ASSET PERFORMANCE MODELLING

Integrating 3D models with IT & OT

Information Technology

Asset Performance Modelling

Operational Technology

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A&D - Interview
Ulrich Turck,
Former Managing Director,
Turck Automation GmbH  (p.24)
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The strides India has made in the last 15-20 years clearly indicates its potential in terms of economic competence. India has been regarded as a major industrial and trading nation at both Asian and international levels. In addition to its important role as an export country, India is also becoming one of the key sales markets in the world. And, with ‘Make in India’, the country is also of interest as a business destination for international industrial enterprises and potential investors.

In fact, as per the United Nation’s report on ‘World Economic Situation Prospects’, released recently, India’s growth rate is projected to accelerate from 6.7% in 2017 to 7.2% in 2018 and 7.4% in 2019, describing the outlook for the country as “largely positive”. Also, the Nikkei India Manufacturing Purchasing Managers’ Index (PMI), rose to a 13-month high of 52.6 in November from October’s 50.3, leading to economic expansion. Growth in output and new orders picked up to the fastest since October 2016, reportedly supported by reductions in GST rates and stronger underlying demand conditions.

At the same time, one cannot ignore the rapid technological advancements that are changing the manufacturing landscape in India. This is perfectly exemplified by what is called Industry 4.0, which is going to shape the future of manufacturing technology. This pinnacle of innovation in the physical and digital worlds, which can render real-time control over the entire value chain, is leading to a plethora of both opportunities and challenges for the entire industry. If this continues, the country is well poised to become the world’s fifth largest manufacturer by 2020. Let’s keep our fingers crossed & hope for the best!

Shekhar Jitkar
Publisher & Chief Editor
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- INTEGRATING 3D MODELS WITH IT & OT
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**mapp View.**

Web meets automation.

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It is worth pondering on how the Indian industry can cope, benefit, utilise and be competitive in the fourth industrial revolution. The first challenge, for India, is to consider what do we make of it and what approach should we adopt to face it. Now that we know that it is a rapid evolution that is underway, the best way forward is to see it as a great leveler—an opportunity to accelerate, embrace and improve the product and lives of our populace while we take our country forward.

The first two industrial revolutions happened far away from the borders of India and actually controlled our destiny from afar for 300 years. It displaced India from its long-held position from the rolls of honour of its famed industry and trade and kept it subjugated, while it desperately struggled to find its way out of contemporary disadvantage in manufacturing and trade during the colonial times. However, the third industrial revolution of electronics and digitalisation catapulted India to bring it to speed in the world economy with education, technology, information, shaping of our policies and creating the IT revolution 1.0 within India.

The third industrial revolution has already readied the canvass and shaped the sky of opportunities for India to be in the best position to benefit from the fourth industrial revolution. This may be evaluated along two principal tracks. The first is considering how it would impact the general life and people in India in a positive sense and secondly, how can the Indian industry use it to its advantage to position itself within the ever changing global jigsaw.

Let us visualise how a farmer can connect to decentralised processing plant, plan their demand and crop produce. It is also important to note how Industry 4.0 diminishes the lines of distinction between businesses and manufacturing. It creates a much bigger, integrated and transparent market and ecosystem—one from which tremendous gains may be derived.

Further, given our muscle, depth, strength and volume of participation in the global IT arena, it is quite natural that the most ready workforce and opportunity to develop technology for Industry 4.0 can well emanate from our shores. Our demography and our learning from the IT revolution 1.0 in India can well be the bedrock of further forays in this direction. However, to harvest the possible fruits as above, a colossal effort is needed in multiple directions like education, skills, IT infrastructure, etc and government and people must work together to make it happen. ☐
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ABB & Kawasaki announce collaborative robot automation cooperation

ABB and Kawasaki Heavy Industries recently announced that the companies will join forces to share knowledge and promote the benefits of collaborative robots. Under the new cooperation, which is the world’s first to focus on ‘cobots,’ both robot makers will continue manufacturing and marketing their offerings while working together on technical and awareness opportunities. This includes educating policy makers, NGOs and the public about the benefits of collaborative automation. Speaking on this, Per Vegard Nerseth, MD—Robotics, ABB, said, “Beyond the technologies behind collaborative automation, there is also a need for creating common industry approaches to safety, programming and communications.”

Airbus, Rolls Royce & Siemens team up for electric future

Airbus, Rolls Royce and Siemens have formed a partnership, which aims at developing a near-term flight demonstrator, which will be a step forward in hybrid-electric propulsion for commercial aircraft. Speaking on this, Paul Eremenko, CTO, Airbus, said, “The E-Fan X is an important step in our goal of making electric flight a reality. The lessons we learned from a history of electric flight demonstrators as well as the fruits of the E-Aircraft Systems House collaboration with Siemens, will pave the way to a hybrid single-aisle commercial aircraft that is safe, efficient, and cost-effective.” The E-Fan X hybrid-electric technology demonstrator is anticipated to fly in 2020 following a comprehensive ground test campaign, provisionally on a BAe 146 flying testbed, with one of the aircraft’s four gas turbine engines replaced by a two megawatt electric motor.

Bentley completes rollout of its application portfolio

Bentley Systems recently announced the completion of its CONNECT Edition application portfolio for design, analytical, construction, and asset performance modeling of infrastructure. The CONNECT Edition’s comprehensive modeling environment supports aligned digital workflows across applications for all project delivery disciplines, directly meeting the challenges presented from the most demanding infrastructure projects. Dustin Parkman, VP, Civil and Reality Modeling, presented CONNECT Edition digital workflows for a road project, from its conception through construction. He began by bringing engineering-ready digital context into OpenRoads ConceptStation, starting with highly precise reality meshes of the underlying terrain prepared using ContextCapture and streamed into the application through ContextShare.

Harting Group accepted UL Client Data Acceptance Program

UL, also known as Underwriters Laboratories, recently announced that it has granted the Harting Technology Group the approval and license for the Client Test Data program. Under this program, Harting is able to conduct testing in its own test laboratory and submit the data to UL in order to streamline the process for UL certification. Speaking on this, Dr. Stephan Middelkamp, Head—Quality & Technology Services, Harting Technology Group, said, “UL’s acceptance of our test laboratory into this program means that we can now license our products even more quickly for the American market and push forward efficiently with customer-specific solutions.”
Automated solution launched for turning big analog data into insights

National Instruments announced the release of the Data Management Software Suite. This enterprise software solution offers a complete workflow to standardise measurement data across teams, mine that data for useful information, transform the data through automated analysis and deliver reports with valuable insight. Elaborating further on this, Dave Wilson, VP—Platform Software, NI, said, “The amount of data being acquired to test devices, monitor physical assets and analyse product designs continues to skyrocket. The challenge with the exponential growth in the amount of data being acquired is the establishment of a repeatable and automated process to extract valuable insights.”

NORD signs an agreement with academic institute

NORD recently announced that it has signed an MOU with The Department of Mechatronics, BIT. The signatories of the MOU are P L Muthusekkar, MD, NORD India and A M Natarajan, Chief Executive, Bannari Amman Institute of Technology. This tie-up is for information sharing and providing training opportunities to students. Speaking on this, Muthusekkar said, “Our aim is to enhance student’s skills as they step out of college. NORD endeavours to create a resource for students. This will help the students to be industry-ready. In the future, the students will have the opportunity to get direct mentors from the company.”

OMRON demonstrates futuristic automation solutions

OMRON, a global leader in advanced automation, recently demonstrated an array of advanced industrial automation for the automotive manufacturing sector at the Automotive Engineering Show in Chennai. Themed around the concept of ‘Sensing & Control + Think’, the OMRON booth was a window to its all key, progressive mid-range and high-end automation solutions from its ILOR + S (Input, Logic, Output, Robotics + Safety) portfolio, which is considered to be the largest in the industry. The solutions catered to MSMEs as well as large auto manufacturing firms, who are aiming to become more productive, efficient and safe.
Schmersal India wins Award for best SME in machine safety

**Schmersal India** recently announced that it has won the award for the Best SME in machine safety at the Navabharat SME Business Excellence Award 2017 held in Mumbai. The award intends to felicitate the achievements in the SME sector to encourage and support the SMEs and offer them the platform to promote themselves in partnering for sustainable growth. Speaking on this, Sagar Bhosale, Managing Director, Schmersal India, said, “The Indian SME sector is growing at an exceptionally fast pace and has truly become the backbone of India’s GDP growth”. He further encouraged SMEs to take initiatives in implementing safety at their workplaces.

Siemens strengthens IC market commitment

**Siemens** recently announced that it has entered into an agreement to acquire Saskatoon, Canada-based Solido Design Automation Inc, a leading provider of variation-aware design and characterisation software to semiconductor companies worldwide. The acquisition of Solido further expands Mentor’s analog/mixed-signal (AMS) verification portfolio to help customers address the growing challenges of IC design and verification for automotive, communications, data-center computing, networking, mobile, and IoT applications. Speaking on this, Tony Hemmelgarn, President & CEO, Siemens PLM Software, said, “This new acquisition of Solido strengthens our presence and demonstrates our commitment to serving our customers in the IC industry.”

GE and Tata Group enter into strategic partnership

**Tata group** and GE recently announced the signing of an agreement in order to manufacture CFM International LEAP engine components in India for the global supply chain. The two companies also announced their intention to jointly pursue military engine and aircraft system opportunities for the Indian market. Elaborating on this, John L Flannery, Chairman & CEO, GE, said, “The Tata group is a leader in the Indian defence and aerospace sector and we look forward to working together to meet the growing demand for LEAP engines. Our collaboration in building innovative technologies will support the ‘Make in India’ vision of the Indian government.”

Lapp Group acquires leading companies in cable harnessing & automation

**Lapp Group** recently announced that they have acquired SKS Automaatio and SKS Connecto in Finland and Poland. Speaking on this, Andreas Lapp, Chairman, Board of Lapp Holding, said, “The acquisition of the SKS companies strengthens Lapp’s leading role in cable harnessing and our market position in North-Eastern Europe.” Also commenting on this was Matthias Lapp, CEO, Lapp—Europe, Africa, the Middle East and Latin America (LAPP EMEA), who said, “Automation and cable harnessing are important parts of our Strategy 2020. With this acquisition, we strengthen our position in automation and solutions for the benefit of Lapp and SKS customers.”
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“Connected smart factories to rise in future”

Deep Agarwal, Regional Sales Director – India, Zebra Technologies, in this interview with Suchi Adhikari, discusses the latest findings from the manufacturing survey that they recently conducted, while highlighting the future of industrial manufacturing in India. Excerpts...

What are some of the emerging trends shaping the future of industrial manufacturing?
The future of industrial manufacturing lies in Industry 4.0, fueled by real-time intelligence, which encourages growth and modernisation of the supply chain. To Zebra, it’s also synonymous with visibility to our customers. In the industrial segment, we see manufacturers looking for new ways to improve visibility and collaboration; their ERP systems should be accessible from anywhere within the enterprise. Logistics providers need to know when products will be available and warehouses must send information back to the manufacturer to ensure supply and demand fluctuations are easily met.

The ability to access information and insights gleaned from IoT and Big Data will naturally lead to actionable metrics. Key performance indicators can provide an overview of plant operations and complexities within specific manufacturing process zones can be examined. This information is invaluable to managers and it will become a hallmark of manufacturing throughout 2017.

Zebra Technologies recently unveiled a Manufacturing Vision Study. Can you highlight the key findings of the study and the biggest implications from these findings?
The global study revealed that manufacturers are adopting the Industrial Internet of Things (IIoT) to enhance visibility and improve quality. Forward-looking manufacturers are embracing a quality-minded philosophy to drive growth, throughput and profitability and only 34% expect to rate improving quality as a top concern in 2022. In addition, manual processes are expected to dramatically decline.

Finally, the adoption of voice technology and wearables will expand over the next five years. The biggest takeaway is that globalisation, intensifying competition and rising customer demand for more options and higher quality products requires a connected plant floor. Zebra’s Manufacturing Vision Study shows manufacturers will continue to adopt Industry 4.0 and smart factory as the number of organisations achieving a fully connected factory is expected to rise dramatically over the next five years. Workers will use a combination of wearables, RFID and other emerging technologies to monitor the physical processes of the plant and enable companies to make decentralised decisions. By 2022, 64% of manufacturers are expected to be fully connected compared to just 43% today.

What are some of the key industrial drivers for accelerating manufacturing investment in technology?
The key driver is visibility to support growth across operations. 63% of manufacturers cited tracking as a core focus with a blend of barcode scanning, RFID and RTLS technology, which is expected to be deployed to achieve the desired visibility.

Keeping in mind the impact of IoT in the industrial segment, what is your company’s vision for the future manufacturing plant floor?
As witnessed in the manufacturing vision study, within 3-5 years, the Internet of Things will start to become a reality. More capable robotics working alongside humans or ‘cobots’ will be in place. In addition, more sensors will be providing visibility throughout operations along with business intelligence systems to analyse and make sense of the data. Therefore, Zebra’s vision is aligned with the requirements of a connected plant floor as the number of fully connected factories rise dramatically over the next five years. Workers will use a combination of wearables, RFID and other emerging technologies to monitor the physical processes of the plant and enable companies to make decentralised decisions.

Can you brief us about your company’s future plans for the Indian market in the short and long term?
Zebra will continue to provide unprecedented visibility into our customers’ operations with innovative products that make our customers as smart and connected as the world we live in. Our company strives to provide visibility that’s visionary, which enables companies to make smart decisions more quickly and make the greatest impact for their organisations.
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Over a decade now, Indra Krishnamurthy Nooyi, the mind behind the global strategy of the food & beverage giant PepsiCo, has undoubtedly been one of the most iconic leaders in the global industrial landscape. While assessing the profound changes in the American eating and drinking habits, the current CEO of PepsiCo, powerfully asserts ‘performance with purpose’ that puts forth her leadership vision to motivate people for giving their best and replicate a holistic impact in the society.

For Nooyi, leadership has been a calling, ever since her childhood days. Over more than two decades, she has placed an undeniable stamp on the company’s performance—turning it into one of the most profitable and diverse organisation in the USA. Once dismissed as a soda and snack marketer in a health-conscious marketplace, PepsiCo has, thereon, transformed its portfolio during the superwoman’s tenure.

A Chennai-native, the lady strongly believes that leadership is a very personal trait and depends largely on one’s perspective to have a revolutionary outlook. While back in school, she was a part of the all-girls’ cricket team, and even played guitar in an all-female rock band. A revolutionist by nature, her success mantra has always revolved around developing a coping mechanism and global perspective.

Spoken about everywhere, the global giant has resolutely believed in a 5C model that has helped her become a successful leader—competence, courage, communication, confidence and compass. Additionally, she envisaged to foresee the future—a change of taste taking place, wherein the consumers were moving towards healthier lifestyles. Keeping these in mind, it was under her leadership that brought about the diversification of the company into new products within the field of packaged foods. She was also the brain behind the formation of a separate brand in 1997 for its restaurants, – Tricon. The brand is currently known as Yum! Brands which made its KFC, Pizza Hut, and Taco Bell.

Ought to keep pushing the boundaries to incorporate flawless execution, Nooyi’s success mantra sets around achieving flawless competence as the ultimate goal. She strongly recommends the need to have agile & collaborative leaders—making something out of nothing! “One needs to look for wickedly smart people,” she believes.

Speaking on the Indian context, Nooyi considers Indians to deal better with the VUCA world. Focusing on innovation instead of acquisition, PepsiCo has been debuting new product lines, targeted marketing and repackaging efforts since 2009. Recently, the company has also reserved 100 of Tesla’s new electric semi-trucks.

"JUST BECAUSE YOU ARE CEO, DON’T THINK YOU HAVE LANDED. YOU MUST CONTINUALLY INCREASE YOUR LEARNING, THE WAY YOU THINK, AND THE WAY YOU APPROACH THE ORGANISATION."

Indra Nooyi
CHAIRPERSON & CEO
PEPSICO

Megha Roy
ASSISTANT EDITOR

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It is effective to think of digital engineering information as the digital DNA for infrastructure assets – down to every nut, bolt and screw. Companies can harness the digital DNA of their assets to personalise asset maintenance for better TOTEX, maximised uptime and more. The feature discusses the role of digital engineering models for better planning & performance improvement, and how the integration of 3D models with information technology (IT) and operations technology (OT) systems are used to model asset performance.
As operations technology (OT) leverages the Industrial Internet of Things (IIoT) with sensors on operating equipment and assets producing an enormous volume of Big Data, there is a need for improved security, information sharing and data management. This, in turn, is driving an unprecedented convergence with IT. However, organisations are struggling to make use of the data from their OT and IT systems, causing them to miss opportunities to improve asset performance. This is due, in part, to the fact that the digital engineering models developed during the engineering phase of capital projects, are typically not playing a role in operations.

What if owner-operators could use these models in operations? Imagine how a digital engineering model—the engineering technology or ET of an asset—could help operations and maintenance people forecast problems, do better planning, and improve performance. It is now possible for companies to converge their IT, OT and ET—and seamlessly integrate process and information flows between them—to enable asset performance modelling to deliver actionable intelligence for decision support through an immersive environment for visual operations.

The digital engineering model

For many years, engineering departments have been using advanced modelling and simulation applications that focus on the process of design and construction of an infrastructure asset—a plant, bridge, highway, railway or utility network—in a way that improves project delivery and asset performance. Better project delivery enables companies to optimise CAPEX, through both the depth of information modelling and the breadth of information mobility for collaboration during design and construction. There’s a staggering amount of information related to assets—detailed component specifications, precise geolocation, configuration management, fabrication details, cost information, predicted lifetimes, recommended maintenance and repair information. Today’s engineering technology makes it possible to bring all of this information together within the federated digital engineering model, making it possible to track, access and share with others collaborating on the project. The technology also enables engineers to model projects in a 3D virtual setting for design integration and construction work packaging, so that when the project is actually constructed in the real world, the project teams and stakeholders are able to minimise unforeseen situations and keep the project on track.

Ideally, all of this information flows between applications and project teams for better project delivery, which is the key to better CAPEX, and flows through to operations and maintenance systems across the entire asset lifecycle, which is a key to reducing OPEX. For example, when companies can integrate the 3D models for each discipline involved in a project, it improves information mobility. Disciplines can more effectively communicate critical design details for operations, detect clashes earlier in the design phase and before construction starts, share updates during the engineering and construction phases, and hand over accurate and complete information to ensure successful start-up and ongoing operations.

The beginning of IT/ET/OT convergence

The Industrial Internet of Things (IIoT) is driving a convergence between operational technology and information
technology. Digital engineering models can accelerate this convergence and add the visual representation of the real world needed to aid decision-making; this can have far-reaching impacts on safety, productivity, efficiency and operations of industries worldwide.

For example, consider how South Australia Water is currently using predictive and real-time operational analytics to forecast water demand and improve customer service, while reducing operational costs. To create a demand-forecasting tool, they needed to pull information from both the operational and IT sides of the organisation in real time. Bentley’s predictive analytics software was chosen as the operational intelligence platform due to its real-time ability to connect and capture data from a wide variety of sources, ability to perform complicated calculations and analysis, and its impressive visualisation capabilities. Real-time monitored sensor data is brought in from the reservoirs, water treatment plants, valves, flowmeters, and pumps spread across the extensive pipeline network. This operational data is combined with climate, energy, cost, and population data and is displayed on dashboards. Bringing these data sources together has resulted in huge benefits, including improved performance, enhanced understanding of interrelationships, and better decision-making and more accurate predictions of short and long-term demand.

South Australia Water also integrated a demand optimisation tool that is used to optimise the availability and the movement of clean water around the network to demand areas quickly and efficiently. It calculates how to deliver the water by calculating costs and determining which pumping stations to use, which pumps are needed, and so on. Built-in analytics take the output of the demand forecasting tool to develop a live hydraulic model that determines water pressures and flows throughout the network. Using this digital engineering model, South Australia Water can actively optimise water supply and reliability to its customers. Customers enjoy improved water security, and response times to problems, such as broken water mains have been reduced by 90%.

Tying together IT, OT, and ET also allows the company to take advantage of lower forward market pricing for electricity. They can use an energy portfolio management spot-market power price tool to determine the optimal timing for pump operations on five pipelines, as well as when to purchase power in highly-volatile markets. The impact on OPEX can be significant with a savings of AUD 3 million per year.

Making the leap to asset performance modelling

Taking the convergence of IT, OT, and ET one step further, it’s now possible to enable real-time asset performance modelling, which ensures that assets are safe, reliable and efficient over their operating life. For example, Bentley’s asset
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performance management software enables companies to develop both operational and asset strategies for improving reliability and maintaining asset performance and predictable production. Using a common data environment (CDE), companies can collect, consolidate, and analyse data and turn it into actionable intelligence. The software also helps ensure regulatory compliance and is aligned with asset management standards, including PAS 55 and ISO 55001. At the same time, it applies leading information modelling and information management technologies to asset operations and maintenance, and when combined with information delivered at handover from projects, provides a complete lifecycle information management solution for owner-operators. This enables owner-operators to optimise processes for the day-to-day running of assets, balancing capital and operational costs and maximising production capability.

Many companies are already on their way to using these solutions, thanks to widespread adoption of condition monitoring technologies. Monitoring assets requires integration of IT and OT systems, as well as Big Data analytics to discern patterns in data and automate or recommend optimal responses to them.

To move to asset performance modelling, 3D digital engineering models across all disciplines are integrated with the IT and OT systems used for asset performance monitoring. As the operating baseline for infrastructure assets, digital engineering models bring together schematics, engineering analysis, network models, 3D models, functional components, catalogs and specifications.

It is helpful to think of digital engineering information as the digital DNA for infrastructure assets – down to every nut, bolt and screw. Just as doctors can analyse human DNA to anticipate health issues and personalise healthcare for better health outcomes, companies can harness the digital DNA of their assets to personalise asset maintenance for better TOTEX, maximised uptime and more.

For example, companies can manage the performance of their assets far more effectively when they have digital engineering models that intelligently bring together all infrastructure data. When IT and OT systems connect with this ET data, teams can view the asset performance history, see all failure alerts, geo-coordinate to the exact positioning within the infrastructure asset, and drill down into the 3D digital engineering model to determine the cause of the alarm. Then, they can refer to the manufacturer’s degradation data, access maintenance and repair data information and take corrective action – all in seconds.

Harnessing the power of continuous surveying

Having an accurate frame of reference, for example, capturing precisely-located photographs and videos and comparing these over time allows companies to bring together OT, IT and ET to support asset performance.
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modelling. New, photogrammetric surveying methods allow systems to keep these frames of reference up-to-date. For example, Bentley’s ContextCapture software is being used to turn digital photography from UAVs and close up ground shots into accurate as operated 3D models of infrastructure assets. Rather than producing a point cloud, the software generates a highly-accurate 3D reality mesh that can be brought directly into a 3D engineering environment, and geo-coordinated for precise real-world location, to design in context or compare the digital engineering model with the reality mesh highlighting differences between the digital design and the actual conditions.

The 3D reality mesh can provide the digital frame of reference aligning all IT, OT and ET data with the real world. Specific components of the reality mesh can be hyperlinked to relevant documents and schematics, historical performance data, and real-time asset monitoring dashboards. When events occur or alerts are triggered, users can navigate their assets through the 3D mesh and then drill down to related maintenance and repair manuals and more. The entire experience is immersive, highly accurate, and based on the latest data.

**Engineering in context**

These same technologies also allow designers to engineer and re-engineer in context. For example, when making the decision to repair, replace or remove, rather than starting from scratch or using an existing design model, the engineer or designer can use the continuously surveyed model of the plant or asset as the accurate, 3D representation for the decision. They can walk through the model virtually and explore the options for adding or replacing with new equipment, right in the context of the 3D reality mesh. Once the engineering is approved and construction or replacement begins, the same continuous surveying technique can continuously generate a new 3D reality mesh to track progress and finally create the new point of reference for IT, OT and ET. Everyone involved can instantly see conditions change as construction progresses and once work is complete, owner-operators can continuously monitor and model assets to assess conditions, drill down into alerts and issues, take informed action and optimise asset performance.

**Seamless integration of processes and information**

We are at an incredibly exciting convergence in the world of asset management. The ability to work in a comprehensive modelling environment, leveraging ContextCapture and 3D reality mesh technologies, and connecting with the Industrial Internet of Things through asset management and predictive analytics software, companies can converge their information technology, operational technology and engineering technology and seamlessly integrate processes and information flows between them. The next generation of engineers—digital natives—will no doubt, find ways to exploit this convergence in unprecedented ways. We can realise immediate benefits today, by using these technologies to make more informed decisions regarding when to repair, retire, or replace assets so that they are safer, more reliable, and maximally efficient over their operating life. ☐
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“India’s IT potential—a huge opportunity”

...says Ulrich Turck, Former Managing Director, Turck Automation GmbH, at the launch of the company’s competence centre at Pune recently. In an interaction with Megha Roy, he highlights the Industry 4.0 solutions that need to be rolled out in order to leverage the automation sector globally. Excerpts from the interview...

The global industrial automation services market is estimated to reach $64.46 billion by 2022, growing at a CAGR of 10.6% for the forecasted period. How do you strategise your company’s developments towards this development?

Over the last three years, we have invested a lot in new technology, processes, in-house processes as well as in improving our IT & distribution system. In terms of infrastructure, we are investing around 30 million euros that also includes the new subsidiaries in our pipeline. In addition, we are planning to concentrate more in the south-east Asian region, wherein we plan to open new subsidiaries at Malaysia and Thailand, along with South Africa.

How do today’s automation solutions address current manufacturing challenges such as operational excellence, productivity improvement, cost reduction, efficient processes, etc? Which are the areas in which you expect to see significant levels of automation in the coming years?

We offer Industry 4.0 products that enable manufacturers to improve their production to higher efficiency levels. Today, a major challenge for manufacturers is to design the production in such a manner that even a one-piece lot is possible. Everybody is talking about high-volume production. This can be better designed by Industry 4.0 solutions since they are flexible and can adapt to the parameters of products being manufactured.

It was a different picture earlier—it was quite difficult. One had to change the tools and wait to connect the machines to the new lot. However, this seems possible in the present scenario. For example, in the automotive industry, the production plant is able to meet the demands of customised configurations without much human-intervention. Also, we had a visit to some automotive companies in India and to our surprise, we came across players who have an automation degree ranging from 31% to 91%. Application for industry 4.0 becomes mostly effective, if the automation degree is high.

The worlds of industrial automation and process control are coming together as communication and security standards enable new system architectures and solutions. What is your take on this?

India is an ideal place to work on this issue. We are a provider of component knowledge and focus had been to be equipped with the required set of specifications & data sheet. But now with changing
An electrical graduate engineer, Turck started his professional career after completing his studies at the German Aerospace Center (DLR). Son of company co-founder Hans Turck, he was initially responsible for the founding of Turck overseas subsidiaries in Eastern Europe & China.

Times, we have to start concentrating into systems, where the entire automation pyramid needs to be analysed. This is a challenge for us, since we are from the hardware side and we need to join hands with the communications, so that both ends are met and we are able to provide the customer with a complete solution package.

What are the technological breakthroughs in the automation sector in the coming years, for example, Industry 4.0, Big Data, Cloud Computing, digital factory, human-robot collaboration, etc?

Last year, we have achieved higher levels in the automation parameters. We started on sensor levels, but later expanded to the IO link, Ethernet product families, multi-protocols which adopts several Ethernet technologies, adding PLCs into our programmes and the RFID family with MES software. We have rolled out our products & services to perform with the Industry 4.0 standard.

How important is the networking of different areas of industry as well as different countries so as make a globalised technology approach?

This is certainly a global approach and it’s our task now to imbibe our subsidiaries with the required knowhow, which cannot be only centered to our headquarters. We need to transfer this technology globally. As far as the Indian market is concerned, it is an important hub for the nearby countries. Joining hands with the IT knowledge of the country, India can surely become one of the strongest competence centres of the Turck Group in the future.

Although technical advance in the industry today has leveraged the automation sector to a large extent, ease of use is still an issue in the industry. In your opinion, how can such issues be addressed?

We need to majorly re-consider the lower salary costs. Flexibility of the production process needs to grow proportionately with the raise in salaries. Flexibility is essential because customers are demanding customisation, which can only be achieved with higher degrees of automation.

Given the current market scenario, what would be your recommendations for industries to invest in automation?

Moving ahead, what are your plans for the Indian market?

We have huge expectations from the Indian market. Owing to its higher levels of education and vast knowhow, India is a major contributor to our knowledge of Industry 4.0 programmes. That’s the reason we have set-up our competence centre at Pune. Moving ahead, we also wish to integrate system integration here.

Our motto is to go beyond production and move towards software. We wish to see India as one of the greatest competence centre for Industry 4.0 in the long run.

What are the areas of automation technology in which you expect to see significant level of growth on the coming years?

To witness a significant level of growth in the upcoming years, we need to focus on three aspects—machine vision, RFID technology and the cloud platform that is in connection with the control devices. India is a very exciting country for us and has a huge IT potential. Having the expertise in control devices, I am quite optimistic that with the appropriate IT and technical expertise, the Indian competence centre can make Industry 4.0 a possibility soon.
Upgrading to smarter avenues in manufacturing

Today, factory operators are looking at adopting latest technologies and becoming Industrial IoT ready to achieve global competency. However, in this endeavour, they are faced with numerous challenges—one being brownfield factories and installations when considering this upgradation and technology adoption. Keeping this in mind, B&R Industrial Automation and A&D India joined hands to organise the Factory Automation Forum that was held at Delhi and Pune. A post-event report...

Currently, in India, the majority of factories & plants are operational for decades. Automation is used extensively in these set-ups, but what is still required are the efforts to make them IIoT-ready. The amount of cost, time and risk involved in upgrading these existing equipment acts as a major deterrent in considering such upgradation. In addition, factory operators, who wish to adopt these new technologies, are also faced with a lack of clarity on possible business models and the return-on-investment (ROI) that can be expected from adopting these disruptive digital technologies.

With this in mind, B&R Industrial Automation, along with A&D India had organised the Factory Automation Forum underlining the theme of ‘Industrial IoT for brownfields’ at Delhi and Pune, recently. The conferences offered a mix of keynote address, technical presentations, panel discussions and demos, which looked at the different areas of smart manufacturing, digitisation and Industrial IoT for brownfield installation and possible cost-effective solutions. It focused on the digital transformation journey towards smart, connected devices with security, analytics and cloud solutions. Industry experts shared
their experiences & recommendations on various IIoT and Industry 4.0 topics, such as digitisation in manufacturing, technological trends and business-model transformation. The conference also highlighted implemented case studies from B&R India on the Indian factories and the journey towards IIoT.

Towards a smart endeavour…

The Delhi conference was inaugurated by Rachit Agrawal, Sales Engineer—User Sales Delhi, B&R India, who overviewed on the importance of data in an organisation that ultimately yields value. This was followed by a presentation on ‘Industrial IoT solutions for factory automation’ by Ludwig Hafner, Head—Business Development, Process & Factory Automation, B&R Austria, wherein he detailed the roadmap to make information available to the next generation. The last presentation was set by Hans Raj Bharadwaj, Sales Engineer, Process & Factory Automation, B&R India on ‘Cost-effective ways of making the existing set-ups smart’.

The highlight of the conference was a panel discussion on ‘Achieving smart factory upgradation’ that discussed the challenges & opportunities on this front. The panelists of the discussion were Ganesha Upadhyaya, General Manager & Head—Business Excellence, Hero MotoCorp; Hemant Malhotra, CEO, Manufacturing Neumann; Sushil Varshney, CEO, Academy of Industrial Management; Arun Kapur, Vice President—Operations, Uno-Minda India Ltd; Ludwig Hafner and Mukund Patil, Sales Manager, Process & Factory Automation, B&R India. The discussion was moderated by Megha Roy, Assistant Editor, A&D India Magazine.

Owing to several technological breakthroughs today, Industry 4.0 has several versions of its explanation applied across industries. When asked about its categorisation in different sectors, Varshney pointed out that in the process industry, there is a major amount of data generation, which can be further utilised in the analysis & improvement of future processes. “Industry 4.0 is certainly resulting in a lot of awareness in the industry, especially in the sensor controllers & data collection part,” he added. As per Kapur’s definition, to keep up with the technological advances, one needs to implement a simplified model with predictive maintenance that collectively defines Industry 4.0. “The analysis of this process includes identifying the pain areas and metrics that can improve the business model. However, business is not only about making money; contribution to the community is also important, e.g. assuring safety & health standards,” he explained. When asked about how can the required level be achieved, he further cited that the cycle time, safety standards, quality defect, fuel warranty, etc can only be reduced when one has a good control over parameters like cycle time, CTQ (critical to quality), safety and online compliance. “Understanding the objective and matrix of a project is fundamental. Industry 4.0 is essential but requires an interphase that improves OE, uptime, reduces defects and helps to improve the delivery performance,” he said.

Stressing on the usage of communication platforms, Upadhyaya believed that the current buzz in the industry is running an industry and understanding what needs to improve. “Communication platforms are important here. One needs to work on improving it to achieve a seamless communication that should have an intelligence of its own to take further action. Thus, smart upgradation is quintessential,” he shared. As per Malhotra, the Indian industry has been using Industry 4.0 methodology to produce better components with higher efficiency so that the costs can be reduced. “Industry 4.0 encompasses the much-required advanced systems that are a dire need in the industry,” he highlighted.

Representing the solution provider side was Patil, who explained, “To us, Industry 4.0 is more of a consultancy. It is a PDCA kind of concept wherein a proper set of awareness is required.” Adding to that, Hafner mentioned that to make Industry 4.0 a reality, one needs to have a commitment from different departments so that this technology can be embraced. “It’s not just the Internet of Things, but also the intranet of people. We can act as an enabler here,” he averred.

Becoming future-ready manufacturers

Becoming future-ready enables manufacturers to improve efficiencies, reduce costs, strengthen competitiveness and create new routes to the market. Opining on this, Malhotra said that the accessibility of data monitoring and securing data is important to become future-ready. Upadhyaya further pointed out that the current challenge is to build your own product, quality and processes. “Today, the industrial atmosphere is quite high for implementing any improvement activity. Digitalisation is happening at a rapid pace, where supporting services is what we need to take care of. Most of the times, automation fails because we do not know what to expect out of it. As such, defining our expectations is requisite,” he said.

While discussing the challenges faced in an attempt to take a leap towards Industry 4.0, Hafner pointed out that the industry needs to be more open to future technologies. “People are not clear about how to calculate the ROI. I believe if you are investing now, you need to be sure that the investment is future-ready. Also, analysing the actual state of the end user is vital. We need the right people for the right job,” he alleged.

Speaking further on the ROI aspect, Patil commented that the
ROI is largely dependent on the understanding of the processes. “After analysing the industry-need and our consumption rate, we need to identify the required band,” he shared. Moving ahead, emphasising on the safety aspect, Malhotra mentioned that only after the implementation of its application can one know about the usage and ROI of a particular project. As per Upadhyaya, one needs to select a pilot project in order to assess the ROI. “Once you want to implement a project, focus on the digital health of your company,” he suggested. Having similar thoughts, Kapur also added to the importance of a pilot-based approach. Concluding the discussion was Varshney, who highlighted the need for having an industry-ready workforce so as to embrace this breakthrough technology.

Roy summarised the discussion by identifying the pain areas of Indian manufacturers and defining the expectations from the customers’ end. She stated that it is important to recognise the objective of implementing Industry 4.0 in factories and categorising the matrixes that lead to improving operational excellence and up-time while reducing defects. This will let the Indian industry conceptualise innovative business models, which will act as a stepping stone towards undertaking the required transformation to Industry 4.0.

Taking the endeavour ahead…

On similar lines, the Pune wing of the conference was inaugurated by Sudhir Gurtu, Managing Director, Leadec India, who spoke on the Indian manufacturing sector and the ‘Make in India’ initiative of the Indian government. He emphasised that the government is trying to push manufacturers so as to take Indian manufacturing to the next level and added, “To take a leap into the next-gen manufacturing, there is a change in mindset required among the manufacturing fraternity with special focus on skilling the labour force and automating plants & factories.”

This was followed by a talk on smart factory by Ninad Deshpande, Head—Marketing, B&R India, and another presentation on ’Industrial IoT solutions for brownfields’, by Prabhat Sengar, User Sales—Pune, B&R India. In his presentation, Sengar touched upon enabling IIoT solutions for factory automation end users, and also elaborated on the offerings by B&R in this context. Next, Hafner briefed on the ‘Industrial IoT solutions for factory automation’, which was an extension of his presentation from the Delhi wing of the conference.

Focusing on brownfield developments, the conference witnessed a panel discussion on ‘Achieving smart factory upgradation’, where the panelists were Manish Kulkarni, Director, BDB; Sudhir Kalkar, GM—Technical, ACG; Nandan D Shanbhag, Manager—Production & development, Electronica; Dattatraya Navalgundkar, Chief Strategy Officer, Kirloskar Pneumatic Company, Ludwig Hafner and Mukund Patil. The session was moderated by Shekhar Jitkar, Chief Editor, A&D India Magazine.

Jitkar started the discussion by stating that with the current march towards digitalisation, the Indian manufacturing sector is going through a makeover and the industry, as a whole, needs to think of the next steps ahead in order to address the required journey of digital transformation. He also focused on the brownfield projects and the challenges that the factory managers are facing today.

Awareness of IIoT technologies

Shedding light on the level of awareness when it comes to the implementation of IIoT technologies, Navalgundkar stated, “In our survey with senior leaders across the country, we found that 68% of companies are not aware of Industry 4.0. So, the general awareness is low.” In order to overcome this, he emphasised that the Indian government is taking steps such as the ‘Make in India’ initiative, which focuses on making factories agile, competitive and cost-effective. “Also, Samarth Udyog initiative is one more approach that would support & encourage smart and advanced manufacturing practices in India,” he added.

Further elaborating on this was Kulkarni, who mentioned that 32% of the Indian manufacturing sector belongs to the automotive sector, where the awareness of IIoT technologies is high—quite similar to the food processing sector. “However, in the tier-2 and tier-3 cities, the awareness and adoption of Industry 4.0 technologies is very low,” he observed.
Upgrading to smart factory

The next part of the discussion focused on the challenges being faced by manufacturers in order to upgrade to smart factory. Speaking on this, Kalkar opined that the adoption of Industry 4.0 technologies is made easy by adopting an approach of collaboration. “Integrating the data, technology, processes and people along with their knowledge skills is key in order to seamlessly upgrade to a smart factory,” he shared. He further stressed that it is the mindset of the people that remains a challenge and not the skillset of the workforce.

On similar lines, Ludwig emphasised, “If the workforce remains resistant to these new technologies, they will lose out in the global competitive market.” Patil further shared that the awareness of these technologies is a major challenge. “When it is a top-down approach, there is a major resistance from the operations team. Thus, it is important to learn these pain points and derive solutions accordingly,” he noted. Agreeing to the change in mindset required, Navalgundkar averred, “We have many uncertainties that still remain in our factories. We can resolve this through automation and not look for cost-effectiveness in this regard. Thus, management approach has to change so as to take this forward.” Shanbhag was of a similar view as well and stated, “To effectively implement automation, mindset has to change.”

Automation in brownfield projects

Directing the discussion towards the parameters required when it comes to implementing automation in brownfield projects, Hafner highlighted, “We must start by drawing a plan and then testing, acknowledging and downloading it. It is important to have a checklist and analyse which data is important for our client. We prefer going to our customer directly to understand their target and analyse why they want the connectivity and where do they want to reach.”

Also discussing the pain points that factory managers in brownfield projects face, Patil informed, “In terms of infrastructure, they are mostly 90% ready—all the resources are automated, however, some form of island automation exists as well. Every company is aware of where they are going wrong and people are slowly opening up to having this discussion related to pain points being faced by them.”

Stressing that there is a long way to go for Indian manufacturers, especially in brownfield projects, Kulkarni opined that most manufacturers are getting confused with all the buzzwords. “There is a need for integrators to join in and provide customised solutions. The challenges being faced need to be solved through digitisation strategies. IT and OT integration and integration with ERP systems is important along with an analysis of how to utilise data effectively.”

Also discussing the expectations that OEMs have from solution providers, Kalkar shared, “We face the challenge of having access to new talent. Perhaps solution providers can start partnering with academic institutes so that they are aware of the current market technologies.” Navalgundkar also spoke on the initiatives being taken to give students a much-needed industry exposure. Shanbhag agreed to this and further suggested, “Solution providers and manufacturers have to join hands. Customers expect turnkey solutions. When customers see this benefit coming from such initiatives, it will become a mass movement.”

Enabling data security

Pointing out challenges that will be faced in securing data when automating plants, Hafner advised that programmes have to be made safer – an analysis of programming, which constitutes security at the programming level is necessary. He further stated that the interface level security is also important to be considered and it should be driven from the software suppliers’ side.

Concluding the discussion, Jitkar summarised that under the ‘Make in India’ initiative, the Indian government aims to increase the share of the manufacturing sector to the nation’s GDP to 25% by 2022. Keeping this in mind, he encouraged manufacturers to help the government achieve this target by taking action and adopting digital technologies in their factories.
With the rapid pace of digitalisation in the manufacturing arena, the need for Indian manufacturing sector to adopt smart manufacturing technologies in order to remain competitive in the global market is no longer a matter of debate. Keeping in mind this futuristic approach, the viewpoint section explores the strategies and actionable steps that can be taken by manufacturing enterprises so as to make the most of smart manufacturing technologies and become globally competitive. Excerpts...

One of the ways that the phone became ‘smart’ is when we could close the loop by getting a notification that the message got delivered and yet another notification that it was read and at what time. Similarly, smart manufacturing enables paperless manufacturing resulting in full electronic traceability, which helps increase operational visibility and manufacturing transparency.

In the aerospace industry, the ability to mature the manufacturing processes concurrent with the design is critical to achieving product cost and production ramp-up requirements. A closed loop collaboration between the production environment, production processes, people, machine and methods along with complete traceability in the shopfloor IT system enables continuous improvement of maturity of manufacturing processes. This further results in better management of capital intensive resources— a competitive differentiator to win in the market.

In manufacturing companies, the barrier to achieving real-time, closed loop collaboration is the variety of integrations, which connect disparate systems across design, manufacturing engineering and production. Look for a solution that is capable of providing a single collaborative platform for conducting design, manufacturing planning & production activities. This should be a solution, which weaves a digital thread across the product, production and performance digital twins.

Sachin Sanghi, Portfolio Development—Digital Manufacturing, Siemens PLM Software
Manufacturing models that have operated for decades now face a massive disruption. Industry 4.0, digitalisation, automation, robotics, Additive Manufacturing, IIoT, AI, 3D printing and more, are coming to the fore as present day disruptors. These new technologies combine modern manufacturing processes with the latest in higher-end computing, digital programs, data analytics, cloud-based programs, mobile and AI. There is a unique convergence of OT, IT & ET—Operations Technology, Information Technology & Engineering Technology, leading to a digital disruption.

The global economy is poised for a healthy growth over the next several years, notably in countries that show good performance including USA, China, India & select countries in Europe. MNCs are looking for reliable cost competitive suppliers in countries, which are stable and with high compliance standards. For the Indian industry, this is a wonderful opportunity to leverage the advantages that the country provides, especially in cost arbitrage. There are several countries across the world who are readying themselves to capture these opportunities, notably in Asia.

In order for Indian companies to take the lead in this race, they need to be prepared. Several action steps need to be taken in this regard. This includes cost competitiveness wherein companies must embrace lean & green missions and must aim for zero defects. They must also plan to bring about drastic improvements in these areas and achieve world-class metrics in lean & green initiatives. Additionally, setting up a global class TPM program in every company is also important. Another significant action step to be taken is people upgradation, which means upgrading people skills across many areas especially in digital, cloud computing, Additive Manufacturing & robotics sectors and achieving global training standards of 40 hours per person per annum.

Implementing digital projects is also important. This includes starting new trial projects in Industry 4.0, automation and robotics across the operations. This will build capabilities & knowledge of these new programmes & help in rapid deployment, when required. Implementing a strategy of change management and changing the culture is also important as it creates an organisational cultural ecosystem, which values and practices transformation & change management and encourages a culture of self-improvement, speed and agility. Finally, there should be more emphasis on R&D and engineering within Indian companies. Global companies invest up to 5% in R&D. Indian companies should aim to win the global business by supplying highly-engineered and superiorly designed products.

The best way to use IoT in smart manufacturing is to directly link it to increase PBT while becoming globally competitive. The only way to become globally competitive is to increase productivity and reduce costs. Using automatic and accurate data to capture the OEE of the plant can be considerably increased directly adding to an increase in productivity. At the same time, proper analysis of the data captured will also help in reducing energy costs and eliminating losses. Considering a futuristic approach, the IoT should be integrated with the ERP system including the PPC and plant maintenance. This will further help in reducing down-times and inventories.
Smart manufacturing technologies are revolutionising the way manufacturing is being done. With these technologies, humans, machines, objects and systems are connected and communicate in a dynamic, real-time, optimised and self-organised way. This creates completely novel services—constant quality control, efficient production for batch sizes of one, predictive maintenance and improved energy management. Multiple smart technologies like sensors, RFID tags, robotics, 3D printing, cloud computing, Data Analytics, etc have become relatively inexpensive and are widely used for building various smart manufacturing solutions. They are already yielding a host of benefits for the company, its associates and customers.

For a company to become globally competitive with a futuristic approach, it is imperative that smart manufacturing technologies and solutions should be used. Some of my recommendations for implementing smart manufacturing technologies include having a clear vision and objective. We must also collaborate with other companies/vendors as it is not possible to take advantage of these solutions single-handedly. A task force to conceive and implement smart manufacturing should involve both manufacturing and IT teams. Smart manufacturing needs expertise of both. It is also prudent to go for small projects, which could yield quick ROI. Looking at the total cost of ownership for a smart manufacturing solution and not just at the project cost is also key. An attractive technology could also have a longer ownership cost. I would also suggest manufacturers to go for modular, scalable & standardised solutions from competent vendors rather than point solutions. Following step-wise approach to maturity in implementing smart manufacturing technologies is also important. Maturity levels for smart manufacturing are available with competent vendors, who have experience in implementing such solutions. It is also advisable to plan using open technical standards and not go for proprietary protocols and standards. Data protection and security is another consideration that is of utmost importance and concern with these technologies. Security measures must be a part of all manufacturing systems from the start, enabling fail-safe production and protection against cyber threats.
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AeroComposit performs product development, composite component production planning, composite manufacturing, and post-sales support. The company provides complete product lifecycle support from conceptual design to serial production launch. This approach improves the reliability and quality of the final product. To reduce time-to-market, the company needed appropriate software solutions at every product lifecycle stage, including product design & engineering.

**Selecting Fibersim**

AeroComposit evaluated several software tools for composite products development. A number of pilot projects were implemented in 2010 to aid in the software selection. Based on the pilot projects’ results, the company opted for the Fibersim™ portfolio of software for composites engineering from product lifecycle management (PLM) specialist Siemens PLM Software. Fibersim is a unified environment for design, data pre-processing for engineering analysis systems, and process planning for both manual and automated composite layup operations.

Several factors led to the selection of Fibersim, including comprehensive functionality, multi-platform features, a unified digital thread from design to manufacturing and compliance with the software standards of United Aircraft Corporation (UAC).

**Partner support**

Innovation Technologies and Solutions (ITS), Siemens PLM
One of the key AeroComposit achievements is development of a production planning strategy for structural polymer composite components

Software authorised partner for composite design and manufacturing solutions, participated in the Fibersim deployment at AeroComposit as early as the pilot project launch stage. ITS has been promoting Fibersim in Russia since 2009, and also is a channel partner for NX” software, Teamcenter® software and the Tecnomatix® portfolio.

“As we launched the pilot project at the end of 2010, we invited ITS,” says Alexey Marusin, IT Director, AeroComposit. “Back then, it was the only Russian partner of Vistagy, the developer of Fibersim. We welcomed Fibersim to join the Siemens PLM Software portfolio, since with this move, our wishes for a single engineering software vendor came true,” he added.

Step-by-step deployment

Under the Fibersim pilot deployment project in 2010, experts from ITS and Siemens PLM Software, provided training to AeroComposit personnel. As the implementation moved from product design to production planning, AeroComposit’s engineers developed manufacturing information from the product definitions designed with Fibersim. The company experts received hands-on training with actual production components throughout the entire product development and engineering process.

As a result, the company became proficient in manufacturing data processing strategies for the available equipment (an automated cutter and a laser projection system for manual layup) and numerical control (NC) code development for automated layup machines. Since mastering the extensive functionality of Fibersim, AeroComposit has managed to significantly reduce development time and the number of errors. For example, Fibersim can control the layer sequence and number with a designed material definition. The designer simply selects the appropriate settings in a dialog box.

A digital thread from design to manufacturing

One of the key AeroComposit achievements is development of a production planning strategy for structural polymer composite components. The company develops design documentation and performs production planning using Fibersim. The software is used at the Moscow site and at the production sites in Kazan and Ulyanovsk, which are already making components identical to serial products.

AeroComposit is an integrated manufacturer, so an end-to-end digital thread is extremely important. To establish such a thread, all of the computer-aided design (CAD) applications have been integrated with Teamcenter project data management and collaboration tools. Since Fibersim is integrated into NX, the results are saved as NX models. “With a unified digital thread, information is transferred between stages as quickly as possible,” explains Marusin. “Everyone uses Teamcenter, and the relevant information is available at virtually every lifecycle stage online.”

This strategy has led to almost paperless processes. Some companies struggle with computer-aided systems deployment because obsolete, paper-based strategies are still in place. Such situations cause information gaps and it is often the case for composite design processes. Fibersim fills the gap, because it accommodates both the paper-based strategy as well as the new digital strategy. Since AeroComposit is a new company with no paper-based legacy, it decided to perform all the design and engineering tasks digitally using the IT systems available.

The digital process, which saves time and reduces errors, is extremely important because errors may lead to delays and defects that are very expensive due to the cost of the product components. The intuitive user interface in Fibersim also helps reduce the number of possible errors. The designer checks the proposed composite layer distribution with the integrated layer and cross-section visualisation tools. Early in
the design stage, the finished product is rendered so any possible errors can be eliminated.

Fibersim also helps in checking the product manufacturability as well as the number and sequence of layers in the design stage. These tools evaluate fabric producibility and layup options so that changes can be made as early as possible. Other functions help with the development of standard parts. For example, aircraft slats and flaps are very different; they have diverse geometry and structural strength features. Still, their layups can be standardised to make the designer’s work easier.

Product design efforts at AeroComposit have been reduced through the 3D modeling implementation and by the integration between CAD and structural analysis tools. Since Fibersim operates within the unified product development framework, the designer can specify certain manufacturing processes such as the composite layup sequence, and then exchange the layup with the structural strength analysis systems. “It saves a lot of time, since product development is iterative. The designer tries to make an optimal design with several iterations, so an ongoing and fast collaboration with analysts is required,” says Pavel Narmin, Senior Manufacturing Engineer, AeroComposit.

Making operations faster

Fibersim has also contributed to shorter production cycles. For example, Fibersim has helped eliminate several intermediate development stages used in conventional approaches to launch production and manufacture products. The software creates data that can be directly transferred to AeroComposit machines, including fabric cutters and laser projectors. All cutting and layup information is made available to the manufacturing engineer with a simple mouse-click in Fibersim. There is no need for additional software tools because Fibersim already supports a broad range of production equipment due to Siemens PLM Software’s close cooperation with equipment manufacturers.

Faster time-to-market is the crowning achievement made possible with the software’s advanced capabilities and benefits. “Our Western partners had expected that it would take us seven years to get any tangible results,” says Marusin. “We obtained these results in just three years.” Marusin emphasises that the partnership with ITS has helped a lot. ITS provided support and training at the initial project stage. The support by Siemens PLM Software has also been considerable. During the project implementation, the experts from ITS and Siemens PLM Software solved many issues related to the adaptation of the software to Russian national standards, and compatibility with the equipment available at AeroComposit. A number of the customer requests have been promptly addressed in the subsequent releases of Fibersim, enhancing the product functionality.

As AeroComposit has gained significant hands-on experience, the processes and the software are still being fine-tuned. The company has requested new functions to support unique manufacturing equipment and processes. For example, the one-of-a-kind manufacturing equipment in Ulyanovsk needs support for dry carbon automated fiber placement (AFP). For the Kazan production site where prepreg (pre-impregnated) carbon fabric cutting is performed with automated cutting machines and the layup process is manual, there is a need for a nesting and cutting optimisation feature. Narmin believes that as soon as these capabilities are implemented, Fibersim will become a perfect solution for manual and automated polymer composite layup processes.

AeroComposit plans to expand its use of Siemens PLM Software solutions. “We have gained our first experience with the MC-21 project, and will transfer it to other programs focused on reducing product development and production planning time. For this reason, we may need extra software,” says Marusin. □

Courtesy: Siemens PLM Software customer success
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Cost-effective solutions for ingredient batching, material handling & mixing

The feature discusses how automation is the key to replace manual batching processes, which ultimately make measurements more accurate, results more predictable and products more uniform across different machines, shifts, and plants. A read on...

Whether it’s making sure that grains are stored without excess moisture, weighing raw materials for chemical production or batching and mixing ingredients for baked goods, automation is the key to better results. System integrator, JA King sees the benefits of automation every day.

Founded in 1939, the company provides products and services to customers in a wide variety of fields but customers’ bottom-line needs are similar—reducing costs, improving quality and accuracy and gaining more business insight through data.

Challenges faced

Based in North Carolina and with multiple locations throughout the southeast and mid-west, JA King specialises in precision measurement in automation and process control. From truck scales to calipers and from bulk bag handling to manual parts kitting systems, the company’s expertise often leads them to customers still using manual processes.

A typical JA King customer, for example, performs batching
manually, using buttons and switches. An operator pushes a button to fill a hopper until the weight reaches a target and then releases the button. But a manual operation like this requires the operator’s full attention for an extended period of time. In addition, it’s subject to inaccuracies—variations that may affect product quality or cause raw material wastage.

The obvious answer is to engineer automated solutions to replace manual processes. With automation, operators can start a process and then move on to other tasks, measurements become more accurate and the results are more predictable, products are uniform across different machines, different shifts, and different plants, pre-programmed recipes let operators easily switch between products, more accurate raw material forecasting reduces waste and historical data provides traceability for compliance and quality analysis.

Reducing automation costs

But PLC-driven automation can be prohibitively expensive. To engineer a control system to automate ingredient batching, including material handling and mixing, JA King decided to use a more cost-effective PC-driven solution. One of their first steps was to find an automation supplier with both reliable hardware and inexpensive software drivers.

“Our introduction to Opto 22 came mainly through online research,” says Joey Spruill, Senior Software Developer, JA King. “Opto 22’s industrial Ethernet I/O is known for its quality—it just keeps on working. And their free .NET OptoMMP SDK library gives us exactly what we need for programming.”

Solution for batching projects

A typical batching solution, Spruill describes the company’s typical solution for multiple batching-type projects and states, “We use anywhere from one to three 16-slot SNAP PAC racks with SNAP PAC Ethernet I/O brains (SNAP-PAC-EB1 or SNAP-PAC-EB2), installed in a tall cabinet enclosure. Typically, one rack is dedicated to analog and digital inputs, with the other dedicated to digital outputs. All I/O connections are terminated in this cabinet using ABB terminal blocks.”
Inside the enclosure, the Ethernet I/O brains are connected to a 5-port Ethernet switch. The switch is also connected to a small PC enclosure, typically mounted in a different location than the I/O cabinet (for example, in an office). Both the I/O cabinet and PC enclosure are assembled at the main JA King facility in Whitsett, NC.

The PC, usually an Advantech fanless embedded PC, runs the custom process control and operator interface software that JA King has created. Each of the customised blending and batching systems JA King’s engineering department builds is slightly different and the engineers have built hundreds of them across many industries.

System monitoring

A touch screen connected to the PC provides an interface for local use. The I/O cabinet can also be connected to the facility network, allowing users in remote locations to run reports or monitor the system. If the PC is online, JA King engineers can also perform remote troubleshooting and install updates. This kind of solution is used in many locations for many types of batching applications.

I/O modules for measurement

Since ingredients in a process are typically measured by weight, Opto 22’s load cell input modules (SNAP-AILC) are used to read the load cell signals. Digital outputs control most material handling for belts, gates, valves, and so on. “If one of the ingredients is water or another liquid, we use meters to measure volume. This is typically done with Badger meters, whose output pulse signals per volume of material—for example, 10 pulses per gallon,” notes Spruill.

Digital input modules like the SNAP-IDC5 count these pulses using the SNAP-PAC-EB1 brain’s counting feature and then convert the count to volume in the PC software. Customers are universally pleased with the cost and time savings that JA King’s automated batching systems provide. And the company is pleased with Opto 22’s product reliability, open standards and a wide range of available I/O signal types.

Future design considerations

“Opto22 products, including the SNAP PAC controllers and I/O will continue to be a part of our design considerations for any new engineering projects, whether it’s batching, mixing, or any other type of automation,” says Spruill. “We also plan to make use of the newer REST APIs that come with SNAP PAC controllers and groove. Using REST and Node-RED, data produced by our systems can be easily integrated into larger facility collection and monitoring schemes.”

With automation, operators can start a process and then move on to other tasks.
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The paper market in France is extremely competitive. Ten different companies produce around 3.3 million tons of corrugated medium and liner paper on a total of 19 paper machines. One of those manufacturers is SAICA, a leading producer of paper-based packaging in Europe and the market leader in Spain. The packaging operations within this group procure the majority of their raw materials from their own paper factories.

SAICA’s Venizel plant, located 100km north of Paris, is where their brown corrugating medium and liner paper between 115 g/m² and 250 g/m² is produced. This paper is further processed in the group’s own corrugated paper factories as well as in those of third parties. The requirements of corrugated paper manufacturers, which paper producers must fulfill relate in particular to the paper’s ability to be machine processed without breaking while guaranteeing good product quality. “Our main objective is to be able to supply paper without any major defects such as holes, spots or edge breaks, which might be the cause of breaks in the corrugated paper machines,” emphasises Renaud Guilianelli, Mill Manager, SAICA—Venizel.

Modular technology for higher product quality

To meet these customer requirements and in order to increase in-house productivity, SAICA made the decision to
The new control system PNOZmulti 2 with up to 80% less energy consumption ...

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install an ISRA VISION web inspection system (WIS) and a web break monitoring system (WBM) in its PM4 paper machine. These prevent any further processing of defective products that might result in web breaks on the group’s own systems as well as on those of its customers.

The WIS system at SAICA consists of four IntelliCam intelligent cameras, a cabinet, a server and two quality terminals while the WBM system is comprised of nineteen IntelliCams, a junction box, two camera boxes, a server PC and two process terminals. The cameras are distributed along the entire system and can, therefore, monitor every critical processing step. The cameras provide crystal clear images and detect even the smallest irregularities at maximum production speeds. As a result of the perfect camera synchronisation and the precise online video information, an analysis of the root causes for defects can be run in mere seconds.

The WBM system monitors production across the entire width of the 5-m web at high speeds of 800 m/min. “The WBM IntelliCams are exactly the right tools for paper manufacturers, giving them the capability to identify defective areas that might cause problems in the paper machine,” continues Guilianelli. Coupling with the WIS, the WBM becomes a powerful root cause analyser to prevent breaks. “This year, we succeeded in significantly reducing the basic weight while increasing our productivity,” he added.

Guaranteeing perfect image quality

The special features of the IntelliCam are the high-resolution camera and the LED lights providing extremely bright 800 W strobe lighting, integrated in a rugged high protection category enclosure. The IntelliCam provides for a customised and easy installation anywhere on the paper machine. An automated wiper or brush cleaning system integrated in the IntelliCam guarantees consistently perfect image quality and reduces the cost of maintenance to a minimum. In addition, the intelligent cameras are equipped with a cooling system that allows them to be installed in outside temperatures of up to 110°C.

Two easy-to-operate software solutions are installed, which can be used on two extended monitors at the same time. The modular characteristic of the WIS and WBM system makes it possible to easily integrate additional IntelliCams at a later time. The paper manufacturer’s own trained staff performs the maintenance tasks and a VPN connection allows for remote access to the system so that more complicated maintenance tasks can be performed by ISRA off-site.

Preventing, not reacting

With the ISRA VISION WBM system, SAICA is able to significantly reduce the number of breaks due to the system’s ability to warn of the risk of any breaks automatically, in a targeted manner and at an early stage. This minimises the number of times the system is at a standstill, thus reducing the cost of production losses. “The WIS-WBM system ensures that we are able to increase our productivity and improve quality,” concludes Guilianelli. In his opinion, there are “clear objective arguments for the necessity of this investment”.

For his machine, the mill manager is forecasting an annual production of 250,000 tonnes, meaning that the WIS-WBM system will have amortised within a mere eighteen months, based on the conservative assumption that the number of breaks is reduced by at least 20 per cent. “Depending on the detected defect type, we have significantly optimised our cleaning time and frequency. Consequently, the number of web breaks has been reduced and our machine runnability improved considerably,” confirms a process engineer. ☐

Courtesy: ISRA Vision
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It seals in heat and keeps out the cold—insulating glass is playing an increasingly vital role in construction. A company in the northern black forest has been tasked with building the machines which will, in turn, be used to manufacture insulating glass. They are currently home to the world’s largest insulating glass production line.

Hidden champion - the term could hardly be more fitting. Tucked away at the edge of the forest opposite a paddock, nobody would expect to find a company with these credentials here. The Oscar Niemeyer Tower in Rio, the O2 World arena in Berlin and the Shanghai Tower all have one thing in common— their insulating glass was made using Bystronic Glass Machines. “There’s even a bit of Bystronic glass in the world’s tallest building – the Burj Khalifa in Dubai,” explained Peter Nischwitz, corporate communications, Bystronic.

An application story on how Lapp Group’s energy chain assemblies has helped Bystronic Glass Machines to generate a vast potential for savings in their operations

Architectural glass is the core competence here at the Neuhausen-Hamberg site, where they manufacture massive machines that make insulating glass. There is a growing demand for it around the world, with increasing emphasis on energy efficiency and soundproofing. “Our machines that turn glass into insulating glass are popular in places where energy

Emphasising on energy efficiency
efficiency guidelines are given high priority,” said Nischwitz.

This success is no accident – it is the result of constant improvement. For example, through the use of ready-made ÖLFLEX® CONNECT energy chain assemblies by Lapp. “Stripping cables, removing the insulation from single cores, assembling connectors and installing them in drag chains – we used to do all of this ourselves in-house,” recounted Thorsten Meier, Process Planner, Bystronic Glass Machines. “As Lapp supplies ready-made assemblies, we can reduce our lead times from eight hours to one.” After all, this is what optimisation is all about—everybody doing what they do best. As an expert in cabling solutions, Lapp takes care of the energy chains. And the electricians at Bystronic spend the time they have saved focusing on other value-adding tasks. “We were able to reduce the assembly times and the logistical complexity as Lapp supplies the chains to us just in time,” he added.

The Bystronic Glass Group consists of three technology centres with a total of 465 staff in Switzerland, China and Germany. Machines and systems for manufacturing insulating glass have been made here in Neuhausen-Hamberg and shipped worldwide for more than 50 years.

A triumph for insulating glass

Logic dictates that you can manufacture the largest insulating glass panels in the world on the world’s largest production line at Bystronic Glass. They are 18 metres in length. That is roughly the height of the Brandenburg Gate in Berlin.

World’s largest production line

A typical insulating glass production line is between 50 and 70 metres long. But here in Neuhausen-Hamberg, they are building on a new maximum: the world’s largest insulating glass production line with a record length of 160 metres for 18 by 3 metre panels.

Two engineers sit with a laptop in the assembly hall. It looks like a scene from space travel rather than mechanical engineering in an SME. The entire system is a customised construction. Meier explained, “We needed to split it into three sections. The first two are located on the customer’s premises.”

At Bystronic Glass they go big, but they also get things done quickly. “If the customer manufactures many similar glass panels, the number of cycles is key,” said Meier. They also have the right equipment for this here – a machine capable of manufacturing between 800 and 1200 insulating glass units per shift.

A partner for progress

Bystronic Glass and Lapp have been working together for a long time, but they stepped up their collaboration in 2011. “That’s when we started using Lapp’s energy chain assemblies,” recalled Meier. More than 100 energy chains by Lapp have been built into the machines and have generated a vast potential for savings ever since. As such, there are plans to use more ÖLFLEX® CONNECT energy chains.

Meier has also been working on another improvement with Lapp Sales Engineer Bianca Feistel—a cable warehouse with 50 cable drums instead of the current 88. The warehouse could be downsized through Lapp’s Kanban system for the drums – once a cable drum is almost empty, an employee scans a code using a scanner provided by Lapp to trigger the replenishment. “We were so impressed by Lapp’s overall performance and know-how,” said Meier. No wonder, helping customers to optimise their processes is what Lapp does best. ☐

Courtesy: Lapp Group
Avoiding a case of mistaken identity

Sensors and diagnostics systems are growing increasingly common – and while this is opening up the ability to save cost by monitoring & optimising operations, a side effect is that wiring installations are becoming more complex. The article explains how to select the best identification marker for a specific job and how to ensure markers remain in place and readable for as long as they’re needed.

Each additional sensor requires additional cabling and terminations and if not labelled properly, identifying these could have major repercussions during the life of equipment. During its life, a typical asset will experience many maintenance inspections, repairs, refurbishments or refits. Every time these happen, it’s vital that maintenance technicians can identify the right cables and terminations quickly and efficiently.

Without adequate identification, a technician could spend many additional hours tracing cables individually to find and resolve faults. Because of this, labels and markers can be worth their weight in gold over the years – with the time saved being worth significantly more than the initial cost of purchase.

Remaining in place & readable

Their long-term staying power and legibility is how identification markers demonstrate their value. While they may seem very straightforward, a great deal of materials science has gone into the development of identification systems.

Most importantly, they must be able to withstand their operating environment. Depending on the application, this may include extreme temperatures, full sun exposure, aggressive fluids such as solvents, lubricants or fuel, mechanical wear, moisture, or a combination of these. With a huge number of potential applications, it’s no wonder that there are so many
identification products and solutions on the market. Each one is
suited to a different type of application and to meet the priorities
of operators. Identification products take the form of labels,
heat-shrinkable sleeves, markers and stickers that identify
cables, terminations and terminal equipment.

When buying identification markers, the only objective is to
ensure that they will remain in place and legible for as long as
required. The first thing to look for is an identification system
that meets the standards of the application where it will be
installed and the conditions that may be encountered. Specific
products are available that meet the conditions found in defence,
marine, aviation, electronics and general electrical installations.

One example from electronics is a type of label for printed
circuit boards. Made of polymide, it can be printed with bar
codes and once in place, remains in place in spite of proximity
to soldering operations.

System approach

Before examining the pros and cons of different types of
identification markers, it’s important to remember that manufacturers can only guarantee performance of
identification markers when they have been developed as systems rather than products. This eliminates variations between batches and
leads to consistent identification markers that will be dependable,
readable and firmly attached when they are needed.

Wire and cable identification

When identifying wire and cable installations, project size
and complexity should influence the type of label selected. For
example, for a one-off or low volume cabling project, pre-
printed snap-on or slip-on markers may be the best option.
These are purchased as individual letters that can be combined
into alphanumeric codes.

As complexity grows, the size of each installation or the
number of products may increase. At this point, installers may
need to introduce longer alphanumeric codes, sequential
numbering and bar codes. These justify investment in a
printable system that is compatible with a more automated
approach. For example, this can enable the installer to download
identification codes or numbers from a CAD (computer aided
drawing) system and print off reading for installation.

For this type of more complex wire and cable installation,
some installers prefer to use markers in the form of flagging
labels. These stand out and are easy for maintenance technicians
to sort and search through for the right connection. Other
installers prefer self-laminating wrap-around labels, which lie flat
against the cable and have a neat and tidy appearance.

The most durable identification markers tend to be heat-
shrinkable sleeves that are based on cross-linked polyethylene
materials that were originally developed by the Raychem brand in
the 1950s. These can survive long exposure to extremely harsh
conditions, such as those experienced in the marine, aviation and
railway industries. Some examples of this type of marker are still
intact and legible today even after decades in operation.
Labelling terminations and cabinets

Meanwhile, printable flat labels are often used to identify terminations, buttons and connections in electrical cabinets, as well as equipment. Many different varieties are available to suit different industries and environments and installers should choose carefully to ensure the label and its adhesive meet the demands of the application and the industry.

While the label material itself is important, it is key to remember because identification markers follow a system approach, the adhesive is just as important as the label material. This is particularly important for powder coated cabinets. Powder coating creates an attractive and protective finish that protects the underlying steel cabinet from moisture and chemicals. However, powder coating is resistant to adhesives. It has a low surface tension, which is a measure of how well adhesives stick to a surface.

Therefore, installers who need to apply labels to electrical cabinets or other powder coated assets should always look for labels that are suited to this type of surface. One example is a new type of panel label that TE Connectivity is preparing to launch in early 2018.

New developments in identification

That is one example of a new development in identification but there are others. Manufacturers often introduce new products that have potential to save time and cost – therefore it’s worth taking a fresh look at what’s available.

For example, in 2015 TE extended its range of heat-shrink sleeves for wire and cable identification with a new product called ZHD-SCE. TE recognised a demand for markers with Low Fire Hazard (LFH) performance as well as resistance to fluids such as diesel, oils and solvents. The new marker is now being adopted in the defense, marine and rail industries, where safety and resistance to fluids are paramount, for example, on electrical installations close to diesel engines.

Other current developments under investigation by materials scientists include enhancing the performance of existing labels. For example, a new type of polymer-based label can be used as an alternative to engraved metal plates that have traditionally been used in aviation and other industries. By switching from engraved plates to the new labels, manufacturers can save time that would have been needed to produce the plates, as well as attach and varnish them.

Another new development is possible due to modern digital printing techniques. It’s now possible to create highly customised markers that optimise the time of specialist technicians, letting them focus on manufacturing rather than printing labels. While identification can range from simple to sophisticated, we’re taking a fresh approach with a new catalogue based on the three approaches that buyers take when searching for identification products. Markers are listed by types such as tags, pre-printed markers, printable tubes, printer hardware, software or accessories such as ribbons and reel holders.

They are also listed by industry to be as convenient as possible for those who are looking to meet the standards and specifications of a certain industry. The third and final way they are listed is by part number, allowing buyers who know their part number already to dive straight and find the right size, colour and quantity of markers that they need to complete their job.
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Lights-out factories are becoming more common, collaborative robots are growing in third-shift operations, mould-makers are designing factory floors for lights-out operations, fully functioning without human supervision. The prospect of making parts overnight with little or no labour cost is tempting to any machine shop. Competition is fierce and customers demand better parts and products to be available precisely when needed at the lowest possible price.

Meanwhile, the cost of materials, utilities, labour and employee benefits continue to spiral upward. The idea that a manufacturer can turn off the lights and go home every night while unattended mechanical minions crank out parts is an enticing idea.

Lights-out production: A highly optimised process

Manufacturers today are looking to cut down costs while ensuring continuous production. The article discusses the advantages of lights-out production that can be adopted in any factory. A read on…

Embodying on lights-out production

Modern technology makes it feasible to quickly implement lights-out production not just for large manufacturing operations but also for small CNC shops. There are a number of considerations to be noted before embarking on lights-out efforts. The big picture objective of lights-out is to reduce labour costs but there are other potential savings as well. Planning long, overnight runs for the night shift allows a shop’s fully manned machine time to increase flexibility. More short-runs that require intervention for change-overs, work monitoring of more complicated parts and the ability to respond to a customer’s urgent order can be accomplished during the day shift.
Machine operator’s time is more efficiently used by setting up for overnight production while daytime runs are in progress. Additionally, power companies often charge less for energy used during off hours so that it may cost less to operate machinery during lights-out production.

Ensuring continuous & stable operations

The reliability of equipment in lights-out manufacturing becomes a pivotal consideration. No personnel will be on-site to address machinery malfunctions and automation equipment must operate flawlessly. Machine tools must be capable of continuous operation and must be highly stable.

Fulfillment requirements in the automated mould-making environment are characterised by high-speed conveyors in a lights-out operation. Running overnight unmanned shifts can improve productivity, throughput and on-time customer-driven delivery requirements. Delivering speed and accuracy in a complex mould-making environment is proving cost-effective because the reduction in labour generates a very rapid ROI (return-on-investment); even the conveyor solutions are custom-built or ETO (engineer-to-ordered) are easily cost-justified.

Rapid, error-free manufacturing

The advent of lights-out facilities is bringing rapid, error-free manufacturing, mould-making and fulfillment operations. Athena Automation, based in Vaugh, Ontario, set up a demonstration site for unattended PET (polyethylene terephthalate) preform production. This system highlights the research, consulting and industrial design services offered to customers.

PET lights-out development projects have important characteristics including auto start-up and shut-down, cycle completion, emergency shutdown and a goal of mold change in less than one hour with split gate technology. Lights-out capability with automatic product handling reduces total cost of ownership (TCO) while maintaining the highest up-time, reduced maintenance and reduced energy consumption. According to Aron Szasz Gábor, Athena Automation, “Developing streamlined factory automation and production processes drives the leanest industrial design services for factory optimisation.”

Optimising processes

A fast, service-friendly system for moulds with up to 96 cavities improves output-per-capital through energy efficiency and an optimised process. The PET preform moulding machines
incorporate two-stage injection units with screw and plunger diameters from 85 to 140 mm. Reciprocating screw injection is available for lab or testing applications, all lights-out.

Post-mould cooling is useful with up to six cooling cycles in water-cooled tubes, an internal preform cooling on transfer pin, energy consumption of 0.21 kWh/kg (machine), 50% lower water consumption, flow-balanced water circuit for better cooling and preform exit temperature monitoring. The take-out robot and transfer station slide out of the way to allow ample mould access and provide space for post-mold tooling change.

Set up for a local blow molder this year at Athena’s plant, the demonstration site boasted of a 150-tonne PET machine that has a P85/E85 injection unit and features auto startup and shutdown. The setup also had HMI-integrated auxiliary equipment, including a dehumidifier and resin dryer as well as a special system to handle preforms as they are made.

Speeding up the process

A conveyor, custom-built by Alfacon Solutions, carries the empty bulk containers to the machine, then moves them on once full. Currently, the containers of finished preforms are removed by forklift but according to Gabor, “The system has a 10-hour bulk container buffer, allowing fully unattended operation. The goal is to extend that time by using automated guided vehicles.” Mold changes are handled by technicians. The moulds incorporate split-gate technology, which allows the cavity plate to be removed before the hot runner has completely cooled. Gabor adds that the target is a mold changeover time of less than an hour.

Alfacon Solutions also implemented an auto-zone conveyor system, autonomously moving bulk containers from empty zones to fill zones and on to full zones. Each zone is a robust chain driven conveyor driven by a single MDR (Motorised Driven Roller). The run-on demand design of the MDR will allow these driven rollers to ‘conserve’ and extend their life cycle. The final consideration in the selection of the 24-volt DC MDR design was its ease of deployment. By a simple change of the control mounted main power supply, the system can be deployed anywhere in the world.

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☐ 12. Reliability, Evaluation, Services
☐ 13. Energy & Environment Technology
☐ 14. Facility Management
☐ 15. Sales, Marketing
☐ 16. Purchasing
☐ 17. Warehouse, Transportation, Logistics
☐ 18. Consulting / Advisory
☐ 19. Education
☐ 20. Other

3. Select the one industry which best describes your company’s primary business activity (select only one)

☐ 01. Industrial Machinery
☐ 02. Electrical & Electronics equipment
☐ 03. Communication & Information Technology
☐ 04. Power & Energy
☐ 05. Automotive Manufacturing
☐ 06. Steel / Metal
☐ 07. Optics & Precision Mechanics
☐ 08. Chemical & Pharmaceutical Industry
☐ 09. Bio- & Environmental Technology
☐ 10. Mining, Oil, Gas
☐ 11. Wood, Paper, Printing
☐ 12. Food & Beverage
☐ 13. Textile, Leather
☐ 14. Building Automation
☐ 15. Technical Consulting, Engg. & related services
☐ 17. Plastics & Polymers
☐ 18. Construction
☐ 19. University, Education
☐ 20. Other

4. What is the approximate number of employees in your company? (select only one)

☐ 1 to 9
☐ 10 to 19
☐ 20 to 49
☐ 50 to 99
☐ 100 to 199
☐ 200 to 499
☐ 500 to 999
☐ 1,000 to 2,999
☐ 3,000 & more

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Enabling ‘Future Faster’ technology

With the aim to enable its customers to adapt ‘Future Faster’ technology, National Instruments showcased its latest industrial trends and discussed the future of machine learning applications, wireless technology, Industrial Internet of Things (IIoT), vehicle electrification and Breaking Moore’s Law, during the recently-concluded NIDays 2017 at Bengaluru. A post-event report...

NI, the provider of systems that enable engineers and scientists to solve the world’s greatest engineering challenges, recently hosted the 14th edition of NIDays – an annual conference on graphical system design – at Bangalore. NIDays offered 22 technical & academic track sessions and tutorials along with a wide range of products and application demonstrations. Speakers and exhibitors from automated test domain joined the event too. The diverse set of panelists shared their experiences and best practices in the areas of processes, management and technology that address the challenges and opportunities for future systems.  

Highlighting the innovations witnessed at the event, Jayaram Pillai, Managing Director – IndRAA, National Instruments, said, “Over the years, we have partnered with local and global experts in our alliance program, constantly striving to innovate and evolve with every challenge and opportunity that comes our way. With technology growing sooner that predicted, it is inspiring to see all the future-ready innovation and products at this year’s NIDays.”

NI Trend Watch 2018

Presented at NIDays, NI’s Trend Watch 2018 examined the technological advances propelling towards a future faster than ever before along with some of the biggest challenges engineers face looking ahead to 2018. Five key topics were explored –

• Machine Learning – This explores the development of intelligent nodes across manufacturing machines, test
systems and industrial assets that will provide the data needed to make better operational decisions

- **Industrial Internet of Things (IIoT)** – This predicts that Industries will have to adopt IIoT to maximise uptime, optimise performance, and drive product & process innovation.
- **5G** – This signifies a generational transformation that will provide untethered experience with much faster data, shorter network response times (lower latency), instant access anywhere and everywhere, and the capacity for billions of devices.
- **Vehicles electrification** – This discusses the reliance on power electronics and electric motor drives that adds complexity to control systems.
- **Breaking Moore’s Law** – With this, industries will demonstrate challenges with an innovation in alternative architectures seemingly ending processing advancements.

Commenting on the need for future faster technology during the event, Shelley Gretlein, Vice President, – Corporate Marketing, National Instruments, said, “As we are racing through the 21st century, where technological progression is faster than ever before, the demand for faster and smarter applications is essential. We help our customers to keep up with the pace by providing industry trends impacting the industry along with actionable insights. Our open, software-centric platform aids in developing cutting-edge innovative solutions in areas such as machine learning applications, wireless technology, Industrial Internet of Things (IIoT) and transportation. Now we can truly be prepared for our future.”

New product launches

The new range of products presented at the event includes LabVIEW NXG 1.0, bridging the gap between configuration-based software and custom programming languages, Vehicle Radar Test System (VRTS) delivering object simulation and radar measurement capabilities for engineers testing autonomous driving technology, and ATE Core Configurations, which supply core mechanical, power and safety infrastructure to help users accelerate the design and build of automated test systems in industries ranging from semiconductor and consumer electronics to aerospace and automotive.

**LabVIEW NXG 1.0**: At the seminar, NI India discussed the next generation of LabVIEW software, LabVIEW NXG 1.0, that gets faster engineering insights with instant hardware discovery, integrated data analysis, and interactive data exploration tools. The attendees got to experience both LabVIEW NXG 1.0 and LabVIEW 2017 with Applications Engineering and R&D experts from NI.

**ATE Core Configurations**: It helps simplify the design, procurement, assembly, and deployment of smarter test systems at a lower cost and shorter time to market by empowering test organizations with a platform for standardization. These 19-in., rack-based configurations are available in various rack-unit heights, and offer scalable power profiles to match the needs of nearly any application and geography. Test organisations can benefit from highly integrated safety features such as thermal shutoff, emergency power off (EPO), optional uninterruptible power supplies and IEC 61010 certification.

**Vehicle Radar Test System (VRTS)**: NI improves safety and reliability test for adas and autonomous vehicles with the introduction of VRTS. Engineers can use the VRTS to test 76–81 GHz radar technology from the R&D lab through high-volume production test and from individual radar sensors to integrated advanced driver assistance systems (ADAS). The VRTS is available through select NI Alliance Partners who provide advanced system integration and support. The VRTS combines NI’s mmWave front end technology, a PXI Vector Signal Transceiver (VST) and application-specific software.

The event was attended by over 700 engineers, scientists, and experts from industry and academia who discussed the trends, opportunities and challenges that will enable the future technology to grow faster. ☐
NIDays 2017 witnessed the launch of LabVIEW 2017 and LabVIEW NXG 1.0? What is the difference between them? What is the objective of bringing in LabVIEW NXG 1.0? Gretlein: Theoretically, there is no difference between LabVIEW 2017 and LabVIEW NXG 1.0. Both are graphical programming language. We want to give our customers latest capabilities like cloud services, modern editor interactions, vector-based graphics and built-in web technologies. Since, it was a very challenging task for our developers to build these capabilities on the old environment, we started building it in a new development environment, based on the latest generation of tools. LabVIEW NXG is the next generation of LabVIEW, but the 1.0 release contains only a subset of features and hardware support currently available in LabVIEW 2017. From the user perspective, they can work on both the versions side-by-side that share the same compiler engine. We will be maintaining both the versions with regular updates so that we don’t want to force any of our customers to use the next gen version and also we don’t want any of our customers to leave behind in technological advancement.

Can you highlight some of the recent application usages of NI’s platform in the automotive and process industry in India? Pillai: Infotainment system is changing in the automotive industry in recent years. It has become the centre of vehicle with features like touchscreen, apps, television broadcast, radio station, etc. These systems can be developed in a lab or resource centre complying to different standards from different countries. While developing you need to have signals that are coming into this system that simulates the conditions in which they operate. In India, we are helping the companies, who are actively involved in the development of infotainment system.

In the process automation industry, we are bringing automation to measurements. Our platform can measure and also automate the measurements. Machine vision is a good example wherein it takes the picture, analyse it and at some point of time it checks and automate the process.

How has been the growth and progress of your partner ecosystem in India and globally? Gretlein: We serve 35000 customers globally; out of these customers, 53% of certified users are our partners. We measure the strength of our partner ecosystem in terms of the quality and not in terms of the numbers.

Pillai: We identify our partners based on their competency, proficiency in using our tools and their expertise in respective domain like aerospace, defence, automotive, etc. In India, currently there are about 26 partners. Our NI Alliance programme is the well-managed partner programme particularly in the test & measurement industry.
Underlining the theme of IIoT from the industrial automation perspective, the one-day conference, that detailed on the automation scenario of the industry was kick-started with the inaugural lamp lighting ceremony by Sujata Tilak, President, ISA Pune Section; Markus Bochynek, Executive Board (Vorstand), VP, Sales & Marketing, Aucotec AG; Rajeev Jorapur, VP, MIS, Bajaj Auto Ltd & Member of Leaders Excellence; Somnath Chakraborty, Director, Siemens Industry Software. This was followed a welcome address and introduction of ISA Pune Section by Tilak.

The digital journey

The opening session on the conference comprised of three keynote addresses stressing on the digital transformation journey from the global, end-user and solution provider’s perspective. Bochynek presented the opening keynote on the topic ‘Industry 4.0: Global perspective,’ highlighting the power of Big Data, the value of Digital Twin, the challenges to be addressed during the digital transformation journey and the required change in mindset for embracing such transformation. According to Bochynek,

Industrial IoT – The automation perspective

Every industry is getting ready for the fourth stage of revolution since Internet of Things (IoT) is reshaping the way businesses are done. So, what about the readiness in industrial automation sector wherein already a billion connected devices are deployed? Exploring more on this, ISA Pune Section recently organised a day-long conference on “Industrial IoT – The Automation Perspective” at Pune. A post event report...
Industry 4.0 creates what has been called a ‘smart factory’. Within the modular structured smart factories, cyber-physical systems monitor physical processes, create a virtual copy of the physical world and make decentralised decisions. He also briefed the role of his company, Aucotec in Industry 4.0 and noted the criteria for appropriate engineering platform for a doable step-by-step transformation towards industry 4.0.

The second keynote was given by Jorapur on ‘Digital transformation in Indian manufacturing sector’ underlining the end-user’s perspective. During his presentation, he cited an example comparing the classical musical show to traditional manufacturing, and broadway show to new-age manufacturing to bring out the opinion that a transformation from classic musical show (two artists performing with the same sync) to broadway show (1000 artists performing with the same sync) needs flexibility, adaptability and the need to maintaining the same quality while scaling it up. “The same applies to manufacturing”, he said. He further elaborated three principles that can be followed to achieve this journey of transformation – Less is more, connect with the core and whole > sum of parts.

Nikhil Kelkar, Sr Director, Siemens Industry Software, presented the third keynote on ‘Digital transformation, a solution providers perspective’ while emphasising the company’s way of looking into Industry 4.0. He stressed the importance of creating a powerful digital twin of the entire value chain from product design, production planning, services to production execution, wherein in the services domain, Siemens’ open cloud based system called Mindsphere collects data from everywhere and formulates one integrated data model.

The great expectations!!

The second session of the conference began with a panel discussion on the topic ‘The great expectations’ with three panelists namely Rajendra Ghaisas, Sr VP, Sigma Electric; Ravindra Deshmukh, Head—Manufacturing IT, Volkswagen; and Sachin Kotasthane, Senior Architect, IT Strategy and Manufacturing Solutions, Tata Motors, represented the end-user segment and three panelists namely Hitendra Uppal, Director, San Telequip; Vishal Pansare, Business Manager, Logicon Techno Solutions; and Sujata Tilak, MD, Ascent Intellimation, represented the solution providers’ end, while Tilak moderated the discussion along with giving her opinions on fulfilling the expectations from end users. The discussion gave an overview of expectations of the manufacturing industry from the IIoT solutions and how solution providers fulfil the expectations. Also discussed were the challenges on both sides and how to go achieve a win-win scenario.

Speaking on the challenges faced and representing the end user segment, Ghaisas mentioned that his company has machines from different brands with a different set of controllers built in them. So, he asked the solution providers if they could provide a standard solution to connect the different set of machines. He was of the opinion that solution providers should run a pilot IIoT project without worrying about ROI and make it a success by ensuring they are able to get all the data without losing any of it. Deshmukh emphasised that his company wants to implement IIoT in key areas, such as data acquisition, mobility, operation, traceability and maintenance, and noted that they are looking for a standardised approach for implementation. On similar lines, Kotasthane mentioned that his company is also looking for a structured approach, viable business case and a solution that pays for itself.

Fulfilling the expectations of end users, Uppal opined about the methods of implementing IIoT by defining the pain areas, getting data related to it and finally act on it. He mentioned that lots of skill sets need to be acquired and lastly, some amount of financial investment and planning is also needed. He was of the
opinion that end users should be willing for experiments, while implementing IIoT. Pansare highlighted that IIoT needs proper network connectivity. While addressing the challenges faced by end users, he mentioned that the end users’ requirements and their overall approach should be clear to the solution providers when they are seeking for an IIoT implementation. Agreeing on the same, Tilak mentioned that working with the customers, adapting to their needs and making them our partner is the key to achieve success. Moving forward, she concluded the discussion that champions have to emerge from the end users’ side, who have the mind-set to invest and promote the benefits of new-age technologies like IoT among their peers.

The panel discussion was followed by a presentation on ‘Doing IIoT the right way’ by Amol Mate, VP – Industrial Business Unit, Altizon Systems. Mate discussed on how to execute IIoT projects the right way—from choosing right use cases to bringing stakeholders on board and from implementation challenges to best practices to achieve the desired business outcome. The next session had two presentations on ‘IIoT in action’ case studies with Asset Care reference from Dinesh R, Associate Manager—Instrumentation, Amway, and a brownfield reference from Aditya Wagh, Sr Manager, Ascent Intellimation.

Importance of cyber security in IIoT

Giving a presentation on major risks related to IIoT was Neeraj Agrawal, Associate Director, Nuclear Power Corporation India, who focused on the importance of cyber security in IIoT. He mentioned about three major IIoT risks – security, privacy and trust. “We should always understand what technology is being utilised, what data is being captured, where it is being transmitted and stored, who has the access to it and what mechanism are in place to protect it,” said Agrawal. He further added that data will play a major role. As such cyber security standards must be strictly followed by the companies who want to leverage the benefits of IIoT.

The way forward…

The final session of the one-day conference comprised mix of presentations and a closing keynote that evaluated the journey to transform towards Industry 4.0. The first presentation was by Virendra Deshpande; Head—Consumer Market, Omron Automation, on ‘Smart sensors and PLCs—foundation of IIoT.’ He highlighted industrial automation as foundation of IIoT and noted that companies should follow open network and communication system like EtherNet/IP, EtherCAT and IO-Link, wherein vertical integration and standardisation are available. Presenting about the IIoT platform was Somnath Chakraborty, Director, Siemens Industry Software, who discussed on how IIoT platforms facilitate and expedite development of IIoT applications. Chakraborty highlighted the company’s offering, such as digital twin and the cloud platform Mindsphere that provides an ecosystem for customers and partners to build together and obtain a complete IIoT solution. Lastly, a discussion on monetising IIoT was put forward as a closing keynote by Ajay Bhagwat, MD, Renu Electronics. He talked about the hype around IIoT and pointed out the key sectors & applications that can add lot more value with the help of IoT and will make sense to invest on them.

With around 150 delegates along with demos from the sponsors, the conference provided the know-how of IIoT and themed around the discussions from the industrial automation perspective.
Image processing solution

B&R makes machine vision an integral element of the automation ecosystem. The company offers the world’s first image processing solution to be seamlessly incorporated in the automation system. The solution comprises cameras, software and lighting accessories. Lighting elements are available integrated in the camera, as an external device, or even as a combination of the two. Extremely precise synchronisation for high-speed image capture and object-specific functions such as bright-field or dark-field illumination are easy to implement. Image triggers and lighting control can be synchronised with the rest of the automation system in hard real time and with sub-microsecond precision. B&R’s machine vision system is integrated on every level: the engineering tool, the real-time operating system and the application software. With a single development environment for every aspect of automation, controls engineers will now be able to implement many machine vision tasks on their own. With OPC UA, POWERLINK, openSAFETY and the powerful Automation Studio software development environment, B&R is constantly redefining the future of automation engineering.

Transformer in a connector

Harting offers M12 Magnetics that contains transformers and all the other necessary components that would otherwise have to take up space on the circuit board - and all in the same size socket as before. It is a device side M12 socket that stays the same size but already contains the transformer unit required for Ethernet. In the past, transformers and various other electrical components had to be accommodated next to the socket on the circuit board, but are now integrated as part of a space-saving design that also simplifies the circuit board layout. Conductor tracks can be made a lot lighter and more direct because they don’t have to be arranged around lots of different components, making planning simpler and cheaper. Greatly increased reliability is a further benefit to customers. In the past, sockets and transformers made by different manufacturers had to be combined, which could sometimes be problematic. The Harting solution is a mutually compatible unit providing greater process security.

Level switches with IO-Link for central configuration

Baumer offers LBFH and LBFI level switches with IO-Link and ATEX approval. The IO-Link interface allows the user to automate the configuration of sensors. The inclusion of ATEX also enables the use of commercially available barriers. The sensors are suitable for hygienic and industrial applications. Thanks to IO-Link integration, the level switches are Industry 4.0-ready. The communication interface enables each application to be configured quickly and easily using standard network components. This ensures error-free duplication of the system and device replacement without the need for additional programming, thereby, saving time. Diagnostic data can be called up and evaluated at any time, which increases system availability. Just like their predecessors, LBFH and LBFI level switches meet the criteria for ATEX categories 1 and 2 for gas and dust. The reduced current consumption of their more advanced electronics means that commercially-available standard barriers can now be used in addition to the Baumer barriers. This increases flexibility in terms of integration even in existing plants, and reduces installation costs.

Online configurator for drylin lead screw modules

igus has developed a completely new online configurator for drylin lead screw modules. This allows the customer to easily design and process millions of different variations of lubrication-free drylin lead screw modules according to one’s requirements. As user, you will receive, among other things, a 3D view of the unit and a dimensioned technical PDF drawing as well as a 3D CAD model with which you can immediately plan the implementation of your project before receiving the product. With a click, you can order the unit at igus. The weight, the delivery time and the price of the assembled parts are displayed automatically. The design and configuration of a lead screw module (SHT) often takes a lot of time and effort for project managers. In order to optimise this process, igus has developed the new lead screw module configurator for its customers. With the technical drawing and the CAD model, the customer can continue to work immediately on his/her project and digitally share the plans of the lead screw module with other project participants quickly and easily.
**Switches for Ethernet networks**

Understanding the increasing demand of Ethernet Technology, Lapp Group launched its new line of switches for Ethernet networks under the name ETHERLINE® ACCESS. One important value is the reconfiguration time, which is the period until communication is restored following an interruption. In the case of the new switches from Lapp, this period is only 20 milliseconds with 250 active components in the network. Besides this, the switches are fully equipped with cutting-edge diagnostic and redundancy features. Switches are a new line of business for Lapp, but this represents an ideal fit for the market leader in integrated cable and connection systems. Only the combination of an industry-calibre switch and industrial brand-name cables such as ETHERLINE® from Lapp guarantees maximum performance in terms of transmission quality and reliability. In addition, the customer does not need to purchase individual components from different suppliers. On the contrary, they can procure a complete communication solution from a single source for the highest demands in industrial applications.

**Capacitive displacement measurement system**

MicroEpsilon offers capaNCDT DTV capacitive displacement measurement system that measures the thickness of brake discs from both sides, enabling the exact determination of the so-called Disc Thickness Variation. This factor is very important because in order to achieve maximum efficiency of the braking system, the disc must have an even thickness. Unevenness, run-out or abrasion on the friction surface of the disc cause the brake pads to lose contact with the rotating disc which in turn reduces the braking effect. Capacitive displacement sensors enable thickness measurements to be performed on a non-contact basis. While the brake disc rotates, the thickness deviation is determined via the circumference of the entire disc. Using several sensors in pairs also enables multi-track thickness measurements. Due to its robust construction, the innovative capaNCDT DTV four-channel sensor is suitable for harsh ambient conditions in test benches or road tests. In its compact housing, four capacitive sensors detect the measurement values with each operating in standalone mode.

**Tower lighting system**

In order to ensure the safety of employees in wind turbine generators, the towers must be illuminated safely. To this end, Phoenix Contact offers a tower lighting system using maintenance-free LED lights. The LED lights are supplied centrally by an uninterruptible power supply (UPS) installed in the tower base. Even before climbing the tower, the service technician can find out the state of the UPS and the batteries. The powerful LED modules confirm to the relevant standard EN 50308. They provide good luminous intensity even at low temperatures. Thanks to a service life of 50,000 hours, the lights do not generally have to be replaced. Due to the low current consumption of the LED technology, the lights also function as emergency lighting. In the event of power failure, the lights continue to be supplied via a central battery. The luminosity is then maintained at 50%. There is therefore enough light still available in the wind turbine generator for the service technician to safely descend.

**Toolholders**

Schunk offers the standard series TRIBOS-RM, TRIBOS-Mini, and TRIBOS-Mini SVL as a sealed version for direct clamping of micro tools with internal coolant supply, too. In the case of deep bore holes and for milling grooves, the internal coolant supply ensures that chips will be removed and taken away from the cutting edge for best cutting actions and that optimum cooling of the cutting edge is possible. Both in combination, allows longer service life of the high-quality tools and excellent finish results at the workpiece. In addition, the sealed design prevents chips or dust from penetrating into the mounting or spindle. The standard version proves itself with a run-out and repeat accuracy of < 0.003 mm at an unclamped length of 2.5 x D and a balancing grade of G 2.5 at 25,000 rpm or ultra-fine balanced at a balancing grade of G 0.3 at 60,000 rpm. They meet all the standards in terms of size accuracy and surface quality and therefore even demanding requirements can be reached.
Highlights – Feb-Mar 2018

» Pharmaceuticals & Packaging

India’s pharmaceutical market ranks as the tenth most attractive amongst 19 other countries in the Asia Pacific region. As per recent reports, the Indian pharmaceutical market has already crossed the 100,000 crore mark. With this in the background, the upcoming edition will feature the latest automation case studies catering to the emerging requirements of this growing industry. It will also focus on the latest technologies in packaging automation while discussing the latest innovations and R&D in this domain.

HANNOVER MESSE 2018

Hannover Messe 2018, the world’s leading show for industrial technology, will take place on April 23 – 27, 2018. The exhibition will include forums, podium discussions, presentations and exhibits which will reflect the current developments in this area.

Software & Engineering Tools

Software & engineering tools automate project management activities, manage all work products produced throughout the process and assist engineers in their analysis, design, coding and testing work. The subsequent issue will see how these tools can provide better productivity and efficiency.

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THE ART OF CONNECTING
Smart Industry Solutions and Products

The automation industry being one of the fastest growing industries across the globe, demands an innovative cable and connection technology to prosper. Lapp, a leading German brand in cable and connection technology, offers a complete spectrum of solutions including cables, connectors, cable glands, conduits and plug and play cable assembly solutions. Besides successfully meeting the current demands of automation industry, our innovative technology is ready to shape Industry 4.0 – the fourth industrial revolution, which brings in the smart factory concept wherein equipments are well-networked for better communication between manufacturing plants.

To further strengthen our offering for smart factories, Lapp launches ETHERLINE® ACCESS, the managed and unmanaged switches. The switches along with data cables and connectors form Lapp’s offering for the industrial network solutions to ensure reliable connectivity.

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- ETHERLINE® Data communication systems for Industrial technology
- HITRONIC® Optical transmission systems
- EPIC® Industrial connectors
- SKINTOP® Cable glands
- SILVYN® Production cable conduit and cable carrier systems
- FLEXIMARK® Cable marking products
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