-site training,*" mentions Mehul Parmar.

Effortless even with thousands of IOs

The handling system setup could span over long distances in the plant, and this makes it necessary for making these systems modular. It is easier from the view of cabling the systems. In case

PNEUCON SOLUTIONS

Dhruv Shah
Executive Director, Prasad Pneucon Solutions

"Together with B&R solutions, we have provided the world's largest cable compounding automation system with a throughput of 12tons/hr, which consists of 4 mixers of 500kg batch each. B&Rs exceptional support and technical knowledge have been instrumental in our success and we look at strengthening our partnership even further in the future."

B&R solutions used to automate world's largest cable compounding automation system with a throughput of 12tons/hr consisting of 4 mixers of 500kg batch each

of centralised systems, the sensors and actuators from the field are routed to the central cabinet. This not only increases the cabling and its associated cost, but also the difficulties in diagnostics and maintenance. Each station in the handling system has its own junction box, which has a set of X20 IOs. The X20 system is a three parts module – base, electronics and terminal. The base and terminal are common for all modules; the user based on the sensors and actuators, selects the electronics. The field devices are wired to these modules and these IOs communicate to the central cabinet over Ethernet POWERLINK. This drastically reduces the cabling and using Ethernet POWERLINK provides the deterministic response needed for the system. "*Adding a new station or expanding a current set-up was never easier,*" says Mehul Parmar. "*Ethernet POWERLINK network provides all the field data as well as the diagnostic data to the central controller. The decentralised hardware setup has helped our teams in making the system designs more modular,*" adds Parmar. The X20 load cell module does the weighing computation, which removes the need for using an amplifier and the X20AI1744-3 module connects directly to the load cell. The operation is thus completely noise free providing a high weighing accuracy.

Automation Studio: Flexible software

Software plays an important role in designing and programming a system. The flexible software from B&R, Automation Studio enables programming in IEC61131 languages as well as in C and C++. Automation Studio acts as a single tool for programming all B&R hardware – controllers, PCs, IOs and motion. Storing and opening machine manuals and datasheets on the GUI, printing of reports and user access are some of the highlights of the system. The software and hardware also provide facilities to store recipes for different types of raw materials. The quantities for mixing are recommended by the user and based on the product being manufactured the appropriate recipe is loaded at runtime.

"*Automation Studio provides various features, which differentiates us from competition,*" mentions Mehul Parmar. "*Managing different variants of the same machine does not need different projects. A single project has a possibility to have multiple configurations and programs. This avoids the programmers the trouble of maintaining versions of same program as in the case of other control systems.*" The user can develop the program independent of the hardware selection. The program can even be developed on a simulation environment in Automation Studio. It is possible to select hardware or change it at a later stage in the project without changing the software program. Such is the flexibility offered by Automation Studio.

Looking into the future

Pneucon has always been a step ahead as far as the technology offered is concerned. "*To enable our handling process become even smarter and open, we at Pneucon, are exploring OPC UA communication standard as the option for horizontal as well as vertical connectivity on site,*" says Dhruv Shah. "*Using open, vendor independent standards is the need of the hour and we look at being ready for the future. B&R has always offered exceptional support and technical knowledge and we look at strengthening our partnership even further in the future,*" adds Shah. ←

Mehul Parmar

Manager – Electrical & Electronics, Prasad Pneucon Solutions

"With our fully automated bulk material handling solutions, we provide cleaner and healthier working environment and increased productivity. The decentralised architecture with B&R controls makes addition of a new stations or expansion of a current setup easy. X20 IO systems and Ethernet POWERLINK contribute towards making our designs modular, easy to install and cost-effective."

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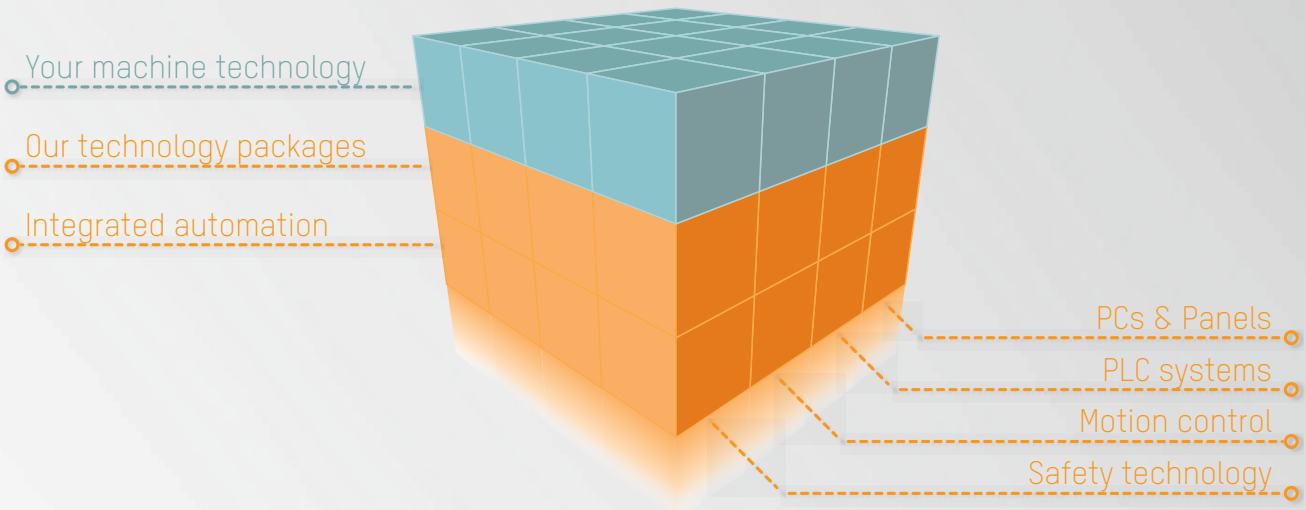

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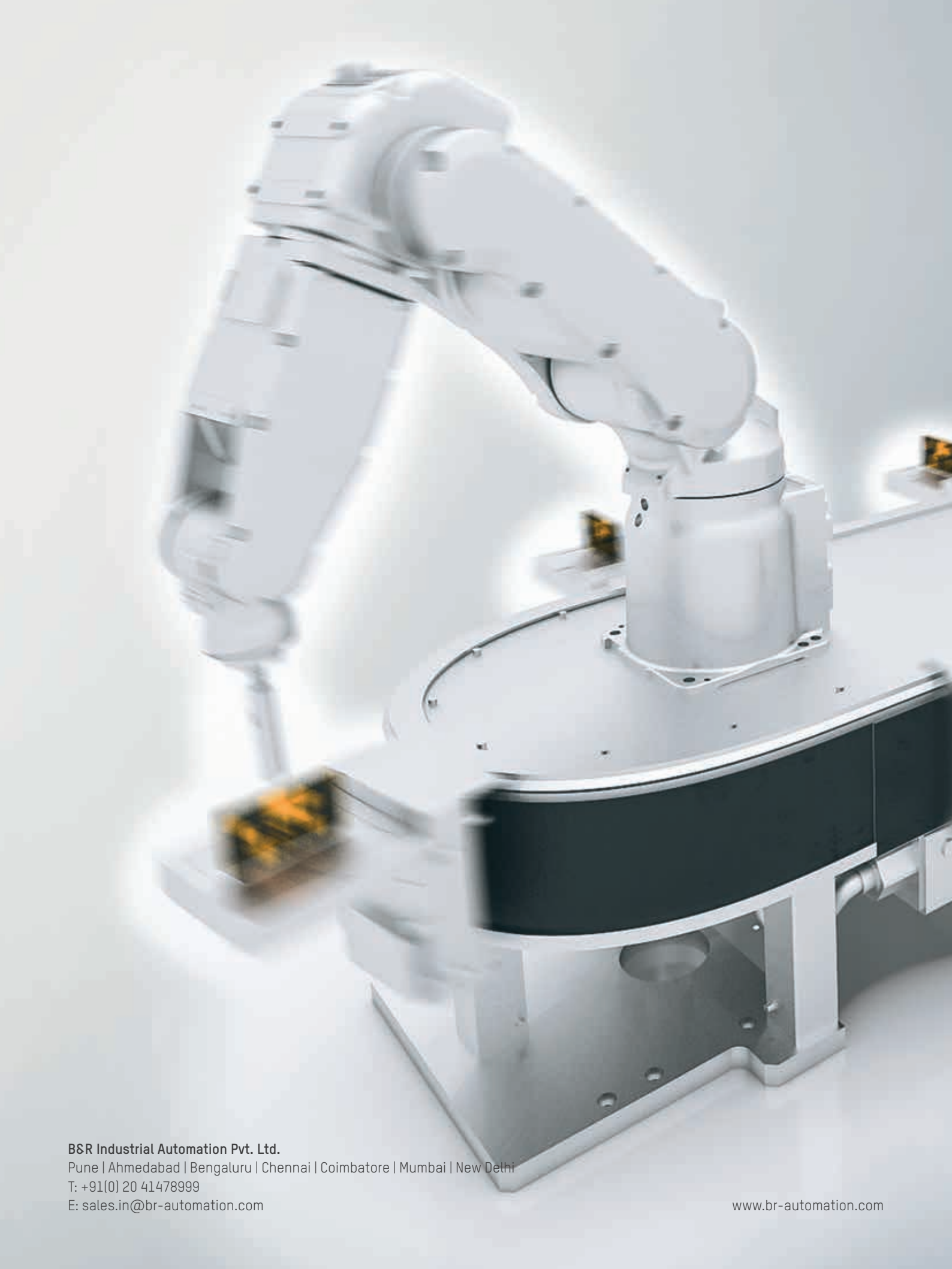

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