automotion INDIA

The B&R Technology Magazine

Smart manufacturing for ultimate production effectiveness

OPC UA TSN From the field to the cloud

APROL Adding 'SMART' to factories

Pharmaceutical packaging Integrating robotics with blistering speed

Foil stamping Stamp of approval

PERFECTION IN AUTOMATION
A MEMBER OF THE ABB GROUP

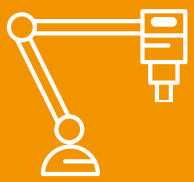
AUTOMOTIVE

FOOD AND BEVERAGES

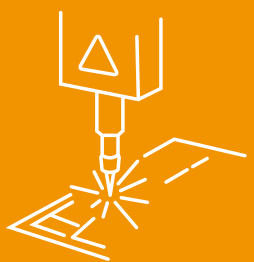
ROBOTICS

PACKAGING

PHARMA



PERFECTION IN AUTOMATION



TEXTILE

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PLASTICS

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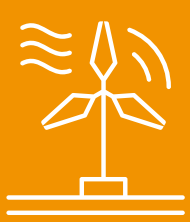

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Dear Reader,

Today, we live in a digital age. What we could see in sci-fi movies only a couple of years ago is already a reality now. The changes in technology have been striking – and the rate at which those changes occur is accelerating. The amount of time needed to accept, adopt and spread a new technology is growing shorter and shorter.

To reach 50 million users, it took the telephone around 50 years. Television accomplished the same in about 20 years, while it took Twitter only two. Pokemon Go did it in a mere 19 days. At astonishing speed, these new technologies go from being a disruption to becoming an integral part of our daily lives as we adapt our lifestyles around them.

Similar technology disruptions can be found in the manufacturing sector as well. While they pave the way for new business opportunities, they also open up new risks. Who could have predicted, after all, that the success or failure of an organisation might hinge on the number of "Likes" it is able to attract on social media platforms. Similar to our personal lives, manufacturing design and automation processes are experiencing the impact of this transformation. In competitive markets, manufacturers have already realised that technology acts as an enabler to prepare them for the future.

B&R is a pioneer in industrial automation, harnessing the combined potential of the absolute latest hardware and software technology to generate solutions that drive the digital industrial revolution. We are a perfect automation partner, enabling our users to implement next-generation technologies not only in new developments but also in existing assets. We help factories bridge the gap between operational technology (OT) and information technology (IT) using open source solutions such as OPC UA, MQTT and AMQP. We also provide machine builders with smart manufacturing solutions that deliver cost-effective improvements in productivity, efficiency, throughput, batch-of-one production, overall equipment effectiveness, time to market and return on investment.

B&R helps machine builders adopt new technologies and solutions that enable them to experience the digital era with smart manufacturing solutions and open, transparent communication.

Welcome to the third edition of automotion India.

Happy Reading!

Ninad Deshpande
Head - Marketing

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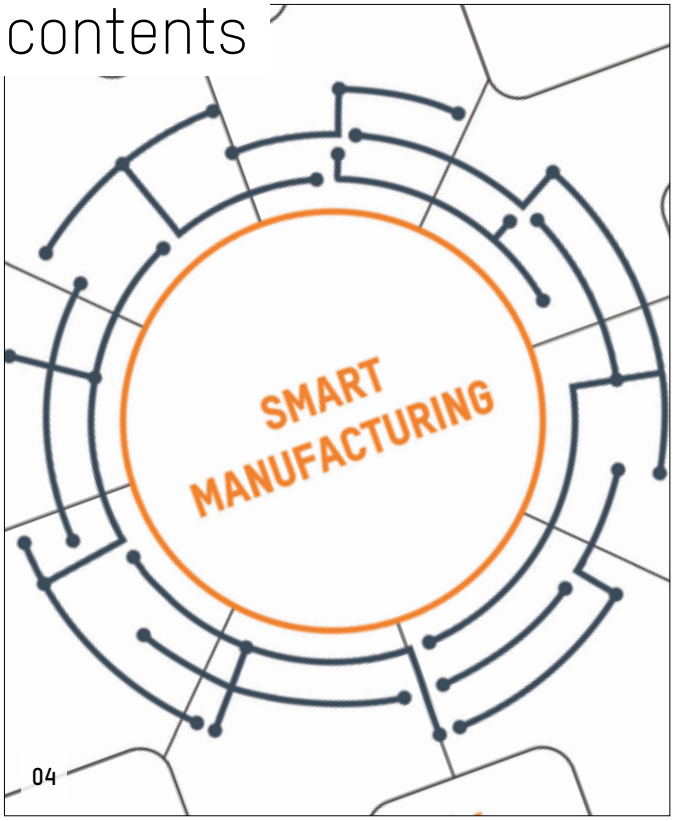

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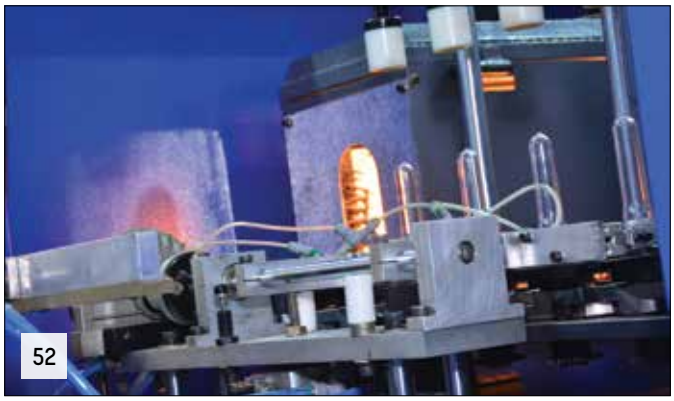

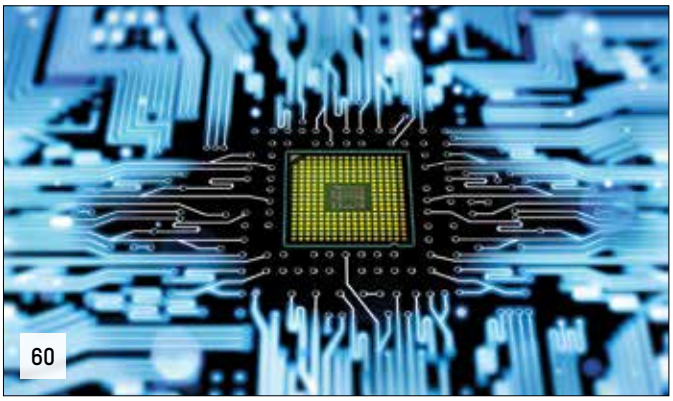

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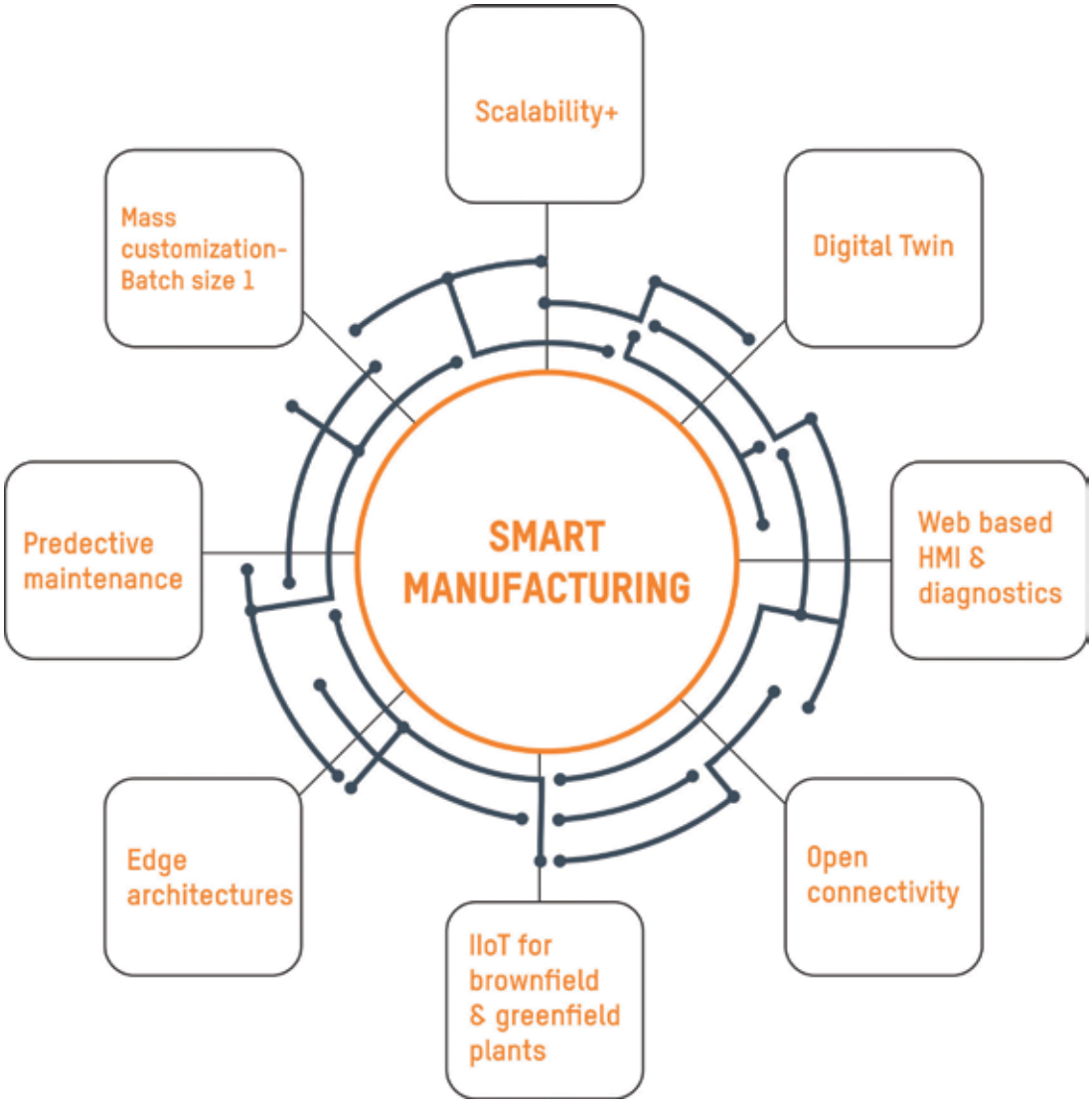
Digital transformation

Smart manufacturing for ultimate production effectiveness



For machine builders and manufacturing facilities, digitalisation is no longer a choice, but a necessity. Global trends like Industry 4.0, Industrial IoT and digitalisation finally leading to smart manufacturing are already proving their benefits in real-world applications. India's machine builders and manufacturers are evaluating technologies and solutions and mapping their paths to implementation for which B&R is highly appreciated by machine builders and manufacturers. B&R provides solutions for tomorrow's needs resulting in significant competitive edge in the area of smart manufacturing and production effectiveness.

Transformation

Companies across every industry are eager to tap into the benefits promised by the digital transformation. Like every major industrial revolution, this one is comprised of an array of technological developments – some already mature and others still under development. The big changes will come about as these disparate parts all are put to work together.

The challenge of implementation, therefore, raises some important questions: Is it possible for any one entity to acquire competence in areas as diverse as processing, communication, safety, reliability, batch size one, mass customisation and new ways of user interaction? What does the roadmap look like? Where do the investments end and the benefits begin?

The answers lie not in abrupt, disruptive revolution, but in peaceful, piecemeal evolution. They lie in a platform where the parts can be upgraded stepwise – one that is shaped by the competence and needs of each company and its application. Along the way, it is vital that each stage of transformation results in a working system, which can settle, mature and provide desired benefits before moving on to the next, more ambitious stage.

The order in which the stages of transformation are completed must be adaptable to the area of application, availability of infrastructure at each stage and according to the priority set by customers. In addition, it is necessary to work on solutions tailored to their unique, individual challenges in order to effectively reap the benefits of the latest technologies. Clearly, there are many paths to Industry 4.0 and smart manufacturing – yet, as long as the roadmap is clear, the journey can be smooth and the destination truly rewarding.

B&R enables smart manufacturing

Everyone is talking about smart manufacturing practices and the Industrial IoT. These topics come up frequently in this issue of *automotion India*, where you will see how B&R, is already propelling its customers today ahead of the competition with next-generation automation solutions.

Even as technologies change, the objectives at machine level and line level remain the same. We seek higher throughput, less downtime, lower energy consumption and higher product quality. In addition, further improvement is needed in ensuring the safety of human operators and reducing pollution and wastage. The journey to smart manufacturing sets out to achieve all of these objectives by applying the latest developments in open communication along with ever-increasing intelligence in the sensors, actuators and automation systems.

Converging OT with IT

Factories are looking at ways to gather data from machines as well as lines and send it to IT systems for analytics. With intelligence becoming more and more decentralised and a growing volume and variety of machine and line data becoming available for analytics, the need for edge computing is on the rise. Edge architectures help collect data from sensors, actuators, machines, lines and plants and move it to IT systems for analytics and long-term storage.

Edge architectures from B&R make life easy for factory operators and plant owners by providing a variety of options tailored to their requirements. **Edge Connect** allows them to gather data directly from sensors and actuators in the field, which can then be shared securely with any cloud platform using the open-source OPC UA protocol – making it the easiest way to collect data from the field.

Edge Embedded goes a step further, providing basic intelligence, trends, reporting, data aggregation and the possibility of

Edge architectures from B&R make life easy for factory operators and plant owners by providing a variety of options tailored to their requirements. Edge architectures help collect data from sensors, actuators, machines, lines and plants and move it to IT systems for analytics and long-term storage.

viewing data locally on the shop floor before moving it to the cloud. With Edge Embedded, factories can divide computation between the cloud and on-site controllers.

Edge Controller provides factories with comprehensive on-site analytics, business intelligence and machine learning – giving them full control of their data. Edge Embedded and Edge Controller can also be equipped with energy and condition monitoring solutions. Edge architectures from B&R are the perfect way to begin the transformation towards smart, connected factories of the future.

Open, real-time access to valuable IIoT data

Time-Sensitive Networking (TSN) in combination with OPC UA provides precisely timed horizontal access to data from machines, controllers, I/O systems and lines – regardless of who built the individual devices. As an open protocol, OPC UA has already found widespread use in a diverse range of industrial applications. Nearly all manufacturers offer OPC UA in their controllers and other products. The technology is developed and promoted by many different manufacturers under the oversight of the OPC Foundation industrial consortium.

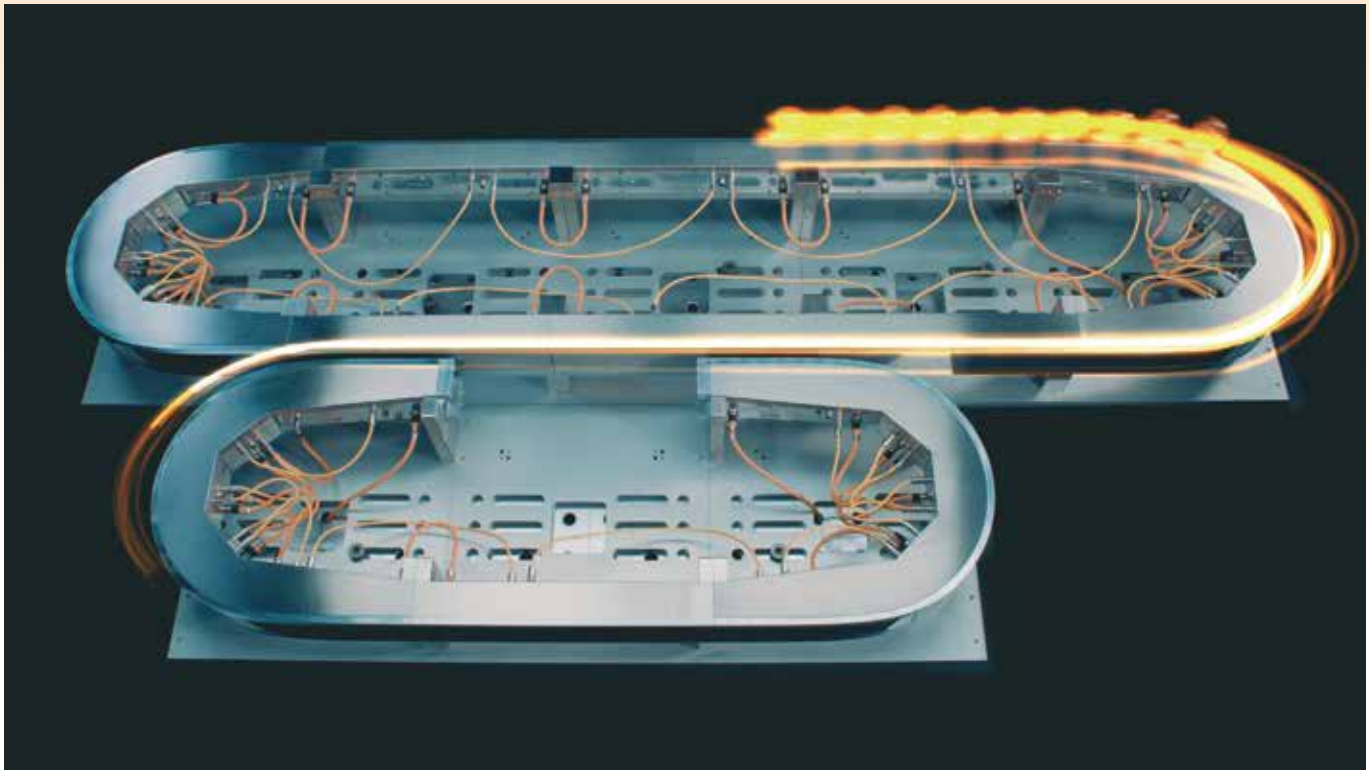
The combination of OPC UA and TSN will set the stage for entirely new industrial automation architectures. One of the most notable features of these new designs will be the disappearing borders between IT and OT networks. With B&R Orange Box, legacy equipment can be integrated into production networks enabling Industry 4.0 connectivity via OPC UA without any changes to the existing machines. B&R also offers familiar queuing protocols like MQTT (Message Queue Telemetry Transport) and AMQP (Advanced Message Queuing Protocol), which allow data packets to be transferred reliably, even in cases where the network connection is poor or intermittently unavailable.

Ultimate production effectiveness

As manufacturers strive to meet new and more challenging consumer demands, machine builders must keep pace with new and more efficient designs. Today's consumers are coming to expect the option to personalise their products. To make individualisation profitable, OEMs must design their machines to provide flexible manufacturing and batch-of-one production at the same level of cost efficiency as mass production.

B&R knows the challenges faced by machine builders in designing such flexible and scalable machines and is able to help them produce small batches efficiently and benefit from the higher margins of personalised products. One of the most exciting ways we do this is by extending their digital transformation to include motion control and mechanical design with ACOPOStrak.

ACOPOStrak is a revolution in adaptive manufacturing that extends the economy of mass production down to batches of



ACOPOStrak is a revolution in adaptive manufacturing that extends the economy of mass production down to batches of one. The unique high-speed ACOPOStrak diverters make it easy to divide and merge product flows, which can pass shuttles from one track circuit to another at full production speed.

one. Parts and products are transported quickly and flexibly from processing station to processing station on independently controlled shuttles. In addition, unique high-speed ACOPOStrak diverters make it easy to divide and merge product flows, which can pass shuttles from one track circuit to another at full production speed. This opens up entirely new possibilities for making manufacturing systems more agile and responsive. The parallelisation of processing stations helps avoid bottlenecks and provide higher machines and lines output. Operating ACOPOStrak with conventional conveyor belts brings flexibility of the intelligent ACOPOStrak together with the low cost of a conveyor system, which is the perfect recipe for more cost-effective mass customisation. It is a generational leap in intelligent, flexible transport systems with its absolutely unique design delivering decisive technological advantages for adaptive, connected manufacturing. ACOPOStrak boosts overall equipment effectiveness (OEE), multiplies return on investment (ROI) and accelerates time to market (TTM).

Your partner on your digital journey

B&R offers innovative and technologically advanced solutions that satisfy all the needs of machine builders and factory operators along their journey toward digitalisation. In this issue of *automotion India*, we present a series of success stories from B&R customers in a wide range of industries.

B&R's innovative products and solutions – together with our exceptional support and partnership – keep our customers ahead of the competition as innovation leaders in their markets. ←

David Hemetsberger
Strategy Manager – India, B&R Austria

"B&R provides solutions for tomorrow's needs resulting in significant competitive edge in the area of smart manufacturing and production effectiveness. Our innovative products, solutions and trust in open source technologies such as OPC UA TSN, POWERLINK, openSAFETY – together with our exceptional support and partnership – keep our customers ahead of the competition as innovation leaders in their markets. We help our customers build next-generation machines and factories, thus, becoming Industry 4.0 ready."

"We are expanding to support future growth"

Indian economy is experiencing rapid growth, which is fueling the need for advanced automation concepts and best manufacturing practices. Jhankar Dutta, Managing Director, B&R India speaks on innovations and plans to achieve higher growth in the competitive Indian market.

Q. How is India's automation market shaping up, considering the current market trends?

The government's initiative of 'Make In India' aims to make India a global manufacturing hub. This movement comes timely with Industrial IoT and Industry 4.0 and is already witnessing a tremendous impact on manufacturing practices in India, enabling a trajectory for high and sustainable growth. The best manufacturing practices together with next-generation automation solutions pave the way for Indian machine builders to make a leap in industrial development and achieve global leadership.

The focus on smart manufacturing is encouraging maximum use of automation, robotics and digitisation in facilities to lower production costs while enhancing efficiency, productivity and OEE. The government is strongly focusing on enabling and supporting small and medium sized enterprises in the adoption of next-generation automation technologies in order to become globally more competitive. Today's Indian manufacturers wish to be technological leaders rather than low-cost players. India is a land of opportunity and the convergence of government policy and global trends makes it an extremely attractive market!

Q. How do you foresee the growth of B&R India in the coming years?

The Indian economy is experiencing rapid growth, fueling the need for advanced automation concepts and the best manufacturing practices. B&R is already satisfying various customer demands with modular, flexible and integrated automation solutions. We are the perfect partner for Indian machine builders and factory operators for implementing innovative advanced automation concepts and becoming Industrial IoT ready. With our hardware and software solutions, we are technology and market leaders in various industry segments, providing best-in-class machine and factory automation solutions.

With our next-generation intelligent transport solutions SuperTrak and ACOPOStrak, we deliver key benefits for adaptive manufacturing to enable flexible and efficient production at any batch size. To stay competitive, an organisation must anticipate the most significant technology trends that shape its business and change with its customers demands. We collaborate with our customers and move forward with them hand-in-hand as they become market leaders. In India, we are expanding our corporate headquarters to 16,000 square feet to keep pace with our projected doubling of business volume over the next three years.

Q. What gives you an edge over your competitors? What is your strategy?

Today, the growing industry demand is resulting in stronger and ever-expanding automation vendor portfolios. As it becomes harder to differentiate through hardware products, it becomes increasingly vital to differentiate through technology expertise, industry expertise, after-sales service and support. B&R is renowned for consistently bringing innovative solutions, shaping the market and providing the best-in-class service to its customers.

We are now taking customer service to the next level with "World Class Support" – a dedicated support hotline +91 83 80 800 008 that serves as a single point of contact for our customers all across India. Customers nationwide will now enjoy reduced response times and an enhanced customer support experience. In turn, this will enable them to offer their customers faster service and reduced machine downtime.

Q. How will your customers be affected by B&R joining the ABB Group?

ABB and B&R have each been market leaders in their own right, and together offer our customers a uniquely comprehensive automation portfolio. By pairing B&R's innovative products, software and solutions for modern machine and factory automation with ABB's world-class offering in robotics, process automation, digitalisation and electrification, we have expanded our position in industrial automation and are uniquely positioned to seize growth opportunities resulting from the fourth industrial revolution. Our shared commitment to open architecture will increase customer choice, flexibility and facilitate their connectivity in increasingly digitalised industries.

Q. Can you brief us on your plans for expansion?

Customers will continue to play a pivotal role in our growth and success. In order to provide them with a unique experience, we are proud to introduce a new platform: Experience Center. This platform will help users understand, witness and experience the use of advanced automation and innovative manufacturing technologies. It will help them to optimise their machines and factories and build a strategy for adopting these technologies in their own processes.

In addition, we are expanding our Pune office space to match our projected growth. Globally, ABB is investing €100 million in Austria to build a state-of-the-art innovation and training campus at the B&R headquarters in Eggelsberg, laying the foundation for around 1,000 new high-tech jobs. I am sure this collaboration will further accelerate our speed of growth in India as well.

Mass customisation

The era of individualisation has only just begun

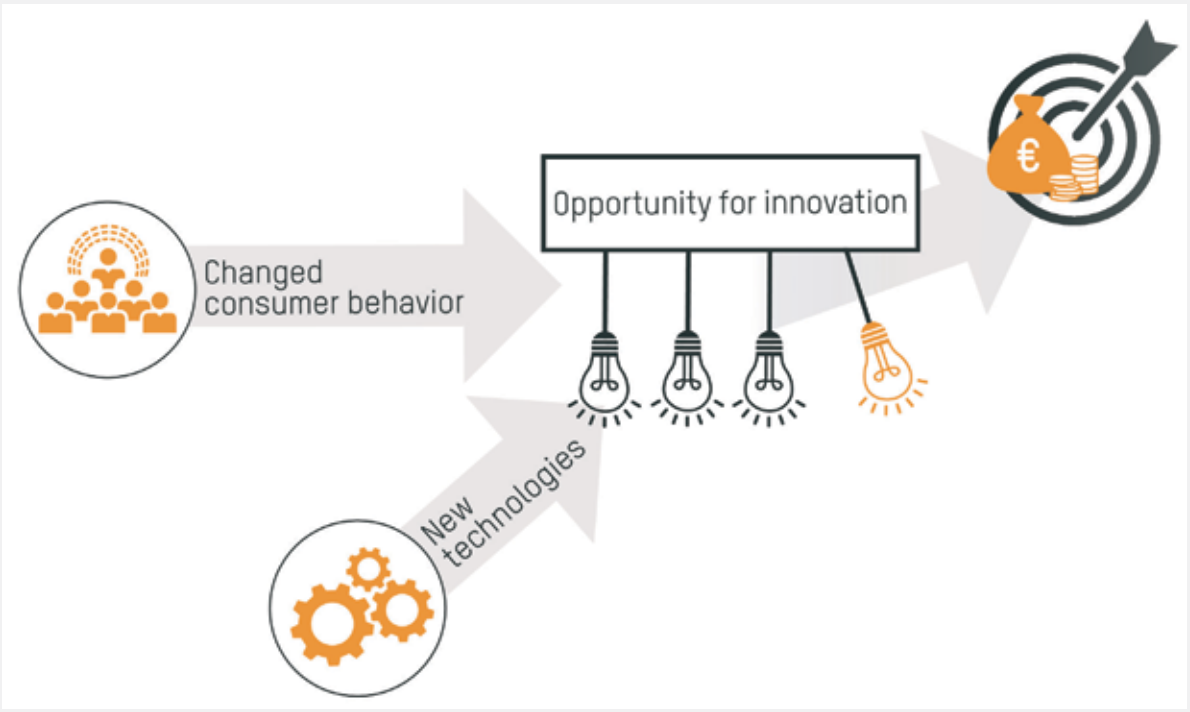
For today's generation of digital natives, the ability to personalise the products they buy is increasingly expected as a given. To keep pace, the makers of these products need highly flexible manufacturing systems that are at the same time efficient and profitable. This introduces a whole new set of demands on plant infrastructure.

The variety of options available for customising mass-produced products continues to grow. It's no longer limited to the usual suspects like breakfast cereals, cars and photo books. Particularly among the younger generation of digital natives, there is a growing desire to fine-tune every online purchase to match their individual tastes and preferences. "The era of individualisation has only just begun," declares Robert Kickinger, mechatronic technologies manager at B&R.

Profitable production in batches of one

Batch-size-one production is nothing new, really. In fact, it's standard practice in many craft businesses. "What is new, however, is the idea of making customised products under mass-production conditions," asserts Kickinger. So far, this has proven difficult to implement in a way that is economically viable. That's because any increase in system flexibility is usually accompanied by a reduction in overall equipment effectiveness (OEE). "When that happens, individualisation is no longer profitable."

The goal of mass customisation is therefore to keep the three factors of OEE – availability, performance and quality – at a level



The convergence of new technologies and growing demand for personalised consumer goods creates new opportunities for adding value.

consistent with what can be achieved in mass production. In addition, manufacturers seek to maximise their return on investment (ROI) and to minimise their time to market (TTM) for new and improved products. "This is the only way to make mass customisation viable from an economic perspective."

Up to now, developing flexible manufacturing systems has been a tedious process. "In many cases, you don't see the problems until the system is actually up and running," explains the mechatronics expert. At that point, fundamental changes to the machine design can extend the time to market by months. "That can be very costly." If the system as a whole or individual components can be simulated and tested in advance, the time to market can often be reduced dramatically.

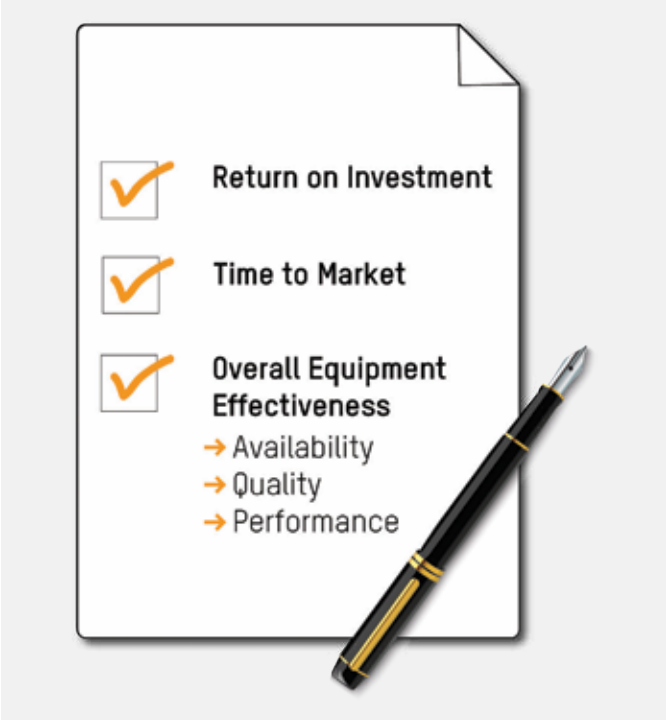
Fast changeover

Once the system is in operation, availability becomes a decisive factor and changeover times play an important role. "The kind of individualised mass production we'll see in the future will be characterised by near real-time processing of online orders," explains Kickinger. By defining the features of the products they order online – from cars to printed products – today's customers have already assumed a highly-automated role in the production process. "This will soon be the standard approach for a much broader range of products," he maintains. To ensure system availability and profitability, changeover times will need to be kept to a minimum or even eliminated entirely.

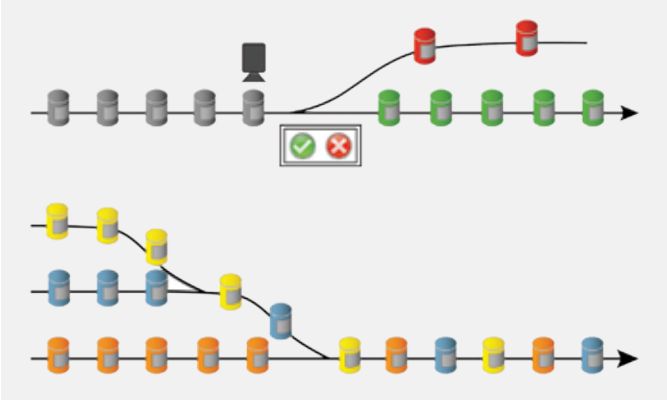
Yet, it's not just the products themselves that are becoming increasingly customised; the same holds true for how they are packaged. A bottling line that produces three different beverages, for example, should also be able to combine them into any conceivable six-pack arrangement. "That's simply not possible on a conventional line," says Kickinger. The constant changeovers would throttle productivity. "What's needed is a solution that allows flexible integration of product flows in real time and at full speed."

Real-time rejection

To ensure sustained high quality, lines must be able to react to faults and defects in real time – without compromising the production process. "Defective products need to be rejected on the spot, while maintaining full production speed," says Kickinger. If a defective item is not sorted out immediately following quality inspection and is instead permitted to continue



Flexible plant infrastructures respond effectively to the economic challenges posed by modern manufacturing.



Mass customisation relies on the ability to split and merge product flows flexibly.

A flexible machine is able to arrange any combination of products for end-of-line packaging.

down the line, it will eventually become necessary to scrap an entire package full of products.

It's not only products that can be defective, however. If one valve in a bottling line stops working, for instance, the automation system should react intelligently by no longer sending bottles to that station, while the process as a whole continues uninterrupted. Kickinger notes that there have traditionally been two options in such a scenario: "Either I let the process keep running and scrap all the products affected by the faulty valve, or I stop production altogether." From an economic perspective, neither alternative is particularly attractive.

Scalability and ROI

In most cases, a conventional manufacturing system doesn't scale easily. To increase output, it's necessary to either add a second line or replace the existing line with a larger one. These options require considerable investment and eat up valuable floor space. "But, it doesn't have to be that way," promises Kickinger.

In a rigidly-timed process, the slowest station determines the maximum output rate. To increase output, the automation solution needs to enable more dynamic timing of processing cycles. If you're able to perform those slower processing steps at multiple stations in parallel, you can multiply productivity without a proportional increase in the machine footprint. Such an approach hinges on the ability to split the product flow and then merge it back together farther down the line.

Competitive advantages

If the line also allows you to add and remove stations on site, that opens up additional possibilities to adjust capacity to changing demand. "Manufacturing technology that adapts to your production requirements: that's ROI you can take to the bank," says Kickinger.

ROI, OEE and TTM are the main economic factors underpinning all manufacturing operations. In this context, both the builders and operators of machinery and plants must rise to the challenge of increasing production flexibility. "Fail to take this seriously and you will find yourself at a competitive disadvantage," warns Kickinger. Mass-customised products have been shown to achieve higher margins than their conventional counterparts. Successful implementation, however, stands or falls with key advancements in plant infrastructure. ←

Foil stamping

Stamp of approval

One of the most popular ways to give products a high-visibility edge on the store shelf is foil stamping. Technoshell Automations has made a name for itself by building the machines that apply this techonology. To achieve the desired accuracy and precision in their highly complex multi-axis machines, Technoshell relies on innovative, advanced automation technology from B&R.

From personal relationships to purchasing decisions – first impressions are always critical. The appearance of a product plays a major role in influencing consumer behaviour, and every industry has its tricks and techniques to grab consumers' attention and convey the desired brand image.

Technoshell Automation is a 28-year-old company offering complete printing and packaging solutions to a wide range of customers. With in-house design, machining, software development capabilities coupled with state-of-the art production capacity backed by high-tech machines and the latest automation technology, they are experts and leaders in their field. "Our machines are designed with our customers' needs in mind, so we place particular emphasis on quality, productivity and affordability," says Technoshell's Director, Nikhil Baste.

New dimensions of stamping

There are clear advantages of hot foil stamping on products and packaging: they are known to attract attention faster and retain it for longer compared to products and packaging without it. Hot foil stamping or heat transfer is a form of product decoration that uses a combination of heat, pressure and dwell-time to apply metallising or pre-printed graphics permanently on a product. "Our hot foil stamping machines and heat transfer machines operate on up-down and roll-on principles to cover a wide range of applications. We offer a wide range of machines to beautify products and packaging," notes Baste.

Hot foil stamping on a flat surface or a simple geometry in two dimensions is a relatively straightforward process. With the addition of a third dimension, things become more complex – and even more so when the task involves hot stamping on a curved surface. In such applications, the challenge is to maintain the required temperature, pressure as well as adequate contact between the roller, foil and object.

CNC-based stamping

With Pro Hot Foil Stamping machine, Technoshell revamped its machine design and mechanics as well as implemented CNC software. B&R's Automation Software played a major role in simplifying the development process.

The stamping process begins with the operator loading the product onto the machine, protected by safety light curtains. The

Nikhil Baste
Director
Technoshell Automations Pvt. Ltd.

"In all our machines, we have effectively used POWERLINK as the vendor-independent networking protocol. It helps us to choose from a list of vendors for various components and yet be able to program, commission and diagnose them in Automation Studio."

Panel PC 2100 runs B&R's Windows-based real-time operating system, ARWin, and provides the robustness and determinism needed for industrial applications

The use of ACOPOS P3 servo drives reduced the footprint in control cabinets drastically – by around 69%.

safety interlocks prevent any accidents during loading. The foil containing the pattern to be printed on the product is pulled by the puller axis over the product. Another set of arms place the foil tightly against the product.

The desired product profile is loaded in the software and the stamp is applied by a two-axis roller driven by a stepper motor. An X-Y axis gives it the necessary vertical and horizontal freedom, while the third axis allows for 360° rotation. For the hot stamping process, the roller is heated to over 100°C.

Once the stamping is over, the arms lift upwards and the foil is pulled away by the stepper axis in order to be ready for the next cycle. "Our hot foil stamping machines provide photographic resolution with the possibility of metallic colors. They offer a permanent and safe decoration solution for complex curved surfaces and are a more sustainable solution compared to metallising for any product," says Baste. "With Pro Hot Foil Stamping machine, we are proud to say that we are the only company providing such high-end technology so cost effectively," he emphasised.

Easier to mapp it

The rate of new product launches is at an all-time high in virtually every industry. "Catering to such rapidly changing demands is becoming a challenge for machine builders," reports Baste. "Thanks to B&R, our machine can handle such requests easily and be ready for any change without requiring us to spend time on-site," he added. Programming new products on the machine is very easy and fast. The G-code created while designing the product can be loaded directly onto

the controller, or the operator can use the graphical user interface to modify an existing product or create a new one.

The Pro Hot Foil Stamping machine features a Panel PC 2100, which serves as an integrated HMI/PLC unit and controls the entire machine. This is coupled with remote X20 I/O modules, ACOPOS P3 and ACOPOSmicro servo drives over a real-time Ethernet POWERLINK network.

Technoshell utilised mapp Technology software framework provided in Automation Studio in all aspects of machine development, with mapp CNC component being the highlight. Having previously used mapp Technology in other machines, Technoshell was well aware of its features and benefits.

The mapp philosophy of configuring more and programming less helped the company substantially reduce development time. mapp CNC made developing CNC application much easier. Making a CNC application in addition to the standard hardware and application functions would previously have been unthinkable. "Even as a CNC application, we still have full freedom to program our machine," says Baste and adds, "That gives us a lot of flexibility in addition to high performance."

Integrated architecture

"We have been using B&R for around 10 years, and we have seen clear benefits of their integrated approach on many occasions," observes Baste. "In all our machines, we have effectively used POWERLINK as the vendor-independent networking protocol. It helps us to choose from a list of vendors for various components and yet be able to program, commission and diagnose them in Automation Studio," he shares.

The use of ACOPOS P3 servo drives reduced the footprint in control cabinets drastically – by around 69%. The POWERLINK network needs just a single Ethernet cable across the cabinet to the Panel PC 2100. This reduces cabling effort and improves maintenance. All the systems are tightly linked together with Automation Studio, the single programming tool for all B&R hardware. The Panel PC 2100 runs B&R's Windows-based real-time operating system, ARWin, and provides robustness and determinism needed for industrial applications.

Entering a new era

Today's manufacturers demand machines that are ready for Industrial IoT. For years, Technoshell has already been providing its customers with features like remote diagnostics and maintenance, integrated and connected machines, usage of open source technologies, scalable and flexible machine design and much more.

Technoshell offers a wide range of printing and packaging solutions to beautify products and packaging.

"We build machines that satisfy complex and varied demands of the printing and packaging industries," says Baste. "Our focus has always been on equipping our machines with next-generation technology. By coupling B&R solutions with our industry expertise, we have consistently been able to offer our customers precisely that kind of advanced solution," he concludes. ←

Pharmaceutical packaging

Integrating robotics with blistering speed

Integration of robotics is on the rise throughout the field of machine automation, and the packaging industry is certainly no exception. Playing a vital role in today's most innovative smart machine designs, robotic applications can have a profound impact on productivity. Using off-the-shelf software components from B&R's mapp Technology framework, ACG Pampac developed its next-generation robotic solution in a fraction of time, and its integrated blister and cartoning lines are already deployed and running full throttle with unprecedented performance and flexibility.

2017 was a milestone year for ACG Pampac, a leading provider of customised blister packaging and cartoning equipment, who is known for innovative solutions to meet the technological demands of the pharmaceutical industry. The company's intensive R&D activity yielded an innovative new high-speed robotic transfer system that offers unprecedented levels of performance and flexibility for its integrated blister-cartoning lines.

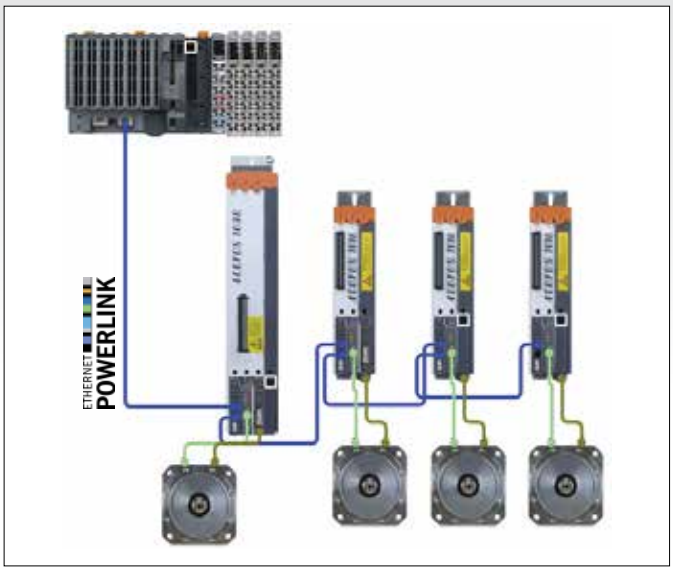
"Rising consumer demands call for faster production speeds, greater flexibility and higher return on investment," says P H Deshmukh, VP-R&D, ACG Scitech. Scitech is an R&D center, consulting and helping all ACG units in developing innovative products. Explaining the company's focus and motivation in upgrading the design of its high-speed packaging machines, Deshmukh adds, "Integration of robots in our packaging line ensures flexibility, coupled with shorter product cycle times, new packaging designs and batch manufacturing. It also reduces bottlenecks and alleviates repetitive tasks."

Next-level packaging with robots

The conveyor systems used for loading, unloading and transfer tasks in conventional packaging lines have limited ability to perform product splitting and stacking. "By using a robot to pick blisters from the blister machine outfeed and stack them on the infeed of the cartoner machine," says Balamurugan K, Deputy Manager of Design, ACG Pampac, "we were able to add a great deal of adaptability to the packaging processes."

Integration of robots in the packaging line also gives the machine exceptional precision and repeatability, allowing for 24/7 operation. The robot mechanics were developed in-house by ACG

Customised 4 axis robot by ACG Pampac.



X20 CPU and ACOPOS servo drives networked on the high-performance, high-precision real-time Ethernet POWERLINK for achieving fast cycle times and precise drive-to-drive synchronisation.

Pampac, and the robot is mounted on a conveyor system that adds a fourth axis for forward and reverse movement.

Flexible yet simple technology

The technical requirements of the new-generation of blister and cartoning machines were very high. "With its mapp Technology, B&R was the undoubted choice as our automation partner for the robotic transfer system," explains Balamurugan. "It drastically reduced our programming effort and gave us complete control over every aspect of the automation system. We were able to configure our customised in-house developed robot with ease using standard mapp components."

As machines increase in complexity, so does their software. As a result, the cost of developing and maintaining machine software is skyrocketing. mapp Technology components allow engineers to create and support even the most complex programming tasks with ease – doing more configuring than programming. For ACG Pampac, this meant being able to control a customised robot using standard mapp components from B&R. With mapp Technology, the robot was effortlessly incorporated and perfectly synchronised with the machine's automation software.

Speed & safety: Top priorities

"The fully integrated B&R solution, along with the single-cable motor connections, provided our robotic machine with higher speed, accuracy, productivity and also helped us reduce cabling and cabinet space," notes Jawed Shaikh, ACG Pampac's Assistant Manager of New Product Development. The single-cable solution enables power, encoder data and digital security information to be transmitted between the drive and the motor on a single cable, reducing both component costs and cabling.

For highly dynamic and precise processes in the packaging industry, extremely fast movements must be controlled with absolute precision and safety. "With B&R controls and ACOPOS servo drives networked on the high-performance, high-precision real-time Ethernet POWERLINK, we achieved fast cycle times and precise drive-to-drive synchronisation," says Balamurugan.

ACG ENGINEERING

Balamurugan K
Deputy Manager of Design
ACG Pampac

"The support we have gotten from B&R has always been impressive and we look forward to building on our successful relationship. The flexibility and performance of B&R solutions gives us plenty of room to continue adding improved functionality and new features."

PackX line – Blister X, Carton X and robotic transfer systems is capable of achieving a rate of 900 blisters and 300 cartons per minute.

mapp Technology

With mapp Technology, ACG Pampac is able to control a customised robot using standard mapp components from B&R. Thus, the robot was effortlessly incorporated and perfectly synchronised with the machine's automation software.

P H Deshmukh
VP-R&D
ACG Scitech

"Integration of robots in our packaging line ensures flexibility, coupled with shorter product cycle times and new packaging designs."

"B&R has provided not only outstanding and innovative technology but also the support needed for a successful completion of our project. Implementing this technology in our pick-and-place transfer system has helped us achieve a rate of 900 blisters and 300 cartons per minute."

Sights set on the future

To support ACG Pampac in this new challenge, B&R assembled dedicated teams for training, testing and support. The robotic transfer system is the latest success to come out of 17 years of collaboration between ACG Pampac and B&R, and the groundbreaking machine features a full range of B&R's innovative technologies. "The support we have gotten from B&R has always been impressive," says Balamurugan, "and we look forward to building on our successful relationship. The flexibility and performance of B&R solutions gives us plenty of room to continue adding improved functionality and new features."

ACG Pampac already has plans for its next project with B&R technology. Development of a new PackX system that will take packaging lines to the next level. "We plan to integrate our complete PackX line – Blister X, Carton X and robotic transfer systems – with B&R controls," says Balamurugan. "We're also looking to leverage various Industrial IoT solutions offered by B&R in this system, including secure remote monitoring and diagnostics," he concluded. ←

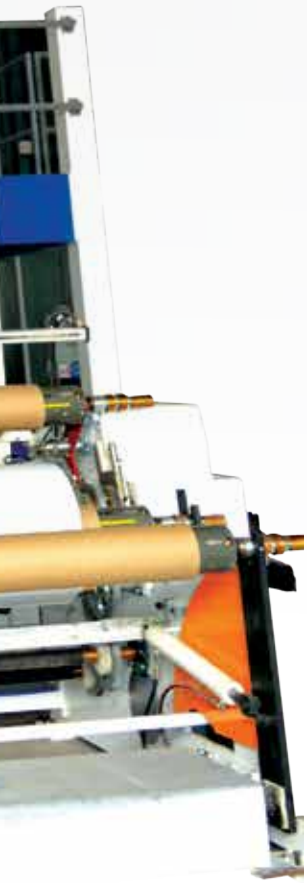
Jawed Shaikh
Assistant Manager
ACG Pampac

"The fully integrated B&R solution, along with the single-cable motor connections, provided our robotic machine with higher speed, accuracy, productivity and helped us reduce cabling and cabinet space. Implementing this technology in our pick-and-place transfer system has helped us achieve a rate of 900 blisters and 300 cartons per minute."

Multilayer blown film lines

The flexible future of plastics processing

Global plastic consumption continues to increase – with particularly rapid growth in India. One of the few companies in India who are able to serve and support the full spectrum plastic processing needs, Windsor Machines Limited gets the flexibility it needs with an APROL process control solution from B&R.



As our lifestyles change, global plastic consumption is increasing exponentially. We use plastics in our households, cars and to package our foods and beverages. While the per capita consumption of plastics in some western countries is over 100 kilograms per year, India's average of 10 kilograms is amongst the lowest globally. However, this is changing quickly. Based in India and serving 65 countries around the world, Windsor Machines Limited is one of the few companies that is able to serve and support the full spectrum plastic processing needs dictated by today's consumer demands.

With cutting-edge product design and latest technology, Windsor Machines Limited manufactures injection molding, pipe extrusion and blown film systems. "Providing all of these solutions under one roof gives us a unique edge over our competition," says T.S. Rajan, the company's Executive Director and CEO, and adds, "As a leading machinery supplier with the lowest operating cost per kilo of polymer processed, working for our customers' profits remains our mantra for success." Windsor is a trusted name amongst manufacturers of both rigid and flexible packaging.

Achieving more with less

Windsor has successfully introduced a five-layer polyolefin blown film line in India. The groundbreaking POD series provides greater flexibility, increased productivity and superior quality in the manufacturing of non-barrier film applications. The POD lines consume less raw material, leading to optimal use and conservation of resources. They are designed to manufacture high-performance, high-quality plastic films used for packaging, milk pouches, edible oil packaging, shrink and stretch wrap films, surface protection films, agricultural films and a variety of barrier films.

"Windsor has a major focus on technology for providing next-generation machines and plants to our customers," says Windsor CTO, Vinay Bansod. "Artificial Intelligence is already available in our injection molding machines and will be soon a feature integrated in our extrusion lines."

Five-layer blown film line

The blown film line can vary from one to nine layers. Modularity, scalability and flexibility of solutions is a major challenge for machine builders. Connectivity to various sub-systems, temperature control, winder control, speed control, oscillations, online changes and long-term data storage are some other notable requirements.

Extruders are used to heat the raw material

A five-layer polyolefin blown film line, the groundbreaking POD series provides greater flexibility, increased productivity and superior quality in the manufacturing of non-barrier film applications.

before it is blown into a film. The choice of raw material depends on the desired film thickness and transparency. The number of extruders determines the number of layers – the five-layer blown film plant consists of five extruder units. These feed molten plastic to a unit from PLAST-CONTROL, which blows it into a film bubble. With the help of guides, this bubble is directed upwards and then split onto different rollers. The film is then rolled onto winders, which support auto-splicing to make the process continuous.

"Connectivity to the PLAST-CONTROL unit, extruder temperature control, winder control and maintaining the specified thickness are some of the critical aspects in the blown film line," says Bansod. "In addition, diagnostics, trends, reporting, access control, online changes and long-term storage are also desired by customers," he adds.

Providing a technological edge

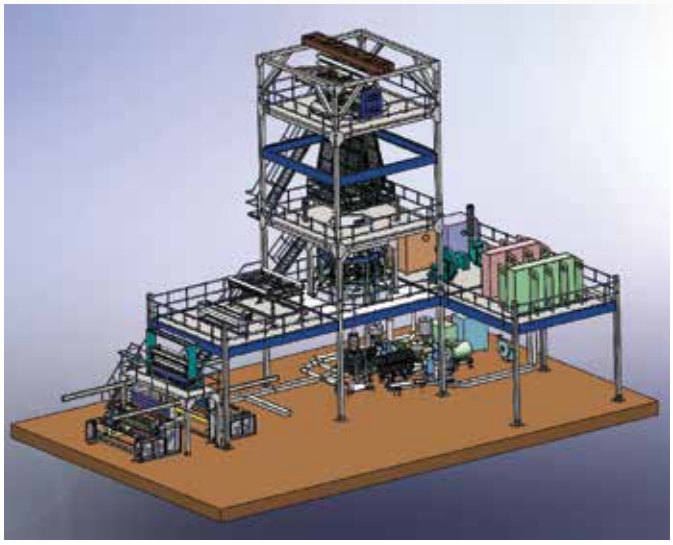
"When it comes to automation, we place our trust in B&R technology and solutions for all of our machines," says Bansod and further stresses, "B&R helps us keep pace with the cutting edge of technology and stay ahead of our competition." In the five-layer blown film line, Windsor has experienced the power of B&R's APROL process control system. Implementing APROL has helped Windsor achieve modularity, scalability, reliability, higher performance and quality in a cost-effective solution.

Windsor's technical teams are strict when it comes to evaluating automation vendors, paying particular attention to reliability, features, support mechanisms and overall cost. B&R satisfies these requirements with ease. "Our focus on technology has helped us achieve 20% year-on-year growth. B&R has played a role in helping us repeat this accomplishment consistently," says Deputy CEO, Nitin Choudhary. "We are proud of the fact that Windsor was first in India to successfully implement APROL solution," he shares.

T.S. Rajan
Executive Director and CEO
Windsor Machines

"Windsor has a major focus on technology for providing next-generation machines and plants to our customers. We are a trusted name amongst manufacturers of both rigid and flexible packaging. Artificial Intelligence is already available in our injection molding machines and will be soon a feature integrated in our extrusion lines."

WINDSOR
Partner in Progress



The blown film line can vary from one to nine layers In the five-layer blown film line. Windsor has experienced the power of B&R's APROL.

Nitin Choudhary
Deputy CEO
Windsor Machines

"Our focus on technology has helped us achieve 20% year-on-year growth. We are proud and happy of the fact that Windsor was the first in India to successfully implement APROL."

Satisfying complete plant needs

Changing from a one-layer blown film line to five, seven or nine layers is a complex process that affects every level of design, engineering and automation software. From the perspective of the machine builder, it is virtually an entirely new development.

"We have always wanted a modular solution that reduces the amount of software engineering required to implement a variety of machine sizes," says Bansod. "Using APROL, we were able to achieve the necessary amount of flexibility with minimal engineering effort," he confirmed.

Windsor has been using B&R solutions for machine automation for some time. The company's engineers are familiar with B&R' Automation Studio engineering environment as well as its hardware. APROL uses the same hardware that is used for machine automation, and the Automation Studio libraries used in APROL made it easier for developers to adapt to the new system.

The PLAST-CONTROL system is implemented in APROL, making it possible to make changes even when the machine is operational. APROL provides the customer with long-term data storage in an SQL database.

Reporting done right

No system is complete without appropriate system diagnostics, alarm management and reporting features. System diagnostics is necessary in maintenance; alarm management is needed to provide warnings and alarms in case of faults and reporting is necessary for management to understand system performance.

"We're constantly on the lookout for ways to improve productivity while eliminating material waste," says Bansod. "The reports generated by APROL provide all the necessary data in Excel format, which makes it easily accessible for the customer. In addition, various levels of access control provide the authorisation we need for production and maintenance."

Long-term relationship with B&R technology

"We have been using B&R for all our machines and plants for over ten years and our long-term partnership has helped us penetrate markets in India and around the world," says Choudhary. "Industry 4.0 readiness is an increasingly common demand from our customers. We have been providing such machines and plants for the past five years capable of analytics, OEE reporting and cloud connectivity," he further emphasised.

"Our upcoming machines will reveal a strong focus on technology development, with over ten new technologies and solutions being planned every year. We are happy to say that B&R will continue to play a vital role in these developments," concludes Bansod. ←

Vinay Bansod
CTO
Windsor Machines

"When it comes to automation, we place our trust in B&R technology and solutions for all our machines. B&R helps us keep pace with the cutting edge technology and stay ahead of our competition."

Overall Equipment Effectiveness (OEE)

Industrial IoT for brownfields

As a comprehensive performance indicator, overall equipment effectiveness (OEE) can play an important role in making manufacturing assets more productive. Difficulties gathering the data needed to calculate OEE, however, have often prevented it from being used to improve older brownfield systems. Now, there is a solution that lets you easily tap into the operating data of digitally isolated equipment and benefit from automated acquisition, harmonisation and analysis – including real-time OEE monitoring.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Overall Equipment Effectiveness (OEE)
Overall Equipment Effectiveness (OEE) is a key performance indicator used to track the productivity of manufacturing assets. The three underlying factors used to calculate OEE are the ratios of good units to total units (quality factor), production speed to designed speed (performance factor) and actual uptime to scheduled production time (availability factor). Fully optimising one of these factors – achieving zero unplanned downtime, for example – would result in a 100% rating for that factor. Multiplying the three factors gives you the OEE value.

Since there is no universally accepted method for defining the optimum level for each factor, comparing OEE ratings across different lines or facilities only makes sense if the factors are calculated consistently.

Connected manufacturing systems with access to the latest technology are able to collect and evaluate extensive technical and operational data to implement the type of solutions envisioned for Industry 4.0 and the Industrial Internet of Things (IIoT). It's easy to expect these features from a greenfield project when starting more or less from a blank slate. For the majority of plant managers, though, the reality is a bit more complicated.

"A company can't just tear down all of its facilities and start from scratch," says René Blaschke, B&R's expert for IIoT brownfield integration. When retrofitting legacy equipment to support new Industrial IoT solutions, the first step is to find a way to automate the collection and harmonisation of its operating data. Then, you need to use this data to calculate the OEE, which reveals productivity losses and serves as the foundation for improving overall performance.

Automated data acquisition from brownfields
To this day, it is not uncommon to find machine operators scribbling down operating data with a notepad and pencil. "This data then lands on the desk of an analyst for processing," says Blaschke. Not only is this a far cry from the digital-age ideal of real-time analytics, it is unrealistic to expect every shift to record its data in a consistent, standardised way. "This has been a notorious problem in production data acquisition," notes Blaschke. It also makes it very difficult to compare performance across different machines.

Industrial manufacturing equipment has a particularly long service life. With machines typically running for 25 or 30 years, one that was installed 15 years ago can easily be around for another decade. For a company looking to implement Industry 4.0, that is simply too long to wait. "So, what you need is a way to bridge the gap for the remaining service life of brownfield equipment," says Blaschke.

For plant managers, this means finding a reliable way to collect and analyse data from machinery and equipment that otherwise lacks the necessary connectivity. With its new Orange Box concept, B&R has proven that doing so can be surprisingly easy. "An Orange Box can substantially reduce downtime and boost the availability of existing machines and lines," says Blaschke. "That makes your entire operation more productive and profitable."

Smartphone notifications
The Orange Box can notify machine operators of significant events – like an open safety door – directly on their smartphone. This allows them to react immediately and resume production as quickly as possible. When the frequency of unplanned stoppages is clearly documented, it becomes obvious where targeted improvements can be made.

Further potential for improvement can be identified by comparing productivity between machines, lines or shifts. "Very often, relatively minor adjustments can have a dramatic impact on productivity," reports Blaschke. Better synchronising maintenance and break times is a perfect example.

Straightforward technology
From a technical standpoint, the Orange Box concept is remarkably straightforward. A B&R controller reads operating data either via wired I/O channels or directly from the machine controller using communication protocols. The Orange Box reads data from B&R, Siemens or Rockwell controllers via the respective INA, ISO on TCP or EtherNet/IP protocols, converts it into OPC UA messages and processes it.

"The results – such as the OEE value – can be displayed right on the machine and/or passed on to higher-level systems," explains Blaschke. The Orange Box has an OPC UA server that

The Orange Box provides a clear overview of operating data for any manufacturing asset.

An Orange Box can transform a production line plagued by frequent unplanned stoppages (left) into one where downtime is a rare exception.

allows any manufacturing execution system (MES) or enterprise resource planning (ERP) system to access the data. When used as an edge device, the Orange Box is also able to send data into the cloud.

The right mapps for your solution

"For the Orange Box to deliver the greatest possible benefit," recalls Blaschke, "we knew it would have to be easy to set up and easy to use." That's why the solution is built around the modular software components of mapp Technology. mapp components – or "mapps" for short – are pre-programmed to exchange information automatically. "Configuring a mapp component is no more difficult than setting up an email account."

A few quick settings, and mapp OEE is ready to start delivering a machine's OEE data, for example. "There's no need to write a single line of code," emphasises Blaschke. mapp OEE has an accompanying HMI component that works in the background. Together with mapp View – B&R's HTML5-based HMI solution – this component can display real-time content on any web-enabled device. The intuitive dashboard provides an at-a-glance overview of all the most important information.

René Blaschke
Expert - Industrial IoT for Brownfields, B&R

"Orange Box helps increase the availability of machinery and equipment."

Pay-per-use

Orange Box is not a traditional product, but rather a conceptual solution shaped by the unique needs of each customer and machine. Its specific functions can be tailored on demand simply by adding the appropriate mapps. Set up an alarm system with mapp Alarm, for example, and use mapp Tweet to alert machine operators of relevant alarms via email or text message. Industry standards such as PackML are also neatly packaged in mapps for easy integration into the Orange Box.

"As a customer, you can pick and choose exactly the functions you need," says Blaschke. "And, like apps on a smartphone, those are the only ones you pay for." The software management functionality provided by the mapp Technology platform allows Orange Box users to install updates or new mapp components via LAN, WLAN or USB flash drive.

Shaped by customer requirements

The Orange Box's modular software is complemented by its equally modular hardware. The most compact form features a 25-millimeter-wide compact controller. "That and mapp OEE are all you need to collect the necessary data and calculate OEE for a machine," explains Blaschke. For more advanced features – such as alarm management or energy monitoring – the solution can easily be scaled up with more powerful controllers and additional software components. Customers who want to give the Orange Box a modern user interface as well can add an operator panel with an integrated controller or a panel-mounted PC unit.

"All the hardware and software is completely interoperable," notes Blaschke. Plant managers can use different combinations of hardware and software on different machines with no added overhead. The Orange Box quickly and painlessly lifts brownfield equipment out of digital isolation to enjoy all the benefits the age of Industrial IoT has to offer. ←

Interview

Competitive printing in the digital era

India's printing industry has undergone revolutionary changes over the past few years. We sat down with Dhiraj Gajria, VP - Operations at Print Plus to find out what his company is doing to remain competitive in such a challenging market.

Q. What is the size of print market in India?

Even with an increase in digitisation, the printing industry continues to grow steadily. I have numerous applications on my mobile, but I am more comfortable reading news from the newspaper than on my smartphone. Today, India's printing sector is doing well due to the availability of the necessary technology and resources at an economical cost. There are numerous job opportunities expected in this industry due to an overall growth rate of 12% per annum.

Q. Which market segments do you cater to and what is your firm's capacity?

Using state-of-the-art technology, we print brochures, catalogues, posters, stationery, visual aids, annual reports, magazines, books, pharma labels, cartons, calendars and much more. To be more specific, Print Plus works with the most renowned magazines in India, Filmfare and Femina. Apart from that, we also cater to the export of educational books. The majority of our printing work comes from the publishing sector. In a day, we convert more than 40-50 metric tons of paper.

Q. Can you comment on the impact of new trends in the industry?

In the digital era, print media is no longer the primary source of news and information. The rapid growth of virtual media has definitely affected the circulation of print media, but certainly not its importance. Despite a lot of modernization on a lot of platforms with regards to business, the ways of old still work and are very effective in reaching out to a lot of people. Internet cannot reach every part of India. People still prefer reading newspapers, magazines and books over smartphone apps and Kindle.

Technology is changing rapidly and, in turn, so are many traditional approaches. The print industry is an area where these changes and innovations can be witnessed clearly. To be competitive, we have upgraded our printing processes with a lot of automation, which has maximised our productivity and curbed the labour problem. In future, we are looking to further increase productivity by implementing automation in post-press departments and utilities.

Q. How has the machine's performance been with B&R hardware?

In the printing industry, the focus is always on quality, speed and precision. High-performance controllers and synchronised drives are necessary for achieving desired level of quality. We are impressed with B&R's technology, which is 100% production friendly and fits perfectly into our production processes. We are happy with B&R technology, which results in better machine performance, more safety functions and a higher level of availability in the smallest possible space. With B&R, we are assured 24/7 operation without downtime, while maintaining quality at the highest level.

Q. What are your company's future plans?

Print Plus is dedicated to advanced technologies that ensure excellent product quality, quick turnaround time, competitive pricing, minimum wastage and low maintenance . We aim to become a company to reckon with in the global printing industry. Our mission is fueled by the efforts of our workforce and the company's core values to cater to the individual demands of our clientele. ←

Linear tube filling

Filled with innovation

Trends in the automobile industry are increasing demand for glues and adhesives that are packaged in tubes. Recognising that these industrial applications pose a different set of demands than its traditional customers in pharmaceuticals and healthcare, filling and cartoning specialist, Parle Kovai developed a new tube filler for the job. When the time came to design a second generation, they turned to B&R to solve some persistent accuracy issues, while also adding enhanced functionality. B&R's integrated motion control technology provided a boost in performance and functionality, while its development software and expert engineers ensured the project was completed in record time.

Whether you're headed to a meeting, a wedding or for a night out: looking your best is likely one of your top priorities. As you complete your personal grooming routine and apply your cosmetics, you may not give much thought to all the effort and high-tech automation involved in making the healthcare products you rely on.

Parle Kovai – a joint venture of Parle Global Technologies and Kovai Machineries – is known as a pioneer in the construction of tube filling and cartoning machines for the healthcare, pharmaceutical, F&B and cosmetics industries, with an installed base of over 800 fillers and various integrated systems worldwide.

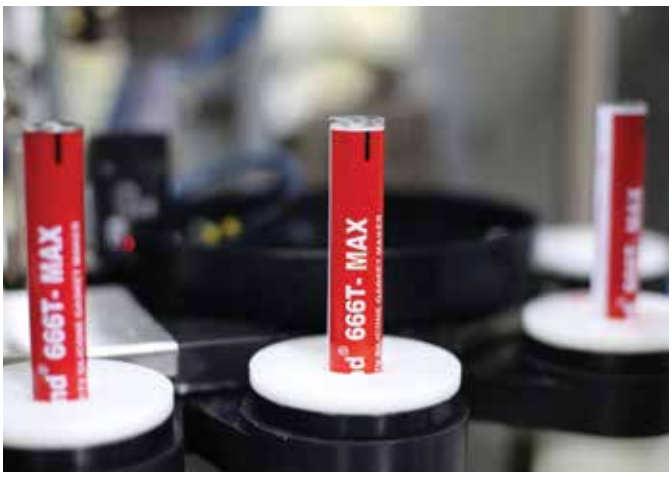
With a product portfolio that already satisfies both primary and secondary packaging demands, Parle Kovai nevertheless knew that the key to remaining competitive is continuous innovation. "In addition to our traditional customers in pharma, healthcare and F&B, growth in the automobile industry has increased demand for chemicals such as glues and adhesives," says Parle Kovai's CEO & Director, Clifford Edward. "That in turn has resulted in increased demand for tube filling machines and opened up the industrial application sector for us."

Challenging your own limits

Having identified the demand for tube filling machines that meet demands of industrial applications, Parle Kovai developed its first such machine three years ago. Although it is successfully up and running, the first machine has been unable to achieve 100% accuracy due to peculiar problems.

"To stay ahead of the competition, we decided to take the challenge head-on and enhance the machine with better

The PK 60 AL machine is automated entirely by B&R achieving a filling accuracy of ±1% greatly limiting waste.



PK 60 AL is a high-tech combo linear tube filling machine capable of filling ointments, cream jellies or any other viscous material in tubes and then sealing or tail-folding them automatically with a capacity of 60 tubes per minute.

features, while eradicating all older problems," explains Clifford. Parle Kovai had its first interactions with B&R at Germany's Interpack trade fair in June 2017. "We talked with B&R's experts at great length about the problems we were having," recalls Clifford. "We discussed how a B&R solution could help us achieve our goals of increased performance, productivity and energy efficiency, along with reduced costs for implementation and maintenance."

"Most companies have no problem doing consulting, presentations and discussions that go into creating a strategic document," says Clifford, "But we have seen many falter and fail when it comes to executing those strategies. B&R's flawless, streamlined and focused approach gave us confidence from day one that the objectives we had laid down for ourselves would be met or exceeded."

Automatic tube filling system

The PK 60 AL is a high-tech combo linear tube filling machine, successfully developed and designed by adopting advanced technology from B&R. This machine is capable of filling ointments, cream jellies or any other viscous material in tubes and then sealing or tail-folding them automatically. The machine has a capacity of 60 tubes per minute. This machine is ideal for aluminium tube filling. However, with some simple modifications, it can also fill plastic tubes.

Tube filling starts with the transfer of empty tubes from the cassette on the machine. They are then loaded one by one into the holders on the turret, where they are centered and oriented on the turret. On each track of the PK 60 AL, the tubes are mounted next to each other on a filling tube sledge, which features a hydraulic system for lateral and longitudinal movements.

At the filling station, the dosage and movement of the dosing pistons use servo technology. The tubes are sealed depending on the type of tube. In case of metal tubes, the tubes are flattened and crimped twice, coding the batch details on the crimped area. They then are sent to a transfer system for cartoning. All machine operations can be configured via the HMI and all the parameters for different tube sizes are stored on the controller.

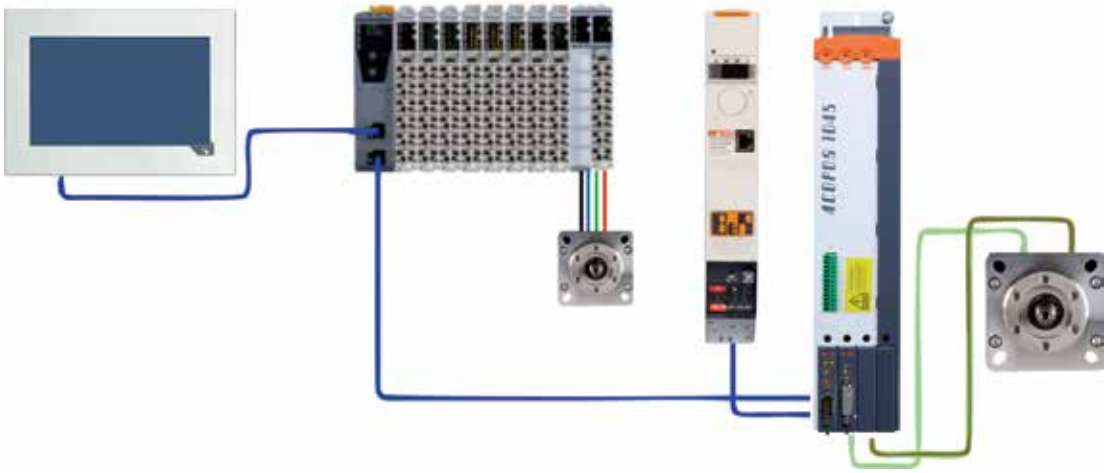
Reduced waste with accuracy of ±1%

PK 60 AL machine is automated entirely by B&R – from controller to drives. It can accommodate tubes of four different sizes or weights, for example 15, 25, 85 and 100 grams. "Tube filling occurs at high speeds, and our machine is capable of achieving speeds of over 60 tubes per minute. We are able to achieve a

Clifford Edward
CEO & Director
Parle Kovai

"In our PK 60 AL machines, we have synchronised the mechanics, pneumatics, hydraulics and the automation system. B&R's integrated approach to motion control allowed us to synchronise the servo drives, stepper and servo motors using POWERLINK as a single communication network. The increased speed and accuracy have improved both ROI and the ability to meet our customers' needs."

parle
Engineering Solutions For Healthcare
parle Kovai



X20 CPU and ACOPOS servo drives networked on the high-performance, high-precision real-time Ethernet POWERLINK for achieving fast cycle times and precise drive-to-drive synchronisation.

filling accuracy of ±1%, which greatly limits waste," says Clifford. A "no tube - no fill" device adds intelligence to the machine, allowing it to sense whether or not a tube is present.

The machine's controllers, I/O modules, servo drives, stepper and servo motors are all connected via POWERLINK. Having a single real-time network for all the control components simplified the machine design and improved performance, accuracy and precision, allowing Parle Kovai to not only save cabinet space but also reduce wiring.

"In our PK 60 AL machines, we have synchronised the mechanics, pneumatics, hydraulics and the automation system," says Clifford. "B&R's integrated approach to motion control allowed us to synchronise servo drives, stepper and servo motors using POWERLINK as a single communication network. The increased speed and accuracy have improved both ROI and the ability to meet our customers' needs."

24/7 shop floor connectivity

"Our customers demand quick support, and B&R's Secure Remote Maintenance solution helped us further reduce our servicing times," says Clifford. Parle Kovai technicians are now able to view machine health and diagnostics information on their phones and tablets. "For our customers, that means timely support with minimum downtime and improved performance," adds Clifford, "and for us it means saving time, labour and travel costs with far fewer on-site service calls while providing the same high level of support." All the necessary service functions are already integrated in the System Diagnostic Manager (SDM) tool, which does not require any programming or dedicated software. It is able to run on any standard web browser.

This, coupled with Secure Remote Maintenance, allows the machine builder to have seamless, secure connectivity to machines on the customer's shop floor anywhere in the world. The PK 60 AL machine is able to provide information of the health of B&R hardware and diagnostics data down to the variable level from any remote location. Parle Kovai can access its machines without interfering in the IT network of the factory. Local IT personnel simply grants necessary access rights and only authorised personnel can access the network. This offers a perfect mix of security and data integrity. "These solutions from B&R offer huge advantages to both our business and that of our clients," says Clifford.

Modular software simplifies complex programming

"In the past, we have used different tools to program our various automation components," says Clifford. "However, Automation Studio from B&R gives us a single tool for programming all B&R hardware – control, motion, HMI and safety." Automation Studio and its mapp Technology components helped reduce time and cost of programming and finish the project ahead of schedule.

"We never expected B&R to finish this project in such a short time, because it was a completely new project for them," recalls Clifford. "Our first machine took two months to complete, but the PK 60 AL was completed in just 21 days thanks to the B&R development team, who easily understood our requirements and quickly delivered results."

Mapping the future

"I was involved in the project from day one, and I couldn't name a single area where we could have asked B&R to improve," says Clifford. "B&R team was confident they could complete this challenging project, and within 21 days we had the results in front of us." The PK 60 AL successfully achieved every goal that had been set for it, Clifford concludes: "We plan to further strengthen our partnership with B&R in the years to come and equip more Parle Kovai machines with B&R technology to streamline their development and add premium features that build our competitive edge." ←

It's in the pouch

Motivated by convenience and sustainability, supermarket customers are increasingly choosing resealable pouches over traditional single-use packaging. Galaxy PackTech has emerged as a dynamic and progressive player in this ever-growing field. Since its inception in 2001, Galaxy has placed its trust in B&R hardware and software solutions to automate its high-speed pouch-making machines.

Motivated by convenience and sustainability, supermarket customers are increasingly reaching for resealable packaging over traditional single-use glass, paper or metal packaging. This has led to a rise in technologies like zippers and pouches that allow consumers to eat, drink or dispense a portion and then easily re-close the package.

Galaxy PackTech is a leading manufacturer of semi-automatic filling, vacuuming, nitrogen flushing and sealing (VNS) machines, automatic wrapping machines and vertical pouch-sealing machines. "Our focus on quality helps us manufacture defect-free products and high-performance machines that fulfill all our customers' pouch-packing requirements," says Galaxy's Managing Director, Jagat Singh.

The pouch-packaging market is growing significantly due to consumer demand for convenient packaging that is durable, lightweight and easy to use while on the go. "Our machines offer maximum performance, easy operation, reliability and above all cost effectiveness," says Galaxy's Managing Director Shiv Kumar. "Our machines comply with international standards and can be customised to match the complexity of our customers' needs."

Foil to pouch – 200 times a minute

Pouch-making machines are a complex mix of mechanics and automation software. The most significant factors in product quality include avoiding wrinkles in the inner foil and ensuring a consistent seal and the proper functionality of the zipper or opening mechanism.

To create a pouch, two layers of packaging paper are precisely aligned on top of each other and sealed on three sides, leaving the fourth for the opening mechanism. The packaging material is fed from a single wound bundle, which is split into the necessary alignment with the help of a mechanical arrangement while perfectly synchronised puller axes maintain the necessary tension. The third part of the

Jagat Singh
Managing Director
Galaxy PackTech

"B&R is an innovative company and a technology leader in industrial automation, and we are happy to have B&R as our automation partner."

packaging is fed by a separate axis on the machine after the two sides have been aligned.

The puller axes take the packaging paper through two separate sealer units, which are temperature-controlled to ensure consistent seal quality. The packages then pass through a cooler unit prior to cutting. Galaxy's GS-24 PLUS 200 machine does this all at a rate of 200 pouches per minute. "We are always a step ahead of the competition by providing innovative solutions to our customers," says Singh.

The ACOPOSmulti generation offers highest degree of efficiency for multi-axis machines that are commonly used in the plastics and packaging industry.

Efficient synchronisation for optimal performance

"When we designed our pouch-making machine, we knew the complexity involved in motion control components. As our preferred automation partner, B&R has always easily met our requirements for precision, accuracy and speed," says Kumar. "The Panel PC 2100 HMIs, ACOPOSmulti servo drives and X20 I/O modules, combined with an Ethernet POWERLINK network, enable our GS-24 PLUS 200 to outperform the competition with exceptional performance, accuracy and product quality."

The machine features a total of 14 axes run by B&R ACOPOSmulti servo drives. "They give us great flexibility and investment security," says Kumar. "The energy recovery, cooling options and integrated safety engineering make ACOPOSmulti one of the most modern and economical drives on the market, and the modular design also saves space in the control cabinet."

The Panel PC 2100 and ACOPOSmulti drives communicate via a deterministic Ethernet-based POWERLINK network that provides communication speeds down to 100 microseconds. "POWERLINK gives us faster synchronisation with easier drive-to-drive communication," says Kumar. "That ensures faster response times and higher accuracy."

The heaters used for pouch sealing are connected to X20 temperature modules. The Panel PC 2100 controls both the motion and temperature control systems and is programmed using Automation Studio, the universal tool for programming all B&R hardware. Galaxy continues its integrated approach through advanced diagnostics technology as well using B&R's Secure Remote Maintenance. This helps them access machines installed anywhere in the world without interfering with end users' IT networks.

Galaxy's GS-24 PLUS 200 machine achieves an output of 200 pouches per minute and is automated by Panel PC 2100, ACOPOSmulti and X20 I/O modules networked on Ethernet POWERLINK.

Many variants, one project

Galaxy's modular approach to both mechanical and electronic design allow it to offer its customers highly customised, flexible and modular solutions. "This approach requires software that is able to support multiple variants," notes Singh. "Not only did B&R's Automation Studio allow us to maintain multiple machine variants but it also did it in a single project."

Project management in Automation Studio makes version management very easy for machine builders. The need to maintain multiple machine backups for different customers and features can be quite a hassle. The difficulties are compounded when these variants are mixed with different hardware configurations. With Automation Studio, however, all backups, features and hardware configurations are handled in a single project. The software developer only needs to drag and drop the functions required for respective hardware on the machine being installed and put it into operation. Tedious tasks become easy to handle.

mapp Technology software framework provided in Automation Studio enables software developers to configure preprogrammed software components instead of programming the functions from scratch. This allows them to focus on optimising the programming of key value-adding processes and spend less time on repetitive basic functionality. "We saw a drastic reduction of development time, even with 14 axes and temperature control modules in our machine. Our developers focused on optimising the machine code and adding new functionality to the machine. mapp Technology has been immensely valuable to us as a machine builder," says Kumar.

Shiv Kumar
Managing Director
Galaxy PackTech

"As our preferred automation partner since the very beginning, B&R has always easily met our requirements for precision, accuracy and speed."

Automation Studio:
The project management in Automation Studio makes life of a machine builder very easy from version management point of view. Usually most of the hassles are created when machine builder needs to handle multiple machine backups for different customers and features.

A decade of collaboration

Galaxy has been using B&R systems since its first machine around 15 years ago. "B&R is an innovative company and a technology leader in industrial automation, and we are happy to have them as our automation partner," says Singh. "The exceptional quality and performance of their systems, together with their expert support and service, has made it easy for us to offer our customers next-generation automation solutions." ←

Factory automotion

Adding 'SMART' to factories

Manufacturers around the globe aspire to build a new generation of smart factories. India's producers are no exception, moving from evaluation to implementation of advanced technologies that will make them ready for the future. Plastech Solutions has emerged as a leader by combining these advancements into a fully integrated system. To achieve this level of integration, they needed a robust, modular and scalable automation solution. They placed their trust in B&R's APROL, as it was a perfect fit for all these requirements.

Plastech Solutions has four manufacturing units at various locations in Pune specialising in plastic components for the automotive, switchgear, aerospace and infrastructure industries as well as for consumer appliances. The company also has an automation division, which caters to the requirements of factories seeking to replace legacy controllers with the latest machine and motion control solutions or to upgrade machines for improved energy efficiency. As a hub of India's automotive industry, Pune provides a great platform for Plastech solutions. They are tier 2 suppliers for various well-known Indian and multinational automotive manufacturers.

Capturing losses for improvement

Everyone seeks to increase profitability and reducing losses plays a vital role in that equation. A factory can be plagued by a variety of losses, which, if permitted to go unnoticed, can impact profitability in a big way. "Our factory has been running for over 12 years, and we were pleased with its productivity," says Plastech Founder and CEO, Ajay Zod.

"In our constant pursuit for improving our production processes, however, we implemented a robust loss monitoring solution," he shared. The solution aimed to reduce losses incurred through production and inventory as well as the consumption of raw materials and energy. Plastech observed that, compared to planned production, the factory was running at only 60% efficiency – with the reason for wastage untracked. On many occasions, multiple motors were operational even when the respective machine was idle. Such instances lead to wasted energy and had a strong impact on profitability.

Ajay Zod
CEO
Plastech Solutions

"B&R's powerful hardware and software has impressed us. Their support towards using open source solutions, such as, Linux, POWERLINK and OPC UA has helped us to remain vendor independent at machine, factory and cloud level. The out-of-the-box energy monitoring, PDA solution together with customised reports is a unique offering by B&R's APROL."

APROL dashboard provides details of overall equipment effectiveness (OEE).

Integrated plant

Plastech has since transformed its manufacturing unit into a true smart factory. The plant currently has 40 injection molding machines capable of manufacturing products and components from 40 different molds. Not only has Plastech integrated communication between these shop floor systems and its IT systems – they have also integrated utilities, inventory management, finance management, infrastructure automation, OEE, operations and sales into a single system.

They also plan to connect and integrate four manufacturing plants at various locations. The factory automation system monitors every machine on the shop floor and connects it to a central system. The data gathered is utilised to calculate the overall equipment effectiveness (OEE) for each machine.

Machine output is identified as either good or bad product and either rejected for scrap or selected for dispatch accordingly. A grinder on the shop floor converts rejected products into granules, which are reused for new products. This step saves a great deal of raw material.

The factory smoke and fire systems are also integrated in the same central automation system, enabling the detection of fire and in turn, controlling water. The cooling water needed for various machines is also monitored by the factory automation system, which maintains the water level as well as supplying the chemical additive for cooling. The cooling tower is monitored for both temperature and pressure. The main factory gate is monitored by an IP camera, also integrated in the factory system. When the gate is open, footage captured by the IP camera is logged in the factory automation system.

A comprehensive overview of all monitoring activity is available to management at their fingertips. Various trend charts provide a visual display of the monitored machines and utilities. "We have connected and integrated all possible components in our factory, and all of them are monitored 24/7. This has helped us achieve higher productivity and OEE while also reducing wastage, inventory costs and losses," says Zod.

APROL for better OEE

"When we initially started discussion of the project, we just wanted to monitor energy utilisation of our systems," recalls Zod. "During evaluations and discussions with B&R experts, however, we quickly realised many business benefits to be gained through having a single system for process control, data acquisition, monitoring, analytics and long-term storage," he added. B&R's powerful APROL solution for factory automation now serves as a single system for controlling and monitoring the Plastech plant. "The flexibility and modularity give us freedom to scale up at any time with minimum cost, time and effort," he highlighted.

APROL is used to control the level in the cooling water tanks and provides automatic filling by pumping water from the ground using compressors in the factory. In addition, it captures data to calculate OEE, uptime and production count and controls factory lifts, gates and IP cameras.

Connectivity for the inventory management, quality control, material management and ERP systems is also provided by APROL. The production manager uses APROL dashboard each day to assign operators to their machines on the shop floor and to select molds for production. This helps monitor efficiency of machines and operators at the same time.

B&R's powerful APROL solution for factory automation now serves as a single system for controlling and monitoring the Plastech plant, helping them achieve higher productivity and OEE while also reducing wastage, inventory costs and losses.

Any variations raise warnings and are logged for analysis. APROL provides comprehensive reporting, trending and historical data. These reports can also be accessed using a smartphone or tablet. The data regarding availability, productivity and quality is converted by APROL into valuable information, such as, OEE ratings for management.

Architectural marvel

The shop floor consists of machines from multiple vendors, making it challenging to gather data. APROL connects to B&R smart molds, multi-vendor machines and SCADA systems via Ethernet and OPC UA. Controllers without native connectivity options are connected using add-on X20 I/O modules and parallel wiring. Utilities are controlled and monitored via X20 I/O modules connected in a decentralised architecture.

An Automation PC 910 runs a Linux operating system, an APROL engineering server and a runtime server. It is connected to the operator station situated centrally in the control room overlooking the shop floor. The decentralised architecture helps in connecting individual machines and utilities to the central Automation PC 910.

The X20 I/O modules are connected via an open source, deterministic, vendor-independent POWERLINK network. This reduces cabling and maintenance effort in the factory and improves diagnostics. The Automation PC 910 also provides long-term storage of historical data and reports.

Plastech has the option of further increasing storage space by using cloud services. APROL can easily connect to various cloud platforms using open protocols, such as, OPC UA, MQTT and AMQP. The modular X20 I/O system makes it easy for the company to choose the specific I/O functionality needed for each utility and machine. This reduces costs and adds flexibility to the process and data acquisition system.

"B&R's powerful hardware and software has impressed us," confirms Zod. Support for open source solutions like Linux, POWERLINK and OPC UA helps Plastech remain vendor independent at the machine, factory and cloud level. "The out-of-the-box energy monitoring and PDA solution, together with customisable reports, is a unique offering by B&R APROL," he notes.

The APROL EnMon solution is currently used to monitor energy consumption throughout the plant. The X20AP3131 energy metering module provides a compact connection for incoming supply. This reduces additional cost of system components and allows Plastech to easily integrate solutions right out of the box.

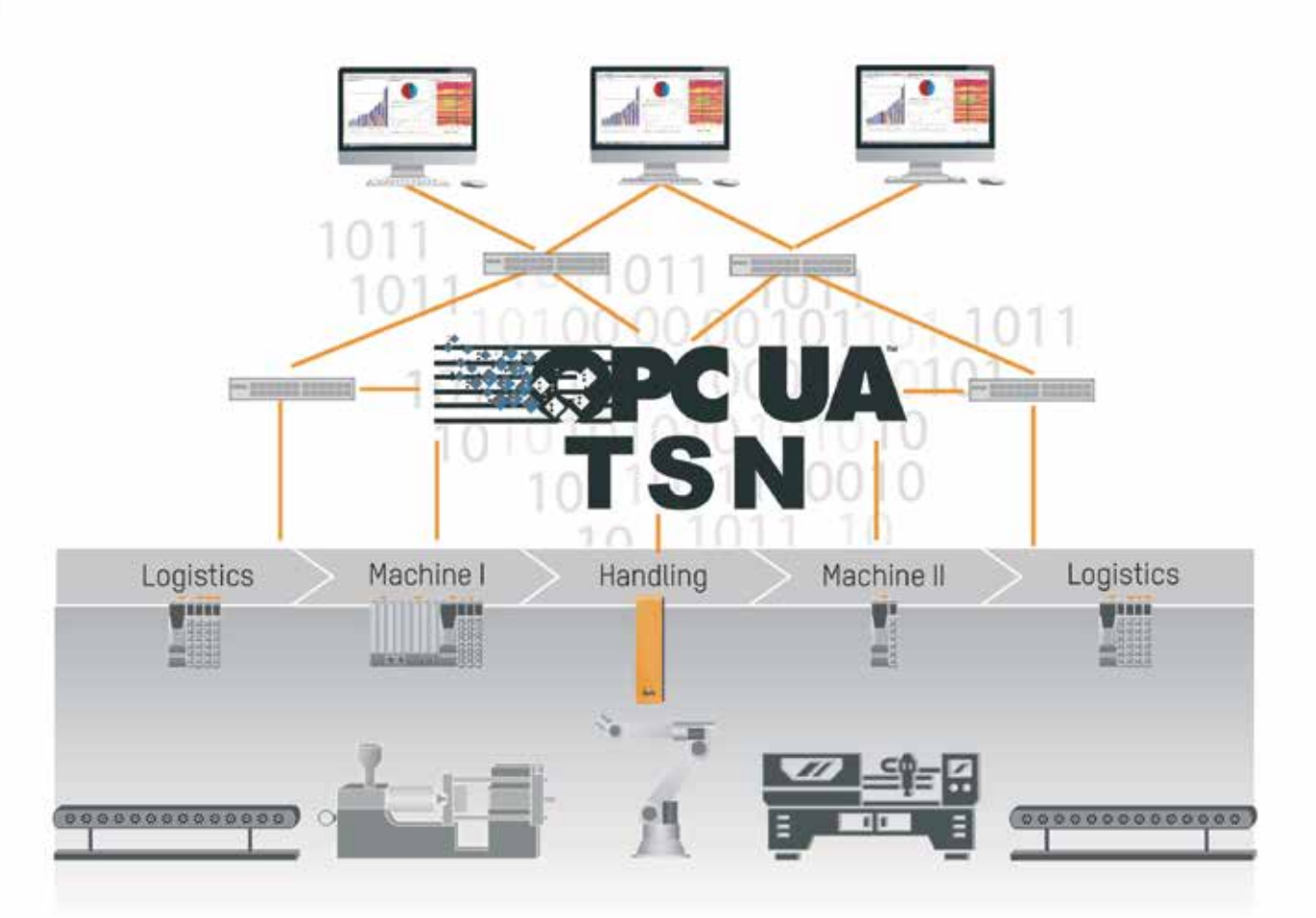
Looking to the future

"We have successfully deployed APROL in our manufacturing facility and have already seen the benefits," says Zod. "We are planning to leverage these benefits for our other manufacturing units by connecting all our sites together."

The performance metrics calculated by APROL provide Plastech with helpful information about shop floor operations. Having all elements of the factory integrated in a single system and data available at one location in the control room is one of the numerous benefits achieved. "In the future, we plan to add energy monitoring for individual machines and utilities so that we get individualised data. We are also looking at integrating condition-based Predictive Maintenance in all our machines using APROL ConMon solution," he concluded. ←

Industrial IoT

OPC UA TSN – From the field to the cloud



OPC UA TSN fulfils all the communication requirements of today's most demanding manufacturing applications.

There's no denying the tremendous value that the Industrial IoT holds in store for the future of manufacturing. Efforts to tap into this potential, however, have thus far only begun to scratch the surface. Spurred by demand from their end customers, automation suppliers are poised to clear the first hurdle on the road to IIoT solutions: seamless communication based on open standards. Time-Sensitive Networking (TSN) in combination with OPC UA provides precisely timed horizontal access to data from machines, controllers and I/O systems – regardless of who built the individual devices.

As an open protocol, OPC UA has already found widespread use in a diverse range of industrial applications. Nearly all manufacturers offer OPC UA in their controllers and other products. The technology is developed and promoted by many different manufacturers under the oversight of the OPC Foundation industrial consortium. Operators of machinery and equipment no longer have to worry that the simple act of selecting communication technology will lock them in with a specific vendor.

With standardised system connectivity, they enjoy equal access to the technology and are able to focus on solving new challenges. Where we've been accustomed to seeing 30 or 40 nodes in a network, we'll eventually be seeing 1,000 or more.

Growing number of nodes

The challenge will be to find a way to manage and control this increased number of nodes effectively. Within this challenge, however, lies an opportunity for automation suppliers to differentiate themselves by offering their customers added value. Software tools that streamline the setup and configuration of complex networks with large numbers of nodes will become substantially more important. These tools will also need to be designed for users without extensive IT training.

It's not only the number of nodes that is increasing so rapidly, however; the volume of data will also continue to grow exponentially. Managing the flood of big data with conventional industrial protocols is becoming increasingly difficult, and this is where OPC UA promises substantial improvement.

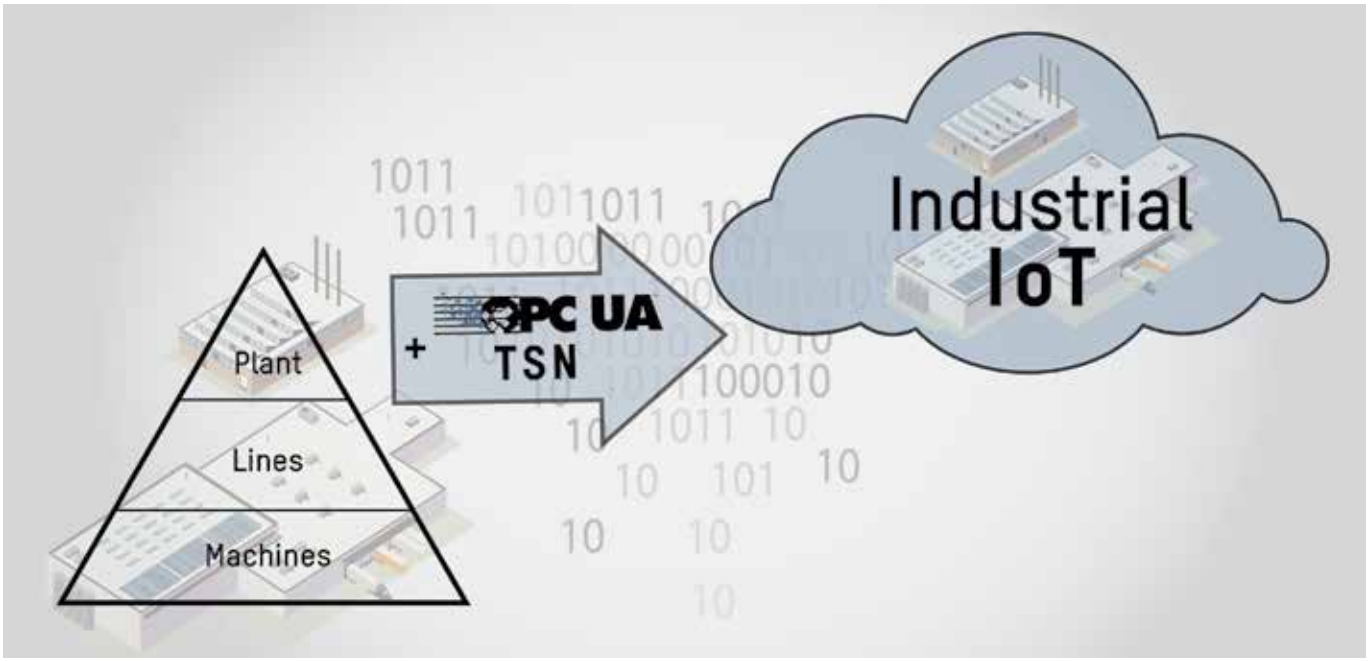
Information, not data

Among the greatest advantages of OPC UA are its information models. Traditional bus systems transmit dimensionless data – simple numbers unaccompanied by units or any other information. The application running on the controller knows how to interpret these numbers using what is known as a semantic data model.

There is absolutely nothing wrong with this approach, of course, as long as machines are operating independently of one another. However, as soon as it becomes necessary to use the data elsewhere – be it on other machines, in SCADA systems or even in cloud-based ERP systems – the semantic meaning is lost, and all that remains are the dimensionless numbers.

Fewer errors

In the past, the semantic context has been transmitted to other systems in lengthy tables or even in handwritten form. This



OPC UA TSN will enable seamless horizontal manufacturing connectivity.

painstakingly tedious undertaking – a notorious source of errors – is eliminated entirely with OPC UA, making it considerably easier to implement more agile and responsive manufacturing solutions.

With its information models, OPC UA transmits not just data, but information that can be correctly interpreted by any node on the network without any further explanation. Say, for example, we have a sensor that measures a temperature of 5°C. Coming from a traditional protocol, the controller would receive this as an integer data type with the value "5". The fact that the number represents a temperature value measured in degrees Celsius, and the fact that there are certain limits to be applied, is defined in the application running on the controller.

OPC UA takes a different approach. The value "5" is provided along with all of its semantic context – in this case, that it is a temperature value measured in degrees Celsius and that it has limit values that should be applied.

Information on demand

Since other nodes on the OPC UA network are able to query this information, it can be used in a much wider variety of ways. If you want to generate a new ERP report, for example, the ERP system can browse the network for appropriate information. Once found, this information can be collected in a database and viewed in the report. It used to be necessary to program this data transfer manually, and the semantic information for each individual value would need to be stored in the ERP system. With such a static structure, changes to variables on the machine would also require reprogramming in the ERP system.

This example highlights just how much OPC UA simplifies communication from the control layer up to higher-level systems. With that, however, we arrive at the next hurdle: When higher-level IT systems are sending queries down into the machine network – referred to in this context as operational technology, or OT – the network load inevitably increases.

For an IT network, delays in the millisecond range are generally no big deal. For a precisely synchronised manufacturing process, on the other hand, sub-millisecond accuracy is absolutely essential. Here, a delay in the millisecond range can shut down a machine, reduce output quality or even cause significant harm to equipment and personnel. This is why nearly every manufacturing facility has traditionally maintained a clear separation between its IT and OT networks. IT networks have historically lacked determinism and cyclic data traffic – two deal breakers at the OT level.

A single shared network

IT networks follow a principle known as "best effort delivery", which means that data packets all share the same level of priority and are transmitted as quickly as possible. If capacity is exceeded at any point, there will be a bottleneck – something that cannot be permitted in a machine network. Until now, there has been no way to implement both best-effort and deterministic cyclic traffic on the same infrastructure. With Time-Sensitive Networking (TSN),

that's about to change. TSN is a group of extensions to the Ethernet standard that will allow both general and time-critical data to be transferred over the same network.

The first step toward equipping a network with deterministic behavior is to ensure all of its nodes are on the same page with regard to timing. The IEEE 802.1 AS-Rev standard was developed for this purpose. It describes a mechanism for synchronising the clocks of all the nodes in the network to establish a uniform network time.

The next step is to guarantee that deterministic data traffic is given priority on the network. This is covered by the standards IEEE802.1 Qbv and Qba, which specify that network switches must operate in such a way that deterministic data traffic is transmitted within a guaranteed time frame, even if this means that other traffic must wait.

To establish a uniform approach to configuring this type of network, the Stream Reservation Protocol (IEEE802.1Qcc) provides standardised interfaces and mechanisms for configuration. NETCONF over TLS is used as the configuration protocol.

Bye-bye bandwidth blues

If you combine the mechanisms described above in a network, it becomes possible to transmit time-critical and cyclic data on the same physical layer as non-time-critical data. Since modern production networks rely on Gigabit Ethernet transfer rates or higher, this simultaneously resolves the bandwidth bottleneck issue that currently plagues not only fieldbus systems, but industrial Ethernet protocols based on 100 Mbit/s transmission as well.

The combination of OPC UA and TSN will set the stage for entirely new industrial automation architectures. One of the most notable features of these new designs will the disappearing borders between IT and OT networks. This applies not only to new plants built with full connectivity from the ground up, but brownfield plants as well. With the B&R Orange Box, legacy equipment can be integrated into production networks via OPC UA without any changes to the existing machines.

I/O devices with OPC UA TSN

B&R is actively involved in the development of OPC UA and TSN in addition to being a leading participant in the testbeds exploring the potential of combining the two technologies. For operators of machinery and equipment, B&R sees vast potential in OPC UA TSN, which is why it is working to move implementation forward in great strides.

Prototypes have already undergone extensive interoperability testing with devices from other IT and OT suppliers in setups like the TSN testbed organised by the Industrial Internet Consortium (IIC). The extremely promising results thus far provide a glimpse of what's to come once the technology reaches its full potential. In addition to its current capabilities, OPC UA will very soon offer fast cycle times and low jitter in the transmission layer. ←

Sebastian Sachse, Technology Manager - Open Automation, B&R

Protocols for a robust connection

Data is transferred from the edge to the cloud using special protocols that support the transmission of large volumes of data. B&R offers familiar queuing protocols like MQTT (Message Queue Telemetry Transport) and AMQP (Advanced Message Queuing Protocol), which allow data packets to be transferred reliably, even in cases where the network connection is poor or intermittently unavailable. They do this by saving data packets in a queue, where necessary, to be sent at a later time.

Other protocols, including OPC UA, can be transferred over MQTT and AMQP. OPC UA has the advantage that it is understood by all types of hardware and software in both the IT domain as well as the control system level, regardless of the manufacturer. This ensures a robust connection between the machine level and the cloud, independently of the hardware used.

Web offset printing

Fit to print

The high-speed, high-volume Newslight 36 is the largest printing press in Prakash's portfolio, featuring up to seven decentralised stations, each separated by 25 to 50 meters. For the robust network, high-performance I/O and motion control systems required for such an expansive system, Prakash relies on B&R's control technology and POWERLINK communication.

Every morning, we open our front door to find a neatly rolled bundle that tells us all about what's happening around the world – a newspaper! Our cup of tea and breakfast wouldn't be complete without it. However, the act of printing a newspaper, magazine or book is just as challenging as the process of creating its contents in the first place. The next time you hold a newspaper in your hand, you may find yourself pausing for a moment to appreciate all the technology behind it.

Prakash Web Offset Pvt. Ltd. is one of the leading manufacturers of web offset presses in India, bringing cutting-edge technology to the nation's print and publication industry. Prakash's ultra-modern plant is fully equipped to build all of its presses in-house in order to maintain the required quality. The high-speed, high-volume Newslight 36 is the largest press in Prakash's portfolio, requiring communication to span 25 to 50 meters between each of its seven decentralised stations. For the robust network, high-performance I/O and motion control systems required for such an expansive system, Prakash relies on B&R's control technology and POWERLINK communication.

High volume, high efficiency

When it comes to printing high volume publications on a fast moving continuous substrate, a web offset press like the Newslight 36 from Prakash is the best tool for the job. The printing process begins with huge reels of paper being loaded onto the two feeds of what is called the webbing-up system. As the first reel nears its end, the splicing unit will begin to rotate the new reel up to its operational speed of 7 meters per second and then automatically splice the two rolls together. This eliminates the time consuming process of changing reels and feeding a new web through the system.

The web offset press prints on both sides of the paper simultaneously. In a process called blanker-to-blanker printing, two blanket cylinders press against each other, offsetting the ink

PPC 2100 provides maximum flexibility and performance in very small packages.

from their plates onto opposite sides of the paper web as it passes between them. Optical sensors and tensioning rollers keep the paper web precisely aligned and maintain the desired tension to avoid tearing.

Precise synchronisation for optimal results

The four print units apply black, cyan, magenta and yellow ink from an image. The four-color image and any optional additional colors are printed on the web as it moves at high speed through the print units. The print units are fed with ink from a central reservoir. "Our machine process is designed to run continuously at very high speed, creating over 36,000 impressions per hour," says Prakash's Managing Director, Saurabh Gupta.

The web of printed paper is several pages wide, so in the final step, it's cut and folded to the correct size for each publication. The folding unit can be formatted to create many different folding and pagination variants, depending on the size and layout of the finished publication. Rotating blades cut the web into different streams, which fold into each other. The turner bars use a compressed air cushion to prevent damage to the printed image. The folded sheaf containing different pages is cut to length as it leaves the press. The finished newspapers are laid out with a small overlap on a conveyor belt that transports them away from the press.

Robust high performance for decentralised control

Conventional web offset press systems consist of dedicated CPUs and controllers at each station of the printing unit. The system offered by Prakash consists of one central controller and a variety of distributed I/O modules and drives to control the individual tower and folder units. The distance between the units can be around 25-50 meters.

A powerful Panel PC 2100 acts as the central controller, communicating over POWERLINK with the decentralised stations, each featuring remote I/O modules and three ACOPOS servo drives. The real-time, deterministic Ethernet POWERLINK communication network provides the company with the desired performance.

POWERLINK has helped Prakash increase its system flexibility, make diagnostics and maintenance easier and at the same time, reduce cabling effort. "We were impressed with the distributed control options B&R offers, which fit our requirements perfectly," notes Saurabh. "Together with POWERLINK, the performance, speed and precision of B&R's ACOPOS drives is simply amazing," he shares.

Universal tool with pre-programmed software components

"We always wanted to have a universal development tool, where we could manage all of our automation components and machine variants in a single project. With Automation Studio from B&R, we are now able to do precisely that," says Gupta. "mapp Technology drastically reduced our development times by providing pre-programmed blocks that our software developers just have to configure. I can say that there is nothing like mapp Technology in the entire automation market," he added.

The high-speed, high-volume Newslight 36 is the largest press in Prakash's portfolio, requiring communication to span 25 to 50 meters between each of its seven decentralised stations.

Prakash's developers are now able to simply drag-and-drop preprogrammed functions into place as needed. Freed from repetitive programming tasks, they can instead focus on the machine's core functionality. This enhances software quality, improves diagnostics and reduces development time so that Prakash can get new presses to market faster.

Compact yet powerful

The Panel PC 2100 is among the most compact and high-performance PLC/HMI systems in automation. It provides Prakash with the power needed for its application, running the real-time operating system and controlling the remote drives and I/O systems. The Panel PC's 24V power supply eliminates the need for a switched-mode power supply (SMPS). No cabling with PC mounting, fanless operation and efficient heat dissipation all contribute to the devices' exceptionally low failure rate in the field.

"Our entire team was fascinated by the design, compactness and performance of the Panel PC 2100," praises Gupta. "Servicing & maintaining PCs in the field has always been a major issue for us, but with the long-term availability of B&R's Panel PCs, coupled with the advanced software features, it's easier than ever for us to provide the best service to our customers," he observes.

Collaboration for technology leadership

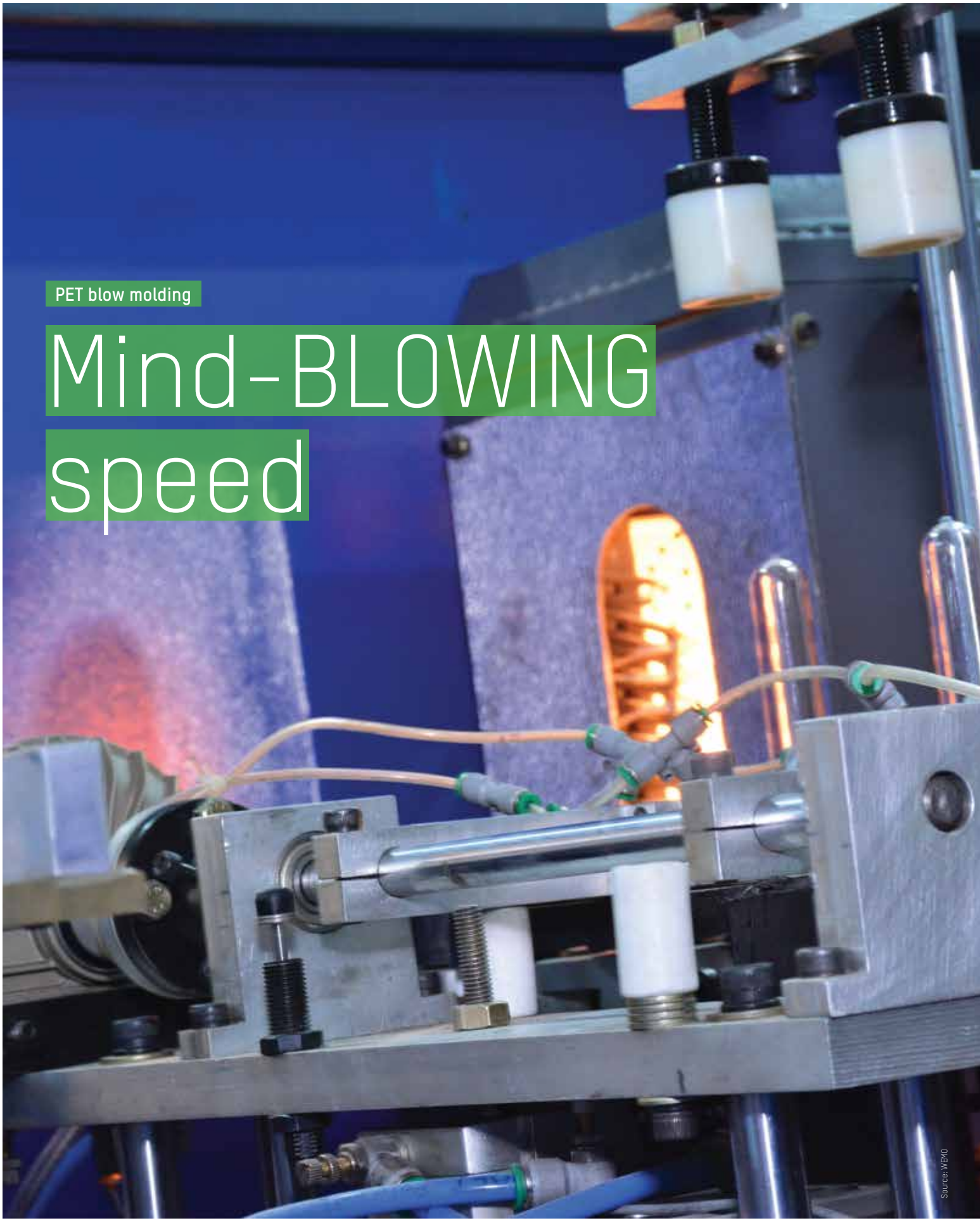
"We are happy to partner with B&R for all of our future machines," says Gupta. "This was the first in a long list of machines that will be 100% automated by B&R. We are sure that this partnership will take us a step higher and give us a technological edge over the competition," he assures. Specifically, Prakash plans to introduce new features for their machines, such as, remote maintenance and diagnostics and integrate additional mapp functionalities that will benefit their customers and improve their service. ←

Saurabh Gupta
Managing Director
Prakash Web Offset Pvt. Ltd.

"Our focus is on our customers and nothing runs like our web presses. We are sure that our partnership with B&R will take us a step higher and provide the technological edge against competition. We were impressed with the decentralised control options provided by B&R, which fit our requirements perfectly. Together with POWERLINK, the performance, speed and precision of ACOPOS drives is simply amazing."

PET blow molding

Mind-BLOWING speed



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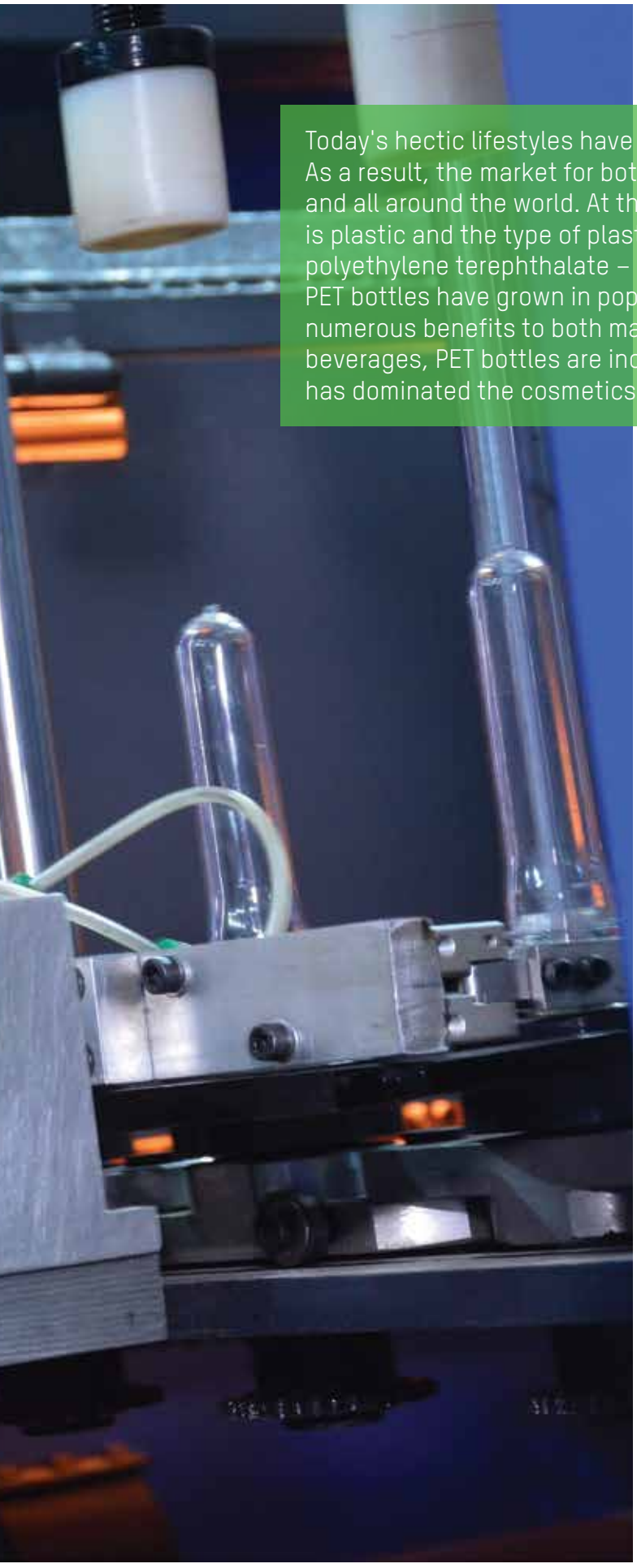


Today's hectic lifestyles have more and more people buying drinks on the run. As a result, the market for bottled and canned beverages is booming in India and all around the world. At the top of the list of preferred packing materials is plastic and the type of plastic most commonly used to bottle beverages is polyethylene terephthalate – more commonly known as PET. Over the years, PET bottles have grown in popularity amongst packaging experts due to their numerous benefits to both manufacturers and consumers. In addition to beverages, PET bottles are increasingly replacing the glass packaging that has dominated the cosmetics and pharmaceutical industries.

To meet the rapid growth and demand in the packaging market, PET PLAST has made substantial investments over the past several years in research and development of its series of PET blow molding machines. With over 14 years of experience in the IT sector, Dheeraj Taneja founded PET PLAST in 2009. Combining advanced technologies to satisfy the requirements of bottling systems in India, PET PLAST set up its manufacturing unit in Faridabad, Delhi.

Efficient, eco-friendly innovation

With its focus on high-end technology and top quality and its customer centric business approach, PET PLAST has become a preferred supplier of PET blow molding machines. They are devoted to continuous technical research in order to build a good reputation and recognition for their brand. Best-in-class design and an in-house workshop operated by a strong and technically competent team enable PET PLAST to develop different kinds of fully and semi-automatic PET/PP/PC blowing machines and auxiliary equipment.

"We at PET PLAST believe in building strong, long-term partnerships – not only with our customers, but also with our vendors. This has always helped us achieve great results. Our combination of technology and expertise has raised the bar for PET manufacturing in India," says Taneja. "According to our customers' requirements, we provide turnkey services including technical consulting, graphic design, installation, commissioning and technical training."

Not only is PET PLAST determined to create machines that are green and efficient to operate, the company also believes in manufacturing them in a way that preserves the environment for future generations. "Our eco-friendly production utilises solar energy for around 20 percent of our factories' day-to-day energy needs," says Taneja. "And, with our energy efficient machines, we pass on these advantages to our customers as well."

User-friendly, high-speed bottling

The fully automatic 4SFAS – 4500 machine from PET PLAST is designed for mass production of PET bottles. A hopper unit feeds

Dheeraj Taneja with his team.

PET PLAST manufacturers a wide range of PET/PP/PC Blowing Machines used by several manufacturing companies in making of packaged drinking water, household chemicals, pharmaceuticals, edible oils, liquor, hair care, pesticide etc.

preforms on guide rails, which are then loaded on the main conveyor using a servo-driven loading mechanism. One loading cycle is capable of loading four preforms on the main conveyor, which is also controlled using servo drives. These preforms then pass through a series of heaters with PID temperature control before entering the blowing zone, where they are formed into the desired shape determined by the mold.

"Replacing molds between production runs is an extremely laborious process that traditionally has taken over six hours," says Taneja. "Having understood the market demands for reduced changeover times, we invested in upgrading the design and can now boast changeover times of less than one hour."

The preforms at the blowing station need high-pressure followed by low-pressure blowing, synchronised with operation of the mold and stretch pin. Mold and stretch pin movements are also controlled using servo drives. Finished bottles are ejected and continue on to the subsequent stations for operations such as filling and capping. This has resulted in an all-electric, fully automatic PET blow molding machine with an output of up to 5400 bottles per hour.

High-speed performance, intelligent motion control

All-electric 4SFAS – 4500 is entirely controlled by B&R control systems, I/O modules and servo drives. This has resulted in higher productivity, improved accuracy and shorter changeover times. "Reduced labour, easy and safe operation, high output, uniform quality and many IT-enabled features are the biggest advantages offered from B&R, which all contribute to making our system very efficient," says Taneja.

B&R's ACOPOS P3 servo drives are used for the loader, indexer, clamping and stretching units. The machine's heating zones are software controlled using a versatile C-Series Power Panel from B&R. This reduces the need for separate PID units and I/O modules. ACOPOS P3 servo technology gives the machine higher positioning accuracy, mechanical compactness and modularity and allows all machine operations to be configured via the HMI.

The fully automatic 4SFAS – 4500 machine controlled by B&R control systems, I/O modules and servo drives has resulted in higher productivity, improved accuracy and shorter changeover times.

With a short cycle time of 50 microseconds, ACOPOS P3 provides advanced motion control together with optimised energy consumption. ACOPOS P3 drives are precisely synchronised with the C-Series Power Panel controller via real-time POWERLINK communication, allowing the machine to achieve a top output rate of 5400 bottles per hour. All together, these features help PET PLAST achieve maximum productivity, resulting in lower cost per bottle and higher efficiency.

Secure, easy machine accessibility

With so many customers and even more machines in the field, one of the main challenges for PET PLAST has been the maintenance and service of its installed base. This typically means costly, time-consuming on-site service calls. B&R's Secure Remote Maintenance proved immensely valuable, allowing PET PLAST to connect with machines around the globe quickly and easily. Service technicians establish a connection from a PC, smartphone or tablet (iOS or Android) anytime and anywhere.

B&R collaboration for Industry 4.0 readiness

PET PLAST is always on the lookout for future challenges and new market opportunities. High energy savings, comprehensive strength, perfect service, competitive pricing and cutting-edge technology have made PET PLAST a force to reckon with in India.

"Today, the biggest trend in our industry is collaboration of machinery with the Internet," says Taneja. "Using the latest technology with advanced features such as condition monitoring and cloud connectivity makes machines smart and connected. Collaborating with B&R has given us access to such technology and made our machines competitive on the global market."

Adopting newer technologies helps PET PLAST improve quality and production volume. This contributes to the company's stated goal of building superior blow molding machines that meet the demands of domestic and international markets. "PET PLAST and B&R will work hand-in-hand to build better machines," concludes Taneja. "Our partnership has already led to great success, and we look forward to achieving even more in the future." ←

Dheeraj Taneja
Owner
PET PLAST India

"Reduced labour, easy and safe operation, high output, uniform quality and many IT-enabled features are the biggest advantages offered from B&R, which all contribute to making our system very efficient."

Pet Plast
Packaging To Grow

With ACOPOS P3, B&R has set new standards for motion control providing a 69% smaller footprint with maximum power density.

Automotive

A suspenseful story with a twist

On many passenger vehicles, a rear twist beam suspension system plays a key role in handling performance and driving comfort. Welding these complex components and inserting the necessary bushings is a job that requires extreme precision. Welding specialist, Finearc Systems relies on B&R for the necessary control performance, and also benefited from the time and cost savings of B&R's integrated development environment.

For many, the daily drive to work is long and frustrating. Yet, especially for those whose commute includes bumpy roads in poor repair, the journey is made considerably more bearable by their car's suspension system. In many passenger cars, the rear wheels are connected to a type of suspension system called a twist beam – one of the most critical components in determining the vehicle's handling performance.

This individual components of the rear twist beam must be arc welded together with high precision, making it the perfect job for Finearc Systems. Since its inception more than 30 years ago in Pune, the automotive hub of India, Finearc has established itself as a trusted name in robotics and automated welding and cutting solutions serving a wide range of industries.

"From concept and design to manufacturing and installation, our professional, highly-skilled team strives to meet the critical requirements and specialised applications of major global players across a wide variety of domains, including automotive, pumps, valves, aviation, construction and many others," says Shrikant Pathak, Managing Director of Finearc Systems.

Meenal Kelkar with technical team.

Rear twist beam bush press machine with innovative floating design.

Bush pressing made easy

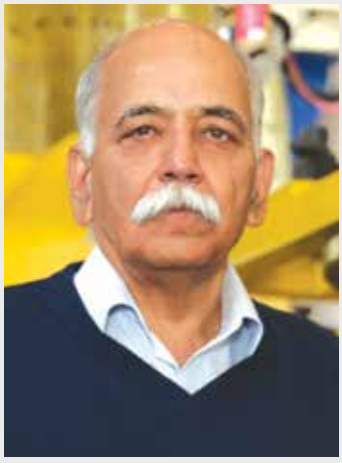
The rear twist beam (RTB) is a critical component in determining handling performance, particularly of passenger vehicles. As an assembly comprised of many separate parts that must be welded together with great precision, the RTB is also highly complex. The RTB assembly line encompasses multiple six-axis robots performing various welding activities.

Once the RTBs have been assembled, they are subjected to quality inspection before entering the final, critical station in the assembly line: the press station, where the bushes are inserted. After this station, the rear twist beam is then ready to be mounted in the passenger car.

RTBs are loaded onto the bush press station manually. Once the machine is in operation, safety curtains provide the necessary protection for the operator. The bush pressing process is not fast, but it does require a lot of accuracy. "Our bush press machine has an innovative floating design," says Meenal Kelkar, Head of Supply Chain Management at Finearc Systems. "The floating design allows the component to be aligned with the bush on the pressing axis, giving our users the desired flexibility and reducing costs."

Errors reduced to zero

"We evaluated many control systems," reports Kelkar, "and our technical team was thoroughly impressed with the performance of B&R's systems. The accuracy achieved was outstanding and we have zero errors in measurement." Load cells can be connected directly to the X20 analog input module and provide pressure

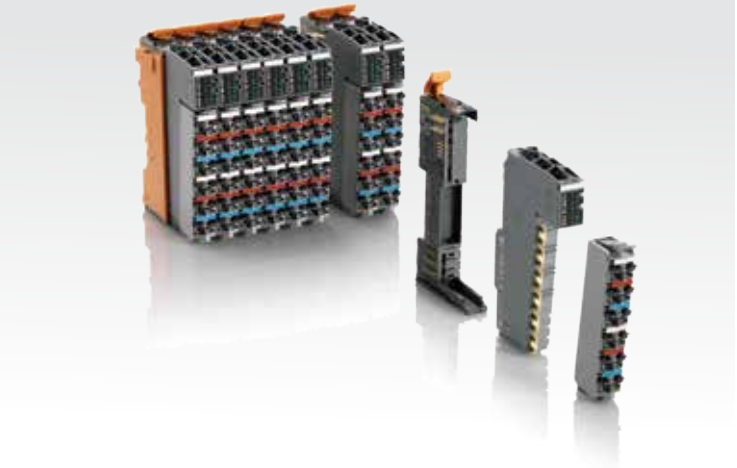


FINEARC SYSTEMS

Shrikant Pathak
Managing Director
Finearc Systems

"Partner with us, when you need to be more efficient, productive and competitive. From concept and design to manufacturing and installation, our professional, highly-skilled team strives to meet the critical requirements and specialised applications of global majors across varied industry domains including automotive, pumps, valves, aviation, construction and many others."

C-series power panel provides an integrated HMI and PLC in the same unit along with various interface options.



Load cells modules can be connected directly to X20AI1744-3 increasing accuracy and reducing field components.

feedback directly to the controller, increasing accuracy and reducing the number of field components required.

During the bush pressing process, the controller records the pressure values with respect to the movement of the bush, and the resulting curve is mapped against set threshold values to ensure quality. This is then linked to a unique bar code, which is printed and adhered to the RTB to provide component and quality traceability.

Masters of integration

The pressure-displacement curves are displayed graphically on a B&R C-Series Power Panel, which serves as an integrated HMI and PLC unit. "One of our challenges as a machine builder is handling the various protocols available in automation," says Kelkar. "The variety of interface options available on B&R's Power Panel give us the desired flexibility."

"B&R also offers a single tool – Automation Studio – for programming every aspect of the automation system," adds Kelkar. "That makes developing and maintaining different versions much easier for our software developers." Finearc can also use a single backup for multiple projects. "This has drastically reduced our effort in commissioning and after sales service," says Kelkar.

"In addition, mapp Technology components available in Automation Studio have been instrumental in reducing our programming costs and development time," she adds. The real-time, vendor independent Ethernet POWERLINK protocol acts as the communication backbone in B&R systems, offering high performance while at the same time reducing cabling and maintenance effort.

Going beyond

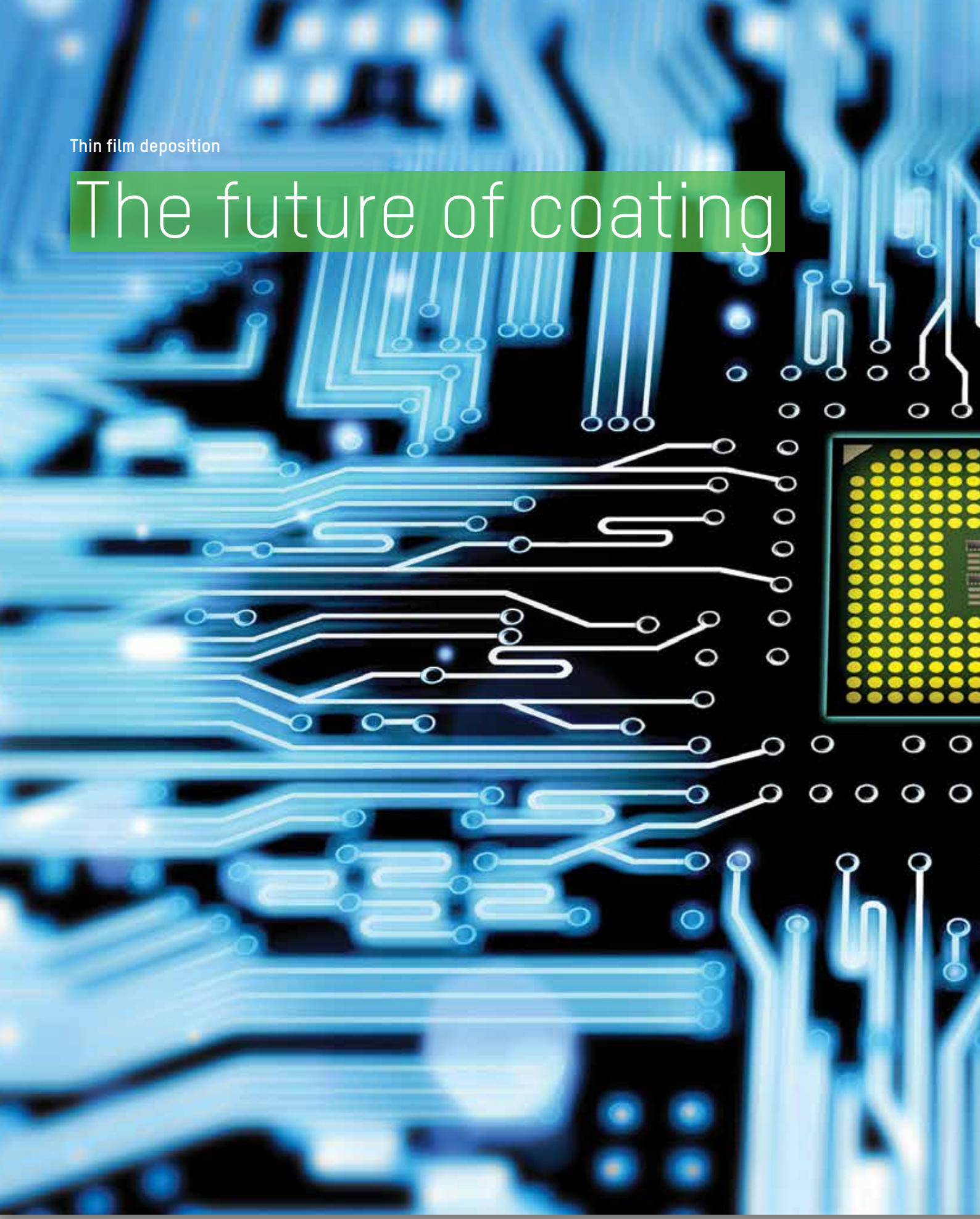
"We have over 50 years of experience in welding applications and we are proud to say that we are technical experts in our field," says Kelkar. "By combining that expertise with B&R's technology leadership in industrial automation, we will take our welding and cutting applications to new heights. We look forward to continuing our collaboration with B&R through many new and challenging applications." ←

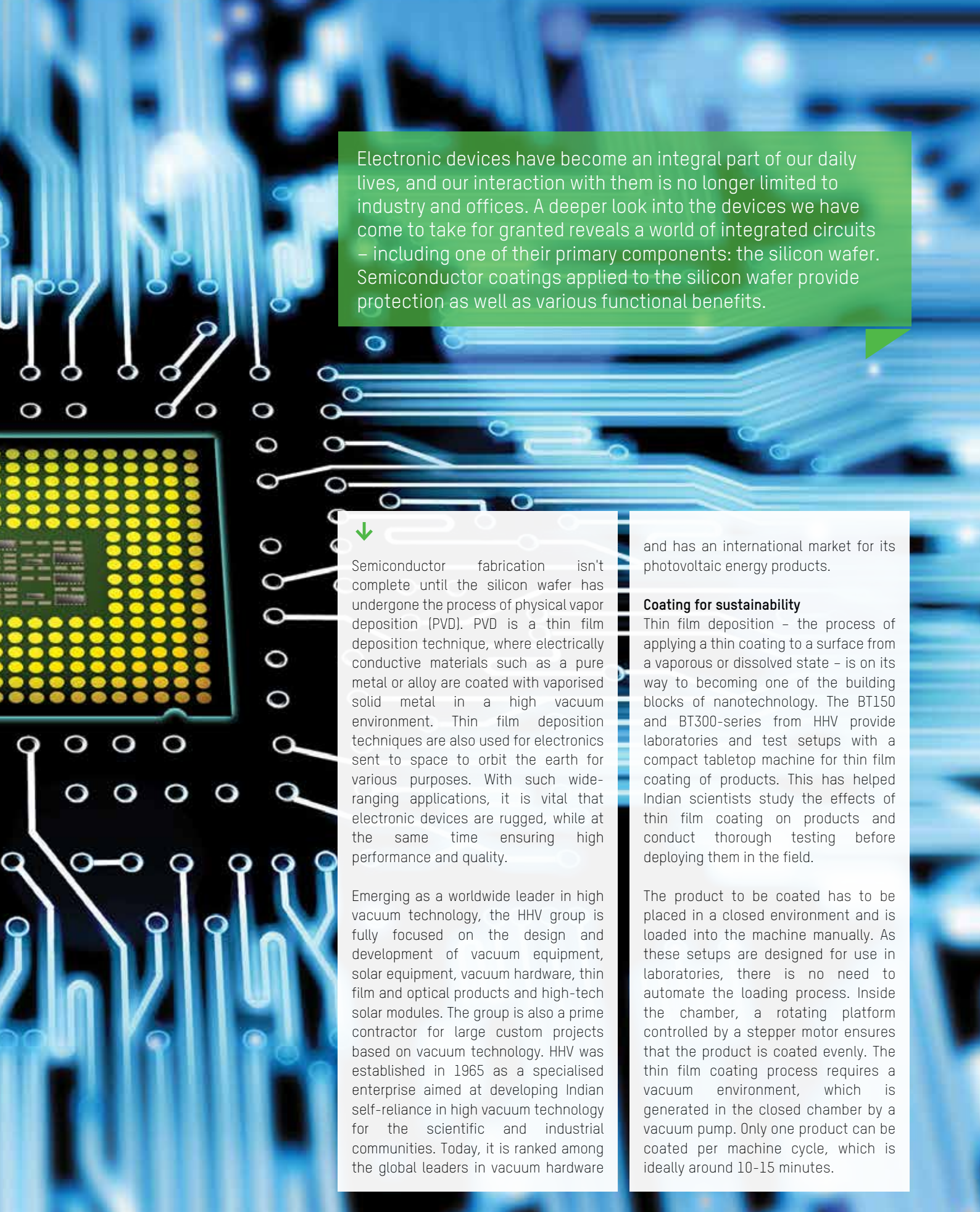
Meenal Kelkar
Head – Supply Chain Management
Finearc Systems

"B&R is a technology leader in industrial automation and combining B&R technology with our expertise, we are sure of attaining greater heights in areas of welding and cutting. We wish to take our association with B&R to a new level and look at numerous new and challenging applications."

Thin film deposition

The future of coating





Electronic devices have become an integral part of our daily lives, and our interaction with them is no longer limited to industry and offices. A deeper look into the devices we have come to take for granted reveals a world of integrated circuits – including one of their primary components: the silicon wafer. Semiconductor coatings applied to the silicon wafer provide protection as well as various functional benefits.

Semiconductor fabrication isn't complete until the silicon wafer has undergone the process of physical vapor deposition (PVD). PVD is a thin film deposition technique, where electrically conductive materials such as a pure metal or alloy are coated with vaporised solid metal in a high vacuum environment. Thin film deposition techniques are also used for electronics sent to space to orbit the earth for various purposes. With such wide-ranging applications, it is vital that electronic devices are rugged, while at the same time ensuring high performance and quality.

Emerging as a worldwide leader in high vacuum technology, the HHV group is fully focused on the design and development of vacuum equipment, solar equipment, vacuum hardware, thin film and optical products and high-tech solar modules. The group is also a prime contractor for large custom projects based on vacuum technology. HHV was established in 1965 as a specialised enterprise aimed at developing Indian self-reliance in high vacuum technology for the scientific and industrial communities. Today, it is ranked among the global leaders in vacuum hardware and has an international market for its photovoltaic energy products.

Coating for sustainability

Thin film deposition – the process of applying a thin coating to a surface from a vaporous or dissolved state – is on its way to becoming one of the building blocks of nanotechnology. The BT150 and BT300-series from HHV provide laboratories and test setups with a compact tabletop machine for thin film coating of products. This has helped Indian scientists study the effects of thin film coating on products and conduct thorough testing before deploying them in the field.

The product to be coated has to be placed in a closed environment and is loaded into the machine manually. As these setups are designed for use in laboratories, there is no need to automate the loading process. Inside the chamber, a rotating platform controlled by a stepper motor ensures that the product is coated evenly. The thin film coating process requires a vacuum environment, which is generated in the closed chamber by a vacuum pump. Only one product can be coated per machine cycle, which is ideally around 10-15 minutes.

Automation Studio
As a universal development environment for all B&R products, Automation Studio make managing programs for machine variants easier than ever. It enables HHV to maintain a single project with separate configurations for each variant.

BT300 provide laboratories and test setups with an compact tabletop machine for thin film coating of products.

Once the product has been loaded and the chamber is closed, the machine can perform the thin film coating process in automatic or manual mode. The process begins with 4 steps to establish the necessary environment – vacuuming, preprocessing, processing and venting. First, a vacuum pump removes air and fine dust to generate a vacuum inside the chamber, which takes around five to ten minutes.

The next step, preprocessing, involves adding a gas to the vacuum chamber, followed by a high-voltage charge that further removes impurities and oxides. The user is able to define the thickness and the number of layers needed for coating. Usually the thickness is measured in angstroms and the BT150/BT300 machines are capable of coating up to six layers using different materials, taking around three to five minutes depending on the thickness and number of layers. A frequency-based input is used to measure the coating thickness and provide feedback to the control system so that the process stops when the desired thickness is achieved.

After this, the chamber needs to be vented before it can be opened to remove the coated product. The venting process slowly removes the vacuum from the chamber over the course of about five minutes. The BT line fits perfectly in a laboratory, which makes it the ideal tool for a lot of routine deposition processes and for small-scale teaching laboratories.

Accuracy in angstroms
Achieving high accuracy is a primary goal for any organisation. The quality standards needed for electronics make accurate coating thickness an essential requirement for thin film coating. HHV has worked closely with world renowned scientists to develop challenging and advanced thin film deposition systems.

This unique equipment has successfully demonstrated its functional performance, product quality and repeatability. "The coating thickness and accuracy achieved by our BT300/BT150 machines is measured in angstroms," says Subramanya Shastry, General Manager of HHV. "We, at HHV, are proud of the fact that no competitor product comes close to matching our best-in-class accuracy: an amazing 0.1 angstroms."

Compact and powerful
The challenges of building a compact tabletop machine start with

Subramanya Shastry
General Manager
HHV

"With B&R, we need considerably less time to commission our machines. Our machines have become both smarter and more compact. Our close cooperation has built a strong foundation of trust making B&R our preferred automation vendor."

B&R's Power Panel C-Series provides crisp, high-resolution HMI with a built-in controller.

Subramanya Shastry with his team.

the mechanical design and carry over into the control system as well. "Our customers are always demanding new features and keep a close eye on the market for better, more competitive products," notes Gadigeppa Battikoppada, Assistant Manager - Design at HHV. "We focus on providing them with cost-effective machines that deliver superior performance."

B&R has long been known for its compact control and I/O systems. HHV instantly found B&R to be an ideal fit for the needs of the BT150/BT300 machines, offering unmatched features. B&R's Power Panel C-Series provides crisp, high-resolution HMI with a built-in controller. The unique 3-part design of the hot-pluggable remote I/O modules in B&R's X20 system make installation and maintenance remarkably simple. The system's compact dimensions – encapsulating all of the machine's I/O needs in a slender 12.5 centimeters – help HHV save a tremendous amount of space.

Reduced development time and complexity

"With the number of machine variants growing exponentially due to the varied demands of our customers, managing software and machine programs becomes an important challenge," explains Battikoppada. "As a universal development environment for all B&R products, Automation Studio has made managing programs for machine variants easier than ever. It enables us to maintain a single project with separate configurations for each variant."

mapp Technology framework, available as a plug-in for Automation Studio, further reduces programming complexity by providing ready-made components that allow HHV to program less and configure more. This has drastically reduced development times and improved machine diagnostics.

"With B&R, we need considerably less time to commission our machines. Our machines have become both smarter and more compact," says Shastry. Recipes can be called up at any time for coating different products with different needs. New recipes can be added and existing ones can be edited on the fly and used for future products.

Cooperation with a future

"We are extremely pleased to have B&R as our automation partner and plan to take the partnership to new levels with numerous research projects already in pipeline," concludes Sashtry. "Our close cooperation has built a strong foundation of trust. We can pass on new requirements from our customers to B&R with confidence. The swift responses, focused problem-solving and technical knowledge of the entire B&R team – together with their world class, innovative products – has made B&R our preferred automation vendor." ←

Gadigeppa Battikoppada
Assistant Manager - Design
HHV

"We provide accuracy down to an amazing 0.1 angstroms. Our customers are always demanding new features and we provide them with cost-effective machines that deliver superior performance."

Two operating systems on one device

The B&R hypervisor allows multiple operating systems to run in parallel on a single device and communicate with each other via a virtual network.

B&R is introducing a hypervisor for its automation system

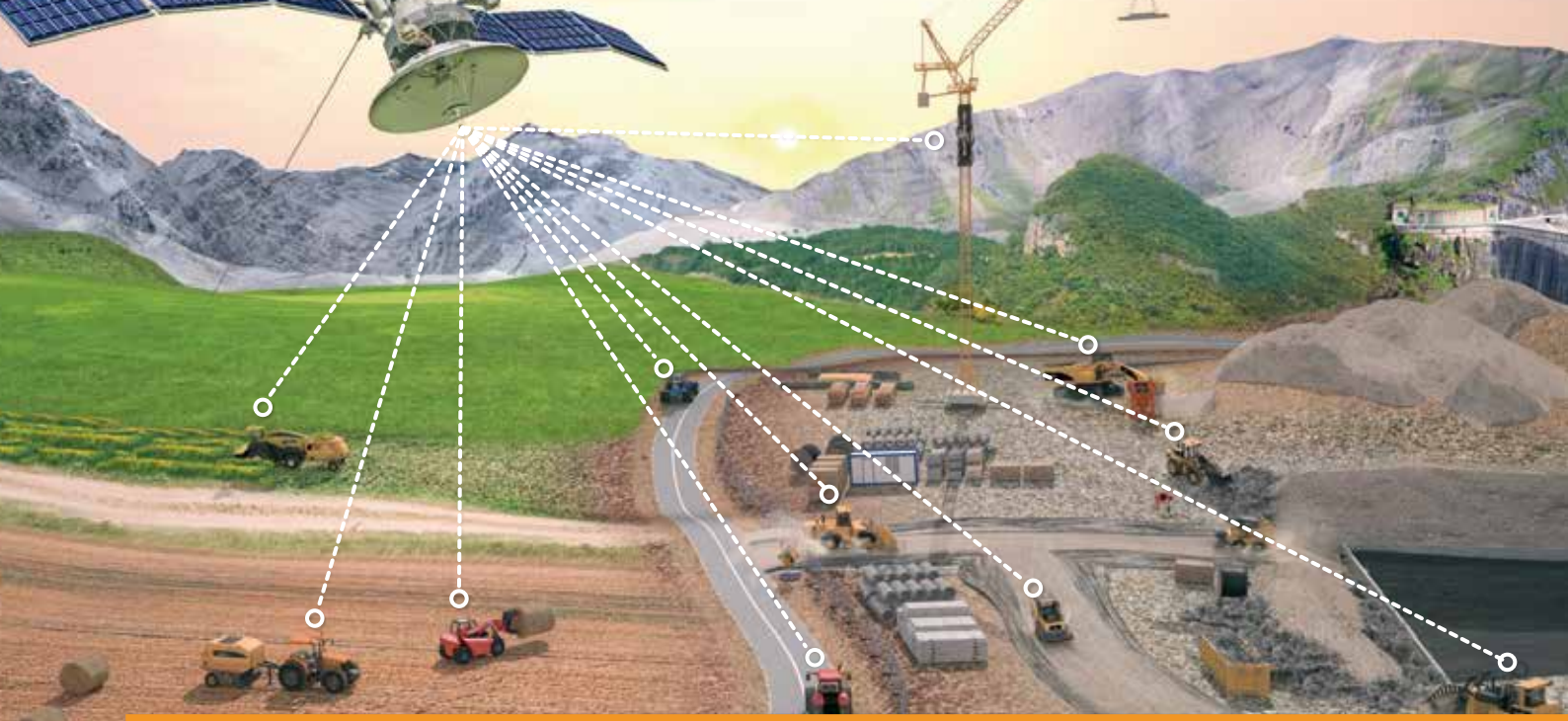
B&R is introducing a hypervisor for its automation system. This software allows Windows or Linux to run alongside B&R's own real-time operating system. That enables you to combine the control and HMI applications on a single PC, for example, or have an industrial PC double as both a real-time controller and an edge controller that sends pre-processed data to higher level systems and the cloud via OPC UA.

Virtual network

The hypervisor provides a virtual network connection that allows applications to exchange data between operating systems. Like with the usual Ethernet interface, this is done using standard network protocols. In place of a cable, there is a reserved memory area that is not assigned to either operating system.

Maximum flexibility

The user configures the hypervisor and allocates hardware resources in the B&R Automation Studio software development environment. The configurations are defined separately for each system, providing maximum flexibility in how resources are utilised. Whereas previous parallelisation solutions were tailored to a specific Windows version, B&R's hypervisor is completely independent of which operating systems are used.



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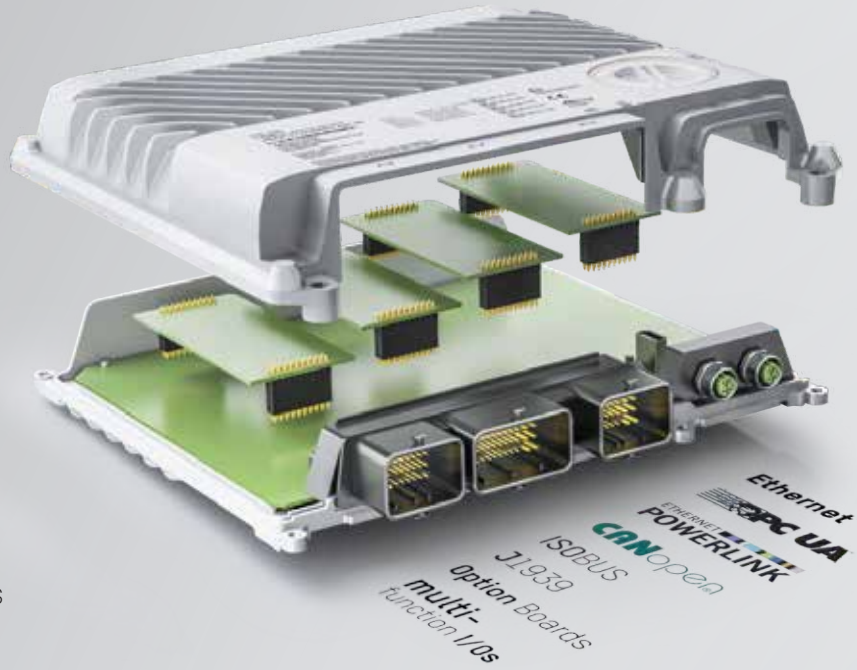

- Scalable hardware platform
- Preprogrammed software components
- 3-times faster development

ETHERNET POWERLINK
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