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[www.beckhoff.com/ethercat-measurement](http://www.beckhoff.com/ethercat-measurement)

Through a wide range of EtherCAT Terminals with advanced functionality, Beckhoff integrates measurement technology directly into the standard I/O system – delivering high speed, high bandwidth and precise synchronisation capabilities. Modular measuring terminals are available for applications that range from the measurement of temperature, power, current and voltage up to complex mains monitoring or Condition Monitoring. The signals are acquired via electrically isolated channels and sent to the controller for further processing. In order to promote more efficient engineering in these areas, Beckhoff offers numerous time-saving TwinCAT software libraries.



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## Emerging strongly!

Welcome to the 13<sup>th</sup> Anniversary Special edition of A&D India. Although it's an occasion for the celebration about the success achieved in the past 13 years, it's also the time to cope up with the gloomy sentiments in the current situation weathered down by the second wave of the COVID-19 outbreak. For A&D India, it's also a good opportunity to look back at the last 13 years and look forward to our ambitions for the next 13. It has been an interesting journey filled with triumphs and challenges. The magazine kept changing and improving with the rapidly changing landscape of the manufacturing industry and of course with the changing reading habits of people.

A&D India was launched 13 years back with the mission of helping manufacturing professionals understand "what makes automation really work?". We kept working on the contents revolving around this theme by collating and providing information on cutting edge automation & now digitalisation technologies to aid the Indian industry leverage these for greater productivity, efficiency, quality, safety and consistency – parameters that form the key to global competitiveness today.

Now, more than ever, we would like to thank everyone who has helped A&D India become what it is today – our editorial advisory board members, editorial contributors, advertisers, partners, and most importantly our readers for their trust and confidence in the publication. I would also like to thank the team A&D India who contributed their bests to grow with the publication and make it the most desirable magazine in industrial automation and digitisation sector.

Hope you'll enjoy reading this special edition, again packed with a lot of interesting features. Let's pray that we all emerge from the current situation strongly! Stay safe, stay healthy!

**Shekhar Jitkar**

Publisher & Chief Editor

[shekhar.jitkar@publish-industry.net](mailto:shekhar.jitkar@publish-industry.net)

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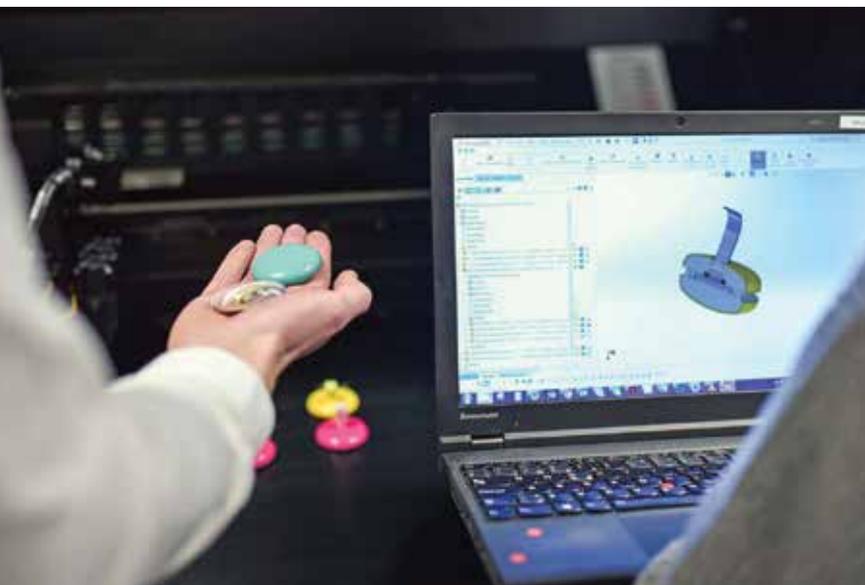
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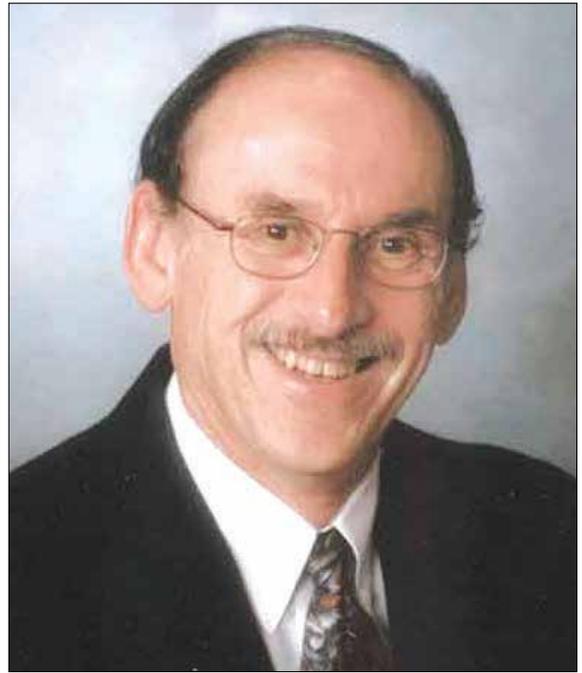
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Sid Snitkin,  
VICE PRESIDENT,  
ARC ADVISORY GROUP

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New developments are also undermining the adequacy of current OT cybersecurity strategies. Increased remote access, particularly from personal devices, has expanded ways for attackers to compromise critical systems. Digital transformation has also weakened OT system defences through broad connectivity with cloud apps & external systems and through the introduction of potentially insecure, unmanageable IoT devices.

A more challenging threat environment is further pushing the limits of what is required to protect industrial systems. Nation-state attackers and cybercriminals are using sophisticated techniques and malware that overcome traditional defences. Industrial companies need active defence programs to stop sophisticated attackers before they impact operations and threaten worker safety.

The safety and operational risks of operating facilities with these kinds of cybersecurity gaps shouldn't be accepted. Smart companies will invest in people, processes and technologies to ensure that defences are properly maintained, new developments are properly addressed and the impacts of sophisticated attacks are minimised.

#### IT/OT cybersecurity convergence addresses security gaps

While companies increasingly

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**“SMART COMPANIES WILL INVEST IN PEOPLE, PROCESSES AND TECHNOLOGIES TO ENSURE THE IMPACTS OF SOPHISTICATED ATTACKS ARE MINIMISED”**

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appreciate the serious gaps in conventional industrial cybersecurity programs, addressing these issues is challenging. The global shortage of cybersecurity professionals, particularly those with OT experience, makes it difficult to hire additional staff. Operating constraints limit the access that security teams need to keep defences updated. Emphasis on isolation as the primary defence constrains visibility of vulnerabilities and abnormal system behaviours.

An onslaught of new cybersecurity challenges also diverts everyone's attention from existing problems. Today, security teams have to develop security strategies for cloud data-in-motion & at-rest, apps that are being moved to the cloud, remote access users and all their devices, the security of new IoT devices and embedded systems and provide secure environments for edge

compute platforms. The fluidity of all the deployment options makes it impossible for companies to maintain security unless they have:

- End-to-end security solutions that span every endpoint and communication pathway
- Centralised management of consistent security policies
- Zero trust security for every step of every system interaction

Though plants and facilities will struggle to make the needed investments in OT cybersecurity, most companies already have IT security teams to deal with these issues. Those that don't will certainly need to make investments in IT security. Converging IT and OT cybersecurity programs provides a way to leverage these capabilities and investments to improve OT cybersecurity.

There will always be core OT-specific cybersecurity issues that require unique people, processes and technologies. But this doesn't mean that they can't be addressed as part of a converged cybersecurity program. Trying to maintain siloed IT and OT cybersecurity programs will only frustrate efforts to address existing & emerging security challenges and increase the risks of deploying new business strategies that integrate traditional IT & OT systems with cloud, IoT and mobile solutions. □

# MOTORS

|                        | INDUSTRIAL BRUSH        |                         | DCmind BRUSH            |                          | DCmind BRUSHLESS       |                        | SYNCHRONOUS                            |  | STEPPER                |
|------------------------|-------------------------|-------------------------|-------------------------|--------------------------|------------------------|------------------------|--|--|------------------------|
| <b>CHARACTERISTICS</b> | 82840<br>82860<br>10 50 | 82830<br>82890<br>10 50 | 89800<br>10 50          | 89830<br>89890<br>10 50  | 80140<br>180 280       | 80350<br>60 70         | 82510<br>20 30 40                      | 82330<br>82340                         | 82910<br>20 30 40      |
| Nominal power (W)      | 0.9 / 3                 | 9 → 33                  | 15 → 35                 | 54 → 104                 | 66 → 150               | 310 → 600              | 0.3 → 3                                | 0.2 / 0.4                              | 0.5 → 5                |
| Voltage                | 12 → 24 V <sub>DC</sub> | 12 → 48 V <sub>DC</sub> | 12 → 48 V <sub>DC</sub> | 12 → 120 V <sub>AC</sub> | 9 → 75 V <sub>DC</sub> | 9 → 75 V <sub>DC</sub> | 24 → 240 V <sub>AC</sub><br>50 → 60 Hz | 24 → 240 V <sub>AC</sub><br>50 → 60 Hz | 3 → 64 V <sub>DC</sub> |
| Front side (mm)        | 0 32                    | 0 42                    | 0 42                    | 0 63                     | 0 35 / 51<br>0 57 / 65 | 0 35 / 51<br>0 57 / 65 | 0 35 / 51<br>0 57 / 65                 | 0 47                                   | 0 35 / 51<br>0 57 / 65 |
| Nominal speed (rpm)    | 3700                    | 3000                    | 3000                    | 3000                     | 250 → 600              | 3000                   | 600 → 720                              | 0 → 1500                               | 0 → 1500               |
| Nominal torque (mN.m)  | 2.2 / 7.7               | 41 → 100                | 170 / 270               | 180 / 290                | 125 → 550              | 830 → 1900             | 10 → 110                               | 2.5 → 8                                | 15 → 300               |
| Noise level (dBA)      | 55                      | 55                      | 35                      | 35                       | 45                     | 50                     | 30                                     | 45                                     | 35                     |
| Service life (hrs)     | 2000                    | 3000                    | 4000                    | 5000                     | 20000                  | 20000                  | 20000                                  | 10 M on / off                          | 20000                  |
| Certification          | CE<br>RoHS              | CE<br>RoHS              | CE<br>RoHS              | CE<br>RoHS               | CE<br>RoHS             | CE<br>RoHS             | CE<br>RoHS                             | CE<br>RoHS                             | CE<br>RoHS             |
| Gearboxes              | +                       | +                       | +                       | +                        | +                      | +                      | +                                      | +                                      | +                      |
| Connection             | +                       | +                       | +                       | +                        | +                      | +                      | +                                      | +                                      | +                      |
| Standard               | +                       | +                       | +                       | +                        | +                      | +                      | +                                      | +                                      | +                      |
| Options                | +                       | +                       | +                       | +                        | +                      | +                      | +                                      | +                                      | +                      |
| IP                     |                         | IP20                    | IP65*                   | IP65*                    | IP54                   | IP65*, IP67*, IP69*    | IP40                                   | IP30                                   | IP40                   |

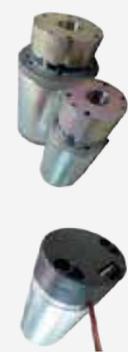
\* Except front face & shaft

- EMC filter
- Cable
- Terminal
- Connector
- Worm
- Planetary
- Parallel shafts
- Interchangeable brushes
- Encoder
- Ball bearing
- Lead
- Silent
- Optional regenerative energy absorber
- Break

## ACCESSORIES & OPTIONS

- > Brakes from 0.25 to 4.5 N.m<sup>(1)</sup>
- > Encoders from 1 to 1000 Pulses per Revolution<sup>(2)</sup>
- > Special connectors
- > Special output shafts (design and/or material)
- > Others - on demand

<sup>(1)</sup> Except Industrial Brush 032, Synchronous and Stepper ranges  
<sup>(2)</sup> Industrial Brush and DcMind Brush ranges only



# CONTROL ELECTRONICS

|                        | SERIES   |                                       | INTEGRATED             |                               | EXTERNAL                |
|------------------------|--|---------------------------------------|------------------------|-------------------------------|-------------------------|
| <b>CHARACTERISTICS</b> | TN121  | SM121                                 | SM122                  | BDE 30                        | BDE 40                  |
| Compatible models      | 5057   | 5075                                  | 5075                   | 5057                          | 5057                    |
| Speed-torque           | •  | •                                     | •                      | •                             | •                       |
| Position (P/R)         |  | 4096                                  | 4096                   |                               |                         |
| Programming            | DCmind Soft & DcMind Soft + CANopen                      | DCmind Soft + CANopen                 | DCmind Soft + CANopen  | PWM or 0 → 10 V <sub>DC</sub> |                         |
| Communication bus      | Optional CAN <sub>1.1 &amp; 2.0</sub>                    | Standard CAN <sub>1.1 &amp; 2.0</sub> |                        |                               |                         |
| Voltage                | 10 → 36 V <sub>DC</sub>                                  | 9 → 75 V <sub>DC</sub>                | 9 → 75 V <sub>DC</sub> | 18 → 36 V <sub>DC</sub>       | 10 → 36 V <sub>DC</sub> |
| Maximum current (A)    | 17   | 17                                    | 75                     | 10                            | 14                      |
| Adaptations            | Programs: Custom firmware as per customer specifications |                                       |                        |                               |                         |

## GEARBOXES

|                        | PARALLEL SHAFTS  | PLANETARY | WORM     |
|------------------------|--|-----------|----------|
| <b>CHARACTERISTICS</b> | 11 models  | 7 models  | 2 models |
| Torque (N.m)           | 0.5 → 6  | 0.8 → 120 | 10 → 20  |
| Power (W)              | 0.2 → 50   | 8 → 600   | 25 → 600 |
| Service life (Mlr*)    | 1 → 10   | 50        | 50       |
| Ratios                 | 4 → 1036800  | 4 → 308   | 5 → 100  |
| Options                | Stainless steel shafts, pulleys, pinions, special bearings, etc... |           |          |

\* Million revolutions

## ADAPTED PRODUCTS

To meet your expectations, Crouzet offers you custom products matching your requirements, in the following areas:

- > Control electronics
- > Motor characteristics
- > Gearboxes



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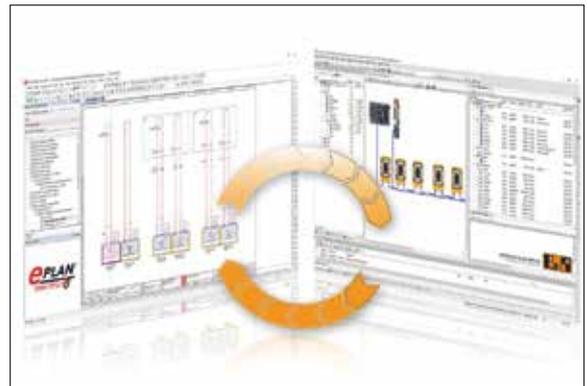


## Siemens commissions India's first HVDC link

Siemens recently commissioned India's first High-Voltage Direct Current (HVDC) link featuring the Voltage-Sourced Converter (VSC) technology. The ±320 kV HVDC system was released by Siemens, in association with a consortium of Siemens Energy (Germany) & Sumitomo Electric Industries, Japan, and for the first time features an integration of HVDC XLPE cable with overhead lines in India. Major HVDC equipment, such as interface transformers & IGBT-based power converters and other high & medium voltage AC equipment, such as gas-insulated switchgear, air-insulated switchgear, control & relay panels, etc, have been supplied from Siemens' factories in India. Sharing his thoughts about this appointment, Gerd Deusser, Executive VP & Head, Energy, Siemens, remarked, "We take great pride in partnering with Power Grid Corporation of India (PGCIL) in this landmark HVDC project. It supports the major initiatives of the government to achieve '24x7 power for all' in the country by ensuring reliable power supply, improving the grid's stability and facilitating the efficient use of renewable energy."

## B&R partners with EPLAN for more efficient engineering

EPLAN recently launched its new partner network, for which B&R is among the first onboard. Today, more than ever, such coordinated integration brings users added value in the form of more efficient engineering and faster time-to-market. Efficient integration between B&R's Automation Studio engineering environment and EPLAN's Electric P8 ECAD platform is made possible by a round-trip connector. These two platforms provide unparalleled support for the automated exchange and synchronization of hardware configurations, I/O mappings and process variables. Developers can start projects with either software or electrical planning, work in both disciplines simultaneously and easily compare and merge projects. Parallel engineering and automated interaction between the tools accelerate the time-to-market and prevent errors due to manual changes. B&R knows that one of the keys to successful development is using the best tools available. With the connection to EPLAN, B&R customers enjoy easy access to industry-leading electrical design software for their machines, plants and control cabinets.



## HMS Networks' study reveals continuous growth for industrial networks despite pandemic

HMS Networks recently presented their annual analysis of the industrial network market focusing on newly installed nodes within factory automation globally. The 2021 study includes estimated market shares and growth rates for fieldbuses, industrial Ethernet and wireless technologies.

The study concludes that the industrial network market shows signs of regained stability, and HMS expects the total market to grow by 6% in 2021.

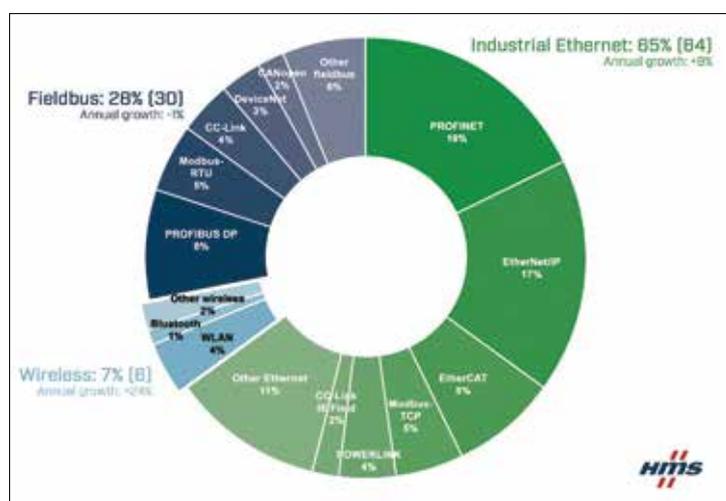
### Industrial Ethernet is growing steadily

Growing by 8%, industrial Ethernet continues to take the market share. Industrial Ethernet, now, makes up for 65% of the global market of new installed nodes in factory automation. EtherNet/IP and PROFINET are fighting for first place, but this year PROFINET passes EtherNet/IP to the top of the network rankings with an 18% market share compared to the 17% earlier. Fieldbus now has a 28% market share of the total amount of newly installed nodes. PROFIBUS is still the clear fieldbus leader at 8%, followed by Modbus-RTU at 5% share and CC-Link at 4%.

### Wireless is here to stay

Wireless continues to grow rapidly at a rate of 24%. With ongoing global activities about wireless cellular technologies as enablers for next-level smart manufacturing, HMS expects the market demand to increase for wirelessly connected devices & machines to be included in the less cabled & flexible automation architectures of the future. Conveying his views, Anders, CMO, HMS Networks, expounded, "Industrial network connectivity for devices and machines is key to obtain smart & sustainable manufacturing, and this is the main driver for the growth we see in the industrial networking markets. Factories are constantly working to optimise productivity, sustainability, quality, flexibility and security. Solid industrial networking is key to achieving these objectives."

EtherNet/IP and PROFINET are leading in Europe and the Middle East, with PROFIBUS and EtherCAT as runners up. Other popular networks are Modbus (RTU/TCP) and Ethernet POWERLINK. The US market is dominated by EtherNet/IP, with EtherCAT gaining some market share. PROFINET and EtherNet/IP lead a fragmented Asian market, followed by strong contenders CC-Link/CC-Link IE Field, PROFIBUS, EtherCAT and Modbus (RTU/TCP).



# Hilscher Communication Solutions



## IIoT

- ✓ PROFINET/ Ethernet/IP connection to cloud and IIoT systems via Edge Gateways or
- ✓ Intelligent DIL-32 Communication IC with integrated OPC UA and MQTT functionality

## Automation and Visualization

- ✓ Lets you monitor and operate your machinery from anywhere
- ✓ HMI System over all common browsers

## Analysis and Data Acquisition

- ✓ Graphical analysis of network timing parameters
- ✓ Passive recording with zero-delay

## netX Chip Carriers

- ✓ For prototyping and SMD manufacturing
- ✓ Complete slave interface with smallest footprint (32 x 32 mm)

## DIL-32 Communication IC

- ✓ Serial Modbus host interface for easy integration
- ✓ Direct I/O transfer via shift register

## Communication Modules

- ✓ Dual-Port-Memory or SPI
- ✓ Once integrated all networks are useable

## Gateways

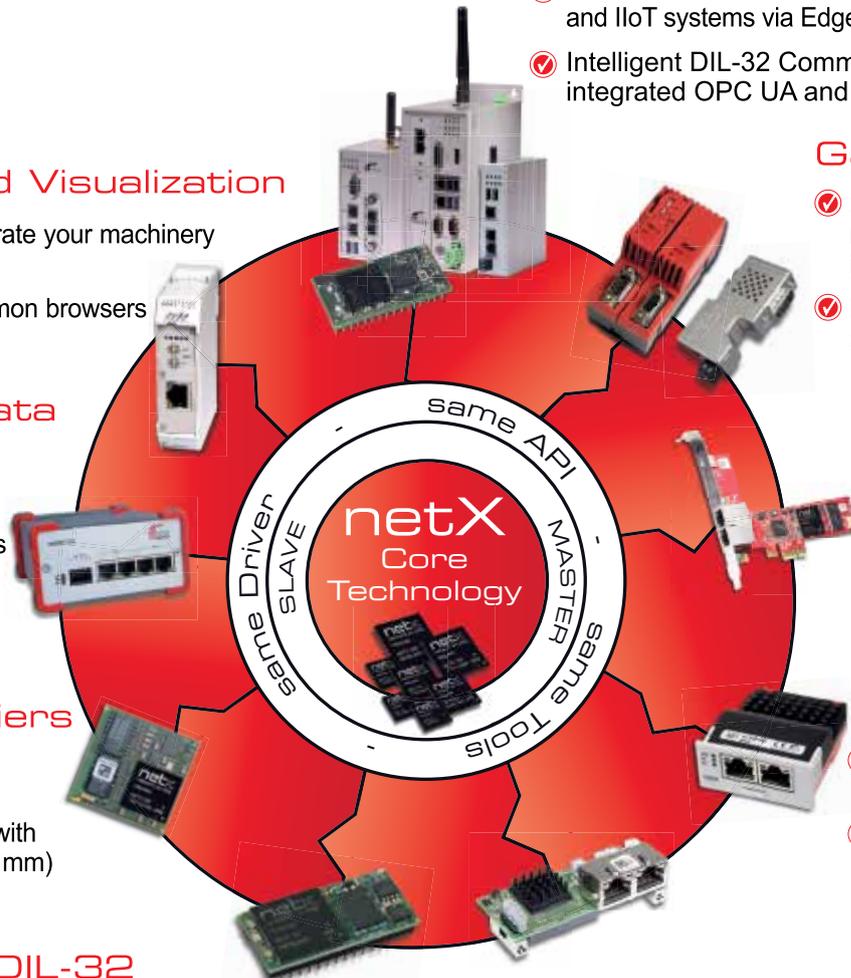
- ✓ 300 different combinations with main industrial protocols
- ✓ High performances and flexibility

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- ✓ All protocols

## IP 40 Exchange Modules

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## ABB reaches cumulative 5GW milestone in delivering solar plant automation solutions in India

ABB recently reached the cumulative 5GW mark in providing Programmable Logic Controller (PLC)-based solar plant automation solutions in India. This milestone is an outcome of many significant solar power projects that the company won across India for its utility-scale SCADA and string monitoring solutions. Talking about this milestone, A R Madhusudan, President - Drive Products, Motion, ABB India, confirmed, "The recent measures unveiled by the Indian government in its annual budget will boost local manufacturing, encourage new investments and address the challenge of availability of funds for setting up solar plants in India. This is a positive move for the industry and will catalyse India's plans of generating 100 GW of solar power by 2022. We, at ABB, will continue to play a key role in achieving this target." Delivered as a part of ABB's drive products

offering, utility-scale SCADA solutions reduce the cost and risk of investment in operating photovoltaic (PV) power plants. In most utility-scale solar PV projects, string boxes are fitted with monitoring systems that perform different kinds of protection, performance and efficiency monitoring. ABB's string monitoring solutions reduce downtime and increase productivity while improving the safety of PV panels and the entire plant.

## AVEVA and Aker Solutions extend strategic partnership



AVEVA recently announced that it extended its long-term relationship with Aker Solutions to accelerate the company's digital transformation strategy. The two organisations will work together to deploy new engineering capabilities, which will enable multi-discipline teams to work together effectively. This will result in developing and maintaining the detailed definition of all key operational items as well as deliver the full range of AVEVA's process simulation, design, engineering and lifecycle management technologies. Expressing his views on the extended alliance, Kjetel Digre, CEO, Aker Solutions, cited, "Digitalisation across our work processes is an enabler for our strategy and growth objectives. We are committed to creating a sustainable energy future to address the need to lower the carbon footprint through the usage of advanced digital technologies." Further, Craig Hayman, CEO, AVEVA, also commented, "Our goal is to work with our customers to help them innovate and drive sustainability, and the breadth of our portfolio is enabling organisations, like Aker Solutions, to deploy faster, reduce energy consumption, cut emissions and collaborate around innovation, boosting sustainable outcomes for all." "Our proven industrial software expertise, enhanced by the cloud and infused with Artificial Intelligence, means we have an unsurpassed understanding as well as the capabilities to deliver sustainability best practices. The scale and scope of our cloud offerings help support digitally transformed ways of working to facilitate improved engineering, operations & performance, resulting in diverse environmental benefits for our customers," concluded Hayman.

## Atos, Dassault Systèmes, Groupe Renault, STMicroelectronics and Thales join forces to create the Software République

Atos, Dassault Systèmes, Groupe Renault,

STMicroelectronics and Thales recently announced their intention to join forces to create the Software République, a new ecosystem for innovation in intelligent mobility. Talking about the benefits of this innovation, Elie Girard, CEO, Atos, asserted, "Combining the strengths of five of the world's leading automotive and technology players, this initiative promises to accelerate the decarbonisation of mobility." Sharing his thoughts about the new ecosystem, Bernard Charlès, Vice-Chairman & CEO, Dassault Systèmes, averred, "The Software République is a multi-industry and multidisciplinary ecosystem that aims to accelerate innovation and grow the driving forces of tomorrow." Further, Luca de Meo, CEO, Groupe Renault, stated, "The combined expertise in cybersecurity, microelectronics, energy and data management will enable us to develop unique, cutting-edge solutions for low-carbon, shared and responsible mobility, made in Europe." Adding to this, Jean-Marc Chery, President & CEO, STMicroelectronics, said, "The partnership at the heart of this project will also help strengthen the links across the entire value chain — a key aspect during this phase of the transformation of this industry." Talking on similar lines, Patrice Caine, Chairman & CEO, Thales, conveyed, "Based on a proven experience in digital security in very demanding markets, such as transport, banking, defence or aerospace, Thales will share its expertise in Artificial Intelligence, cybersecurity and connectivity to strengthen the protection of vehicles, their data and those involved in mobility."





## Rockwell Automation brings the connected enterprise to life

**Rockwell Automation** recently organised a virtual session, 'Editorial Perspective'. This session focused on the industrial pharma manufacturing technologies that are helping India to recover from the pandemic. The session kicked off with the opening address by Ruchi Mathur, Marketing Head, Rockwell Automation, India. Mathur narrated the strategy of the company to bring the connected enterprise to life. For this purpose, they integrate control and information across the enterprise to help industrial companies and their people be more productive. Giving insights about the session, she asserted, "Today's session will create a meaningful, knowledge-based platform for editors and their teams to learn, understand and get insights about what is truly changing the game for pharma manufacturers." Mathur stated the takeaways from the session, such as demystifying the technology behind LS manufacturing, understanding global response to the Black Swan crisis and knowing how Rockwell Automation has supported the industry in these tough times. Followed by this session was a virtual tour to the 'Facility of Future' with Aditya Chaudhary, Industry Leader – Automotive, Rockwell Automation. Chaudhary, discussing the importance of the experience centre, explained, "Customers no longer buy the pieces of technology, but they buy experiences. By experiences, I mean the business outcomes which they expect from their investments." The sneak peek started with defining the business problem-solving arena, where industry-specific problems are solved with appropriate solutions. He discussed the details of this arena with Vivek Kumar Gupta, MGR – Commercial Engineer, Rockwell Automation.

Digital twin plays a vital role in the designing & specifications of a smart plant. Vijay Kumar Bhat, Sr Commercial Engineer, Rockwell Automation, shared information and the role of the digital twin in the development of various aspects of the smart factory. He also demonstrated various technologies, like, intelligent conveying technology, also known as the independent cart technology, where each cart can follow its path. Moving ahead, he explained the MES system and iOS system, which can be customised. The mixing tank application was exhibited in the company of Vikas Attri, Commercial Engineer, Rockwell Automation. During the journey around the centre, Chaudhary also explained the importance of cybersecurity in manufacturing plants and manufacturing systems. Understanding the importance of cybersecurity, Rockwell has code developed all its technologies with its partners Cisco and others. Anshu Nagdev, Sr Commercial Engineer, Rockwell Automation, made a walkthrough of the Remote Operations & Command (ROC) centre, which shed light on few aspects of the ROC. Arvind Rao, Global Director – Operations & Info Applications, Rockwell Automation, threw light on the global perspective, 'Digital transformation in life sciences sector'. Rao discussed various challenges the pharmaceutical manufacturing industry is facing globally. These challenges being: shift to complex targeted biologics, expedited drug approvals, personalised medicines, workforce shortage, regulatory & price scrutiny, network security & counterfeiting. The company emphasises domain expertise, believes in understanding their customers' problems, processes & applications and how best to deploy the technology to solve their problems. Expressing his views on Industry 4.0, Rao illustrated, "Industry 4.0 is simple to understand but complex from deployment and adoption perspective. Also, we should think about it as a journey, not a destination. Rockwell helps its customers to move ahead in this journey with the help of a structured roadmap with clear plans, investments and ROI." He also discussed the four key areas where digital transformation is useful, which are,

1. Speed time to market
2. Outperform quality standards
3. Maximise productivity
4. Protect against security threats

To improve the time to market, Rao gave perceptions to the areas where technology can help, namely -

- Bringing products from idea to reality faster through simulation and virtual commissioning
- Getting facilities online faster by shortening validation through pre-engineered solutions
- Releasing products faster by simplifying and streamlining the electronic batch review
- Providing end-to-end visibility and oversight through IIoT integration of the system

He exemplified his views with the help of various global customers of the company that are using different solutions provided to them. "At Rockwell Automation, we emphasise on training the workforce to get more and more ROI," he concluded. Dilip Sawhney, MD, Rockwell Automation India, shared the insights from India perspective for the pharma companies. The company has supported various generic manufacturers to upscale their production. He said, "The companies that made strategic investments into automation, equipment and workforce, have significantly differentiated themselves from their peers." Later, Sawhney and Rao interacted with the media to share the insights, data points and facts to decipher the progression in technology by answering the queries. Sawhney concluded, "The role of technology has never been the core and central before. The manner in which this digital transformation wave has been sweeping through our lives, particularly through industry, is unprecedented."



## “We are working towards localising components”

...mentions **Prakash Rao**, Director, JUMO India – one of the leading manufacturers of industrial sensor and automation technology – in this interview with Anvita Pillai. He discusses the changes encountered due to COVID and how they maintain versatility now, the importance of sensors in manufacturing, new trends and more. Excerpts...

**What has changed for JUMO India in the past year? What changes has COVID brought to your organisation?**

Response to COVID-19 has advanced the adoption of digital technology by several years, and many of these changes could be here permanently. This pandemic was a mirror to JUMO that reflected its strengths and weaknesses. The state-of-the-art products, production, market presence and financial stability displayed its strength, whereas the absence of advanced digital connections marked the need for improvement. We have made significant planning and investment to broaden Our digital dashboard to create digitally enhanced offerings.

**Can you elaborate on the ways how sensors can make factory floor operations smooth? Do you think the manufacturing industry downplays the importance of sensor in automation?**

The combination of sophisticated sensors and increased computational power, once implemented at scale, enables new ways to analyse data and gain actionable insights to improve many areas of operations. The result will be responsive and agile production processes that enhance performance across a range of industrial sectors.

The manufacturing industry has always been responsive about the implementation of sensor and automation for the shop floor, but the stanch motivation was lagging in realising its execution.

**What, according to you, are some of the latest & upcoming trends in industrial sensors and automation technologies?**

The biggest trend taking place in the world of sensors is IO-Link. Being digital, it is being acknowledged by almost all industries, where they want to overcome traditional challenges of analogue systems, like EMC issues/signal losses, etc, which are very mutual in analogue signals. IO-Link would drive total costs down as compared to analogue systems and positively bring big information from sensors into the IoT interface, directly as well as into the PLC.

Cloud computing and LoRaWAN are among the latest technology trends widely discussed in industry and infrastructure projects.

**Maintaining versatility is going to be key given the current times. How does JUMO help its clients to remain versatile during this period of instability?**

Looking at the product range and services offered by JUMO to over 22 different industry segments, we very confidently say versatility is embedded in our genes.

In addition to this, the pandemic has encouraged us to apply value-addition to our existing product range and offer it as a one-stop-shop experience to our clients.

**What strategies is your company implementing to ensure a boost in its market presence & positioning in India?**

We believe in simple strategy' 'Get the work done!'. We are working towards localising components to add value to our products and services; it not only helps us become competitive but also generates business opportunity for local manufacturers, giving a push for the 'Make in India' initiative. On the market front, we aim to expand our network to tier 2 and 3 cities to boost our presence in India; the pandemic has not dithered us from hiring new staff to fulfil this expansion strategy.



## “Focus on both employee and machine safety”

...mentions **Sagar Bhosale**, Managing Director, Schmersal India – a company that’s been offering products & technologies for a safe working environment – in his interview with Anvita Pillai. He elaborates on prioritising man and machine safety, the initiatives for safety, new trends and more. Excerpts...

**What were the key learnings for your organisation during COVID-19? Can you elaborate on the ways you’re focused on man and machine safety during this pandemic?**

The pandemic of coronavirus has changed the way our organisation functions. The key learning was to create a balance between the physical and emotional well-being of employees and keep the wheels of the business running. Both have to operate in tandem for the long-term survival of all. We had to modify policies, communicate them to all employees and ensure the necessary system framework for implementing new norms for staff working from home and the plant.

**Given the pandemic and its reservations, what tips can you suggest manufacturing companies to ensure complete shop floor safety?**

To manufacturing companies, we recommend focusing on both employee and machine safety. The employees must be appropriately masked up and trained to follow the set SOPs. There should be no loitering, and ensure compliance with MHA instructions to prevent the infection spread. All employees, without exceptions, should get vaccinated at the earliest as per the guidelines. Shop floors need to prepare & invest in upgrading to IoT-based solutions, from a machine safety aspect, with Industry 4.0 on the horizon.

**What measures has Schmersal taken to ensure proactive safety management and create awareness, especially during the last and this year?**

To reduce accidents and near misses in factories, periodic seminars about the latest applicable standards and training on the tools to implement these standards were done at a high frequency. We also have free online safety courses; after taking the course as per consumer convenience, they undergo a test and get certificated. Besides, individual in-house sessions, with product demonstrations, especially during the safety weeks, helped spread safety awareness in a big way.

**Can you highlight the emerging technology trends that are driving the machine safety sector? How mature do you think the Indian machine safety industry is as compared to its global counterpart?**

The trend is clearly towards adopting new safety systems that provide higher uptime of machines to users and easy safety diagnostics. All Schmersal solutions, which help the users to achieve their aim of Industry 4.0 compliance, are in high demand. The Indian industry is moving very fast towards this end, although there is a substantial catch-up to be done if we see our global counterparts.

**What are your long-term goals and goals for 2021? Can you also elaborate on the plan of action to achieve these goals?**

The primary goal in 2021 for Schmersal India is to stabilise the Export Oriented Unit, which has additions of many new lines transferred to India from the global headquarters. Also, the Global IT & Engineering Centre in India, which provides services to our whole Schmersal group, will be spinning off into a separate entity in the coming months. Our main focus now is creating awareness on the standards for machine safety in association with the Directorate of Industrial Safety and Health as well as the Bureau of Indian Standards.



## “Big Data technology has become much more commoditised”

... says **Dhruv Kapoor**, Co-founder – Chief Technology & Product Officer, Zilingo. Zilingo is a B2B digital sourcing platform making the supply chain fair, transparent & sustainable. In this tête-à-tête with Juili Eklahare, Kapoor throws light on how MES software can help in the garment industry & what it really is about and the potential for entrepreneurs to add value to the garment space. Excerpts...

**Why is MES software so especially impactful (in terms of reducing waste and increasing efficiency) in the garment space?**

When a new design comes in, initially the factory floor workers have lower efficiency because they are getting used to the new design. The other element is downtime; for example, let's say a new design comes in – then parts of the factory are lying idle. For instance, the packaging department is lying idle because the workers in the sewing department are sewing the garment. This is exactly where MES software can help. Firstly, it allows capturing data at a much granular level. Secondly, because of the data captured, one can use Big Data & data science to create powerful insights in real-time and use that as feedback for the factory staff on the factory floor.

**It's 2021. Why are we now seeing MES software emerge as part of the Industry 4.0 wave?**

There are two factors – firstly, it is the availability of the internet; for the information that we are collecting on the factory floor to be useful, it has to be sent in real-time. Secondly, Big Data technology has become much more commoditised and cheap. We are collecting millions of data points on a daily basis. All that data has to go to a data warehouse and be available to analyse in real-time.

**Is MES software about people or about sensors/computer vision/etc?**

In the garment industry, it's much more about people. That's because, despite automation, garments continue to be made by hand. This is because they are really complicated. Humans are inherently smart at being able to figure out how to take a soft piece of fabric, sew it up and pass it to the next person in the production line. Thus, it's a very people-heavy process.

**Zilingo was earlier only doing B2B (and before that B2C) ecommerce. Why nudge the company to enter the MES space?**

One factor was that we wanted to deepen our relationship with the manufacturers. Another primary motivation for us was that we noticed the Industry 4.0 trend and felt it's currently in its infancy. Therefore, we wanted to be early on that growth curve.

**What is your advice to budding entrepreneurs who want to get into the garment manufacturing business?**

There is huge potential for entrepreneurs of all types to add value to the garment space. This is because the garment space is dealing with a lot of challenges right now, and those challenges are solvable. For instance, one major challenge is the tremendous impact of the COVID-19 pandemic. When a significant shake up like this happens, a lot of opportunities are created; for example, the fact that brands & factories need to be more data-driven. So, entrepreneurs have a lot of scope to build brands that are more data-driven & agile or build companies that provide a product that helps brands become data-driven.



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# Why TSN is the future in manufacturing



*Juili Eklahare, Features Writer*

Time-Sensitive Networking (TSN) is considered to be the future of industrial communications by industry leaders. It will bring data transfer to the next level, empowering Industry 4.0 applications. TSN has the capability to bring diverse parts of an enterprise, such as the Operational Technology (OT) and Information Technology (IT) sectors closer together. While the implementation of TSN is still in its initial periods, with future-oriented businesses keeping up, this technology promises a gigantic prospective for plentiful manufacturing sectors.

TSN has been bringing in a lot of responsiveness in the industrial automation domain due to the increase in interest in the Industrial Internet of Things (IIoT). In fact, the IEEE 802.1 Time-Sensitive Networking Task Group and the Avnu Alliance are presently working on the TSN standard for industries. From the automotive industry to the food & beverage industry, TSN provides vital rewards for industrial manufacturing, including bandwidth reservation and Quality of Service (QoS) mechanisms – even in real-time and minus proprietary extensions to the standard – as was the case with Ethernet. It shows several benefits to industries, from simplified machine design and developed performance for the converting sector to advanced levels of integration for semiconductor manufacturing. In truth, a report from Global Market Insights last year said that the market size for time-sensitive networking will surpass \$1bn by 2026.

Plus, with the snowballing rollout of 5G technology, wireless TSN is becoming a reality, as it provides the low latencies essential for IIoT. In fact, as an example of 5G and

TSN integration, Qualcomm Technologies & Bosch Rexroth have also showcased time-synchronised industrial devices over live 5G network in the past. Moreover, with the demand for precision timing & synchronisation in industrial automation systems, the usage of multi-chip proprietary solutions has frequently been necessary, growing both complexity and costs for developers. To help the developers, Microchip announced the SparX-5i, a single-chip IEEE standards-based Ethernet switch family that makes available to the industry a complete TSN feature set.

Automation system builders and end-users are extremely insightful and well-aware of the capabilities of TSN and above all, its capacity to deliver a unified way towards interoperability. Therefore, several companies are keenly looking at embracing this technology. Besides, it is a well-accepted idea that TSN will unquestionably become a must-have in the short- to mid-term. In fact, the widespread roll out of pioneering industrial Ethernet solutions is a matter of when and not if, and businesses are prepared to act right away.

With the emergent fashion headed for converged networks and a surge in demand for bandwidth, TSN is a more economical and future-proof solution than purpose-build networks. It brings different industrial organisations and market leaders together to appreciate the filled capability of Industry 4.0 and digitisation. The driver to Industry 4.0 is additionally placing industrial systems on a strong route to TSN-based technology. At this time, the formation of TSN-based solutions is going through a chapter of progress, and it is positively an exciting time for technology professionals.



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# DIGITAL TRANSFORMATION

## Nice-to-Have to Must-for-Survival

2020 was not just chaotic, but also confusing. It can partly be attributed to the pandemic and partly to companies' ineptness to have a disaster management plan in place. But through the chaos and confusion, advanced technologies, especially digitalisation, found their voice. It shifted its position from a 'nice-to-have' to a 'must-for survival'. The Cover Story, with responses from industry stalwarts, finds out the top trends & technologies in manufacturing, factors to be considered for cost-effective growth & ROI, management enabling digitalisation, the approach to digitalisation during volatile times, the importance of data management & data governance and the pros, cons & reasonable measures to avoid failure during the digital transformation journey.



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# “Companies not willing to transform might face existential crisis”



“Getting started on digitalisation will require concrete work of enthused, empowered, capable confluence of cross-functional teams”

**Atul Govil,**  
CTO,  
India Glycols

The entire world hasn't seen more disruption cumulatively in the last decade than it did in the last 15 months.

## The growing trends of manufacturing

The five core themes that have emerged and will continue to see higher adoption this fiscal and years to come are – remote working and e-collaboration leading to higher adoption of cloud offering, the exponential use of e-commerce (both B2B and B2C), automation of processes using analytics, AI/ML, IoT & robotics, innovative security solutions and countermeasures to properly address & mitigate severe cybersecurity threats and ensure due compliances and Product-as-a-Service, wherein the supplier provisions maintenance, repair & alerts services for the supplied equipment/asset, at agreed SLAs.

## Adaptability & resiliency for future digitalisation

To embed digital in the identified processes of an organisation, it is important to carve out a multi-disciplinary team of passionate members, jointly analyse the current state of end-to-end operations across the value stream – with a fresh pair of lenses. Management of change looks great in theory and is the most vital aspect in delivering transformation projects. Over the years, peers and senior leaders build a greater bias towards their gut, intuition against data-driven insights and cross-functional coordination.

Manual, excel-based workflows, processes with high and routine dependence on people is a good candidate to start delivering value with higher ROI. With the volatile macro business environment, there is great value in identifying levers to shorten the overall supply chain cycle time to be more adaptable & resilient to serve customer demand.

## Approach to digitalisation

Like stated earlier as well, it's all about people first. It's important to improve the team's (leaders, managers and other personnel) knowledge of technology and its potential implications. Look for active, ongoing collaboration with

academics/government institutions on building skills needed for the future. One should look at how to progressively build trust and employee engagement through open, transparent communication on how the new-age skills and knowledge will give the associated team and the enterprise an edge over others and help individuals regain confidence about their prospects. With digital natives, the millennials, coming into the workforce in significant numbers, legacy system and processes will need to be progressively revamped & digitalised to create an attractive work environment for them to join and be retained.

## Data management & data governance

Deploying new systems, applying and building inter-connectivity across disparate but contextual systems can add value and improve performance when effective data management & analytics are applied. Companies on their path of DX have to factor that any analytics, any AI or ML used to create actionable insights, is based on the quality and availability of the underlying data sets. If this data set is incomplete or inaccurate, it will lead to incorrect predictions and misleading reports.

Siloed systems and siloed data sets (both from inside and outside the organisation) need to be connected with the business context to eliminate any blind spots and achieve a firm grasp on aspects that matter for prompt decision support.

## Tips for getting started

Getting started on digitalisation will require hard, concrete work of enthused, empowered, capable confluence of cross-functional teams. It's not an isolated IT project. It is not the time to be sitting on the fence, to stay competitive, companies need to proactively adopt new tech to solve current business problems, achieve higher work efficiencies and create new business models. Considering one's business partners, the competitive landscape is changing, changing fast given the pandemic, so one needs to change. Companies that are not willing to transform may end up facing an existential crisis. □

# “Cross-functioning teams are essential today for data governance”



“For an impactful transformation, working on the low hanging fruits will be a good point to start with”

**Bipin Jirge,**  
Managing Director,  
ifm electronic India

In the last few years, with manufacturing evolving, I feel that ‘predictive maintenance’ and ‘remote maintenance’ of assets will be one of the major application areas in the ‘must for survival’ category. We want assets to have almost 100% uptime, and that calls for minimum downtime. Predictive and remote maintenance will save the time of breakdown as well as optimise manpower requirement for maintenance of especially remotely located assets, which are vital for running the plant, like utility pumps, for example.

## Making impactful investments for targeted ROI

Digital transformation is for everybody, but it’s not one-size-fits-all. For an impactful transformation, working on the low hanging fruits by using simple to install, to operate and to maintain technologies will be a good point to start with. It is always good to start with the most bottleneck prone machine and then start doing real-time data gathering of the actual operating hours, setting time, as well as few machine condition parameters, like motor temperature, hydraulic pressure. This gives us a good starting point to look at the real-time data in a simple way.

## Upgrading and staying ahead

The approach to the digitalisation of technologies in the new normal conditions considering the current SOPs, social

distancing norms, employee safety and most importantly, the volatile business environment should be adapting to simple technologies for automation early on and starting the journey towards using technologies as well as training the manpower to use these technologies in the real world.

## Establishing data management and data governance

Data management and data governance are critical in digital transformation. To coordinate between IT and OT, teams/manpower in the company, even in bigger industries, are concerned. Cross-functioning teams are a need of the hour in this data governance.

## The pros and cons of digitalisation

### Cons:

Investments are needed upfront. This can be managed by adopting very simple forms of IoT in the initial phases, starting to adopt the IT concepts on the shop floor in a more minor way.

### Pros:

There would be long-term gains in productivity, cost reduction, compatibility towards customers systems in this new digital world, etc. □



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# “Digitalisation is a breakout in the forward direction”



“Many pros can become cons if we adopt digitalisation without proper design and thought”

Vilas Pujari,  
CIO,  
ACG Worldwide

Manufacturing is the biggest contributor to the production of physical goods after agriculture. With the new generation moving to IT and service, there will be a shortage of blue-collared workers/plant associates. While automation, by design is the best thing to happen, we will be forced to go for digitisation & automation by default, which the pandemic has now hastened.

## Top trends of future factories

Digitalisation is a breakout in the forward direction, but the real question is the speed of adoption, viability and identifying the best amongst the available technologies. We see the emergence of technologies in the areas of remote monitoring and remote action. The second clear trend is AI and ML to augment the human brain with innumerable possibilities and look at something hitherto impossible or feasible. A plethora of technologies like IoT, HoloLens, electrical and guided vehicles, AR/VR, etc are making these possible.

## Choosing the ideal solution

There are two approaches to this – one is plucking the low hanging fruits. Consider using technologies that make commercial sense to help with it. Another way is to be more strategic, ie, consider available technologies, peep into the future and do a thorough evaluation for adaptability and longevity. The first approach is good when one has various technologies and is not sure about their sustainability. The second approach is for veterans with better management and financial bandwidth.

A process-based approach will help in the sustained adoption of technologies leading to digital transformation. Sporadic technology ‘introductions’, untrained users using technologies and lack of process-based approach will not only impact the strategic initiative of digital transformation but also put the organisation a few years back due to bad experience and wasted resources.

## Digitalisation in new normal & silos of transformation

Digitalisation technologies support in effective implementation of SOPs, social distancing norms and employee safety. While there are challenges in the physical implementation of these digitalisation initiatives, this is an opportunity to realise immediate ROI on these initiatives. Adoption is much faster because urgency rather than a top-down implementation drives it. Digital transformation essentially means bringing more process and activities under automation, integrating process and OT/IT networks & databases. With this kind of data volume, we should implement data management and governance as a strategy. It is recommended that CXO level teams own the governance while the actual management can be more tactically done. The real benefits of digital transformation can only come if we can create a single, unified view of enterprise data with ease, irrespective of source, ownership and applications generating data. We tend to use best of breed applications leading to silos of data for better adoption as these applications would have their databases. Creating an enterprise data lake is the answer to these challenges.

## Pros, cons, recommendations

I do not see any cons of implementing a digital transformation strategy. However, many pros can become cons if we adopt digitalisation without proper design and thought. The most common reasons for failure could be – assuming we can do everything on our own, leaving the implementation aspects to IT and lack of user involvement, lack of board/CEO level involvement in the strategy & lack of review at highest management levels, lack of involvement or people and ignoring the ‘people’ aspect in these initiatives, leaving too much to consultants, ignoring security, having too many initiatives at the same time and many more.

We recommend strategies be owned by senior management involving of a reasonably good number of people in the transformation and involving good consultant right from conceptualisation. □

# “Digital connectivity of plant & machinery will get priority”



“In the current business scenario, it is advisable to invest in equipment which supports lot-size-one production”

**Jitendrakumar Kataria,**  
**Managing Director,**  
**Beckhoff Automation**

The challenge is to foresee the upcoming opportunities for entrepreneurs and develop solutions using the latest available technology.

## The trends catching up

**Edge computing:** Edge computing is gaining importance because small, dedicated PCs can pre-process data before the same is pushed to the cloud.

**Human control technology:** Evolution has decreed that the central nervous system regulates human functions. Therefore, our brain, the powerful controller, acts as a modular central computer that accesses a closed process image of the entire body via our nervous system. Here, the speed of communication matters most.

Similarly, ethernet is the physical high-speed medium, and the EtherCAT fieldbus is a communication protocol that enables the exchange of process images collected to the controller. As our brain simultaneously processes multiple sensory inputs, such as visual, acoustic or tactile, the TwinCAT software runs the system using appropriate algorithms.

**Machine Learning:** Machine Learning doesn't follow the classic engineering route to design, formulate and deploy a solution for a specific task; rather the desired algorithms are learned from modelled process data instead. Beckhoff offers a high-performance execution module for trained classic machine-learning algorithms using TwinCAT 3 function and trained neural networks.

Digital connectivity of plants and machineries will get priority. Machine Learning, AI, robots, 3D Printing etc, are all the fast-growing trends in manufacturing technology – and have been making rapid inroads in the machines for quite some

time. This journey is certainly not a cakewalk because of legacy systems, and it's a challenge to gather required data from these systems. Products like IoT coupler can be helpful. All the new machines will be available with connectivity features.

## Priorities & critical factors of digital transformation

Digital transformation is important, but it needs the right motivation from the top management for implementation. The priority must be to acquire and analyse the data from the shop floor equipment to utilise this information to improve processes, reduce resources, increase efficiencies and increase OEE for visible results of digital transformation. Highly automated energy-efficient machines will be the focus. So, machines should be smart and adequately automated to make the operator task easy, safe and efficient. Also, in the current business scenario, it is advisable to invest in equipment that supports lot-size-one production as the volume and variants that needs to be produced vary dynamically.

Adopting connectivity with real-time data exchange from manufacturing processes using interconnected machines, computerised equipment and networked inventory systems, inter-connected employee health tracking systems and relevant data sharing with customers and vendors will be most beneficial to enterprises. Machine operators and skilled people can be a part of this interconnectivity.

## Tips for successful implementation

If digitalisation is implemented only in one section of manufacturing instead of a complete end-to-end process, then the benefits will not be visible. The cost incurred will be looked upon as an expense. Digital transformation is a continuous process, with a full visibility/roadmap of the end results for the complete manufacturing process. □

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# “Understand what smart factory would mean before investing”



“Consistent, well-thought and practical approach to upgrade to new technologies is essential for any business”

**Dr Rishi Mohan Bhatnagar,**  
President,  
Aeris Communications

2020 taught us that technology and innovation are critical to business growth and success. Enterprises were confronted with new challenges in running shop floors, managing labour shortage due to mass migration, reaching out to the customers faster than the competition, managing customer experience, go-to-market and work collaboration.

## Trends driving the future

As businesses continue to pursue digital transformation initiatives to address these challenges, specific technological capabilities will be in high demand in 2021. The key trends that will drive technology investments this year will be IoT, 5G and the hybrid cloud market.

Technology in industries like manufacturing, process and healthcare plays a crucial role in sustaining businesses and bouncing back from the prevailing impediment. Convergence of VR-AR-MR and 3D Printing and Intelligent Automation-Artificial Intelligence (IA-AI) convergence via RPA and analytics will be familiar. Data, automation and digitisation are transforming every stage of the manufacturing process.

## Choosing the right strategy

Companies, irrespective of their size and scale of operations, need to finalise a well-thought strategy and a roadmap that leverages Industry 4.0 interventions to remain competitive. But first and foremost, they need to understand what a smart factory would mean for them before investing. There are three common characteristics associated with smart factories -

1. They are connected, automated and have flexible digital shop floor processes.
2. They define new relationships between operators and machines.
3. They require a change in the structure and scale of the factory.

Technologies, like IoT, AI, advanced robotics, wearables and

3D Printing, are transforming what, where and how products are designed, manufactured, assembled, distributed, consumed, serviced after purchase, discarded and even reused. They affect and alter all end-to-end steps of the production process and, as a result, transform the products that consumers demand, the factory processes & footprints and the management of global supply chains. Most importantly, organisations need to collaborate with a leading IoT service provider with a proven track record of smart factory implementations in green- and brown-field & multiple digital transformation programs, preferably in India and abroad. The team of experts from the IoT service provider needs to be an integral part of the core team responsible from strategy to execution so that key learnings and best practices can be imbibed right from the beginning.

## Considerations for successful transformation

Many businesses are afraid of taking an unconventional road, exceptionally when they persuade their company to adopt new technologies. The common questions that swirl through their minds is – Is it essential for running my business? Can I afford it? Can I implement it correctly? What should we do if something goes wrong? A consistent, well-thought and practical approach to upgrade to new technologies is essential for any business. While it is true that the early adopters of the latest technologies enjoy the benefits of quick adoption and stay ahead in the competition, there is no need to rush and become a part of the mad race.

Consider these critical points for your business success before diving into technology adoption – carefully contemplate the ‘why’, ‘how’ and ‘with whom’ you would like to embark on the journey of tech transformation; have a close market watch for technology use cases and successes – what applies to others, may not be true for you; plan to balance your fast change with immediate needs – segregate ‘must have’ from ‘desirable’ and communicate the risk of the legacy system migration across the whole organisation and train everyone to embrace change. □

# “Ensure a handshake between data governance & management teams”



“Data governance is building a blueprint for digital transformation whereas data management is executing the strategy”

**Jhankar Dutta,**  
**Managing Director,**  
**B&R Industrial Automation**

What we do today will eventually ensure a better tomorrow. Today’s situation can be looked at as an opportunity to deliberate on and build concrete strategies for one’s digital transformation journey.

## Trends to adopt

During these tough times we witnessed most manufacturing organisations gearing up to adopt emerging trends, such as remote access to machines, lines, factories & processes, cybersecurity, data access & logging, predictive maintenance, business intelligence, energy monitoring, process & line optimisations, digital twin, batch size-one-production and mass customisation. AI, ML and virtualisation are the few trends which have attracted attention from various manufacturing organisations over the past few years even before the onset of the recent pandemic.

Those wanting to embark on their digital transformation journey should follow five basic steps while creating a roadmap. First, they should identify gaps in their existing processes & operations and the areas that could be digitised. Second, evaluate various technologies and understand what each next-generation technology solutions have to offer and the kind of problems it will solve. Third, make feasible studies and map these technologies against identified gaps. Fourth, prioritise technologies for implementation, which will be done with a prerequisite understanding of investment needed and what would be the perceived benefits, ROI and the estimated timelines for achieving returns. Last but not the least, choose a right automation and digitisation partner guaranteeing your success.

## Approach to technologies & essentials of transformation

The time required for technology to evolve has come down to a few months or years. Thus, it is impossible for any organisation to keep pace with these technology evolutions.

However, it is essential for any organisation to review their existing processes, identify gaps and try to bridge gaps in existing technologies with support. It is not wise to keep evaluating and not take any action on the implementation front. This will lead to a wider gap between companies and its global competition. It is similar to the situation in the vehicle market where the government took too long a time to move from BS-IV to BS-VI, skipping BS-V, which is evidently taking a toll on the entire ecosystem. Organisations trying to play the wait-and-watch game will be eventually faced with a similar scenario.

Data management and governance cannot simply sustain without the other, thus if organisations are working in silos, then they will have serious gaps in various implementation strategies. It is extremely important to ensure a handshake between data governance and management teams. If we take an analogy, data governance is building a blueprint or planning a roadmap for digital transformation whereas data management is executing the strategy. Thus, to get the real value of data it is essential for a seamless alignment between data management and data governance teams.

## Recommendations to avoid failure

The key challenge that remains for all is the right strategy, investment and resources needed for such a digital transformation journey. A long-term goal is no doubt important and needed but short-term goals and milestones too are equally important. It is important to celebrate each milestone. This not only gives a change to savour success and keep motivation high but also to look back & learn from mistakes, tweak strategy and move forward. In addition, it is necessary to overcome a conventional mindset and know that investments made will take some time to provide returns and be effective. □

# “Every crisis is a catalyst for innovation”



“Many digital initiatives fail because ‘change’ is assumed; ‘change’ has to be planned for and facilitated”

**Venugopal G,**  
**Head - Digital Advisory & Industry 4.0,**  
**Robert Bosch Engineering and Business Solutions**

Industry 4.0 is the future of manufacturing. Digital connectedness, both vertical and horizontal, is the way forward.

## Core trends of manufacturing

Automation, including industrial robots, Industrial Internet of Things, cloud computing and Artificial Intelligence (AI) with seamless Operations Tech & Information Tech (OT-IT) integration, form the core of the digital manufacturing landscape. There is a huge scope for evolving/niche technologies, such as 5G, 3D Printing, AR/VR, digital twin, drones and image analytics, in manufacturing. For distributed manufacturing, authenticity requirements & circular economy and blockchain are evolving as compelling propositions.

## Key factors for impactful transformation

Digital transformation needs to be contextualised for each organisation. The leadership commitment, tech & digital maturity, business priorities, surrounding ecosystem, risk appetite and cultural dimensions determine the path of each journey.

The big-bang approach can be risky, especially if it has many exploratory threads. A balanced approach with a quick proof-of-concept is strongly recommended with a ‘fail fast-scale fast’ mindset. Focus on digitalisation of what (domain or function) one is good at, especially if one does something that is not time-tested. Many digital initiatives fail because ‘change’ is assumed; ‘change’ must be planned for and facilitated. Celebrate not only the successes but also the failures to create an atmosphere of digital entrepreneurship in the organisation.

## Scaling during volatile times

Every crisis is a catalyst for innovation. Digital investments in safety & sustainability will occupy a significant wallet-share of the CEO’s/CDO’s budget allocation. Organisations need to invest in technologies to reduce reliance on human power wherever possible. ‘Light-out factories’ will become strategic to tackle future situations like this.

Strengthen investments in communication & collaboration

disproportionately and be creative in people-related processes. Any organisation’s future skill requirements will have a strong bias towards cognitive competencies. The fact is that you cannot hire these skillsets from outside. One needs to invest in their people to fill the gap and utilise the time now and be ahead of the curve. Data is the backbone of any digital transformation. Companies need ‘data experts’ at different levels – technical, domain, governance, security, architecture, etc. Identifying the ‘data value chain’ from its origin to consumption and often beyond is very critical. Many a time, non-availability of good/clean/useful data is an issue. It calls for a data strategy – it will include understanding the purpose & use of data, identifying the use cases, designing seamless data processes to avoid redundancy & duplication, designing the architecture for scalability & security and establishing governance (a data board for example) for data policy & review for continual improvement.

## Positives and recommendations

The pros of digital transformation in manufacturing are well evidenced, from cost reduction, productivity improvement, flexibility and throughput increase to enhancement in safety and sustainability that influence the intangibles about people & brand. Unfortunately, only about 5% of digital initiatives have been termed truly successful. Only half of the technology initiatives have fetched the targeted results. The main reason narrows down to people and digital adoption, from leadership to the operating team. A human-centric digital strategy is crucial for success. The fuzzy definition of digital will create confusion. Companies need to carve out their digital journey and play to their strengths. Digital often has an exploratory angle, and it demands a super-agile delivery model against classical technology programs. Lastly, one cannot do everything by themselves; it is important to build partnerships and tap into the larger ecosystem for complementarity and to share the transformational load, the risk and of course, the returns. □

# “Understanding of requirements is key to digital success”



“Implementation of digital initiatives require proper understanding and clarity in terms of requirements and expected outcomes”

**Manish Walia,**  
**Business Head (India) –**  
**Industrial Automation Solutions,**  
**Delta Electronics India**

## Technology trends moving into future

More and more manufacturing & process companies are adopting digitalisation with an aim to maximise profitability and flexibility. Going ahead, simulation in designs and operations is expected to gain momentum. Currently, top technologies are remote access and cloud connectivity — these play a vital role in the collection and analysis of plant data in real-time.

## Understanding the need for impactful investment

Today, digital technology is infused in every part of life, starting from online classes to enabling work from home. The manufacturing and process industry is no different and is heavily relying on digital technologies to streamline processes, increase productivity and ensure business continuity. When we talk about the OEM segment, the biggest ROI is coming from gathering the data from the machine and analysing it for machine diagnostics & troubleshooting purpose. For the manufacturing and process industry, digital technologies prove to be extremely helpful in reducing power and energy usage.

From the management’s perspective, one should look at the different simulations and the data of libraries for making the system/process more efficient. They should identify from these simulations & libraries the major actionable items for making their systems greener, smarter and as per the requirement, also making them more profitable.

## Approach to digitalisation

Necessity is the mother of invention. In the current scenario, the necessity is social distancing, which can be achieved with digitisation, as it empowers us to access the

data remotely. So, digitalisation is the need of the hour, and everything is moving towards it. Looking ahead, automation products and IoT will play a very important role in digital initiatives. At Delta, we offer automation products that start from the very basic level for factory automation, machine automation and process automation. The data can then be pulled by using gateways, cloud connecting devices and be then taken across the software. This ensures security and further transition.

## Data governance & security

With data access and availability becoming easier, ensuring their data remains, their property is emerging as a top priority for organisations. For governance, robust software and multiple level security is a must. For instance, we have software to calculate OEE, EMS for effective data governance. These software also help in addressing the issue of silos. Considering the automation segment, wherein machines, processes and controlling devices come into the picture, Delta software offers powerful security with a multiple password level protection.

## Pros & cons and recommendations

Everything comes with some pros and cons. However, with digitalisation, benefits far outweigh the risks. Digitalisation is advantageous for monitoring or reporting, which makes troubleshooting and diagnosis easier. The major reason for failure is not having proper understanding and clarity in terms of requirements and expected outcomes from digital initiatives. Because what we understand is what we implement. □

# “Modernisation of manufacturing is a must for increased productivity”



“The uniting of supremacy and productivity of modern factories, with the data and adaptability of software, is helping the manufacturing industry innovate”

**Sangram Kadam,**  
Vice President and Head (APAC & META),  
Birlasoft

Today, India is at an inflexion point where technology redefines business models, and manufacturing is no exception. Many new digital technologies will pioneer the manufacturing industry backed by the digital-first approaches.

## Trends of the future

As the manufacturing industry reinforces its path towards digitalisation, trends like the adoption of digital twins, 3D Printing, AI, Machine Learning, IoT and AR/VR are witnessing faster acceptance and implementation than ever before. A transformational vision towards Industry 4.0 and smart factories among the Indian manufacturing ecosystem will stimulate growth required for this industry and provide the impetus to stand the test of times.

As a result of the pandemic, many manufacturers needed to shift to a contactless, digital model and engage with their end customers digitally. Manufacturers needed to install business solutions that create superior digital experiences for their customers and ecosystem.

With a sudden change post the lockdown, the companies now needed to invest in a new set-up that addresses the present challenges. They will need to pivot and adapt to market turbulence, downturns and unpredictability.

The uniting of supremacy and productivity of modern factories with the data and adaptability of software is helping the manufacturing industry become a platform for innovation. Software applications, like Manufacturing Executive Systems (MES)/smart manufacturing, provide manufacturers with agenda, planning, tracking, analysing and capabilities to control the manufacturing operations, thereby giving real-time updates on the shop floor and speeding up the issue of redressal mechanisms.

## Reinventing to stay ahead

Manufacturing companies need to realise the role of

digital transformation to reduce cost, increase productivity and efficiency of employees in this era. They need to speed up the adoption of technology on the shop floor and help create India as a global manufacturing hub. As we overcome the global pandemic, it is crucial to make India a nation and its key industries self-reliant. The modernisation of manufacturing and infrastructure sectors is a must to speed up productivity. Technology investments across them must also accompany this.

It is time to reinvent the country as a destination for innovative solutions that support engineering design and create hubs supporting local innovations at different levels. Governments are also supporting the industry by bringing in initiatives like Make in India, Digital India and Aatmanirbhar Bharat.

## Recommendation for successful transformation

Today, companies across sectors are rushing towards adopting digital technologies. Instead of racing to adopt the latest technology, companies primarily need to look at the business model first and then acquire the capabilities, skill sets and employees needed to create that change.

Although most companies and executives know how important it is to evolve with technology and create digital processes and solutions, implementing it in the entire ecosystem is a different story. Many businesses have faltered in correctly adopting their digital transformation goals.

Firstly, companies should implement these technologies on a smaller scale before going the full mile. Secondly, for a successful digital transformation, the intent and ideology need to be deeply integrated into the company's fabric. Lastly, businesses should invest in training their employees to learn and use these digital technologies effectively to reach business goals primarily.

Overall, technology is rapidly changing, so companies need to be agile enough to adapt new-age technologies into their processes to usher in a truly digital era. □

# “Start with business objectives and look for incremental benefits”



“The key is, be consistent, build incrementally and execute limited scope with speed”

**Anand Parameswaran,**  
SVP & Global Business Head,  
Cyient Digital

Digitalisation’s true value lies in our ability to reimagine how to solve critical business problems across functions, systems and processes. And while every domain will have its nuances around product, platforms and applications, digital technology itself is sector-agnostic.

## The trends envisioned

We foresee continued evolution of the following trends driving adoption of Industry 4.0 -

- **Digital twins:** A virtual replication of equipment and processes created with the help of AI/ML, simulation and modelling, digital twins can be used to monitor assets remotely. It improves asset management, enables predictive maintenance and optimises operations & utilisation.
- **Smart manufacturing:** Powered by sensor technology, the convergence of IoT and 5G will turn connected machines into smart factories. This will pave the way for smart manufacturing that could improve operational efficiencies and enable new functionalities.
- **Intelligent supply chain:** Integrating supply chain with factory, including warehouses and material 'on the move', provides better visibility and traceability of inventory. This enables the use of methods like inter-modal logistics, which add incremental value at different points in the product lifecycle.

## Staying ahead in the technology race

The key is to start with problems/opportunities for business transformation for those starting on their digital journey. Ask yourself, “what disruption in the industry/company’s value chain will provide a significant advantage or differentiation over

the rest?” or something as basic as, “what are the three things in my business that I want to improve?” and then identify how digitalisation can help you get there.

The other thing to remember is that digital technologies are evolving at a breakneck speed; what seemed futuristic in 2019 is either a commonplace or obsolete. So, companies need to acknowledge that some of their investment will become outdated & will need a constant refresh, and a few others may not yield the desired result. However, consistency and discipline in technology investment are important because the risk of inaction is far higher than the risk of making some mistakes.

## Suggestions to win at digital transformation

It is advisable to always start with business objectives and look for incremental benefits or improvements. And as powerful as technology is, it is also unpredictable because, with the proliferation and democratisation of technology, one never knows what new technology is around the corner. Take inspiration from the 8<sup>th</sup> law of Peter Senge – ‘Small changes can produce big results – but the areas of highest leverage are often the least obvious’. The key is, be consistent, build incrementally and execute limited scope with speed. It is far more effective to iterate after three months of adopting a solution, as against spending three months on visioning, discovery and roadmap exercises to launch a ‘perfect’ solution.

Another thing is to have realistic expectations and anticipated outcomes. For example, out of 10 investments, three or four will yield moderate results, one or two will yield significant benefits, and the rest may not be as effective. What matters at the end of the day is to learn consciously to increase the overall success rate. □

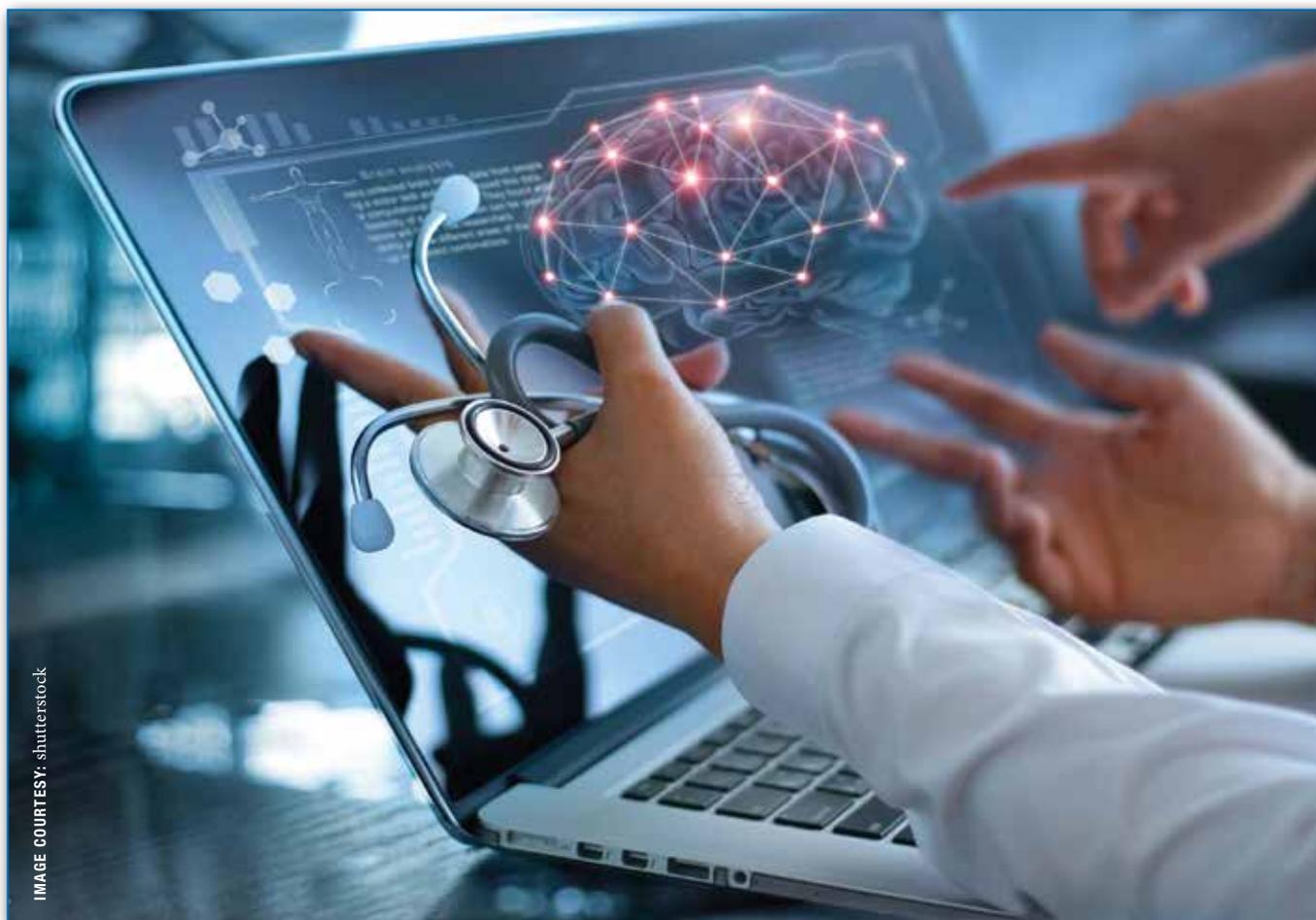


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## A leap in faith for healthcare 5.0 - Automation interventions for national health policy 2020

Based on a survey conducted by EY and Imperial College of London's Institute for Global Health and Innovations, India witnessed one of the highest adoptions of digital technologies in healthcare and services. The article explains how, in amalgamation with the National Education Policy released last year, the healthcare game can be transformed.



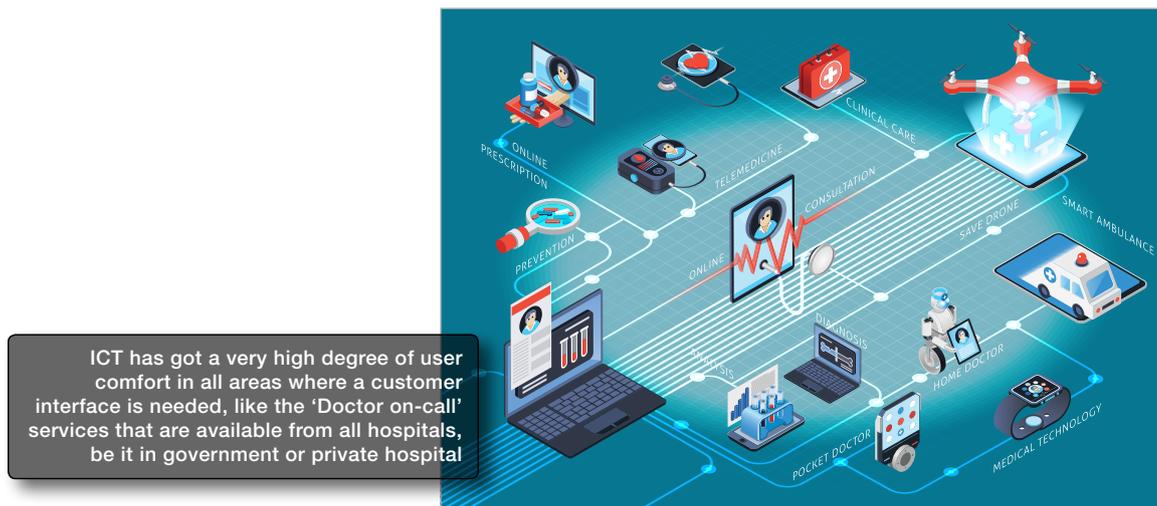
Ramani Iyer,  
District Vice-President  
(2017-2018),  
Asia Pacific District 14,  
International Society of  
Automation (ISA)

‘According to a survey focused on the US, UK, Australia, UAE, India and Italy, India witnessed one of the highest adoptions of digital (read automation) technologies in healthcare and services. In the survey conducted by Ernst & Young (E&Y), in association with Imperial College of London's Institute for Global Health Innovation (IGHI), India reported a threefold increase in the number of people using online consultations.

The objective of the study was to gain insights into how several Health and Human Services (HHS) providers have unlocked the power of digital (and automation technology) to

redesign services and deliver effective & focused solutions, which led to better outcomes for citizens and patients.’

‘The global education development agenda reflected in the Goal 4 (SDG4) of the 2030 Agenda for Sustainable Development, adopted by India in 2015 – seeks to ‘ensure inclusive and equitable quality education and promote lifelong learning opportunities for all’ by 2030. Such a lofty goal will require the entire education system to be reconfigured to support & foster learning so that all of the critical targets and goals (SDGs) of the 2030 Agenda for Sustainable Development can be achieved.’



## The National Education Policy 2020 & healthcare

The New Education Policy 2020 announced by the Government of India envisions a new and forward-looking perspective for India's Higher Education. In particular, healthcare education has found a focus so that the duration, structure and design of the educational programmes match the role requirements that graduates will play. Students will be assessed at regular intervals on well-defined parameters primarily required for working in primary care and in secondary hospitals. The need for a comprehensive and inclusive healthcare and services ecosystem, which enables affordable healthcare, is the basic building block of a developing economy. All the developmental investments for a five trillion economy will come to a nought without a healthcare infrastructure. It is in that context we must address the various areas of the healthcare ecosystem and education policy.

We need to accept that technology and innovation are so highly pervasive that they get quickly integrated with any product or service introduced in the marketplace. The integration is driven by competitive market-driven forces. A good example is the Pulse Oximeter, which has brought blood oxygen saturation levels and correlated pulse measurements literally to the fingertip. A simple calorimetry principle gives you the result in 20 seconds. A typical CT Scan/MRI instrument uses high degrees of new techniques and IT software to produce an easily readable summary of the body condition. The use of newer technologies for measuring basic body parameters and integrated software is highest in medical electronics & diagnostics.

## Healthcare transformation with technology intervention

A fascinating aspect of evolutionary-nee-revolutionary changes that we see in the adaptation of practices is in the technology use, be it from internationally available sources or use of local ingenuity. These developments are continually impacting the healthcare scenario, be it for services or products. These cover all areas of society, including government. The earlier 'source code' barriers have all broken down. The e-office, built on open architecture, is used by over 65 government departments. As said by a senior government officer, "Today, working in the government is not like delivering things in six months. It is about delivering things tomorrow".

An example is the Aarogya Setu app, which enables one to view the COVID situation around them. It will give one a self-administered test about their health condition vis-à-vis COVID infection and provide all the contact information to seek help. Ever since it was introduced a year ago, it has seen 17.8 crore downloads. The CoWin website is amazing; it informs one with every bit of information that one needs to know. With a simple set of instructions, the CoWIN website enables anyone anywhere to fix an appointment for a COVID vaccination in any part of India in real terms. Aarogya Setu and CoWIN are fine examples of automation at large.

There are three domains where automation technology use is bringing a remarkable difference to healthcare services. Firstly, in the direct user interface through ICT. It has got a very high degree of user comfort in all areas where a customer interface is needed, like the 'doctor on-call' services that are available from all hospitals, be it in government or private



Behind-the-scenes, large chunks of valuable insights, data generation is happening, and with new world tools, like AI/Machine Learning, simulation, etc, it is leading to new inventions and newer technological breakthroughs

hospitals. Secondly, in the behind-the-scenes operational area of diagnostics, consultation, treatment, medicine delivery and use of advanced medical devices, there is a widespread use of automation. Even areas like insurance cover, claim settlement, etc, cashless treatments are highly automated.

And in the third area, behind-the-scenes, large chunks of valuable insights, data generation is happening, and with new world tools, like AI/Machine Learning, simulation, etc, it is leading to new inventions and newer technological breakthroughs. The insights that have surfaced in SARS-CoV-2 virus strains & mutants are available to the scientific community nationally and internationally. This is a potentially high knowledge growth in the completely new domain.

But healthcare has seen limited use of AI. Except for Artificial Neural Network (ANN)-based classification of diagnostic images, the current wave of AI is yet to touch core healthcare delivery, such as patient monitoring, identifying diagnosis, patient treatment planning, etc.

## Technology use and integration

India is a global leader in information and communication technology and in other cutting-edge domains, such as space. While education will play a critical role in this transformation, technology itself will play an important role in the

improvement of educational processes and outcomes; thus, the relationship between technology and education at all levels is bidirectional.

Given the explosive pace of technological development allied with the sheer creativity of tech-savvy teachers and entrepreneurs, including student entrepreneurs, it is certain that technology will impact education in multiple ways, only some of which can be foreseen at the present time. New technologies involving AI, Machine Learning, for student development and other forms of educational software and hardware will not just change what students learn in the classroom but how they learn, and thus these areas and beyond, will require extensive research and extensive user trials both on the technological as well as educational fronts. The skillsets graduates gain by being exposed to healthcare challenges will increase roles in quality checks, data checks, interpretation for predictive analysis, simulation study using live data, security systems, forecasting and data security.

There is no denying argument that ICT/automation technologies and the focus on healthcare education together will propel the NEP 2020 to its prophecies for an exciting future for India. □

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**EM** – the only industrial magazine in India that offers a three-dimensional perspective on technology, market and management aspects of manufacturing

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## About us

Katlax is the technology center for circular connectors, cordsets and wiring harness. The company designs manufactures and markets circular connectors in sizes M8 and M12, the company also develops, configures, and produces customer-specific cabling systems, harness, splitters, adapters, IO Junction Boxes and others cabling solutions.

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## Digital transformation in chemical industry

The chemical industry has caught up with digital technologies, where there are umpteen uncharted possibilities to expand outputs to help companies design original products and developments. The article discusses the digital transformation roadmap, how chemical companies are leveraging industrial internet technologies and how some chemical companies have applied industrial internet technologies for solving more intricate issues.



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The chemical industry is highly diverse. The industry is also highly regulated as it deals with substances that may be hazardous & toxic and production processes that are polluting and susceptible to catastrophic accidents. Additionally, the manufacturing process, which may involve a complex combination of reaction, distillation, extraction and such other operations, needs close monitoring and control, not only to ensure that operations are efficient & productive, but also to address the environment, health & safety concerns, traceability issues and compliance requirements.

Because of the nature of the production operations one encounters in a chemical plant, often it becomes necessary to select the optimal operating conditions so as to reduce waste & energy consumption and maximise profits. Also, it is not uncommon for the quality of the final product to vary from one

batch to another. Therefore, a chemical firm inherently is on the lookout to generate additional production & operational data and analyse them to uncover patterns and gain valuable insights, which can then be used to make better & speedier business, production and operational decisions.

It is no wonder therefore, to find companies in the chemical sector seeking ways to transform their business and production processes & operations, so as to increase efficiency & revenues, drive growth, become more profitable and enhance shareholder value & customer satisfaction. At the overarching level, they aim to realise these goals by focusing on improving overall productivity, efficiency and their agility to adapt to the market dynamics & enhance customer experience. At the granular level, their objectives are to improve plant availability, reduce waste generation & energy consumption and such others.

What contributes to the success of the company's efforts in achieving transformation is its ability to capture information, contextualise, analyse & share the same among stakeholders and use the same in decision-making



What contributes to the success of the company's efforts in achieving transformation is its ability to capture information, contextualise, analyse & share the same among stakeholders and use the same in decision-making.

## Digital transformation and industrial internet technologies

Digital technologies/industrial internet technologies are excellent tools for data mining and, therefore manufacturing companies deploy them to achieve desired changes. The methodology that involves the use of industrial internet technologies to bring about changes effectively & comprehensively in a company's business and production processes & operations is digital transformation. Through digital transformation, a company aims at achieving the desired goals.

Industrial internet technologies facilitate data or information to be generated, collected and analysed cost-effectively & efficiently. These technologies also help the sharing of information among different applications, databases, automation systems and enterprise solutions, without having to adhere to the traditional hierarchical architecture for information flow. Manufacturing companies, by using these technologies, can comprehensively marshal and analyse data/information and generate business intelligence & insights. Often, a combination of industrial internet technologies is used in conjunction with traditional industrial automation systems and enterprise solutions, such as the distributed control systems, enterprise solutions planning, etc, for achieving the objectives of transformation. Digital transformation is a prerequisite for a company to make a transition from the third era and become future-ready for the fourth era of industrialisation.

When a physical entity in the value chain is embedded with internet connectivity enabled sensors, it becomes a cyber-physical system or Industrial Internet of Things and gets vested with the ability to generate information & share the same with other cyber-physical systems, including on-premise & cloud

computing resources. When embedded with edge computing, the physical entity gets empowered to process data that demands lower latency and faster responses. While the internet empowers communication capability, cloud computing enables more complex tasks associated with the physical entity to be performed. Internet-enabled and networked cyber-physical systems and computers can efficiently & cost-effectively collect, process, analyse, share & store massive amounts of information. Data analytics helps companies examine the real-time or historical set of information to uncover patterns & relationships and thereby, extract valuable insights from them. While descriptive analytics helps study information to describe what is happening, predictive analytics forecasts what will happen under a set of conditions. Artificial Intelligence technology, with its cognitive capabilities, helps predict potential outcomes under a set of plausible conditions; hence, it can be useful for problem-solving and decision-making. Digital twin technology is another powerful tool that can be used to create a digital representation of a physical object, such as a turbine or a boiler; with its help, one can imitate the working of the physical object so as to study & improve its performance. Augmented and Virtual Reality technologies can be of great use in training people and impart industry-specific knowledge in operational procedures and health & safety requirements.

## How chemical companies are leveraging industrial internet technologies

Industrial internet technologies offer opportunities for a chemical company to digitally transform many of its production, operational and business processes. While some companies adopt a 'big bang' approach while pursuing transformation others take a 'step-by-step phased' manner approach with proven applications acting as guideposts.

Many chemical plants still have local panels for ancillary equipment such as compressors & pumping stations, and many valves that are manually operated. With the help of these



Companies operating the chemical sector are leveraging industrial internet technologies and have taken the path of digital transformation to effectively & comprehensively evolve their business

technologies, some of the manually or locally operated equipment/devices can be cost-effectively connected to the central control room so that they can be monitored, shut down and opened remotely.

Typically, ancillary equipment is periodically inspected and maintained, involving downtime & loss of revenue. Some companies have embedded some of the critical pumps and compressors with internet-enabled sensors, edge computers etc, that sense and process parameters, such as mounting frame vibration, alignment and temperature of a pressure-packing case & bearing and communicate the information to the cloud. Using the analytics software that resides in the cloud, the performance of the equipment such as the pump/compressor is monitored to detect its deterioration and foresee possible failures. Based on the information generated and its analysis, plants decide on whether and when maintenance needs to be scheduled, what kind of work needs to be done on the equipment etc. Through predictive maintenance, companies save time & money and eliminate unnecessary work that results in enhancing the plant's profitability & performance.

On similar lines, some companies are gathering control valve related data with the help of smart positioners for diagnostic & predictive maintenance purposes and for studying control valve response characteristics. If data from the control valve's smart positioner are accessed, friction analysis can be done to determine the amount of friction present in the valve assembly that can make the valve more difficult to travel. Air consumption analysis can reveal whether the valve assembly is using an excessive amount of air. Excessive air usage can be caused by wear or damage to the pressure retaining portions of the actuator assembly and/or to the instrument tubing. With wireless vibration or acoustic transmitters embedded at the right locations on a control valve assembly, a centralised monitoring system can gather data and perform trend analysis to assess the possibility of leaks. Such IIoT-enabled applications can result in improving the performance & uptime of control valves and their failure reduction & reliability improvements. Based on the

analyses, one can determine proper maintenance scheduling.

### Addressing more intricate issues

Some chemical companies have applied industrial internet technologies for solving more intricate issues. According to a McKinsey article, "Using advanced analytics to boost productivity and profitability in chemical manufacturing," one specialty chemical company was having problems in its furnace in the production line. It undertook an advanced analysis of the data the furnace's sensors had collected over 615 days of production, comprising 600,000 samples, each with 63 tags. The analysis helped the company identify critical throughput drivers and made it possible to build a model of the production process. The model quantified the interdependence of key variables, where the company had previously only been able to see qualitative correlations, and this provided a more accurate understanding of the process; a test run of the furnace confirmed the model's findings.

### Digital transformation roadmap

Companies operating the chemical sector are leveraging industrial internet technologies and have taken the path of digital transformation to evolve their business and production processes & operations effectively & comprehensively for marketplace success. The company that wants to take the path of digital transformation has to draw up its own roadmap driven by its objectives and priorities. Industrial internet technologies are ready for deployment, especially for applications where the availability criterion of the technologies is not critically important. The way forward for a company is to begin the journey by identifying areas that hold significant payback potential and take the path of digital transformation. It has to set achievable milestones, with each milestone having a specific objective, pursue them, evaluate the achievements, make course corrections as the journey continues, and set new objectives and pursue them. □



## 80 GHz: High frequency level measurement

Changing media, as well as process pressures and temperatures, characterize the typical reaction processes in the chemical industry. Thanks to precise signal focusing, the VEGAPULS64 maintains maximum performance in complex liquid processing vessels with agitators or other

internal components. And its very small process fittings also make it suitable for compact vessels. The level sensor is ideal for continuous measurement of any liquid in the pharmaceutical and chemical industries.

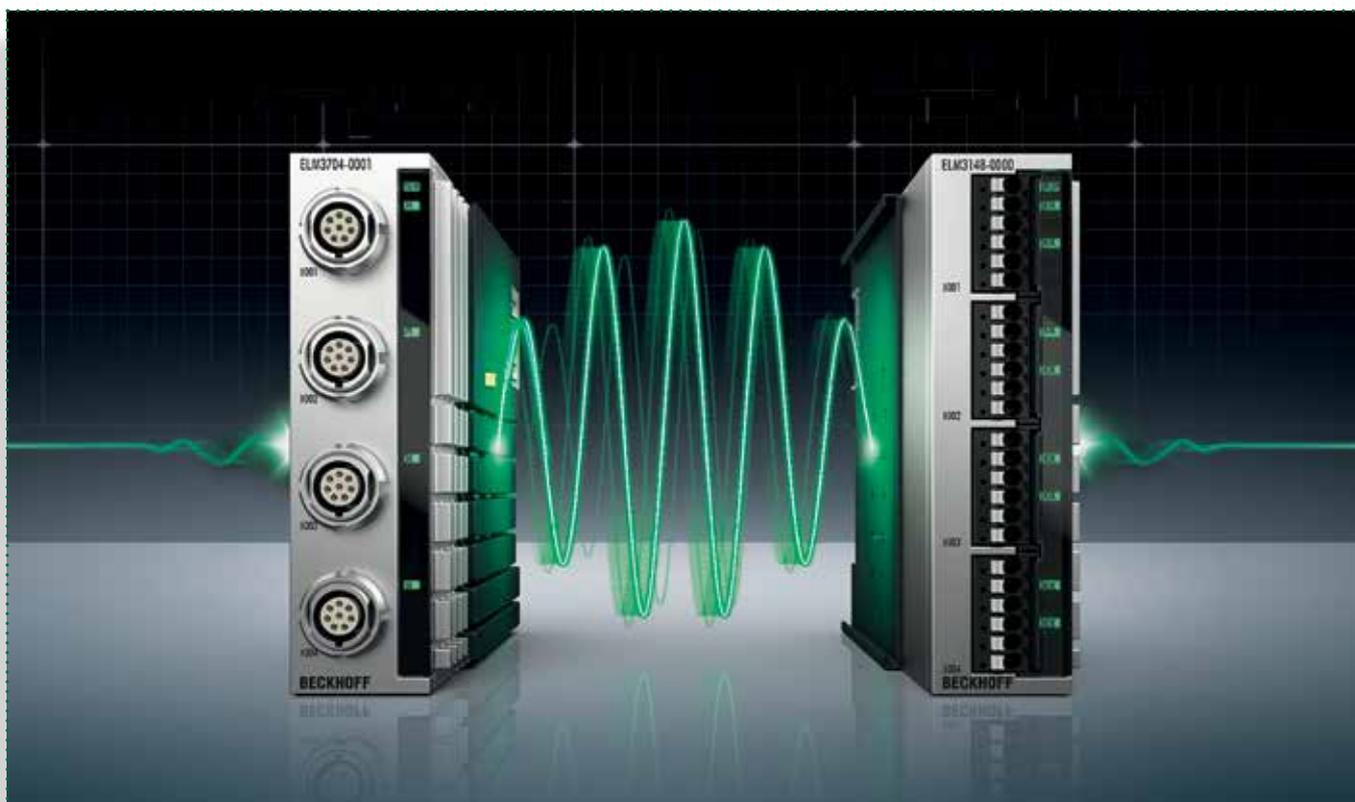


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Looking Forward

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## System Integrated measurement technology benefits machine builders

The mechanical engineering sector is constantly working to find ways to optimise machinery, improve machine availability and minimise fluctuations in production. Integrating high-performance measurement capabilities into control systems can help initiate new development approaches that overcome performance limitations once considered insurmountable. The article finds out how the new economy line of EtherCAT measurement modules open up this path to innovation for an even broader diversity of machinery.



Martin Podrouschek,  
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Beckhoff

Programmers and engineers looking to advance machine development often run into at least one technological hurdle at some point or another that stalls further performance gains. The problem areas can be many and varied – physical as well as electrical – and they broadly affect all the machines of a given type, even from multiple vendors. The key question is how machine planners can deal with these challenges they are faced with. When it comes to controlling machines in a closed-loop or gaining greater visibility into machine processes, the EtherCAT measurement modules from Beckhoff offer a right-fit solution by allowing high-performance measurement technology to be incorporated directly into the control systems.

Integrated measurement technology benefits machine builders and users in various ways over the entire lifecycle of a test or production machine. Examples include:

- During first-time commissioning, installation troubleshooting and process fine-tuning
- During operations, to monitor operating sequences and production quality, measure vibration, monitor power, check results and predict the need for maintenance
- In maintenance, to verify that the work carried out has achieved the intended outcomes

In all these cases, measurement technology adds value by delivering insights gained from carefully planned measures to



achieve greater visibility into the machines' inner workings. But for this to succeed, measurement applications must be planned from the outset, during a machine's conceptual design phase. After all, if there are no sensors in place to measure something, either directly or indirectly, no measurements can be made. Only users who are thoroughly familiar with a given process can make informed decisions on the whereabouts; it would make sense to take measurements within a machine. That said, novel types of measurements can also produce surprising new findings that allow processes to be optimised further.

### Economy line modules open up a wide range of applications

The 1 ksps economy line of EtherCAT ELM measurement modules is the second category of integrated measurement technology to be released by Beckhoff. The basic ELM3x0x line rolled out previously, with sampling rates of 10 to 50 ksps per channel & an accuracy of 100 ppm, is designed to support highly dynamic measurements – rapid sequences of movements, load reversals or alternation of the kind that often occur on test rigs and benches. The same terminals can provide compelling insights into processes in high-speed production machines as well.

However, many production processes do not require such fast sampling rates. This is why the new ELM314x economy line with 1 ksps per channel was developed. It fits perfectly with the movement sequences of mechanical machinery yet offers the same capabilities and works exactly the same way with TwinCAT software. Plus, there is the compatibility advantage as well. So, for example, if a machine should become substantially faster at some point in the future, the EtherCAT measurement modules can simply be replaced with faster ones

with minimal effort, and measurement can continue as before.

The new ELM314x economy line currently comprises 2, 4, 6 and 8-channel variants. The modules allow high-precision measurements with 100 ppm accuracy over a wide temperature range, at low per-channel costs and can process analogue signals in the ranges from  $\pm 1.25$  to  $\pm 10$  V, from 0 to 10 V, from  $\pm 20$  mA and from 0/4 to 20 mA.

### Measurement modules with diagnostic capabilities

The ability to monitor and diagnostically analyse measurement performance is of key importance for any user. This applies not just to machines operating continuously but also to test rigs that need to run over the weekend and even short-term testing tasks. Cable breakage, short circuit, overheating and disruptions to the power supply are just some of the issues which, at best, might cause an interruption of the measurement process and, at worst, falsify the measurements recorded without being noticed. Measurements of the kind taken unattended, deep inside production machinery, must therefore be able to anticipate such faults from the outset and report them reliably in the event that flawless measurement results can no longer be obtained.

### Making the most of EtherCAT's advantages

The fast, high-precision measurement modules benefit from the field-proven EtherCAT capabilities, which are ideal for industrial measurement systems:

- The transfer rate of 100 Mbit/s is sufficient for several 100 analogue channels, each with a sampling rate of 10 ksps
- The distributed clocks system, which allows synchronised data capture on a large number of channels and terminals,



EtherCAT measurement modules, including the new ELM314x Economy line, can be used to seamlessly integrate high-end measurement technology into control systems.

at long distances, with an accuracy of up to  $\pm 100$  ns

- The proven, consistent parameterisation of EtherCAT slaves via CoE and data transport via PDO is already familiar to the users

Given that PC-based control technology has always been used to equip even extended plants with EtherCAT, the current portfolio not only incorporates measurement terminals and the means to implement TwinCAT functionality, but also includes numerous EtherCAT infrastructure components spanning the entire measurement chain. The latter include the following: optical transmission equipment, such as couplers & fibre-optic media converters, for environments with a high EMC load; the CU2508 family of port multipliers for parallel EtherCAT data streams require transmission rates in excess of 100 Mbit/s and couplers with ID switches to support flexible topologies and in general, the fault-tolerant redundant EtherCAT cabling.

## Measurement technology & simulation

In many fields, computer-aided simulation is used to trial wide-ranging ideas in advance, thus reducing subsequent testing time, effort and expense. It can be highly worthwhile, especially with the kinds of complex systems that cannot be tested extensively in advance. With systems like these, a simulation may be the only viable way to find the right approach to a solution. It can also help to identify the best locations for sensors within a machine or, alternatively, show that certain sensors could be left out if the information they would provide can be obtained by other, possibly indirect, means.

This might sound as if measurement technologies could become redundant in the long term. Doubtless, simulations can be run under a wide range of repeatedly changed starting conditions and save a lot of time. However, the fact remains that applications must always be tested, time and again, against real-life conditions as well. A simulation model has to be compared

repeatedly with how the actual machine it represents behaves. Precise measurement data obtained from the machine itself showing actual timings and quantities is essential. Without this feedback, the model would evolve in isolation and any simulations run would produce unrealistic results. High-quality, built-in measuring technology ensures a steady flow of information from the machines, and the various measurement channels, if set correctly, provide exactly the control data needed to refine the simulation model.

High-quality measurement data is also crucial in another, entirely different field of application where a virtual world and real-world data are combined: hardware-in-the-loop testing. Here, tests and measurements are conducted on a device, and the data collected is fed back into a test model in real-time. If incorrect measurements, dynamic inaccuracies or deviations occur, testing is no longer possible. HIL tests of this kind are now performed on many production machines, and this calls for measurements to be conducted under production conditions, with short cycle times. These are genuine high-speed measurement tasks where precision is essential.

## Future proofing production & machine

Looking ahead, the emphasis placed on equipping various types of machines with measurement technology may shift as machine vision systems and advances in sensor technology give rise to new solutions for new requirements. However, continuous measurement in some form will always remain part of the process. Beckhoff, with its EtherCAT measurement modules in general and the new ELM314x economy line in particular, has successfully introduced a valuable class of component to electrical measurement technology that serves this purpose well. With the addition of machine vision technology to TwinCAT, optical measurement is becoming increasingly important, too. □

To read more, visit: [www.beckhoff.com/measurement-modules](http://www.beckhoff.com/measurement-modules)



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## Bounce back in a year of surprise: Changing connectors market during COVID-19

COVID-19 has amplified the importance of technology and digitalisation by manifolds. Every given industry has or is adapting to the digital changes and moving on. The article explains the changes incurred in various sectors and trends to look out for and adapt to.



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The COVID-19 pandemic has graphically illustrated the importance of digital networks and service platforms. Imagine the ‘shelter in place’ reality we would have experienced at the beginning of the 21<sup>st</sup> century, only two decades ago: slow internet and nothing like Facebook, WhatsApp, Zoom, Skype or Netflix.

The examples below are just a few of the seismic shifts occurring in communication, interaction and collaboration over the past few weeks:

- Healthcare is quickly moving toward telehealth vs in-person visits when possible
- Schools and universities are now conducting coursework online so students can continue to learn at home

- Many companies are now supporting hundreds or thousands of new remote employees
- Dorms and hotels are being transformed into makeshift isolation or patient areas that require new types of connectivity

We’re ordering groceries online, streaming more HD content as we self-isolate and even celebrating birthdays and anniversaries from afar. Without physical and face-to-face contact, connectivity naturally accelerates – more by force than by pleasure. In the span of a few weeks, social distancing has led us to rethink and change how we live day by day.

Once things begin to return to ‘normal’, it is likely that some of the new habits we created out of necessity during this

In order to take full advantage of this connectivity, however, one needs a network and cabling infrastructure in place to support it



pandemic will lead to changes moving forward, too. This global emergency has given us the opportunity to discover – and re-discover – the advantages of the digital world.

In order to take full advantage of this connectivity, however, one needs a network and cabling infrastructure in place to support it. We have pulled together a few examples of how technology usage is rapidly changing specific markets.

## Enterprises

In workplaces, telecommuting became more prevalent nearly overnight. Employees who were used to traveling to an office every day have begun to complete their work from home. Frequent travellers are learning to conduct business in new ways.

This sudden shift to remote work and no travel has increased data demands significantly. Instead of attending in-person meetings, for example, workers are relying on platforms like Zoom, Skype and Teams to communicate and collaborate.

## Healthcare

To encourage social distancing and keep people safe, many healthcare organisations are encouraging patients to use telemedicine to communicate with clinicians when possible instead of coming in for appointments.

Online healthcare consultation requires an infrastructure that can support the tools needed for success. Healthcare networks not only need to be able to support high speeds and more bandwidth as they dive into telemedicine but also ensure secure connections.

## Education

Students and teachers have had to quickly adapt to learning and teaching online instead of communicating face to face in classrooms. Just as with enterprise usage, this shift to online communication and collaboration has boosted the use of video conferencing platforms in education.

## Connector industry shows bounce back

The connector industry has historically reflected significant world events, and so it came as no surprise that electronics suppliers, along with many other businesses, experienced a jolt at the beginning of the global pandemic. However, 2020 ended up being a year full of surprises before COVID-19 closed factories in China. By March, however, as key economies, like China and the US, went into lockdown, it was clear that we would need to update that forecast.

April, May and June proved to be challenging months, with worldwide connector industry sales declining in the double digits. By September, though, sales had once again moved into positive territory, and in October, the industry recorded the highest year-over-year growth since 2018.

Fortunately, the industry proved to be even more resilient than any of us had anticipated, and the fourth quarter of 2020 proved to be outstanding, recording the highest quarterly sales in connector industry history.

## Trends

While many new-age technologies have been around for



To take full advantage of the connectivity, one needs a network and cabling infrastructure in place to support it

some time now, we must remember that technology is constantly evolving. Below are a few trends expected over the next year.

- 2020 saw the adoption of contactless technologies, such as digital payments, facial recognition, online education and other smart devices, on a huge scale. The current pandemic has acted as a catalyst in bringing about the next wave of digital transformation, and contactless technologies will continue to pave the way for a contactless society at a macro level.
- Artificial Intelligence (AI) will become more prevalent than before. Coupled with Machine Learning algorithms, huge chunks of data and crafting out successful plots from the same will be seen through it.
- The electronic and semiconductor fraternity is of the opinion that IoT will reshape the industry in the year 2021. In fact, the coming year will likely see the evolution of IoT from mere Internet of Things to Intelligence of Things through the integration of AI.
- In the automotive sector, the emergence of safety sensors in cars should continue to grow, and with the current pandemic, vehicle automation will be one of the key focuses
- The rise of IoT, autonomous vehicles, smart devices ecosystem and 5G, have highlighted the need for greater focus on edge computing
- Secure and seamless wireless technologies, such as Ultrawideband and Near Field Communication, will continue to run the show over the next year as well

Here is the list of few digital marketing trends one can use:

### 1. Mobile optimisation

There is more mobile than any time in recent memory, yet desktop transformation rates are practically twofold of what they are on versatile stages. This is the ideal opportunity to put resources into another mobile site assembled with user-accommodating organisations. Dynamic web applications, for

instance, can give one's image's site application, like speed, moment logins and consistent page transitions. The coronavirus has a great impact on online business.

### 2. Artificial Intelligence and Machine Learning

AI-controlled tools which explain differently will provoke identified investigations revealing client experience upgrade, giving a fast reaction to the client's inquiries. A prescient investigation will help entrepreneurs in dynamic situations. Information will be dissected and utilised for battles dependent on AI examples & projections.

### 3. Social media

One should utilise his/her social media channels to stay up with the latest with his/her business. Companies can make posts informing clients whether they are open or not, in case they are taking on the web requests or offering take-out or essentially protecting themselves and their representatives. By and large, simply being dynamic online is encouraged. On current occasions, remaining effective with one's crusades is likewise striking. It promptly catches the crowd's consideration and makes an increasingly normal purchaser commitment open door for the brand.

### 4. Create interesting content

Advertisers are not exclusively putting resources into employing individuals with an inventive curve of the mind to support them. They are, in any event, putting resources into making content as the neighbourhood, as could be expected under the circumstances. They are likewise utilising various mediums like plain content to workmanship to liveliness to video and so forth and attempting to make the substance as fascinating as possible. Indeed, an ever-increasing number of advertisers are quick to understand that content assumes a key job in getting the creative mind of clients. □

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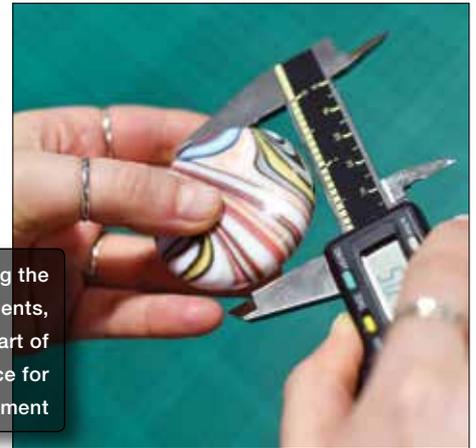
## Making ideas real

Quadpack, a global manufacturer of packaging solutions to the beauty industry, has been keen on increasing innovation through core research & development. To reach the goal of constant innovation, they adopted the Stratasys J750™ 3D printer. The case study elaborates on how the printer helps Quadpack create ultra-real prototype in real-time and in a cost-effective manner.

Founded in 2003, Quadpack is a global manufacturer of packaging solutions to the beauty industry. One of Quadpack's long-term business goals is to increase innovation through enhanced research & development. Coupled with this is the goal to increase the time-to-market for its clients. To achieve these goals, the company recently expanded its design team to create the Design and Advanced Technologies department. In a step aimed at increasing innovation, Quadpack purchased a Stratasys J750™ – the world's only full colour, multi-material 3D printer – from local Stratasys partner Tri Tech 3D. The 3D printer is now at the heart of the Design & Advanced Technologies department. Much of the work on the J750 involves testing new ideas using three types of models. First, Quadpack develops prototype models for new references in its Q-Line range of beauty packaging solutions.

The company also develops samples for clients who need bespoke models. As the team gets closer to production, whether for custom projects or its own product range, it manufactures trial moulds to test designs prior to the full-scale production. "Having been limited on the colour, materials and production time with our previous 3D printer, we bought the J750 because we needed greater speed and flexibility to produce the three types of models we use," explained Jeremy Garrard, Director - Design & Advanced Technologies, Quadpack industries and continued, "Its unique full-colour, multi-material capabilities give us the freedom we need to test new ideas with ease. The early stages of design and development are also vastly accelerated. Once a concept is ready to be developed into a product, it all moves at great speed – we create a 3D model, test it using a 3D printed trial mould and we're ready for the full scale production. The ability to

The high-quality 3D models produced using the J750 are helping clients' custom developments, offering improved visualisation as part of Quadpack's design-to-delivery service for better early-stage development



address all these areas of design and production with one 3D printer makes for a much better return on investment. When it comes to 3D Printing, as far as we're aware, no one in our industry has a 3D Printing capability as cutting-edge as ours."

### Advanced ultra-realistic prototypes aid client visualisation

In workplaces, telecommuting became more prevalent nearly overnight. Employees who were used to traveling to an office every day have begun to complete their work from home. Frequent travellers are learning to conduct business in new ways.

This sudden shift to remote working and no travel has increased data demands significantly. Instead of attending in-person meetings, for example, workers are relying on platforms like Zoom, Skype and Teams to communicate and collaborate.

### Healthcare

Offering greater design freedom when testing new ideas, the J750 has had a knock-on effect on the company's ability to create innovative new products for its Q-Line portfolio. The high-quality 3D models produced using the J750 are also helping clients' custom developments, offering improved visualisation as part of Quadpack's design-to-delivery service for better early-stage development. "The J750 is key to achieving faster time-to-market, making visualisation of bespoke products easier," explained Garrard and added, "For clients, a highly detailed 3D printed model is a sure way to see what the finished product will look like. One can see it, feel it, touch it. It makes the idea real for our clients and accelerates the decision-making process. In terms of inspiration, it helps the industry access new ideas in a very real way. As an example, the first packaging ideas developed by our designers, based on our trend investigations, were 3D printed using the J750 and exhibited at the Cosmopack exhibition in Bologna. We used the machine to create around 300 prototypes for our Trend Wall and for our global sales teams to show to clients.

We were blown away by how much interest we received by key prospects, including a leading trend house."

### Accelerating production with 3D printed moulds

Quadpack is also 3D Printing injection moulds on demand, using them across its range of injection machines to run real-life production samples, with the output exactly the same as the finished product in terms of specifications and material types. This provides the company with greater efficiency, allowing it to carry out quality checks prior to cutting steel on the main production mould for the industrialisation of the packaging. Steel trial moulds are expensive and take around six weeks to produce, but Quadpack will now be able to make them in as little as 24 hours and at greatly reduced cost. "The trial mould capability of the J750 is exceptional and relevant to everything we do," asserted Garrard and went on, "For example, if we develop an ampoule with a snap-off cap, we can try it with full end-product functionality. It is fantastic as it gives us greater efficiency and reduces risk. Everything happens earlier, faster and better, which is key to helping us achieve our overall goals of delivering innovation and improved time-to-market."

With the Design and Advanced Technologies department building a foundation for a future full-scale R&D centre, there is no doubt the J750 will play a crucial role and help deliver faster innovation to market. Garrard explained, "We're extremely proud of our industry-leading prototyping and mould-making 3D Printing capability. It gives us a real competitive edge and helps us foster creativity, boost innovation and accelerate the development process, which is good for us and even better for our clients." Having a local, dedicated Additive Manufacturing support service is also essential to helping Quadpack achieve its goals. Garrard concluded, "Stratasys' partner, Tri Tech 3D, offers us expertise and continued high-level support. As we continue to push the boundaries of what's possible with 3D Printing into other areas of our production processes, this local support is invaluable." □

*Courtesy: Stratasys*



## Scanning & measurement's effect on automation

The emergence of smart manufacturing has witnessed several critical systems being used, at the core of which is the deployment of scanners. The article talks about LIDARS, the range of scanners, their uses & how they have been recognised to be of great significance in applications.

Automation in manufacturing plays a very vital role in enhancing the facets of manufacturing, be it improvements in its productivity, product quality, preventive & predictive maintenance, improving safety & the working standards of its operators, providing information & data for advanced analytics and for many further derived benefits.

Automatic pick and place systems, high-speed conveyors, industrial robots etc, are some of the commonplace equipment that is deployed for automation in the manufacturing industry. To function effectively, most of the industrial equipment incorporates high precision sensors for its positioning and measurement requirements. They are further adorned with identification systems for tracking & tracing, vision systems for quality checking, barcoding systems, distance measurement sensors, profile checking and many other special automation equipment for their effective working.

The dawn of smart manufacturing and new-age material handling sectors is seeing robotics arms, mobile systems, autonomous systems, bots and material handling assets being deployed extensively. At the heart of these very critical systems are what are now being called 'Limited range scanners' or 'anti-collision systems' or '2D/3D positioning systems' or 'LIDARS' which are actually enabling these

equipment to move and work the way we design them to.

'Scanners' are the devices which are used for detection and precise measurement of distance of the objects that are around or get into their 'range' or 'field of view'. These scanners basically use (human eye safe) Ultra-IR LEDs which work of the principle of Time of Flight (ToF) or sometimes on the 'Phase shift principle'. Mobile robots/AMRs/AGVs which carry materials from one location to another within the plant need these types of scanners for their free navigation and safe movement. Scanners have also proven to be of high consequence in applications like volume measurement, tracking, 3D pixel imaging etc.

### Pulse Ranging Technology (PRT)

PRT or Pulse Ranging Technology is a direct measuring method for measuring distance. PRT uses ToF principle to measure the distances. It is the most accurate distance measuring process. In this method, a laser diode transmits short pulses of light at a speed of light (300,000,000 m/s) that are reflected by the target object and then recaptured by a light sensitive receiver element. The power of a single pulse is up to one thousand times more intense than the power of

pulses generated by sensors that emit permanent light beams. The time taken by pulse to travel to the target and received back are measured accurately.

$$\text{Distance (m)} = \text{Velocity (m/s)} \times \text{Time(s)}$$

The exact distance (m) from the object is calculated using the measured values and the speed of light (m/s). In sensors, this procedure is repeated up to 250,000 times per second before the distance value is generated.

The advantages of PRT lie in the direct nature of the measurement method, which achieves accurate, reliable measurements, high repeatability and short response times. Only sensors with PRT achieve accurate, reliable and reproducible results regardless of ambient and object conditions, such as surface condition, dark colour or extraneous light which are commonplace challenges in any manufacturing environment.

There are a wide range of scanners to extract the best results and to address different applications and needs for solutions in the manufacturing and material handling industry.

1. Multi ray scanners
2. 360° 2-D LIDARs
3. 3-D LIDARs

### Multi ray LED scanner

These scanners use multiple LEDs aligned in a housing and making them work as a single unit. For example, each of these, let us say 11 LEDs, are separated at an angle of 8°, thereby allowing a total scanning angle of 88°. Each of these LEDs work independently but are bunch controlled through embedded microcontrollers which calculate distance as well as echo values of the objects which are in front of it. This very high speed mother microprocessor which is at the backend of this scanner takes these 11 measurement values and generates a common output on a communication bus, like CANopen which is commonly used in mobile equipment. With the measurement range of up to 8 mtrs, these scanners can achieve the measurement accuracy of  $\pm 50$  mm. These cost-effective scanners have found themselves wanted in a lot of anti-collision applications in mobile BOTs which are used in warehouses. The wide scanning range of these scanners makes them an ideal solution in areas where there are blind curves and tracks because of their wider angle of viewing.

### 360° 2-D LIDAR scanner

These scanners deliver fast and very accurate 360° scans

of the area around them. There are a wide range of area scanning products available but most of them use the usual lens technology wherein the optics remain at the same position and reflecting mirrors rotate around it to give the beam a different direction at different time intervals. Yet, such scanners are only reaching up to the scanning angles of 270°, thereby having a big blind zone. Such fast, very compact, 360° scanning equipment reliably relays very accurate measurements of the area around it.

The excellence of this technology is also in its high scanning frequency of up to 50 Hz and the sampling rate of 250,000 measurements which allows a gapless vision of 360° and ensures that the scanner has a direct view on the environment at any measuring angle. Further to add, the scanner has an on board, highly visible multi-directional display through which status reports can be displayed or application-specific information like distance values, measuring profiles etc, can be easily displayed.

### 3-D LIDAR

These scanners have different sensing ranges with the smallest angular resolution of 0.014°, accurate light spot, which has found suitability in a variety of applications. Navigation of AGVs in the plant is one such application. Because of high resolution, there is an overlapping of beam spots, which results in gapless measurement. So these 2D scanners can also be used for 3D profiling of the component by mounting it on a robotic arm or a gantry which acts as third axis.

These scanners offer four scanning layers in only one LIDAR sensor and therefore, highly accurate 3-D measurement. The device has no moving electronic parts, which makes it especially durable for operating in harsh and demanding environments. It has a mirror cube which rotates to create the four scanning layers. The integrated red pilot laser can be switched on and adjusted to the scan planes of the infrared measurement laser, enabling direct alignment of the sensor. The scanners offer a scanning angle of 100° with an angular resolution of 0.1° and the high sampling rate of 50,000 measurements per second, allowing the accurate and fine positioning of objects. The sensors compact housing makes for its easy installation even in tight spaces.

For sure, this huge step forward in scanning and measurement as realised through a compact, accurate, reliable and user-friendly product changes the dynamics of the field and would deeply impact the applied industrial automation. □

*Courtesy: Pepperl+Fuchs Factory Automation, India*



## Innovation, interaction & invigoration: The experience of #HM2021

Due to the given circumstances, Hannover Messe had to adapt to a digital format for its trade fair. This year, too, despite a digital mode of interaction & communication, it managed to be a strong driver of business, trends and innovation. Organised by Deutsche Messe on April 12-16, 2021, the show explored a lot of ‘firsts’, both business- and technology-wise. A post-event report with a glimpse of the five days...



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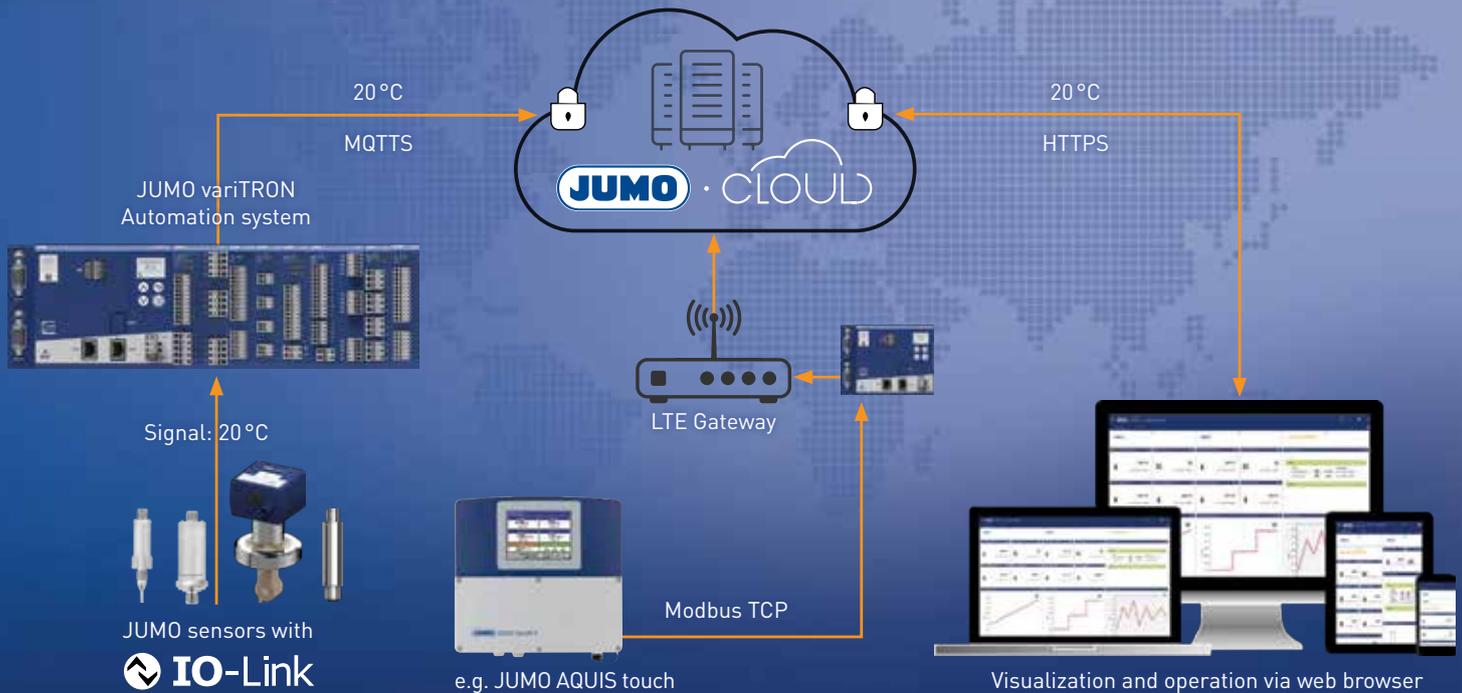
Hannover Messes 2021, a star event of the manufacturing industry for ages, commenced digitally this year. The year of uncertainties, 2020-2021 has brought many questions, many innovations for discussion and many qualms on what the future holds. And there couldn't be a platform better than Hannover Messe 2021, organised by Deutsche Messe on April 12-16, 2021, to discuss all this. The five days propagated and kept the audience enthralled with innovation, inspiration and interaction. Under the theme 'Industrial Transformation', companies from world over presented their technologies and ideas virtually. A benchmark of an exhibition, the show

glimpsed into the future of the industry and trade shows both.

### What's the way? Digital & virtual?

Well aware of the need of the time and need of their customers, Hannover Messe ensured no one missed the three or rather four important factors of their gala event – expo, conference, networking and, of course, the adrenaline that comes naturally to attend this larger-than-life expo. During the 'Warm up – Hannover Messe 2021, digital edition' session, Dr Jochen Köckler, Chairman - Managing Board, Deutsche Messe

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Carmen Hentschel, Moderator and keynote speaker for topics of digitalisation and Dr Jochen Köckler, Chairman - Managing Board, Deutsche Messe AG, announcing the Hermes Startup Award 2021

AG, accepted that the times have changed, but it has given them new avenues and new ideas of 'hybrid' events which they would keep up with. The surfing experience was divided into three sections – Expo, Networking and Conference, to make the experience as close to real-life as possible. Each tab was layman-ed out to ensure the easiest user interface experience.

### Accepting the 'not normal'

With almost 1800 participating companies and the sundry of discussions, the show covered everything ranging from AI to 5G and beyond. Among the number of sessions attended through the course of five days, one was 'A resilient and sustainable future' hosted by Nathalie Marcotte, Senior Vice President & President – Process Automation, Schneider Electric (SE). Elaborating on the future of automation, she emphasised, "We (SE) truly believe that the future is collaborative, and industries need to leap to universal automation. Today, we have come to a crossroad where we need to advance our technology models to reach Industry 4.0 fundamentally. To fully realise the potential of I4.0, we must embrace a new way of thinking." Another session attended was 'Infinite evolution: Digital transformation driven by scenario-based ecosystem' hosted by Haier Digital Technology (Qingdao). "A very important topic in the topic of evolution is data sovereignty, which is sensitive for everyone. Companies need to start a ruse for higher value-adding, better sovereignty. Building a database by trusting one's ecosystem is essential for it," asserted Haiqin Xie, Deputy General Manager, Haier COSMOPlat IoT Ecosystem Technology.

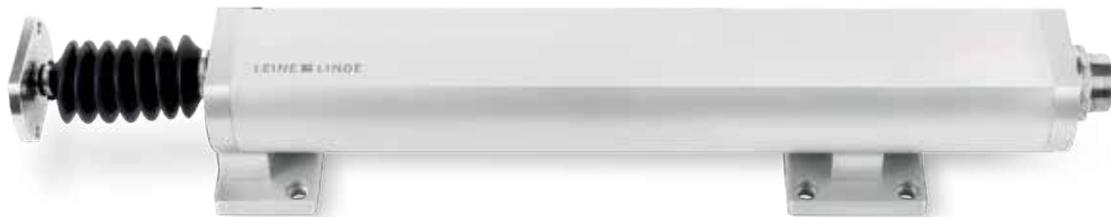
Another showstopper, the Hermes Award 2021 was bestowed to Bosch Rexroth for its world's first electrical actuator for controlling process valves underwater. Their Hermes Startup Award 2021 was awarded to the company core sensing for its project, coreIN, a robust and reliable force & torque sensor.

### Humans, AI and network resiliency: A bag of opportunities

IoT, digitalisation and AI are the world's future and can immensely help industries like manufacturing. The session 'Smart manufacturing and business value of IoT' hosted by Francis Cepero, Director – Vertical Markets, A1 Digital, discussed topics central to smart manufacturers. Elaborating on preparing for business impact, he averred, "In our experience, companies should not go for digital twins, predictive demand, simulation of the supply chain, etc without having done their homework on the subsystems, their asset management levels and all the other aspects that are critical to the performance of one's manufacturing aberrations."

Another interesting session was the fireside on 'Industry 4.0 and what's ahead' hosted by Steve Multer. Commenting on building the factory of the future, panellist Domenic Tota, Executive Director, Network Engineering, Estée Lauder, revealed, "It starts with the people. One of the areas is delivering that key governance model, which will drive the processes for the employees. A clear governance model will bring the pieces together with converged IT & OT." Elaborating on why security integration is key, Bernd Heinrichs, Executive VP & Chief Digital Officer – Mobility Solutions, Bosch, another speaker onboard, emphasised, "Security is key. It is not an afterthought; it should be included from the beginning in designing a factory and designing the products & solutions. The solutions need to be end-to-end, covering IT & OT types of sectors in one company." Discussing the trends that stand out to him, Dan Wiggins, Vice President, Industry Solutions Group, Growth Marketing, Segments & Industries, Cisco, revealed, "While AI and all the technologies will make a big difference in the future, I believe edge technology becomes very important because the future is all about the data. Besides, because of all the

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Under the theme 'Industrial Transformation', companies from world over presented their technologies and ideas virtually at Hannover Messe 2021

technologies that are going to come out, I believe robust wireless infrastructure will also become important.”

To discuss the stability of the future for India, Kartik Natarajan, President & COO, Cyient, discussed 'The resilient manufacturing in post-pandemic times: A shot in the arm for India'. He mentioned, “We believe, in order to build resilience in manufacturing and shield our industries from negative impacts in times of crisis going forward, we must focus on four key pillars of manufacturing – connected, efficient, smart and sustainable.” Siemens Digital Industries talked about 'Digital enterprise virtual experience' to show the experience of merging data and the physical world. Cedrik Neike, Member of the Managing Board, Siemens AG and CEO, Siemens Digital Industries, explained, “The rapid development of available data in recent years makes one thing clear - digitalisation knows no end. Instead, it starts an infinite loop: you collect data, and you learn from it, you take the next step. In production, this creates an infinite pool of knowledge that we are far from fully leveraging. And anyone who manufactures industrially can take advantage of this potential. This applies to production sites with a long history just as much as it does to completely new production sites from the very first pixel of planning onwards.”

## Workforce & infrastructure for 2021 & beyond

Having a future-oriented infrastructure and a workforce adapted to it is essential for the smooth functioning and success of factory/workplace of the future. Discussing 'Industry 5.0: How to digitally transform manufacturing for modern work and the next-gen workforce', speaker Bill McDermott, President & CEO, ServiceNow, revealed, “We must listen and learn from the people. We must recognise with great empathy that the best ideas are always closest to

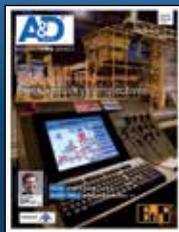
the customers and boardrooms are very far away, in many cases, from the customer. For example, COVID-19 highlighted the vulnerability of value chains. 20<sup>th</sup> century value chains were based on just-in-time manufacturing, and ultimately, it did not protect anybody from the shock. So, now, we are moving to the world of just-in-case. New paradigms have risen to de-risk while protecting profit.”

Another session host, Viviane Schmidt, Lead Solution Architect – IoT & Edge, Hewlett-Packard Enterprise, deliberated on 'Improve Overall Equipment Effectiveness (OEE) with condition monitoring and predictive maintenance'. She suggested, “The first step is to do edge computing. Get some edge components and get some edge components and a software solution that can read the PLC, the machine data and translate it into the IT world.

## Creating the experience aura

While one may feel that the virtual world of webinars & exhibitions is becoming boring and mundane, Hannover Messe 2021 proved otherwise. The five-day event was engorged with 1800 participants, 10,500 products and innovations, 90,000 registered participants, 3.5 million page views, 140,000 livestream views, 700,000 search queries and 1500 expert discussions. Even though the personal contact wasn't simply there, Köckler added, “The digital Hannover Messe confirmed that we are on the right path. Based on our experience this week, in the future, we will bring together the best of the digital and analogue worlds to provide our customers with a holistic hybrid tradeshow experience.”

Through its platform, Hannover Messe proved they can create the same excitement and vibe digitally and be so omnipresent that it ensures no one misses out on anything in the digital world. □



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- 01. Corporate / General Management
- 02. Director, Supervisor
- 03. Group Leader, Project Leader
- 04. Manager, Specialist
- 05. Engineer, Technocrat
- 06. Other

**2. Select the one title that describes your principle job function. (select only one)**

- 01. Management
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- 03. Safety & Security
- 04. Risk Management, Accident Management
- 05. R&D
- 06. Design Engineering (Plant Engineering)
- 07. Project Planning, Production Planning
- 08. Laboratory, Test, Field Service
- 09. Explosion Protection, Fire Prevention
- 10. Manufacturing, Production
- 11. Quality Assurance
- 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
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- 06. Steel / Metal
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- 17. Plastics & Polymers
- 18. Construction
- 19. University, Education
- 20. Other

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

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- 200 to 499
- 500 to 999
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## Servo drive with modular cooling concept

B&R Industrial Automation recently made ACOPOS P3 servo drive available with feed-through heat sink or cold plate cooling. The new cooling solutions



**ACOPOS P3**

dissipate up to 60% of generated heat outside of the control cabinet. This makes it possible to use much more compact cabinets, since fans and air conditioners can be reduced or eliminated entirely. Operation and maintenance costs are also reduced. These new ACOPOS P3 cooling solutions are suitable for a large number of axes in all power ranges. With the elimination of fans and air conditioners that bring outside air into the control cabinet, there is also substantially less dust that gets sucked in along with it. This significantly reduces the need to stop the entire machine for maintenance tasks, like replacing air filters and the machine availability goes up. The heat sink offers IP64 protection and is compliant with standards EN 60529 and UL 50 Type 12. The fan installed in the push-through heat sink offers IP54 protection. Its cold plate cooling uses a water-cooled plate to dissipate virtually all heat generated by devices via the coolant. As a result, control cabinets need far fewer fans and climate control units, reducing costs.

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## All-in-one telecontroller

Crouzet recently introduced a telecontroller, which is a bundle of five products in one, known as em4 Alert. The products included in this new telecontroller are:



**em4 Alert**

- Cellular modem – Gives cellular capabilities to the application
- Alert system – Event alerts, status feedback and alarms wherever the user is
- Data logger – Measure and record key parameters

- Nano-PLC – A PLC in a logic controller body
- Display – Visualise and change parameters

In the new telecontroller, the cellular capabilities are given to the user application directly or through a Modbus network. It also minimises the downtime of the machines & systems of the user, since it will detect any failure and immediately alert user. Due to its modular shape, em4 can also be used in distribution and modular panels. The PLC performance is managed by 26 I/Os (16 inputs and 10 outputs). The screen and control buttons embedded in the CPU make em4 the only Nano-PLC that allows the user to, immediately and directly, visualise alarms, and data as well as change parameters in the application.

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## Power sensors

Rohde & Schwarz recently launched the new R&S NPR67S and R&S NRP67SN power sensors that introduce a frequency range unprecedented in a diode



**R&S NRP67S and R&S NRP67SN power sensors**

power sensor, reaching from 50 MHz all the way up to 67 GHz. Combined with the advantages of the company's three-path diode technology, a wide dynamic range from -70 dBm to 20 dBm and a high measurement speed of 10,000 measurements per second, users benefit from extremely fast power measurements with unsurpassed accuracy and dynamic range previously not possible at these frequencies. All R&S NRPxxS power sensors with their portable format are ideal for installation, maintenance or monitoring applications, both locally and remotely. They can be used by being connected to an R&S NRX power meter, selected Rohde & Schwarz signal generators & analysers or a PC with the R&S NRPV virtual power meter software installed. In addition, the R&S NRPxxSN includes an Ethernet interface to support remote operation via LAN. The devices support the industry standard USBTMC protocol, making integration into test systems easy.

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## Slimline solenoid interlock



**AZM150**

Schmersal recently introduced a new slimline solenoid interlock with 1400 N interlocking force known as AZM150. The solenoid interlock can be combined with three different actuators for different installation situations, namely, straight, angled and movable actuators. One of the plus points of the interlock is the rotating actuator head which can be locked simply by putting the lid on rather than a screw fitting. The AZM150 has an electromechanical design which can be combined with high safety standards. The interlock comes with a low coding level as standard but is also available with an optional high coding level. Because of its slimline, space-saving design, the AZM150 is especially suited to small machines and to packaging machines and machine tools. The new solenoid interlock is available in operating current and standby current variants. If required, it can be supplied with an optional lockout tag, which protects operating staff from being locked inside larger, walk-in systems and machines by mistake while they are performing servicing and repair work.

Schmersal India | Pune  
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## Multiprotocol connectivity for optical inspection systems

Hilscher recently integrated its PC-card, cifX M.2 2230 Key A+E, with Vitronic's VIRO WSI, which is an optical inspection system. This system consistently inspects weld seams on workpieces 100% objectively & reliably based on previously defined quality criteria and replaces the manual, therefore error-prone, visual inspection. In order to quickly identify defective welding seams, the system requires a constant real-time coordination between the visual inspection and the handling robot.

With increasingly limited space in control cabinets and due to smaller IPCs, the M.2 format is establishing itself as a rising standard for PC-based use cases. Hilscher delivers the smallest and most space saving multiprotocol PC-card for industrial communication in M.2 2230 format on a low power consuming platform. Overall, the company delivers a ready-to-use network interface. It includes a complete package containing the hardware, device drivers for different OS, loadable firmware and configuration tools.

Therefore, Vitronic's application and service engineers focus on their core competencies, for

example, equipping their customers' plants, machines and devices with strong & reliable vision solutions. The electrical and mechanical commissioning and set-up of data transmission is handled in cooperation with VIRO WSI users.

The combination of technologies from both companies shows how synergies from the fields of vision systems and industrial communication leads to solutions that enable plant & machine builders to create production lines with zero recalls in the most flexible & easily adaptable way to the latest communication standards.

Key benefits of cifX PC-cards for Vitronic include:

- **Flexibility:** Standardised cifX API ensures VIRO WSI systems can adapt across all protocols with the same drivers, tools and interfaces to fit changing customer demands
- **Smallest Size:** M.2 card fits space-savingly into an existing M.2 socket on the mainboard of the IPC
- **Scalability:** PC-card supports various real-time Ethernet and traditional fieldbus networks, e.g., PROFINET IO, EtherNet/IP, PROFIBUS & many more



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Hilscher India | Pune

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## Modular safety relay for tailor-made safety

Pilz recently launched a new safety relay, myPNOZ, which offers millions of options for device structure and configuration with its various device classes & modules. In order to offer such tailor-made safety, the company created a universal digital foundation for its latest product as it aims to work with customers to manufacture their individual automation product.

### Countless possibilities, one product

The first step that users record their requirements online via the corresponding online tool, myPNOZ Creator. In the myPNOZ Creator, users, i.e. customers, assemble the complete solution to meet their requirements from a wide range of possibilities. They then have a tailor-made product, where the logic operations for the safety functions are pre-defined via the plug-in sequence and no software knowledge is required. myPNOZ is delivered, ready-to-install. A streamlined configuration and installation process is characteristic of the product.

Thanks to a continuous automated workflow, the specifications and all other information pass without media clashes from order to production and

then dispatch. The product is assembled from semi-finished products, fully configured and undergoes final tests either in the production plants or, if necessary, directly in the delivery warehouse. Customers have their myPNOZ within the shortest time scale – ready for commissioning. All that is needed is a screwdriver for control cabinet installation.

myPNOZ offers users a wholly new customer experience with regard to the selection, ordering and installation of industrial components. Tool support simplifies selection and ordering, helping to prevent errors. This is an extremely important point, particularly with safety relays whose job is to protect human and machine.

### Interaction between automation, IT & OT

The basis for one-off manufacturing of products with greater type diversity, as is the case with myPNOZ, is the networking of automation, Office Technology (OT) & IT. Here, the product development alone is not responsible for digital business models; it is essential that the IT department in particular is involved. Each time the conversation within companies turns to Industry 4.0, it is imperative that the IT infrastructure is included from the start.



myPNOZ

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# Highlights – Jun-Jul 2021



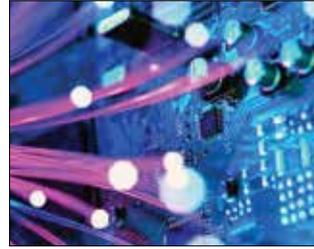
## » POWER & ENERGY

As the renewable energy integration increases, there is a widespread adoption of smart grid technologies and distribution of automation. The next issue finds out the future of smart energy and power industry in combination with robotics & automation.



## » FIELDBUS & NETWORKS

The successful migration from conventional automation frameworks to future-proofed cyber-physical systems requires state-of-the-art network and a foundation of fieldbus. The next edition will explain the considerable challenges, industrial-grade wireless networks and how digitalisation powers industrial automation.



## » TEST & MEASUREMENT

Manual testing process can only cover certain use cases and hence, automation is starting to take over. The next edition explores how automation & digitalisation are becoming an integral part of the test & measurement domain and the latest trends in this area.



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