



AUTOMATION & DIGITISATION

# INDUSTRY 4.0

## The key to revive & grow the manufacturing sector

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**A&D - Interview**  
**Dattatri Salagame,**  
President & Managing Director,  
Robert Bosch Engineering and  
Business Solutions (RBEI) (p. 20)

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## Exploring business virtually!!!

The COVID-19 pandemic has highlighted various critical gaps in the manufacturing sector. Manufacturing organisations today are focusing more on building their business continuity plans and re-inventing new manufacturing supply chain models as well as exploring automation and digitalisation possibilities to reduce the impact of this crisis on production operations in the future. While in the pre-crisis era, automation was viewed as a means to innovate, reduce cost and gain a competitive edge, now the purpose has shifted to survival and damage limitation. To mitigate global supply chain risks for future crises, manufacturers will consider bolstering their in-house capabilities instead of outsourcing manufacturing to other countries. The pandemic will intensify the need to automate, especially in jobs that have high human interaction and the ones that are hazardous, causing death or injuries. Developing technologies that will protect and provide workers and consumers, a safe environment will be the focal point in this drive to automate.

Although, the degree of automation adoption may be varied depending on the industry and the readiness of the companies to make investments at this time, the COVID-19 crisis has certainly acted as a catalyst to the transition to automation & digitalisation, especially in building resilience among businesses for future disruptions.

In this context, we are happy to announce Virtual AUTOMATION & DIGITALISATION EXPO, scheduled on 19-22 August 2020, to help manufacturers from all the industry sectors get to meet automation and digitalisation suppliers virtually, and explore the latest technologies and solutions pertinent to their needs today. Considering today’s social distancing norms and travel limitations, virtual expo is an ideal platform to understand the technology trends, exchange information, and access new products and technology demonstrations, in a safe way. Please do write to us to know more...

In the meantime, take care, stay safe!

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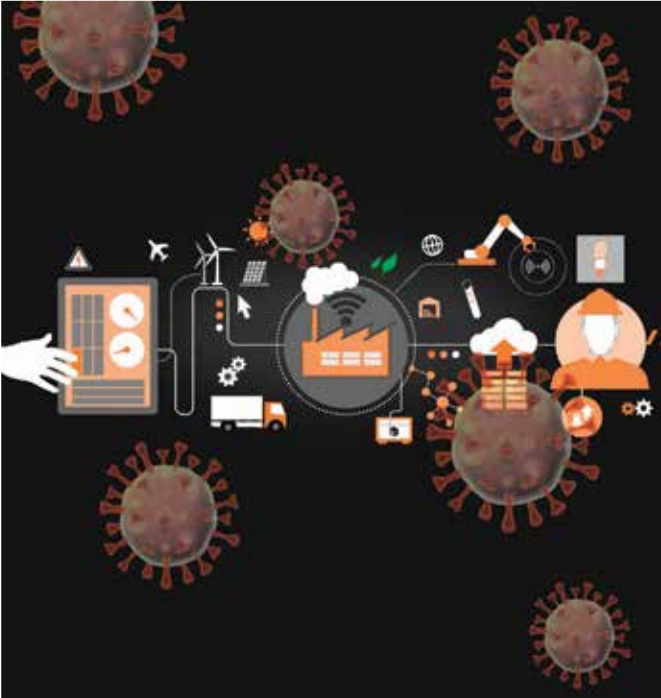
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## COVER STORY

The Cover Story analyses how Indian manufacturing can recover from COVID-19 with technologies being the crutches



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We have lost over 400,000 people globally due to COVID-19. Prevention and common sense, though, have been interpreted differently by the world leaders, and the abrupt lockdowns, unplanned restrictions, limitations of a serious stimulus package and the threats of the contagion, which have forced the already looming recession in India into a depression that is currently an escalating global problem. A depression is a major downswing in the business cycle; one which is characterised by sharply reduced industrial production, widespread unemployment, a serious decline or cessation of growth in construction and great reductions in international trade & capital movements.

Amidst this crisis lies opportunity. While none of us are an exception to this downturn, it also presents to us options of implementing changes which we never thought feasible or realistic. The key ingredient to this change and us inching back to normalcy will be automation and how organisations seize this moment.

With a mass exodus of labour and unavailability of skilled workforce, the case

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**“A STEADY INCOME  
SOURCE GENERATION  
CAN HAPPEN ONLY  
VIA INDUSTRIES”**

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to implement more automated systems and processes in all sectors has never been stronger. Add to that the draconian laws that will become worse as protectionist agenda arises from the polity. What will be crucial is how organisations view this change and take decisive steps in that direction.

Traditionally, India has always been a labour-intensive market, where often the cost of employing the labour tends to be cheaper than automation. It is a classic case of CAPEX vs OPEX, where organisations chose to have a steady fix outflow on labour costs over implementing automation that need a much larger commitment of capital.

Drastic times call for drastic measures and my urge to organisations will be to focus on committing budgetary allowances towards projects that involve automation

and directly lead to de-risking of processes or the activities over the long-term. This will ensure that they are well protected in their endeavours to serve their customers whilst negating the risks of labour shortage that we all are facing today.

I still firmly believe that a cohesive man and machine environment with automation still has a place in this world, and apart from de-risking highly skilled activities or inefficient processes, this will not create an impact on the number of people being hired. What will change is the skill-set of the people we hire and that we, as organisations and industry bodies, need to focus on investing into cultivating these skills to create the workforce of the future that are equipped to handle such automation around them.

Ultimately, the India story will revive when the lowest economic spectrum of the society feels secure enough to start spending. For the same, a steady income source generation can happen only via industries. I am confident on the Indian entrepreneurial spirit to find innovation amidst this crisis and create a new phase of a growth-focused India. □





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## Hannover Messe Digital Days to premiere on July 14-15, 2020

**Hannover Messe** Digital Days will commence on July 14, 2020, with exciting keynotes from business, science and politics as well as panel discussions, live chats, networking and innovation presentations. Everything will revolve around the questions of how industrial transformation can succeed and which steps the industry must take to recover quickly from the consequences of the shutdown. Discussing the prospects of the Digital Days, Dr Jochen Köckler, Chairman of the Managing Board, Deutsche Messe AG, accentuated, "With the Digital Days, we are creating an online platform for the entire Hannover Messe community. We had to cancel the show this year due to the corona pandemic, but people still need to learn about the latest technological products and solutions and to talk with experts from all over the world. Because tomorrow's innovations are only possible when different industries and cultures exchange ideas." One of the biggest highlights is the Hermes Award ceremony, which will be awarded digitally for the first time. A jury chaired by Dr Reimund Neugebauer, President, Fraunhofer-Gesellschaft, chose the winner from numerous high quality submissions, which will be announced on July 14, 2020.

## Honeywell expedites development and production of vital vaccines & medical therapies

**Honeywell** recently announced Fast Track Automation, a combination of proprietary technology innovations for the life sciences industry that enables vital vaccines, treatments and therapies to move from regulatory approval to full production in as little as two months, depending on the process requirements. The solution incorporates process automation elements that can be configured in a virtual environment, then implemented rapidly once a therapy is approved and ready to be produced for public distribution. As the company has been providing the pharmaceutical/life sciences industry with consistently innovative advancements in automation and digital software technologies, systems and services, Ashish Gaikwad, Vice President & General Manager, Honeywell Process Solutions, India, said, "Our solution allows for end-to-end manufacturing process. It offers intuitive data visualisation, providing real-time information and predictive insights while offering benefits, like enhanced audit-readiness and data integrity, minimised regulatory risk, increased operational efficiencies and reduced rejects and waste. This offering simultaneously enables manufacturing automation designs in parallel with clinical trials, to ensure production is ready to go once a medical therapy is approved."



## Smart Manufacturing Summit 2020

**ET Edge**, in media partnership with A&D India magazine, hosted 'The Economic Times Smart Manufacturing Summit 2020' on June 5, 2020. The inaugural edition of the summit brought forth discussions on post-COVID scenarios, making of the smart factory, predictive operations, plant automation and more. The summit entailed an interactive platform that made sure its users did not miss out on the feeling similar to that of a live event. The exhibition space of the online platform accommodated all its sponsor stalls, while all the sessions were actively running in its auditorium. The sessions hosted through the day included active discussions on COVID-19 and the future of manufacturing, implications of smart manufacturing, digital manufacturing – factories of the future, need for manufacturers to reboot, execution of digital transformation, shift from lean factory to a lean digital factory, operational impacts on manufacturing, sustaining through the labour crunch and more. In a session on 'Digital manufacturing – factories of the future are here today', John Coughlan, Chief Executive Officer, TSP Engineering, asserted, "Digital learning will become more common in workspace now on and well-trained & skilled people is what will bring in success."

Besides the interactive sessions, the summit hosted a panel discussion on 'Is Industry 4.0 already a passé?', moderated by Dr Robert Joseph, Former Director, Industrial Strategy – Industry 4.0, Stanley Black & Decker and panellists comprising D S Ravindra Raju, President, Deepak Fertilizers and Petrochemical Corporation; Sanjay Singal, COO – Dairy Beverages, ITC; Anil Rao, CEO, NTT Data Business Solutions; Sanjeev Aggarwal, Chief Manufacturing Officer, Lava International and Krishna Bhojkar, Head – Manufacturing Engineering, Skoda Auto Volkswagen India. It also witnessed a fireside chat, which had Shekhar Jitkar, Chief Editor, Publish Industry India in discussion with Ravi Sehgal, Chairman EEPC India and S Ramchandra, COO, AMCO Batteries. The trio discussed 'Getting workspaces post-COVID ready'. The Economic Times Smart Manufacturing Summit 2020 efficiently explored the developments in the manufacturing space along with the bottlenecks being faced during the implementation of the forward-looking ideas. The lively and interactive sessions highlighted solutions to some of the practical problems on contemporary topics and more.





## HP's 3D Printing helps manufacture ventilators

HP Inc recently announced a partnership with Redington 3D in India, to successfully produce 120,000 ventilator parts for AgVa Healthcare. As part of this initiative, 12 categories of parts have been 3D printed, to manufacture 10,000 ventilators. Talking about the successful execution of the project, Rajat Mehta, Country Manager – 3D Printing & Digital Manufacturing, HP India Market, expounded, "The successful execution of the AgVa Healthcare project is a testament of the capabilities of HP's 3D Printing technology and how it can remove the limitations of designing by producing complex products in a short time." Taking the talk further, Ramesh KS, VP, Redington India, asserted, "By deploying two of our HP Jet Fusion Production 3D printers, we could manage our production schedule with ease and help the country in its preparedness to fight this pandemic situation. As a team, we feel proud to be part of this mission & leverage our digital manufacturing capabilities, at the time when it is needed the most."



## Schneider Electric and AVEVA extend partnership to deliver end-to-end solution

Schneider Electric and AVEVA recently announced their expanded partnership to deliver innovative solutions for the data centre market. The combination of AVEVA™ Unified Operations Centre, scalable industrial software with Schneider Electric's EcoStruxure™ for Data Centres control and monitoring capabilities enables both deep and expansive visibility to day-to-day operations. The new joint solutions provide a homogenous view of engineering, operations and performance across a heterogeneous, legacy installed base. Talking about delivering a comprehensive solution for hyperscale data centres to operate and maintain their critical environments, Pankaj Sharma, Executive Vice President – Secure Power Division, Schneider Electric, cited, "The solution can take data that has long been managed at individual data centres, often in siloed sub-systems, normalise it across multiple sites and can ultimately inform and provide enterprise level IT/OT/IoT integration to deliver real-time decision-making. The complete solution will deliver operational efficiency and a more reliable data centre fleet." Adding to it, Craig Hayman, CEO, AVEVA, accentuated, "Our joint customers are empowered by the standardised systems and processes resulting in improved workforce efficiency across multiple and the entire enterprise."



## Siemens introduces workplace distancing solution

Siemens recently created a new solution, named SIMATIC Real Time Locating Systems (RTLs), that enables organisations to build an end-to-end digital twin, in order to simulate worker safety, iterate on and optimise workspace layouts and validate safety and efficiency measures to help future-proof production lines. With SIMATIC RTLs, companies can continuously measure distances between workers, provide real-time visual feedback to employees regarding their spacing from others and create a log of all movements and interactions over time. In this way, this system continuously facilitates safe distancing while providing numerous additional benefits.

Discussing the importance of safe work environment, Tony Hemmelgarn, President & CEO, Siemens Digital Industries Software, stated, "We are helping our customers create a safe work environment, which is extremely important as they look to produce efficiently and reliably under unprecedented circumstances. The combination of real-time distancing management and digital simulations will help companies maintain safe work environments today and make educated decisions about ongoing and long-term optimisation." In order to implement this solution, Siemens' SIMATIC RTLs transponders are embedded in badges which are worn as personal protective equipment by all employees. RTLs receivers placed throughout the operation can then continuously track and record workforce movement. When two employees are in a risk scenario (eg, less than six feet apart), their badges will display a warning, alerting them to the situation. The data collected over time can be analysed to identify 'hot spots' where risk scenarios occur frequently. Such situations become easily actionable via the digital twin. Utilising the collected data, new manufacturing layouts or workflows can be simulated until one is determined to provide the desired outcomes, which can then be implemented in the physical operation.

Talking about the deployable solution from the company, Raj Batra, President – Digital Industries, Siemens USA, insisted, "Siemens is providing a powerful, rapidly deployable solution that helps manufacturers take control of their operations and achieve better safety, productivity and cost outcomes today and in the post-COVID era. Our solution consists proven technologies that can begin delivering results for most manufacturers in one to two weeks."



## “Automation and digitisation are definitely bound to increase post-COVID-19”

... says **Sudarsan Srinivasan**, Managing Director, VEGA India, in this interview with Juili Eklahare. He explains the major challenge the COVID-19 pandemic has brought to the industry, how the company has been trying to reach out to its customers through various digital platforms and its short-term and long-term plans. Excerpts...

**Can you tell us about VEGA India’s journey in India so far? What are the key growth drivers and which are your target markets in the country?**

VEGA India’s ten year journey has been very interesting. Our growth is a result of our futuristic instrumentation devices, coupled with the quality pre- and post-order services, which are at par with the company’s global values. As for our target markets, the entire process and automation industry is our target market. However, our main industry segments include the chemical, oil & gas, steel, cement, pharmaceutical, to name a few.

**How has the sensor market been affected since the COVID-19 pandemic? What are the additional challenges it has brought?**

The nature of the pandemic has definitely caused a negative impact on most businesses. Our prediction is that it would take roughly two quarters for the current situation to stabilise. At present, we are already experiencing a decline in the inflow of order income as customers are buying only if they absolutely need to. Plus, the import is taking longer periods than usual, credit period is getting extended and many of our customers have already started revisiting & revising their project budgets. The major challenge will be maintaining a well balance in cash inflow and outflow.

**Do you think the use of automation and digitalisation will increase post-COVID-19, with the constraint of social distancing norms?**

Automation and digitisation are definitely bound to increase post-COVID-19, as the industry would look at less man-machine interface. The current situation has compelled us to achieve Industry 4.0 rather fast than expected, with many innovations anticipated in digital networking of machines, product and IT network.

**Understanding your company’s customers involves understanding their processes, making field visits, etc, how is that going to change post the lockdown? Will you be forming a new way of executing orders from them and also with post-sales service support?**

Our company has consistently been trying to reach out to its customers through various digital platforms that are available. Post-lockdown, we would continue our digital outreach through apps, like VEGA-Tools and Vega Inventory System (VIS). However, if the customers let us visit their premises, we would do so by taking care of the safety of our employees and also adhering to the safety guidelines of our customers. Our service team is already able to access our instruments installed in customer sites from their home offices and solve issues, if any. However, post-lockdown, we are fully equipped with the necessary safety gear to visit customer sites for commissioning or post-commissioning service visits.

**What are your company’s plans for itself five years down the line?**

Increasing our market coverage, and thereby, the market share of our products in the Indian sub-continent would be our consistent short-term and long-term plan. In addition, we would also like to increase the product portfolio of our domestic manufacturing by adding more products on our Indian shop floor.



## “Discussions on innovation must be aligned with business”

... says **Ashutosh Parasnis**, Co-founder, QLeap Academy, in this interview with Juili Eklahare. He gives details on how the company looks at leadership as an ability to lead, how if one wants to adopt Industry 4.0, he/she should start by thinking what business problems to address and also throws light on the primary reason why industry-institute relationship is not deep-rooted in India. Excerpts...

**Can you tell us about the work you are doing in consulting enterprises, SMEs & start-ups in their digital transformation journey? What kind of challenges do they come across?**

The early stage start-ups are challenged with perfecting the solution and acquiring customers. Established businesses seek to sustain growth and competitiveness. Their challenges include refining the product portfolio & exploring adjacent markets and very importantly, validating if their legacy business model is competitive in a digital world.

**One of the key activities at your institute is to educate individuals with 21<sup>st</sup> century skills. What role exactly will that play in Industry 4.0?**

Industry 4.0 is digitalisation of the manufacturing enterprise. It's a major change management initiative that impacts a company's strategy, processes and infrastructure. We, therefore, do not look at leadership as a role at the top but as an ability to lead, no matter what role one performs. We have Industry 4.0 programs for senior management, engineering leaders, with emphasis on use cases and solutions. Our services also help organisations re-imagine a business situation and build an Industry 4.0 solution that is relevant to their business and not generic.

**You say that if one is serious enough to apply Industry 4.0, he/she needs to look at it in a much wider length. Can you elaborate?**

What we are saying is that if one wants to adopt Industry 4.0, he/she shouldn't start discussing technology in a small isolated project. Rather, one should start by thinking what business problems or opportunities he/she would want to address and what can be done differently. Initiatives with the potential to generate impactful business benefits will find a lot of support. Technology then steps in to play a critical role – one will then realise that he/she needs talent that can adapt to new technologies and processes.

**You have designed and conducted courses & workshops on creativity and innovative organisations. What do you think are the pivotal elements that need to be infused to bring about creativity to the fullest in manufacturing organisations?**

Firstly, discussions on innovation must be aligned with business. Secondly, one needs a different management approach to innovation as compared to daily operations. Thirdly, talent needs to be trained not just in creativity but in managing innovation. This creates the much-needed, multi-disciplinary set of cognitive, entrepreneurship and domain skills.

**What are your views on industry-institute partnership in India? Would you like to give your recommendations to strengthen the relationship further, to benefit both?**

For far too long, the two have operated independently, barring few exceptions. The primary reason why this relationship is not deep-rooted in India is the gap in the technology readiness levels that exist in institutes versus those prevalent in the industry. Institutes create knowledge, IP and inventions. Industries desire an invention that is nearly manufacturable. Developed ecosystems have contract research labs that translate inventions to products, which is what India needs.





“The secret to success is the ability to customise & personalise”

... mentions **Alok Medikepura**, Director, Next Big Innovations Lab (NBIL), in his interview with Anvita Pillai. Here, he talks about the starting journey & challenges, quandary of the lockdown, new innovations by NBIL in drug testing, future goals and more. Excerpts...

**What was the idea behind starting NBIL? What challenges came your way during the starting out phase?**

NBIL was born out of an idea to bring about exponential changes in the field of precision medicine and personalised treatments. The desire to use a novel emerging technology, like 3D Printing, and to create a large scale societal impact was the common goal that brought the initial team together. Being the first in market is always a challenge. In the process, we had to identify the right global partners, develop technology from scratch and build an interdisciplinary team that has, over the years, helped us grow leaps and bounds in a short time frame.

**Start-ups have been amongst the most affected due to the corona crisis. How has the present period of corona crisis fared for your organisation?**

Overcoming new challenges and pitfalls along the way, is part and parcel of any start-up's growth cycle. However, the current ongoing COVID-19 crisis was something none of us were prepared for. Given that we are an R&D-focused company, the COVID-19 lockdown threw at us big curveballs. We used the lockdown period to reevaluate plans, better strategise and look at how our expertise and knowledge base could be used to assist the government in the fight against coronavirus.

**How can your 3D bioprinter play a vital role in the testing of new drugs, especially now, when there is a lot of drug testing going on to find a cure for the coronavirus?**

NBIL has partnered with Merck group (German life sciences and healthcare multinational group) and is working to ensure that in the long run, 3D Bioprinting can be used as an effective tool to bring down the cost of novel drug development. The secret to success here is the ability to customise and personalise 3D bioprinters and specific biomaterials being used. We have embarked on this journey with our 3D bioprinter, TRIVIMA – a customisable 3D Bioprinting printing platform for R&D labs around the world.

**In 2017, your company received the Karnataka government's Idea2PoC grant. How did that help fast-track your journey towards advancements in your 3D bioprinter?**

Receiving the Idea2PoC grant from the Government of Karnataka helped us take off and accelerate our start-up journey. Using the funds, we have successfully developed India's first customisable 3D bioprinter and also proudly deployed a Made in India 3D Bioprinting technology within an international R&D lab in Europe.

**What plan of action do you intend on implementing to further strengthen NBIL's position in India?**

Collaboration is the key to success. We have already brought on board multiple partners from industries, academia, government and civil society with the goal of advancing 3D Bioprinting in the country. We will soon launch 3D Bioprinting skin – InnoSkin and make it available for R&D labs worldwide for use as an alternative to animal testing. We have other interesting collaborative projects in the pipeline, which will help us move towards our goal of creating a positive societal impact, in the areas of precision medicine and personalised treatments.

# To infinity & beyond: ISRO's private foray

– *Anvita Pillai, Sub-editor & Correspondent*

Indian Space Research Organisation (ISRO) has been proving its mettle to the world year after year. In 2019 alone, ISRO accomplished a total of 13 missions at a staggeringly low cost compared to the world standards. These innovations have certainly proved that India's space organisation is a solid contender in the space sector, but still it lacks the technical expertise, hindering it from being at par with NASA. For the longest time, ISRO has been fully dependent on different versions of two launch vehicles, the GSLV and PSLV series, which are less powered and can only launch out engines weighing less than four tons. For a perspective, the SpaceX Falcon 9 (US' smallest rocket) can lift twice as much payload than India's most powerful rocket, the GSLV Mark III.

While India also has a robust private sector in space, the initiatives have only been limited to working as suppliers for ISRO; none despite the government allowing FDI in the sector have taken the leap to become a SpaceX or BlueOrigin. But now, ISRO seems to be changing things. In last year's budget, the government announced setting up of a new commercial arm under ISRO, a private entity called NewSpace India, and more recently, it has allowed the Indian National Space Promotion and Authorisation Center (IN-SPACe) programme, which will act as a regulator facilitating technology transfer from ISRO. Not that ISRO hasn't been doing technology transfers, but these have been limited to only a few corporations. Besides, its other commercial arm Antrix — this shall now be responsible for bagging foreign contracts — has been dogged by bureaucratic hurdles. Until now, ISRO has been solely engaging with private

companies and overseeing the transfer of technology. Instilling these private entities will help ISRO focus more on advanced research into interplanetary & human space flight missions. Additionally, the recent reformation to allow private sector participation in the space journey, private players can also start building and launching satellites. This move will give a boost to home-grown research & development in satellite technology and enable customising based on requirements of agencies. It opens the field to more job opportunities and international orders, since ISRO will be able to deliver more frequent launches than before. Additionally, it will also help ISRO to cater to the increasing demand for space-based applications & services in the fields ranging from weather to agriculture to transport to urban development. With revised government laws and private sector participation, ISRO can prioritise and enable accelerated growth in advanced R&D, interplanetary and human space flight mission. With IN-SPACe re-orienting itself from a supply driven model to a demand driven model, ISRO/India can play a major role in the global economic space sector.

Private participation, added with access to geospatial data for private players, will bring in immense economic progress. This also adds an impetus on the supply chain and closes in the gap between demand and supply through various trenches for the Indian space sector. This new levelled playing field, along with admittance to ISRO's testing facility, will help in building resilience and overall capacity. It could also help in India's future projects like the Chandrayaan 3, Gaganyaan, Aditya Li, Ni-Sar, Venus mission, etc, if implemented properly.

# INDUSTRY 4.0:

## The key to revive & grow the manufacturing sector



The COVID-19 pandemic has brought in incomparable losses to the Indian economy and restoring the country's financial health is going to be a difficult task. The manufacturing industry and the MSMEs, which are amongst the most affected sectors right now, need to start relying on Industry 4.0-relevant technologies to ensure continuity and sustainability of their businesses. The Cover Story analyses the impact of COVID-19 and draws resemblances from the history, while vindicating how Indian manufacturing can recover from the impact of the pandemic with technologies being the crutches.



Dr Rishi Mohan Bhatnagar,  
President,  
Aeris Communications India



Robots connected remotely to computer systems, equipped with Machine Learning algorithms, can run manufacturing units with minimum human support



COVID-19 lockdown is estimated to cost India \$4.5 billion a day (Acuité ratings). The negative sentiment of the economy can be seen in the fluctuating stock market and in the weakening of the Indian currency. However, India is not bearing the brunt of coronavirus alone; the global financial markets also reacted pessimistically to the COVID-19 pandemic and behaved in ways never seen before.

### Drawing parallels from history

The advent of COVID-19 or the coronavirus pandemic has led to unimaginable economic, social and psychological unrest, comparable only to the Spanish flu pandemic of 1918. First observed in Europe, the United States and parts of Asia, Spanish flu's spread was exacerbated by World War-I. Today, globalisation led international financial dependence and intercontinental travel is one of the reasons for the rapid global spread of COVID-19. In many ways, the current situation is a déjà vu of 1918-1919 era. At that time, there were no effective drugs, citizens were ordered to wear masks, all businesses were shuttered and bodies piled up in makeshift morgues before the virus ended its deadly global march. The greatest effect on the working population also occurred during this time. Researchers at the Federal Reserve Bank of St Louis revealed that the Spanish flu caused manufacturing to decline by 18% in 1918-19, led unsurprisingly by huge dips in both supply and demand, a large labour supply shock and increase in wages.

According to the Purchasing Manager's Index, India has seen its manufacturing sector growth slow to a four-month low in March as economic activities slumped. A few days after

the lockdown was first announced, the Society of Indian Automobile Manufacturers (SIAM) announced that the auto industry was losing ₹2,300 crore in production turnover for every day of closure. Are we going to experience the 1918 setback again or is there a way to mitigate the impact COVID-19 and a looming recession?

### Technology at rescue for the manufacturing industry

Thanks to the advancements in technologies, like the Internet of Things (IoT), AI, AR/VR, cognitive computing, digital twins, Machine Learning, robotics, creating cyber-physical systems, 3D Printing, blockchain, etc facilitating Industry 4.0, the world of manufacturing is transforming its four building blocks – material, machines, methods and manpower.

- 1. Material:** The global supply chain for raw materials was heavily dependent on one source. This will undergo a major disruption with majority of the countries/industries announcing either shifting to alternate, nearshore or domestic locations. This will be presenting new opportunities for countries, like India, to become the manufacturing hub. But this requires strategy to scale, produce quality output and reduce cost. Technology can help automate, monitor and control the entire supply value chain remotely, anytime, anywhere.
- 2. Machines:** Industry 4.0 integrates communications, IT, data and physical elements across the value chain and helps transform the traditional plants into smart factories. The whole new world of Industry 4.0 brings to life machines that are highly intelligent and connected, creating a fully

4 M'S OF MANUFACTURING	CHALLENGES	OPPORTUNITIES	DIGITAL SOLUTIONS
<b>Material</b>	<ul style="list-style-type: none"> <li>Supply chain management</li> <li>Quality assurance</li> <li>Logistics</li> </ul>	<ul style="list-style-type: none"> <li>Shift of focus to domestic supply chain to reduce dependency on global markets</li> <li>Global companies reducing dependency on a single supply chain location</li> </ul>	<ul style="list-style-type: none"> <li>Real-time supply chain and logistics management solution</li> </ul>
<b>Machine</b>	<ul style="list-style-type: none"> <li>Scalability</li> <li>Digitization of legacy infrastructure</li> <li>Quality of Product</li> </ul>	<ul style="list-style-type: none"> <li>Automation</li> <li>Agility</li> <li>Platform &amp; Resource sharing</li> </ul>	<ul style="list-style-type: none"> <li>Integrated Platform for digitization of legacy infrastructure</li> </ul>
<b>Manpower</b>	<ul style="list-style-type: none"> <li>Human priorities have changed – Safety &amp; Health is the prime focus</li> <li>Hygiene standards needs revamping</li> </ul>	<ul style="list-style-type: none"> <li>Cross border talent availability</li> <li>Automation</li> </ul>	<ul style="list-style-type: none"> <li>Remote workforce management</li> <li>Robotics</li> <li>AI, AR &amp; VR training modules</li> </ul>
<b>Methods</b>	<ul style="list-style-type: none"> <li>People processes</li> <li>Operations processes</li> <li>Business processes</li> </ul>	<ul style="list-style-type: none"> <li>Digitization of               <ul style="list-style-type: none"> <li>Product Lifecycle Management</li> <li>Manufacturing Operations</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Digital Twins</li> <li>AR, VR</li> </ul>

Summary of the challenges, opportunities and digital solutions that address each of the 4 Ms of manufacturing

digital value chain. And there is good news for existing factories or brownfield, too, as new technology platforms present the capability to digitalise the non-digital assets, securing existing investments.

- 3. Manpower:** Skilled manpower has always been a challenge, but in today's world, where human priorities have changed to staying safe and healthy, this will become even more difficult. More stringent hygiene standards need to be deployed, audited and monitored, and for large factories, this will be equally challenging to implement. To reduce the exposure and all, this will require technology interventions. Robots connected remotely to computer systems, equipped with Machine Learning algorithms, can run manufacturing units with minimum human support. In addition, safety & security of on-duty workforce is equally critical, especially in areas which are remote or hazardous. Today, connected and wearable technologies are helping employers monitor and track their workforce in real-time on a single dashboard. This helps in providing immediate assistance and relief to workers having emergency.
- 4. Methods:** People, operations and business processes will undergo complete transformation. The combined power of computers & automation enables remote management, fault detection and control of machines for their upkeep & predictive on-demand maintenance activities. This also enables standardisation of goods quality at reduced cost of production.

Digital skill gap would remain a challenge during the COVID-19 crisis. A well-defined digital transformation framework, with regular conduction of on-the-job skill development initiatives as part of the factory transformation journey, would prove beneficial. On the brighter side,

employers can also have access to the cross-border talent pool for roles and responsibilities which can be performed remotely. At this time, deeper interface and stronger collaboration with technical universities can also help manufacturers for identification & early hiring of bright minds and training the entry level engineers on systems and corporate culture.

The table above summarises the challenges, opportunities and digital solutions that address each of the 4 Ms of manufacturing.

### The future is now

Ensuring continuity and sustainability of businesses amid the COVID-19 crisis, while maintaining the uninterrupted supply chain of goods and services in the country, is critical. Even though Industry 4.0 is in its nascent stage in India, the Government of India's push to manufacturing through the 'Make in India' initiative has garnered considerable attention. The Smart Advanced Manufacturing and Rapid Transformation Hub (SAMARTH) - Udyog Bharat 4.0 is an Industry 4.0 initiative by the Department of Heavy Industry, Government of India, which aims to raise awareness about Industry 4.0 among the Indian manufacturing industry. Also, National Policy for Advanced Manufacturing would help manufacturers implement technologies faster for enhancing productivity, reliability and business strategy while reducing costs and improving profitability.

COVID-19 has created a stressful time for all the industries, especially for the country's Micro, Small and Medium Enterprises (MSMEs). MSMEs make up for about 45% of the country's total manufacturing output, 40% of

With an agile working model that allows businesses to remain productive, digitisation and adoption of emerging technologies will continue to be a critical priority and serve as a cost-effective route for business differentiation across industry verticals in the foreseeable future



exports and almost 30% of the national GDP and operate across the value chain. They employ an estimated 11 crore people and are stressed due to depleting internal reserves and low visibility of demand. To mitigate the negative impact of COVID-19 lockdown on the manufacturing & MSME sectors and their revival, the PMO announced the financial relief package of ₹20 lakh crore under the 'Atmanirbhar Bharat Abhiyan' to boost 'Make in India' and strengthen the Indian supply chain globally. The relief package is built on five pillars – economy, demography, system, infrastructure and demand, to support the Indian supply chain considering the land, labour, law and liquidity that will support small businesses, MSMEs and the farming sector. At a time when other countries are shifting their dependence on imports, this relief package brings fresh hope to Indian manufacturers and MSMEs who are heavily dependent on imports from other countries to manufacture their products.

### Silver lining in dark clouds

I believe that there exists a silver lining in this darkest cloud of the century. What differentiates the past from the present is the fact that the 21<sup>st</sup> century is marked by the digital era and

India has a digital savvy talent pool. We have to live with the realities of the 'new normal' driven by the WHO guidelines on personal and environmental sanitisation, social distancing and work from home. And this has a profound impact on the corporate culture with the priorities of business drastically shifting from profit to prevention, with business continuity, assets and employee safety becoming paramount. Technology is the only option for business continuity and survival. We must make 'local' the mantra of our lives. We have indigenous technology solutions from IoT and technology start-ups to large technology firms for both greenfield Industry 4.0 implementations and for making brownfield factories transform into smart factories. The government at the centre and state are providing full support, and the financial relief package will work as booster doses, especially addressing the MSME sector.

I am very hopeful that post-coronavirus lockdown, things will slowly and steadily commence towards normalcy in line with the 'new normal'. Manufacturing companies will now progress faster from the initial stage of testing digital technologies and pilots for proof-of-concept to full scale implementations with the management boards approving investments to rapidly institutionalise technology advancement for Industry 4.0. □



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# Shielding manufacturing from virus: Holistic security for data-driven architectures

With manufacturing shop floors becoming futuristic, there is a crippling problem of unsecured resources that are unattended. With there being a 37% increase in cyber-attacks in the Q1 of 2020, manufacturing industries need to make cyber security their primary preference. The Viewpoint section of A&D India seeks to proliferate the major threats, especially with the shift in work culture due to COVID-19, that the industry should be aware of, how companies can effectively secure its IT & OT and how the government can contribute to building a cyber secure infrastructure.



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## “Cyber security for manufacturing is like an insurance”

The new economy is a data-driven economy, and hence, everyone needs to be aware of the security concerns. Going beyond the security risks could extend to deliberate disruption of operations either by physical intervention, by perpetrators or by cyber intervention by people with motives to disrupt.

### Security sanitisation

Owing to COVID-19, organisations need to assess and implement the necessary protection levels to ensure that when their manufacturing assets are connected to the outside world, they do so in a sanitised and protected environment. This means that the approach to security has to be layered. The first and the most cost-effective layer of defence is one's people (employees, partners, vendors, etc). The second layer has to be the IT security layer, which would mean ensuring that one's IT systems have the latest firewalls to ensure data connections, networks & assets are secure and IT policies are up to date. The third layer is to set up immediate Operational Technology (OT) security policies to ensure that all vulnerabilities are patched/managed and moved to more robust, multiple network strategies based on collaboration between IT & OT networks, implement nest perimeters with network segmentation & continuously monitor networks for anomalies and have an emergency response team to tackle any malicious attacks.

### Standard secure ecosystem

Cyber security for manufacturing is like an insurance and quality topic; hence, the adoption of cyber security measures must become a competitive advantage within organisations throughout the manufacturing sector rather than a regulation driven topic. The industry and government should jointly build an ecosystem based on cyber security standards in which independent auditors would confirm that effective cyber security efforts are in place.



**Larry O'Brien,**  
Vice President – Research,  
ARC Advisory Group

### “The shift to remote workers includes shift to remote monitoring”

Probably the biggest physical cyber security concern right now is the huge wave of employees that are working remotely. Many organisations and manufacturing companies are not set-up for the volume of remote workers we have right now, and this presents an extra requirement for security.

#### Solutions for remote monitoring

The shift to remote workers also includes a shift to more remote monitoring and remote operation of processes. Various solutions exist for securing remote access to control system and production information. These include things like industrial firewalls, unidirectional gateways, data diodes and more. This requires an understanding of the marketplace for industrial cyber security solutions and good security-related selection criteria, not just for cyber security products and services but also for control systems, software and related offerings.

IoT-based solutions present their own cyber security challenges. Many IoT and edge platform providers have good cyber security schemes built into their offerings to ensure secure communications and secure connectivity to edge and end devices, but not all suppliers do this, and many end-users are finding it a challenge to manage the risks posed by new technologies versus the business value they provide. Following the guidelines laid out in standards, like IEC 62443 and the NIST framework, is still the best way to ensure security.

#### Securing the approach

There are very few laws or regulations that exist in any country to ensure an acceptable level of cyber security in the manufacturing or critical infrastructure segments. In future, banks, credit rating firms and insurance companies will most likely employ their own rating systems for industry sectors and individual companies to measure acceptable levels of cyber security and risk management.



**Prashant Phatak,**  
Founder & CEO,  
Valency Networks

### “Not only ransomwares but human attackers can also cause disruptions”

The manufacturing sector typically lacks awareness when it comes to the physical aspect of data elements. Even today, a great amount of data is in physical forms, such as printouts and document piles, which need to be protected mainly from the prying eyes of attackers. Strict controls, such as frisking, CCTV camera systems and random checks, are key implementations to be adopted. Besides, the confidentiality of these documents, the environmental controls (protection from fire, spillage, etc) must be considered, too, because it is generally forgotten that these problems fall under information security.

#### Security changes due to virus

With the COVID-19 scare, companies are forgetting that a work from home policy needs to be designed carefully, followed by a Bring Your Own Device (BYOD) policy. At the same time, the IT management of a company needs to be wary of the potential attacks on a company's network infrastructure. To address these issues, detailed process audits and network audits needs to be performed and experts need to be consulted to control the risks.

The concept of IoT security is still not understood properly by many. It's not only the ransomwares but human attackers can also cause disruptions. Companies seem to be less aware of these challenges and hence, companies should invest into an end-to-end approach from a cyber security standpoint, as opposed to addressing only a part of it.

#### Strengthening laws of security

Lately, every piece of data has some value, and hence, it can be stolen. Although the government is addressing information security issues, the width and depth of it is inadequate and the pace is slow. An apt way to achieve that would be a law protecting the industries as well as individuals from information security, cyber security and data privacy attacks.



**Rajarshi Dhar,**  
Senior Industry Analyst,  
Digital Transformation  
Practice,  
Frost & Sullivan

### “Build proactive security framework based on next-generation technologies”

Modern cyber-attacks include data breaches, Industrial Internet of Things (IIoT) attacks, IP theft, attacks on Industrial Control Systems (ICS)/SCADA systems and more. Manufacturers need to make sure that not only their sensors, smart products and mobile applications but also their confidential financial data, customer information, blueprints of future projects and patents are being protected.

#### Securing discrete architecture

During a scenario like COVID-19, using Robotics Process Automation (RPA) and Software-Defined Security (SDS) architectures, manufacturers can minimise manual interventions, thereby reducing the need for a large number of security specialists and threat hunters.

The typical IIoT security threats include device hijacking, Distributed Denial of Service (DDoS) attacks, Permanent Denial of Service (PDoS) attacks and Man-in-the-Middle (MITM) attacks. To secure IIoT devices from these advanced threats – manufacturers need to outline the various types of IIoT security threats, the characteristics of attacks, the assets to protect and the prioritisation of risks; use advanced technologies, like voice recognition, biometric and iris scan, in addition to securing access with password management and focus on using specialised IoT security solutions that are capable of pinpointing the most devastating threats and minimise false positives.

#### Proactive central security framework

Manufacturers need to build a proactive security framework based on next-generation technologies that can address unknown threats. While companies increase their focus on adopting best-in-class solutions, regulatory bodies should come up with industry mandates for manufacturing units and critical infrastructure that includes setting up mandatory Security Operations Center (SOC), conduct regular Vulnerability Assessment/Penetration Testing (VA/PT), end-to-end product assessment, prepare incident response plans and create an internal ecosystem of skilled resources capable of handling advanced attacks.



**Shinto Joseph,**  
Director – SEA Operations,  
LDRA

### “Have a holistic approach to address security activities”

Manufacturing companies have a lot to consider when it comes to physical security. With more cyber security breaches happening, manufacturers shouldn't focus on one practice alone, e.g. putting an antivirus. Adoption of modern security practices go beyond traditional perimeters of security approach. Training employees on protocols and procedures will produce better results, as they are the most important stakeholder in the line of defence.

#### Setting priority on security

During situations like the COVID-19, awareness and round the clock alertness along with the right tools and practices are key. Identifying goals and setting standards for policies, processes and procedure of security is priority. Finally, look for gaps in the existing strategy, work on implementing new solutions, consult with expert audits and build in-house competencies. Ideally, we should have a holistic approach, where we address security at IT, OT and IIoT level, so that the entire set of activities are addressed. Most of the time, manufacturers prefer immediately available solutions from the market or retrofit newer cyber security practises in a legacy system. This entails just a stop-gap arrangement, as the threats and the point of vulnerabilities are always on the rise.

#### Establishing global safety norms

The trust deficit between countries is increasing day-by-day. It's high time that countries come together and form the right standards for security and enforce it globally, similar to what happened globally for safety practices. Traditionally, in India, we are not that serious about following safety and security practices on the ground. This means, the need of the hour is a joint action by the government and industry.





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# “Play at the intersection of future technologies & become an innovator”

... mentions **Dattatri Salagame**, President & Managing Director, Robert Bosch Engineering and Business Solutions (RBEI), in this interview with Anvita Pillai. He talks about his journey as the newly elected President and how the company is trying to make the best out of the current pandemic situation. He also details on the contribution to the ‘Self-reliant India’ movement, expectations & changes set to come in the auto industry & more. Excerpts...

**You assumed the position as the President & MD just in the beginning of April 2020, which is also around the period when the country went into a lockdown. What were the challenges that you had to deal with in the first few weeks of taking over?**

I assumed responsibility for RBEI right at the heart of the COVID-19 scenario. We had to now do business in ways that we were not used to. One of the biggest challenges that I faced at the get-go was to equip 96% of our employees to work from home amid a very long and indefinite lockdown. We are into R&D operations, which meant, in some cases, supporting associates working in our labs to continue with their research and testing from the confines of their homes. Our primary focus was that our employees stay safe as they continue to do great work from home and ensure our clients did not lose too much momentum. Another challenge was allaying any fear of a long-term impact

on careers and ensuring that we, in the leadership team, led by example inspiring others to take on these new challenges one day at a time. A great example of our employees’ spirit is how they have designed solutions using technology available in hand, for COVID symptom scanning, monitoring physical distancing, mask usage and related applications. It was the need of the hour.



**Are there any opportunities that you see for your company out of this present situation? If yes, then what are they?**

The pandemic has had an unprecedented impact on global economies and trade. It has taken down fundamental ecosystems across industries. Our focus is to build RBEI up from being an engineering powerhouse into a company that is aspirational for India’s best tech-talent – a fun company that builds technologies that impact daily lives. One thing that I keep saying is that the connected world is coming, whether we like it or not. The biggest opportunity that I see is for us to play at the intersection of these future technologies and become an innovator across the value chain with our years of experience across software, sensors and services. We build beautiful software in India, which is a part of every product that comes out of Bosch, globally.

**In what ways do you think India can add significant value to your global customers, especially with the ‘Self-reliant India’ movement being announced?**

Nearly every software from Bosch has a footprint of India or RBEI in it. India has a huge potential in terms of talent to scale when one looks at the full-stack development for the connected world. We have eye care and haemoglobin solutions that are locally made and have the potential to go beyond India. The fact that our services to our customers have continued uninterrupted during a crisis itself is very reassuring to our customers. They can focus their attention on other priority areas. This in itself is the value-add that our customers have realised.

**Industries you cater to, like automotive, have started working with the ‘new normal’. How can solutions by RBEI help with its solution in this shift to the ‘new normal’? In addition, what structural changes do you think are set to come in the automotive sector?**



*Associated with RBEI for 24 years, Dattari Salagame took over as the President & Managing Director of RBEI in April, 2020. Prior to this role, he was responsible for strategy, M&A and new business ventures for Bosch. He was instrumental in crafting mid-term breakout growth and transformational program for diverse businesses of Bosch in India. He established 'Discover Nurture Align' (DNA), the start-up accelerator program by Bosch, in India, with a mission to promote Indian tech start-ups and to set a benchmark for the rest of the world.*

The pandemic has hugely affected the automotive industry, which is going through a structural change, and our customers across the world have been affected. However, almost nobody red-lighted any future product engineering. We have been building products for the automotive industry that can be used during the pandemic, like facial recognition and temperature recognition products, which are being provided commercially. Big brands are already going contactless in the automobile industry for contactless service.

I am optimistic about the mid to long-term in the sense of pick-up, especially in the automotive sector in India. With the market bound to get more competitive, future products will see an increase in features and innovations in the digital space and we envision that turning into a great opportunity for us. As we prepare to take on the role of a technology enabler, I believe India will continue to drive a lot of that innovation.

**You have been very out-and-out about promoting start-up culture in India. Now, with you assuming the top managerial position in the company, how do you plan on offering a boost to start-ups in India? What sort of start-ups does your company intend on collaborating with?**

At Bosch, we look at how we can create value with partners across the board, including technology start-ups. We often explore these synergistic relationships, sometimes to gain access to a particular competency, bridge the gap on solutions and sometimes for the talent. As we continue to run programs like Discover, Nurture, Align (DNA) & encourage technology start-ups to work with us, this inter-dependency with Bosch will increase. While we bring these solutions into our fold, the start-up also gain access to a much larger market – our global customers, as well as our technology expertise to ensure that their solution is market-ready. Some of the niche markets

where we continue to see opportunities for collaboration include telemedicine, pharma & agriculture, automation in factories, energy, retail and safety.

**Do you think it would be a smart decision for companies to invest now in digitalisation/Industry 4.0? Or should they wait for normalcy to restore before starting to invest in technologies?**

This is a time as good as any for companies to invest in automation and digital technologies. The prime focus for most companies, especially in the manufacturing space, is to go back to the business scenario of the pre-lockdown era, or a better scenario. This will mean

new products and the ability to compete in an extremely competitive market, while still managing to survive. Cost cutting and innovation are inevitable. In manufacturing, it is imperative to ensure efficient factory orchestration of machinery, resources and processes. At this point, I do not believe that any company can afford to have a wait and watch approach to what lies ahead. All decisions need to be taken here and now.

**What is the recovery period you are aiming for RBEI to overcome the side-effects of the lockdown? What is the plan of action that you intend on implementing for a quick recovery?**

At RBEI, we are sufficiently prepared for the near future. Contingency measures were put in place early on. As we move towards the opening up of the lockdown and with employees returning to work in a phased manner, we feel more confident about the situation improving. Recovery is the strong word – with a majority of our workforce working from home, we never really shut down. At RBEI, it will continue to be business as usual, with some amount of caution and some amount of uncertainty – but that is the new normal. □

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## Digitalisation in steam power plant: Improving plant performance with Advanced Process Control

Unlike the olden days, today, a plant runs on real-time monitoring with digital technologies rather than relying completely on plant operators. Over the years, Advanced Process Control (APC) solutions have become increasingly sophisticated. With it, steam plant operators can optimise thermal efficiency, reduce emissions and maximise participating in ancillary service markets, without exposing units to increased thermal stresses or accelerating maintenance intervals. The article explicates on how fossil steam power producers are turning to digitalisation & APC to stay relevant & profitable in a power market being upended by renewables & trading.

In most of the world today, power producers are operating in uncertain times. As traditional operating models are upended by new sources of energy, particularly the wind, solar and steam power plant operators find themselves running plant and equipment in ways never intended by their designers. This stresses not only the equipment but also budgets and resources. The uncertainty produced by today's markets also leads to shifting priorities from management and lack of operational predictability.

The result is an increasingly complex operating environment and fragmented marketplace driven by inconsistent and fluctuating demand. Operators face new challenges every quarter. Deregulation, power trading, decentralised power markets, competition from renewables, price volatility, fast ramping, retiring workforce, loss of institutional knowledge and the constant threat of cyberattacks are amongst the most critical of these challenges. This is especially true in mature markets where many steam power plants operate as back-ups to a power grid



Today's operators serve more of an executive or orchestration role – overseeing operations to ensure safety and intervening only as needed

increasingly supplied by renewables. This leads to inefficient operations where plants must frequently ramp up and shut down as load demand fluctuates. In these markets, the days of plants operating continuously at the base load are coming to an end.

In markets where steam power plants (i.e. fossil-fired boiler with steam turbine) still run at full capacity, optimising performance to eliminate unplanned downtime, meeting regulatory burdens and increasing power output are still priorities that must be met, offering significant improvements in profitability. Markets where plants participate in intra-day and day-ahead energy trading, providing reliable power generation schedules and the capability to deliver ancillary services are the key to profitability.

## Technology drivers and market demands

The advances in power plant control and optimisation are being driven by a combination of technological (i.e. Internet of Things, cloud, faster computer processors, broadband networks, etc) and market forces. Of these market forces, three are paramount: renewable generation, fuel costs and environmental targets. Renewable generating capacity is growing rapidly. At first in Europe and the US, but now in most parts of the globe. With high renewable energy penetration comes greater challenges to grid management. For traditional baseload plants, this means changing output quickly. Only performance optimisation solutions make this economical.

Global fuel prices are another factor. In order to maximise profits, all power plant operators want their plants to burn the least amount of fuel for the highest amount of energy output. This is a critical issue in some global power markets. In the US, for example, cheap natural gas from shale makes it increasingly difficult for coal plant operators to compete. While in Europe,

high natural gas prices are challenging gas-fired plant operators with the same problem. In both cases, optimisation that allows operators to maintain tight control over the combustion cycle, while minimising equipment stresses and holding maintenance costs down, can be the difference between operating economically or not.

The one thing all power generators in every market have in common is they are meeting these challenges head-on with digitalisation. Finally, the same environmental concerns around climate change that have stimulated the rise in renewable generation are driving de-carbonisation of steam power plants. Much tighter emission restrictions increase cost pressures on older coal-fired plants in particular. Newer plants find compliance less of a burden, but cost control still depends on the effectiveness of control and optimisation systems.

## Digital solutions to common problems

From integrated control systems drawing data from an army of sensors, to remote collaborative management of operations from anywhere on the globe, digital is how operators reduce costs and increase margins. Advanced Process Control (APC) for power plants has become increasingly sophisticated over the past 20 years. Where once a power plant was controlled by an operator facing a bank of gauges and levers, today's plant control systems run on real-time data from thousands of sources. Today's operators serve more of an executive or orchestration role – overseeing operations to ensure safety and intervening only as needed. The result is a more accurate control over all of a plant's processes, not just a select few as in the day's past. APC and new digital solutions allow for greater optimisation of a greater number of parameters, leading to higher efficiency and greater flexibility to meet market demands than ever before.



Advisory solutions can suggest best actions. But operators may disregard this advice, making sustained, repeatable efficiency gains hard to replicate fleet-wide.

## How APC systems help operators meet these demands

The secret of a low heat rate and, hence, high thermal efficiency, is to maintain operation with as little variation as possible. Any variation leads to a loss of efficiency and revenue. That is why APC-based performance optimisation is focused on maximising efficiency and reducing variability. Efficiency is at the core of all power plant operations and drives technological advances across the entire power generation spectrum, from coal-fired plants to solar and wind.

For steam power plants, this has led to the development of supercritical and ultra-supercritical boiler technologies based on ever higher steam temperatures and pressures that rely on ever more sophisticated materials and technologies. In a coal-fired plant, for example, optimum plant efficiency depends on maintaining the plant within a narrow range of steam cycle operating conditions. The more tight the control, the easier it becomes to maintain efficient generation. When talking about power plant efficiency, steam cycle efficiency is the headline figure that is mentioned the most. But optimising efficiency stretches well beyond this. Power plants are large users of electricity, which is used to drive a whole range of auxiliary systems, such as pumps, fans, compressors, drives, etc. If the operation of all these energy consuming components can be controlled as part of the overall optimisation scheme, there are enormous savings to be had. This underscores one of the strongest business cases for optimisation. By operating each component of a plant as efficiently as possible, an APC solution can pay for itself in as little as one to two years.

## Steam power plants benefit the most

APC solutions are available for all types of power plants, but it is in steam power plants that they offer the greatest advantages. For example, APC allows boilers to maintain low nitrogen oxides (NO<sub>x</sub>) emission conditions and high carbon burnout, both of which are critical for plant emission performance and efficiency. Depending on how they are configured, APC systems can also manage steam temperatures and pressures throughout the steam cycle, allowing the best achievable efficiency while minimising mechanical stresses. Optimising coordinated boiler/turbine control for grid frequency support also can be achieved. At the same time, system parameters and KPIs are collected to support predictive and prescriptive maintenance activities, lowering maintenance costs significantly.

APC solutions can be used to control gas turbine and combined cycle power plants, too. But modern gas turbines often operate at the limits of their material capabilities and are already closely controlled to ensure that they do not exceed these limits. Because of this, there is less room for operational changes which improve efficiency at base load. Instead, APC can improve load response (e.g. start up and ramping) as well as the low load capability of such units. With cogeneration plants, APC will also improve plant economics by maintaining optimum efficiency for multiple fuel changes and for frequent power and steam demand fluctuations.

## Holistic approach is key

Each of these improvements can lead to considerable





APC and new digital solutions allow for greater optimisation of a greater number of parameters, leading to higher efficiency and greater flexibility to meet market demands than ever before

operational improvement. In this approach, integration is the key to APC system effectiveness. It is always the goal of power plant operators to achieve the best heat rate and highest level of flexibility. But the inability to automate and optimise all the different parts of the plant as one is often an insurmountable challenge to achieving these goals. Any integration that does occur relies on the expertise of plant operators. Thus, the whole plant model, if there was one, resides in an operator's head. However, today's solutions are capable of optimising the whole plant (or fleet of plants) as a single unit. So, when plant operators talk about power plant optimisation today, they are talking about this holistic view of 'plant control'.

### Solutions independent of the control system

This holistic approach is made possible by performance optimisation solutions that are control system agnostic. In the past, software applications ran directly on the control system infrastructure. Today, these applications are model-based and are implemented on top of the control system (usually running on a PC or server) and interact with the control systems via industry standard real-time interfaces to read inputs and send outputs to the underlying basic controls. This allows the use of a variety of digital modelling techniques (e.g. data based or physical equations), to create a 'digital twin' of the plant.

### Lowering maintenance expenses

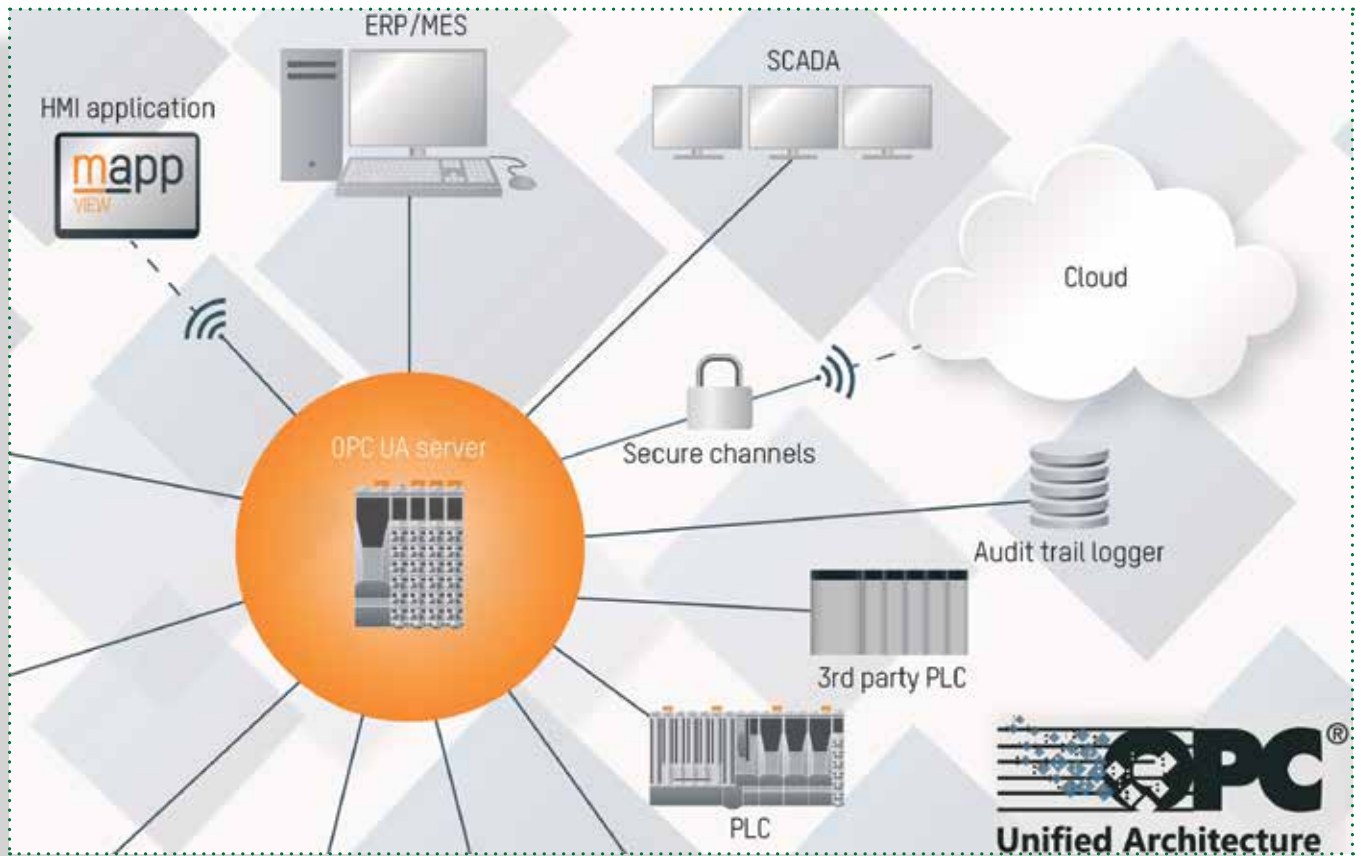
Because of fast ramping and other operational demands, power plants today are subject to stresses that exceed their

original design criteria. This leads to increased equipment wear and higher maintenance costs. Digital twins and other APC systems help keep these expenses under control by ensuring the plant always operates within certain limits. During start up, for example, if the temperature gradients within the boiler can be limited, thermal stresses are reduced. By maintaining tight control of conditions during start up, shutdown and when a plant is ramping, APC solutions extend the lifetime of plant components. In addition, the data collected during each cycle can be used to build up a historical picture of component health that can be used to predict equipment failure before it happens – keeping unplanned downtime to a minimum and allowing maintenance personnel to schedule needed repairs at optimum times.

### Speed & solution

Even though the future for steam power plants is challenging, there is a path forward. Driven by market forces beyond their control, plant operators are embracing digitalisation to improve performance, save money and reduce emissions. This is nothing new. The power industry has been adopting technological solutions to solve problems for years. What has changed is the urgency at which they must now proceed. Speed is essential. Steam power plant operators in particular are facing market demands their facilities were never designed to meet. ABB believes that today's APC solutions provide the best route to success, empowering flexible, economical operation for years to come. The challenges are here now but, fortunately, so are the solutions. □

*Courtesy: ABB*



# OPC UA over TSN, connecting future-ready factories

As factories steer to implement strategies for digitalisation, increased networking requirements are inevitable to make the enterprise more adaptive to changing market demands. Plus, interoperability in a factory is a significant element, where industrial networks play a pivotal part to guarantee smooth connectivity till the end. This article throws light on how OPC UA is eliminating the need for traditional factory level fieldbus systems, how it reduces the engineering effort in configuration and setting up data exchange between systems and the transformation of industrial network to enhance process capabilities.

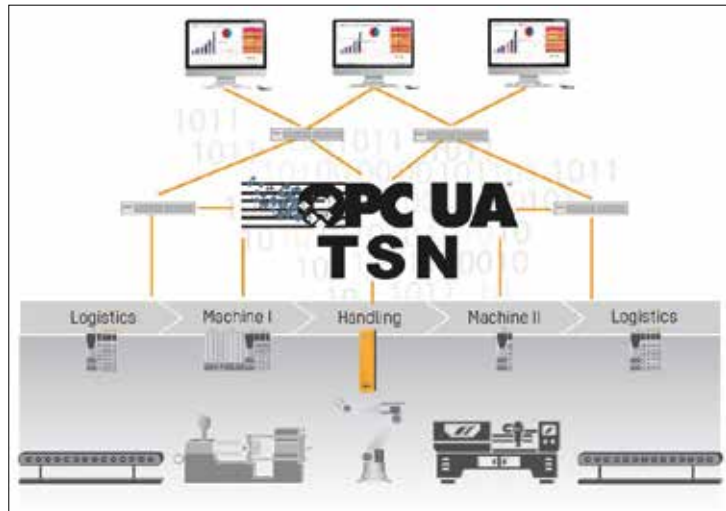


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Digitalisation is an important growth catalyst & concurrently a major disruptor for the manufacturing sector. Digitalisation focuses to foster the integration of IT technologies with machines, solutions and services across the complete value chain, which enhances entire product and service life cycles. The new-age technologies open doors to unprecedented new business opportunities and customer value. However, this is only possible if meaningful information can be shared openly & securely across each level in a factory. Therefore, interoperability in a factory is an important paradigm and industrial networks plays a significant role to ensure a seamless connectivity from end-to-end.

## Transformation of industrial network to enhance process capabilities

The communication in a shop floor has sharply evolved over decades. The manufacturing industry saw migration from analogue signal to fieldbus networks. The fieldbus supports rapid exchange of data between individual systems, generally over great distances measured in baud per second. However, fieldbuses brought its own challenges. They differ according to their transmission medium, maximum number of data bytes per telegram, topologies, data traffic management and redundant



With flexible topologies, OPC UA over TSN merges both time-critical application and enterprise data on the same network, providing seamless connectivity

architectures. Building over the increasing demand for communication paved way to the growth of industrial ethernet.

With the advent of superior bandwidth and speed, excellent flexibility and large established product ecosystem, ethernet adoption in industries has been rapid and comprehensive. The real-time ethernet network integrates all components in industrial automation, such as PLCs, sensors, I/O modules, motion controllers, safety controls, safety sensors and actuators and HMI systems. The protocols were devised to give users a single, consistent and integrated means for handling all communication tasks in modern automation. Although industrial networks are based on Ethernet IEEE 802.1, they commonly incorporate additional mechanisms to provide latency guarantees that, in turn, are often incompatible with each other. As a result, the real-time ethernet solution market nowadays is severely fragmented and, due to the lack of compatibility, is crippled, concerning future development. The manufacturing ecosystem seeking to automate operations has typically found itself locked into proprietary systems through conflicting connectivity standards. This has limited technological innovation and industrial transformation.

### Challenges with existing industrial ecosystem

The manufacturing industry has many complex operational and communication requirements. In addition, the implementation of IoT brings its own connectivity challenges. The protocols applied on an IoT platform faces risk of interacting with the shop floor machines that demand an interface system to converge Information Technology (IT) with Operational Technology (OT). The process lines, machines, sensors, servers, clients, applications and different devices produce numerous outputs and data points. The data often needs to be exchanged

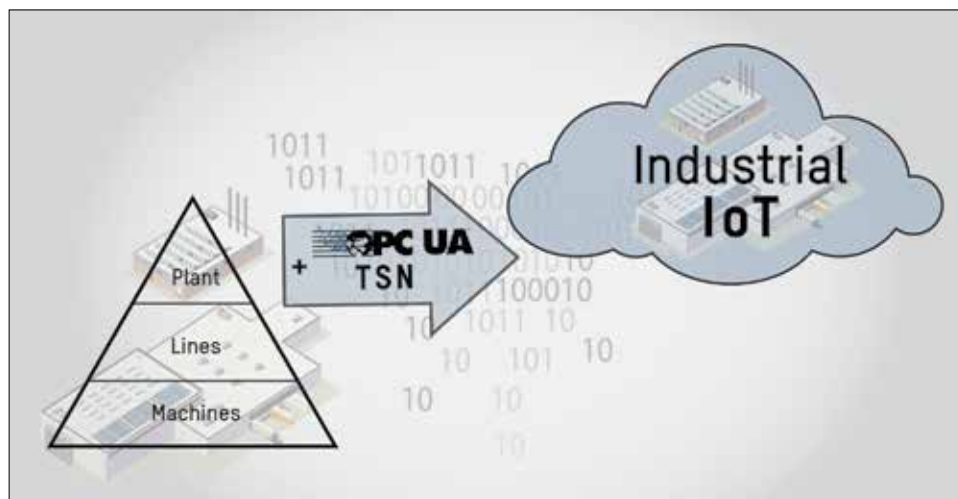
between machines and enterprise system and ultimately analysed to improve production rates, reduce downtime, enhance quality, increase profits and identify new business models. The entire ecosystem demands an open, unified horizontal connectivity, like machine-to-machine communication & vertical connectivity, like machine to IT in order to establish a seamless interoperability.

### Open source technology for industrial interoperability

Open standards bridge the gap between enterprise IT and the production floor. The proven open communication protocol Open Platform Communication Unified Architecture (OPC UA) is eliminating the need for traditional factory level fieldbus systems. The soft facts, like easy implementation, openness, vendor independent, risk avoidance, conformity, interoperability, long-term availability and overall distribution make OPC UA gain acceptance in industries. A typical automotive industry consists of multiple stations on assembly line and it becomes evident to connect each station and share data in real-time to control the process. Data from the assembly line also needs to be shared on Andon system to give the factory supervisor a holistic update on the shop floor situation. OPC UA suffices the need of collaborating each station on the assembly line as well with the central monitoring system. The client-server-based protocol allows seamless communication from the individual sensors and actuators on the production line and links up to the ERP system or the cloud.

OPC UA is the main successor to classic OPC, with a key advantage of platform independence. OPC UA can be easily incorporated with Windows, Linux, Mac, Android and other platforms, which is significant for the manufacturing industry, such as FMCG, where machines and systems are often running





FOPC over TSN proves to be an open, unified and secured communication for IIoT applications

on different platforms. The FMCG industry uses OPC UA to connect the entire supply chain and access data over remote in a secured way. The built-in security mechanisms, like authentication, authorisation, encryption and data integrity through certificates makes OPC UA the most secured protocol for data exchange. In addition, OPC UA can accommodate legacy systems on production line with the existing infrastructure and allows for scalability. This reduces the investment by factory owners to make brownfield machines IoT-enabled.

OPC UA reduces the engineering effort in configuration and setting up data exchange between systems. The industry specific information are standardised, such as for injection moulding, robotics, machine vision etc in OPC UA servers, in the form of companion specification. Rapid growth in companion specification of various industries makes OPC UA a preferred platform with the world’s largest ecosystem for interoperability. It is designed for scalability and supports a wide range of application domains, ranging from field level to enterprise management. Applications include discrete automation, batch and continuous process control, connectivity within and between machines, IIoT communications between devices, edge controllers and cloud systems.

### OPC UA goes real-time

OPC UA has had its limitations when it came to complex processes with real-time requirements until now. Adoption of publish-subscribe model (pub/sub) and implementation of IEEE 802.1 standard for Time Sensitive Networking (TSN) aims to give the OPC UA communication standard real-time capability. TSN is an extended ethernet standard to add the guaranteed determinism to OPC UA, with low latency and jitter cycles and prioritising data traffic. TSN gives flexibility to handle large volume of data, with plug and produce model adopting the security measures of OPC UA. The performance of TSN over

existing real-time ethernet protocols has proven to be 18 times better over the gigabit ethernet communication.

In the shop floor of an industry, TSN enables the convergence of numerous small, isolated machines into one, unified network structure. The network can accommodate the requirements for real-time communication on a larger scale, while providing more transmission bandwidth for IT data. In factory automation, network convergence enables distributed real-time control, such as large machinery and numerous robots that can interact with each other more precisely and flexibly. Factories can enable applications, such as predictive maintenance using OPC UA over TSN, that require the analysis of substantial amounts of sensor data in real-time to make decisions on controlling machine downtime. TSN offers converged network for secure remote access of production line to perform maintenance tasks remotely. B&R is driving the initiative of OPC UA over TSN shapers group, which has gained traction with the inclusion of major global players from automation, electronics, robotics, software and networks, with a common vision to enable an open, unified, standard-based Industrial IoT communication solution between sensors, actuators, controllers and cloud, addressing all the requirements of industrial automation.

### Making the factory future-ready with OPC UA over TSN

The need of the hour is to select an ideal communication standard to converge OT and IT to yield long-term benefits. OPC UA is well positioned to address key interoperability challenges in the industry, ensuring higher profits and reduced operational expenses. With the flexibility of TSN, adding security and complete independence to handle real-time data, shapes OPC UA over TSN as the ideal communication protocol for implementation of Industry 4.0 and making the factory future-ready. □

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## 3D measurement solutions

As manufacturers work toward developing their trade in the worldwide business scenario, the necessity for measurement precision has become of even bigger importance. TOOLCON Systems was looking for a measurement solution that will allow them to take on significant projects and deliver total solutions to its clients. That's when it was introduced to FARO's 3D measurement technology. This case study divulges how TOOLCON Systems purchased the FaroArm and how the company went on to buy more units of the newer FaroArm models, which afforded the team the means for easy verification of product quality by performing 3D inspections and throws light on how the portability of the FaroArm also removed the need for the company to move objects to the machine for inspection.

As the 'Make in India' initiative makes headway with transforming the country into a manufacturing powerhouse, India's tooling sector is well on the path to becoming a key player in the global market. Other than continual improvements in productivity and costs, ensuring the quality of products is another key factor for the sector to flourish on the world stage.

### Producing the best tooling systems

The quality of a finished part, its properties and the speed &

accuracy with which it can be produced, are highly dependent on the precision and characteristics of the tooling. Hence, to produce the best tooling systems, manufacturers must design and engineer them to the highest quality. One way of achieving this is to invest in staff training and tap on the latest technologies to gain an edge over the competition. TOOLCON Systems is deeply aware of this.

Headquartered in Pune, Maharashtra, TOOLCON Systems is a leading manufacturer of high precision tooling. Since its inception in 2001, the company has grown its business to include a wide variety of products across four vastly different verticals – dies, fixtures, special purpose machines & material handling systems.





FARO 8-Axis Quantum FaroArm

## Constantly improving its processes

Over the years, TOOLCON Systems has garnered a solid reputation among its clients for being a trustworthy partner. From the production of automobile chassis that are 1.2 metres long to frames for building fixtures that are 14 metres long, the company has proven both its versatility in handling projects of varying requirements and its reliability to get the job done.

Beyond that, TOOLCON Systems is constantly on a lookout to improve its processes and grow its offerings — which eventually led to its venture into providing assembling and certification services. In addition, the expansion of its premises in 2006 made it feasible for the company to accept jobs of a larger scale. As a result, it had to search for a measurement solution that would have allowed them to take on such projects & deliver total solutions to its clients.

## A reliable & efficient solution

Ajay Mungade, Director, TOOLCON Systems, shared, “We have never rejected any of our customers’ requests or projects. Instead, we have worked hard to increase our in-house capabilities in order to meet their demands.”

TOOLCON Systems was first introduced to FARO’s 3D measurement technology by one of its customers. After much research, the company’s first purchase was the FaroArm 7-axis Platinum, which afforded the team the means for easy verification of product quality by performing 3D inspections, tool certifications, CAD comparison, dimensional analysis and reverse engineering.

Armed with this new measurement solution, the company enjoyed higher repeatability and consistency due to FaroArm’s high precision (up to 0.020 mm).

## Improving quality and productivity levels

The convenience of using the FaroArm, together with FARO’s user-friendly software, also provided greater ease for report generation with 3D data points, making the process of product design, development and testing a breeze.

“We are now able to reach areas that were previously inaccessible with other solutions due to the ergonomically-designed 7-axis FaroArm,” expressed Mungade and went on, “What’s more, the portability of the FaroArm also removed the need for us to move objects to the machine for inspection. This has not only helped to improve our productivity levels, but also the quality of our products.”

Furthermore, after having experienced the accuracy and ease of use that the FaroArm provides, TOOLCON Systems went on to engage a local service provider at a later stage to tap on their FARO Laser Tracker for jobs involving larger parts, allowing them to optimise their processes for large scale metrology applications.

## High satisfaction all around

TOOLCON System now owns four FaroArm units, including a recently purchased Quantum FaroArm, and uses them for up to 10 hours daily. With enhanced efficiency and improved capabilities from FARO’s measurement solutions, TOOLCON Systems now looks towards expanding their business further beyond India’s shores.

Speaking on the company’s trust in FARO’s solutions, Mungade commented that they have full confidence in its service, quality and the integrity of its solutions. “Its solutions have allowed us to win the faith of our customers and boost customer satisfaction levels tremendously,” he signed off. □

*Courtesy: Faro Technologies*



## Bringing design accuracy to healthcare products

GSK Consumer Healthcare has always tried to be on the forefront in trying to provide its consumers with products that are visually attractive and attention grabbing. Until 2011, they relied on outsourcing the product packaging projects, which were long, tedious and had confidentiality issues. For this, GSK turned to DesignTech to bring in an in-house solution that was rapid, accurate and saves cost. The case study evaluates how the Stratasys J750 3D printed, a solution suggested by DesignTech, helped GSK to achieve maximum efficiency with accuracy while saving cost and confidentiality.

GSK Consumer Healthcare, an associate of GlaxoSmithKline plc, one of the largest pharmaceutical companies in the world, aims to provide everyday healthcare products that help people to do more, feel better and live longer. These products, which are sold in more than 150 countries, include household names like Boost, Crocin, ENO and Horlicks. Its office in India has won many awards in 2019, such as Brand of the Year, Best Sales and Operations Planning Practice in Pharma and Advancement of Women.

### Good products deserve good designs

GSK leaves no stone unturned in its effort to provide better healthcare products and maintain its dominance in the market. Being an industry leader, GSK is fully aware of the importance of product packaging (colour, shape, aesthetics, etc), which can help grab the customer's attention and build a personal connection. As a result, it was a priority for its design team to promptly respond to any changes in the market and come up

with new packaging ideas that address those changes.

Before 2011, GSK used soft tooling to create prototypes for its packaging, which was outsourced due to absence of an internal team. Yet, the long prototyping process, made worse by multiple iterations, led to delays in delivery and cost escalations. Furthermore, outsourcing always carried a confidentiality risk, which was a headache for an international company. Frustrated by these issues, GSK decided to adopt new technologies, specifically 3D Printing, the star in Industry 4.0.

## The requirements are high

While GSK needed the basic value that 3D Printing technologies typically provide, such as speed, accuracy and cost-saving, they also had unique requirements. Because most of its products fell in the fast-moving consumer healthcare segment, GSK wanted its packaging to be aesthetically pleasing, recognisable and memorable. Consequently, when its engineers were looking for a professional 3D printer, they wanted something that could print multiple colours and multiple materials. Additionally, they needed to be able to print different levels of transparency.

With these special requirements in mind, GSK turned to DesignTech. Headquartered in Pune, Maharashtra, DesignTech provides comprehensive Additive Manufacturing solutions, in addition to other services, and it has been ranked amongst NASCCOM's Top 50 Emerging Companies in India. When approached by GSK, DesignTech immediately proposed the Stratasys® J750 3D printer and Stratasys flagship PolyJet system. The J750 can deliver unrivalled aesthetic performance, including true, full-colour capability with texture mapping and colour gradients. As the first Pantone Validated 3D printer, the J750 can print over 500,000 colours and the materials cover a wide range of shore values and transparencies. It also promises prototypes that look, feel and operate like the real thing.

Together, GSK and DesignTech tried out the J750 using it to 3D print multi-coloured bottle lids, sachets and toothbrushes with multi-coloured bristles. The parts exhibited breath-taking accuracy, and the J750 also delivered a convincing transmittance percentage for GSPG bottles. After the teams from both

companies had analysed GSK's current and future requirements for product packaging, GSK decided to purchase the Stratasys J750 3D printer. "The Stratasys J750 3D printer delivers aesthetically appealing components with full functionality. We can now quickly print multi-colour, multi-material, transparent and opaque packaging prototypes that help us deliberate and make quicker decisions about our launch strategies," mentioned Sanil Prasad, Head Packaging, GSK.

## Streamlining the process and everything else

With continuous support from DesignTech, GSK now 3D prints the packaging components of all its consumer healthcare products, such as bottles with various textures, coloured bottle labels with a transparent bottle body, tablets & tablet containers, caps, lids, jars, etc, with its new J750 3D printer.

The team has even successfully printed a bottle with exactly the same transparency as the original Horlicks bottle. And thanks to the part accuracy, different stakeholders at GSK (marketing, packaging, supply chain, etc) can now assess and finalise the packaging designs with ease and confidence. Amazed by the potential the J750 has to offer, the GSK team has since expanded the printer's applications and printing prototypes to sample products from other divisions, such as oral health, pain relief, nutrition and digestive health.

The GSK team has been impressed by how the J750 has helped them save both time and money, and a project that used to take a whole month can now be completed within a day and a half. The Stratasys J750 3D printer delivers aesthetically appealing components with full functionality, stated Prasad. "We can now quickly print multi-colour and multi-material transparent and opaque packaging prototypes that help us deliberate and make quicker decisions about our launch strategies," he added. Now with everything done in-house, there are no more worries about confidentiality. In addition, the consistently high-quality parts printed by the Stratasys J750 always passes the functional, thermal, tolerance and dimensional accuracy tests with ease. □

*Courtesy: DesignTech Systems*





## Enabling best-in-class after-sales services for the automobile industry – the telematics way

Telematics is one of the top developing sectors worldwide and the automobile industry altogether is inserting more and more telematics to keep performance track and spot any faults in its vehicles and live up to the demands of customers. This article explores how, with the government's BS-VI initiative, it would become compulsory for the entire auto OEMs to have new vehicles equipped with telematic devices; how telematics devices, equipped with Machine Learning capabilities, are using predictive algorithm to identify potential faults or probable breakdowns and how automobile companies can use telematics to the best.



Sven Sommerfeld,  
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The automobile sector in India may be witnessing comparatively challenging times in the near short-term. However, the country's position as being among the top five markets in the global automobile landscape remains as intact as ever. While the focus generally is around the new vehicles sold, a key element of revenue contribution also comes from the after-sales provided by the automobile manufacturers and their dealerships around the country. The consumer is also constantly looking for a different

level car ecosystem experience, even in the economy car section that was expected only from luxury vehicles in the recent past.

The after-sales segment within the automobile industry appears healthy amidst all the turmoil. For instance, according to a report by Confederation of Indian Industry (CII) under the name 'Transformation shifts in mobility and impact on aftermarket in India', the after-sales market industry in India has grown at a rate of 14% CAGR between 2014 and 2019. The report

elaborates that this market is bound to touch about ₹75,000 crores by 2020. While the after-sales services industry seems to be growing, there is a tremendous and consistent need for improvising on networking, introducing new concepts on mobility, electrification and innovations to meet the ever-evolving customers' needs and demands.

### Right measures using telematics data

Within after-sales, fault prediction or proactive maintenance now plays a prime role in managing the high expectations of customers. It is because of fault prediction that one can proactively identify potential breakdown points or major failure in the vehicle and thereby, score high on customer delight. With the government's BS-VI initiative, it would become compulsory for the entire auto OEMs to have new vehicles equipped with telematic devices, so that the real-time running status of the vehicle is known. Right measures can be taken using this telematics data to check whether the vehicle is running at an optimum level. With electronically generated fault codes, it would be easier to know the parameter out of threshold value or whether any minor fault code could lead to a major fault code.

Furthermore, automobile manufacturers across the globe face tremendous challenges in getting timely information on the effective working condition of vehicles that are critical to reduce maintenance cost and undertake timely repairs. It is, therefore,

becoming important to identify the faults and failures before they occur. With the emergence of technology as a key element in the overall scheme of things in the automobile sector, AI and IoT are the solutions to the problem statement at hand.

### The many benefits of telematics

Telematics devices, equipped with Machine Learning capabilities, are using predictive algorithm to identify potential faults or probable breakdowns, thereby enabling continuity. Regarding the aspect of autonomous driving, telematics provides important inputs to the algorithms of autonomous vehicles through data sharing between all the vehicles.

But what exactly is telematics and how does it pre-empt potential eventualities? Telematics combines GPS with on board diagnostics, with a cross-reference on how a vehicle is behaving internally. With telematics, it is possible to map and record data (speed, position, weather conditions, etc) of each vehicle running on the streets. This data is then put into a data lake to steer the traffic in the most efficient manner; these aspects support the successful working and implementation of autonomous driving. Also, telematics records the internal issues (if any), along with the travelling pace. Digital thinking and networking through telematics device can offer manufacturers with a 360° view of customers and new ways of interacting with them by offering direct solutions to their problems. Telematics devices not only

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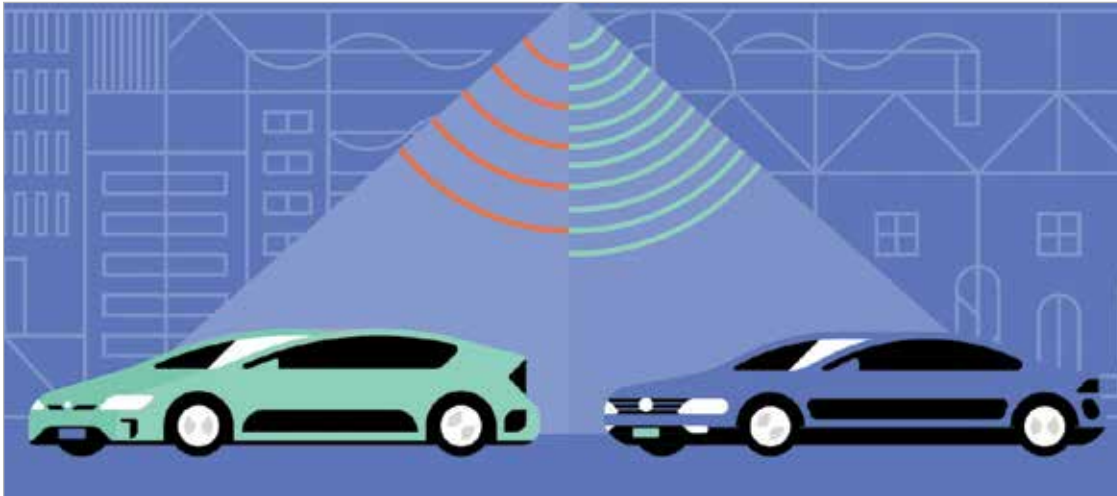
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With telematics, it is possible to map and record data (speed, position, weather conditions, etc) of each vehicle running on the streets

offer high quality maintenance solutions but also enhance the entire lifecycle management of the vehicle by offering solutions on the right parts and right labour quotes that need to be put in for smooth functioning of the maintenance process, allowing smooth customer service, where they can create a claim on the OEM, followed by the possible claim reimbursement.

### Telematics equipped with ML & AI

Telematics has been playing a crucial role in increasing the uptime of fleets. It also has a significant part in logistics and fleet management services, where breakdown of vehicles would only add to the loss of time and increase lag time. In case of fleets, telematics can play a very interesting role as the database fed in the system, which is collecting data on various vehicles, would identify which truck or vehicle needs timely service. The device also helps to identify the potential breakdown, thereby allowing the company to send a mechanic to a certain spot where the breakdown is predicted ahead of time to fix it. This prediction warns truck drivers about a potential breakdown and then offers a nearby dealer's contact to get it fixed. The dealer gets informed in prior, so that there is a spot reserved for the truck to be fixed, and since it is also known which part will fail, it is ensured that the part is either in stock or ordered timely.

With the rise in various models of vehicles, the services and maintenance tasks have assumed a complex nature. However, new age transformative technologies, such as digitisation, have emerged as saviours and are helping transform the after sales value chain for the automobile industry. Telematics equipped with ML and AI is one of the best illustrations of this phenomenon and the benefits arising out of it are all grabs for the automobile industry. Automobile companies can use telematics to the best as they can offer predictive maintenance, information or prediction

on faults in the vehicle, personalised product offerings, etc. Companies can also utilise it to their benefit, where warnings can be given to drivers to reduce speed ahead if all other cars are reducing the speed on the road while driving to avoid accidents or any wear and tear of a part. Telematics also plays a good role in quality control, and research & development, i.e. if the parts in the car or the truck are actually used as intended to be used.

### Role in planning customised insurance plan for vehicle

What's more, it can play a fruitful part in planning a customised insurance plan for the vehicle. Telematics is a very good indicator, as companies can offer insurance products which preferably fit the customers' driving patterns. For example, if the driver or the owner of a vehicle sees a part which might be breaking soon, an insurance for wear & tear can be offered in the car / truck itself.

In the recent outbreak of the pandemic, telematics could be used to identify the routes of the cars, and hence, the 'travelling' of the virus. It could also be used to inform the public or the governments about potential threads; for example, if a lot of people from a hotspot are travelling on the same route and maybe have the same amount of fuel when they started. So, it can be predicted where they would fill up gas and warn the gas station in advance.

### Offering best results

Telematics solution can offer optimum results based on apt providers, connectivity, coverage areas and network compatibility. To develop a good telematics solution infrastructure, the nation would need to develop all these aspects entirely. □





## Cyber security considerations in smart grid ecosystem

With the smart grid ecosystem ready to bring in a new era efficiency and reliability, it has invited cyber-attack issues that could potentially wreck havoc for national security infrastructure and customer satisfaction. It is essential to ensure that something so critical considers security in the early stages of the software lifecycle. The article explains aspects that need to be taken into consideration, requirements and procedures for security of smart grids.



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Marketing Research Manager,  
LDRA

Smart grids provide bi-directional communication between utility and customers, sensing from power generation to consumption. A smart grid ecosystem would transform the energy industry into a new era of reliability, availability, security and efficiency. As the electrical energy is a just-in-time product, it needs to be consumed as it is generated for continuous usage. The monitoring and control

needs to be in real-time, as any disruption in generation, distribution and consumption would create havoc and affect almost all critical infrastructures.

### Consideration for security

Due to the interconnected nature of various sub-networks,

systems, interfaces and operational modes that attack surfaces are numerous. Any exploit on the vulnerable network and system would have a domino effect, impacting the infrastructure and would lead to disruptions.

### Development of security requirements for a smart grid ecosystem

The requirements are analysed for violation against top-level security goals (confidentiality, integrity, availability, non-repudiation and privacy) as a precondition. The deriving security requirements are a complex exercise for interconnected ecosystems like the smart grid. The procedure for deriving security requirements for a smart grid is:

1. Detailed architecture and description of the smart grid system needs to be devised after considering the requirement analysis & the interaction of multiple domains.
2. Based on the top-level architecture, appropriate use cases

are developed.

3. Security-driven risk assessment is conducted considering grid architecture and potential use cases.
4. The outcome of risk assessment and security management processes would capture detailed security architecture and security controls (mitigations).
5. A list of constraints – physical, technical and financial – needs to be considered.
6. Detailed security requirements are developed depending on architectures, controls, measurements and processes.
7. Implementation of security requirements will lead to development, installation operation and maintenance process creation/update. Besides, it might generate new requirements for additional product development and installation.
8. Any change in development, installation, operation and maintenance process will invoke impact analysis and risk assessment.



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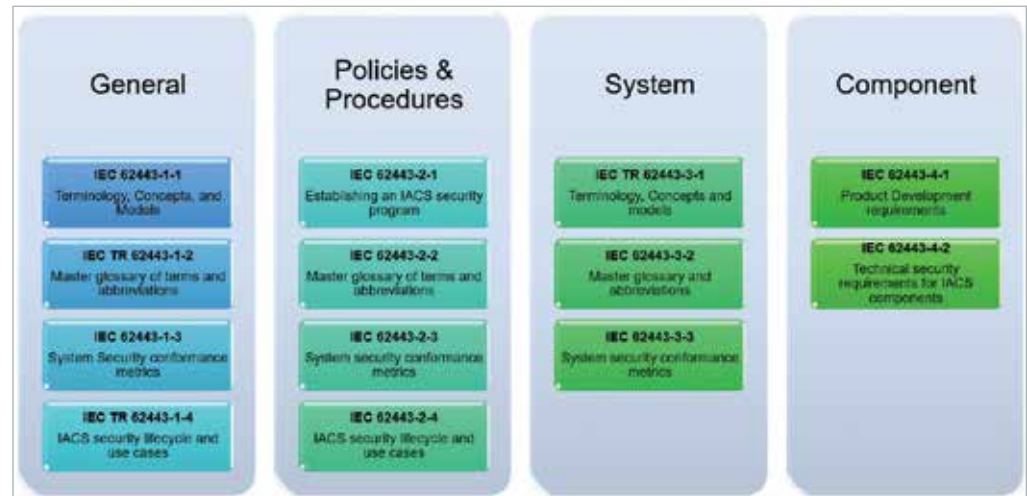
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ISA IEC 62443 set of standards

9. With the discovery of new vulnerabilities of the legacy systems, set-up configurations would be assessed for potential risks and subsequently be mitigated to an acceptable level.

## Existing regulations/standards

NIST has released a framework and roadmap for Smart Grid Interoperability Standards, Release 3.0 in 2014, which is available on their website. As per table 4-1(reference [6]), there are many smart grid relevant standards identified. Some of the relevant regulations and standards are NERC CIP Sets, NIST Special publications (800-82 & 1108), IEC 62351, IEC 61850, ISA/IEC 62443, IEEE 1815, etc. Let's understand more about ISA/IEC 62443(increasingly adopted as a risk-based standard) framework and software considerations as per ISA/IEC 62443-4-1 (Part 4-1).

## ISA/IEC 62443 framework

ISA/IEC 62443 standard sets mentioned above have evolved as a perfect risk-based security standard for industrial systems. This standard set has been evolved from ANSI/ISA-99 and is currently being adopted by various industries, including the smart grid. This is a supplemental standard set, not a replacement of the compliance-based standards or regulation. In fact, by adopting ISA/IEC 62443, it would be easy to show adherence to regulation or compliance.

## Software considerations in security

The vulnerabilities of software design and implementation

could be exploited to compromise a system and impact critical assets in smart grids. The scope of ISA/IEC 62443-4-1:2018 is limited to the suppliers of secure products in an Industrial Automation and Control Systems (IACS) environment. This part (part 4-1) encourages to consider security in the early stages of software life cycle (rather than handling retrospectively) by following the eight practices, namely:

- Security management
- Specifications of security requirements
- Secure by design
- Secure implementation
- Security verification & validation testing
- Management of security related issues
- Security update management
- Security guidelines

Compliance with the best practices mentioned in ISA/IEC 62443-4-1:2018 can be eased through the usage of automated and integrated software, such as LDRA.

## Focused securing of systems & subsystems

The recommended regulatory framework for the security of smart grid systems would be a mix of compliance guidelines, regulations from the country-specific agencies and risk-based consensus standards, like ISA/IEC 62443 set. Software aspects of security are critical because most of the critical systems and subsystems are extensively driven by software. By performing requirement traceability, static verification, software composition analysis & comprehensive testing, including Vulnerability Assessment and Penetration Audit & Testing (VAPT), errors in software could be reduced to a greater extent. □





# Manufacturing post-COVID: Technologies to mitigate challenges of the future

With the manufacturing industry in distress due to the lockdown and its restarting, organisations are assessing their need for advanced technologies, such as digitalisation & how it can help to address today's challenges. To offer better insights on the same, A&D India magazine, in association with Dassault Systèmes, organised a webinar on 'Restoring manufacturing operations post COVID-19'. A glimpse of the webinar...



Anvita Pillai, Sub-Editor & Correspondent, [anvita.pillai@publish-industry.net](mailto:anvita.pillai@publish-industry.net)

The Indian manufacturing sector, disparate to the present situation, is slowly resuming production. While the 'new normal' is dubious, many industries are restarting with the strict guidelines issued by their respective state governments. To retrospect on the future functioning and the role of technology, A&D India magazine, in association with Dassault Systèmes, recently organised a webinar on 'Restoring manufacturing operations post COVID-19'.

The virtual session set off with a poll for the audience with the question, 'How do you think the current situation will affect the adoption of advanced technologies like digitalisation in manufacturing industry, going further?' While 94% people thought the adoption of advanced technologies would increase,

only 6% felt the adoption would decrease, which set a positive platform to begin the session.

## Deferring the usual approach

With the resumption of industry operations, there has also been news of employees being exposed to the virus, losing restart risks. In the introductory session, Arun Rao, Senior Director, Sales & Geo Strategy, Dassault Systèmes, discussed the looming concerns for the auto industry while restarting and stated, "The changes in the demand and the way supply has to come in is hampering some of the manufacturing set-ups to resume 'business as usual' kind of approach." He added

that with the way new things are coming up, there needs to be an emphasis on innovation, sustainability and resilience.

### Efficiency & use of technology for efficiency

Experts on technologies, Kiran Divekar, Director, Brand Lead Delmia, India, Dassault Systèmes and Bhavesh Kumar, Director, Brand Lead Simulia, India, Dassault Systèmes, took over the session from Rao. Beginning off on 'Manufacturing operations post-COVID', Divekar evaluated the operational best practises with respect to social distancing, impact of COVID on production and how organisations can mitigate workforce challenges. He discussed the four key factors, i.e. optimum workforce to manage the social distancing norms, impact of workforce shortage on shop floor, assessing the need for additional/reduced shift circuits and analysing the need for changes in layout, to become more efficient. "Digital technologies and simulation can help analyse the impact on productivity and evaluate different KPIs," asserted Divekar.

To further analyse 'How simulation is going to help in operations post-COVID-19', Kumar continued on Divekar's analogy on the use of Multiphysics simulation. He engaged on reimaging solutions, how simulation helps in reducing cost and why it is important to have simulation across product life cycle. "Simulation technologies can help in planning, scheduling and therefore, making the testing and prototyping process more efficient," commented Kumar.

### Shop floor & workforce of the future

Further, discussing 'Planning and optimisation', Divekar touched upon critical supply chain challenges manufacturing companies are grappling with in the present times and KPI-driven supply chain modelling software to prepare shop floors for tomorrow. "The implementation of solutions deployed needs to be rapid because the challenges have to be solved now. It's not something we want to solve six months down the line," stressed Divekar. He went on to discuss the challenges that organisations are set to witness with the labour exodus happening. He prompted the best way to move on is by assessing the demand cycle, if low or high, then to adjudge on the optimal staff needed to ensure production runs smoothly.

### Smart change to prompt & nimble

To gain insights on the nuances of restarting manufacturing operations amidst social distancing, the role of digitalisation moving forward & the ideal approach, the new normal and actionable strategies, the webinar continued with a panel discussion on 'Restoring manufacturing operations post COVID-19'. The discussion moderated by Shekhar Jitkar, Publisher & Chief Editor, Publish Industry India, comprised Rao, Divekar and Kumar. Jitkar commenced the discussion with the question on how the Indian manufacturing organisations need to be better prepared to restart considering the 'new normal' regulations setting in to Rao, who retorted, "In order to overcome the current situation, technology will play a key role. Not just technologies, going ahead, trying to leverage the concept of digitisation to the maximum possible extent will help mitigate and understand the challenges organisations are facing." Commenting on the methods of smart change in manufacturing to balance the cost pressure and performance, Kumar accentuated, "Use of technologies, like simulation, is going to only increase in the post-COVID world. It is essential that the impact of the use case technology (simulation) reaches across the organisation." Further explicating on skilling in the present times, Divekar emphasised, "Skilling, upskilling and reskilling is going to be much more important now. It will help in increase in productivity, cross-functionality of teams and to make business prepare for the future." Finally, in closing, to explain the key factors for organisational success, now, Rao ascertained, "The virus is going to stay for some more time, and that's for sure. The employers will need to now focus on three things – employee well-being, saving cost and taking care of risk management."

### Preserving, protecting and ramping up

The webinar by Dassault Systèmes, in total, highlighted the need for manufacturing organisations to preserve the integrity of their business and protect their people at the same time. It also touched upon the necessity to ramping up of production and plan for the future, which can make them flexible for any future altercations. □

## Drylin linear system

igus recently supported a student project at EMAG LaserTec GmbH with drylin W linear systems, which is a part of the company's young engineers support (yes) programme. With the knowledge imbibed from the subjects taught as well as the training workshop at EMAG LaserTec GmbH, the pupils were able to develop a spice vending machine by themselves with the help of the linear guides that ensure a cost-effective and long-lasting automation solution.

### From industry to the supermarket

The idea for the spice vending machine came up during a tour of the EMAG LaserTec factory in Heubach. There, the students were fascinated by the automatic high-bay installation for tools and then thought about a task that could also be automated in everyday life. The students decided to construct a spice vending machine for supermarkets in order to speed up selection and shopping. In order for the system to be able to take the right spice out of the machine, they needed long-lasting and smooth linear guides for the axes, so they contacted igus.



drylin W linear guides

### drylin W for fast automation

A total of three linear guides from the drylin W modular system are used in the machine. They ensure that all the compartments are easily accessible, so that the appropriate spice can be taken out and delivered. In the guide carriages of the linear rails, the company relies entirely on wear-resistant, high-performance polymers. The tribo-plastics in the sliding elements are completely free of lubricants and are suitable for use in the food sector. As there is no lubricating grease, no dirt can stick to the linear carriage and block the guide. The young inventors chose a belt drive to drive the z-axis. The problem here was the high vibrations, which the guides were able to successfully

absorb. The drylin linear technology is used not only in innovative spice machines, but also in many tried and tested machines, such as ATMs, drink machines and even in automated order picking systems in pharmacies.

With the university initiative, igus wants to support pupils, students and lecturers with free samples, sponsorships and the development of innovative projects.

igus India | Bengaluru

Email: [vinayak@igus.in](mailto:vinayak@igus.in) | Tel: +91-93411 36381

## Integrated servo drive

Beckhoff recently expanded its compact drive technology portfolio (up to 48 V DC) by extremely compact devices for distributed field installation with the new AMI812x series of integrated servo drives. The integration of servomotor, output stage and fieldbus connection in a space-saving design makes the drives ideal for automation outside of control cabinets in the motion power range up to 400 W. The AMI812x



AMI812x in three overall lengths

integrated servo drive can be placed directly on the machine without a control cabinet and without upstream I/O level, allowing for the implementation of highly compact machines without control cabinets. At market introduction, the AMI812x series includes three overall lengths in the F2 flange code with standstill torques from 0.5 to 1.1 Nm. The AMI812x is optionally available with a multi-turn absolute encoder without battery backup and with a backlash-free holding brake. The STO safety function can be integrated as an option via the TwinSAFE Logic. The operating state is indicated by integrated status LEDs. Electronics and motor are supplied via the M12 power interface.

Beckhoff Automation | Pune

Email: [info@beckhoff.co.in](mailto:info@beckhoff.co.in) | <https://www.beckhoff.co.in/AMI81xx/>

## Industrial gear units

Nord Drivesystems recently offered the extruder-type drives, MaxxDrive® industrial gear units that are optimised for heavy-duty operations, as the manufacturers in the plastics-processing industry appreciate the long service life, the low maintenance and the high energy efficiency of the product that is being used. This enables adaptation to almost all common connection dimensions. Due to generously dimensioned thrust bearings, safe absorption of process forces and a long operating life can be ensured. The 'extruder' option can be



Extruder-type drives

customised to the customer's shaft and optimally matched to his/her demands, with several bearing variants. This gives plant constructors, manufacturers and processors of plastics the opportunity to develop safe and highly reliable drive units that are particularly versatile. The extruder types that are available for the MaxxDrive™ industrial gear units are in sizes 5 to 11, with rated torques from 15 to 75 kNm. The company also produces a very diverse range of drives for torques from 10 Nm up to over 250 kNm, supplies electric motors in the power range of 0.12 kW to 1000 kW and supplies the required power electronics with frequency inverters of up to 160 kW.

Nord Drivesystems | Pune

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## Thermal imaging cameras

Testo recently showcased the Thermal Imagers, which are the thermal imaging cameras that allow non-contact measurement of body surface temperature & are proven to detect elevated skin temperatures brought by various external causes, like COVID-19.

### Thermal cameras at work

Testo 890 thermal cameras have built-in fever detection mode and automatic face recognition feature that help the user to conduct mass scanning of people. They can be installed at the entrance of the premises over a tripod & a separate LED screen (connected to the instrument via HDMI cable) can be used as a bigger virtual screen to monitor the scan results of the people or can also be manually handled by a person to inspect the entrants.

While in operation, the thermal imager will give the hottest temperature when Field of View (FOV) of the camera/lens covers minimum a face of the person. Generally, the temperature of the retina or inner canthus of the eye, which is near to (not exactly) the core body temperature is measured. While screening, the surface temperature of the skin is recorded, and an alarm is triggered if it exceeds a certain threshold value (approximately equal to or above 99.5° F). This allows those with an elevated body surface temperature to be identified quickly and easily. They can be isolated from others and further medical investigations can be carried out.

### Thermal scanning guidelines and key points

It is necessary for the person conducting thermal scanning to know about the process, procedure and application of the equipment. However, if someone is determined to use technology with no experience, no training and without the right kind of product, he is expected to get false & wrong results. Another necessary point to understand about this method is that the thermal imaging cameras can only detect, measure and document the variations of skin surface temperatures and do not define if someone is sick or healthy. These ultimate diagnostics decisions can only be taken by medical healthcare professionals using a fever thermometer on people detected with escalated body temperatures.

There are some necessary points that must be kept in mind while conducting the thermal scan, like for example, the person under scan in

front of the camera should have —

- Face uncovered completely
- No mask on face
- No glass or spectacles
- No hair on forehead
- No head covers

Similarly, while using thermal camera, there are basic requirements that need to be ensured regarding the equipment, such as the emissivity of 0.98 being advisable. Distance should be within 8-10 feet approx; it

should be installed at a location with no sunlight or reflections on the camera lens or no air conditioner grill or duct in front of the thermal camera. The height of the camera should be adjusted considering the height of the shortest person.

### Range of instruments for thermal scanning

- Thermal Imager with wi-fi and bluetooth testo 872 is a hand-held instrument and can be easily hand carried by the person doing the thermography. The image of the person with temperature data can be stored on the smartphone in the app via bluetooth, and directly can be e-mailed to the concerned authority for further reporting/escalation if needed.
- Thermal Imager with tripod testo 882 can be used manually by a person or can be mounted on a tripod
- Thermal Imager with automated monitoring testo 890 is to be used with tripod arrangement. Plus, this comes with an alarm system – acoustic as well as visual alarm to alert if high temperature is detected in any person.
- Non-contact infrared temperature screening window IRISS ClearIR Series enable the temperature measuring device to be used from behind a secure and sterile environment at a safe distance

### Safety comes with responsibility

Implementation of thermal inspection looks the need of the hour and therefore, it becomes the responsibility of facility management, decision makers, transportation authorities, regional and public health care and security authorities, institutional heads, HSC officer of production plant etc to ensure the health and safety of the public, colleagues and other associates.



Thermal scanning cameras for fever detection in COVID-19 times

# Highlights – Aug-Sep 2020



## » AUTOMOTIVE

With the increasing solutions in the field of software and automation, there have been collaborative ways in which machines and people can interact. With the growing industrial sector, digitisation is a pre-requisite for the fast-paced industrial sector, commoditisation and price demands. The upcoming issue investigates the key drivers in automotive industry that will increase the speed and quality of new technologies involved in the industry.



## » ARTIFICIAL INTELLIGENCE

Artificial Intelligence, digitalisation, analytics and automation are building blocks for the future of the manufacturing industry. Digitalisation relies heavily on Artificial Intelligence to make automation intelligent. The forthcoming edition analyses operational benefits, opportunities for businesses and how Artificial Intelligence can bring about the transformation and increasing efficiency, manufacturing quality and more.



## » AR/VR

Application of AR/VR in manufacturing is currently in the process to create permanent change in the industrial development, production and operational processes, right from the design and development to the virtual representation. The next issue will provide deeper insights on the great footholds in the manufacturing space that have been and are going to be created by AR/VR.



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PRESENTS

# “VIRTUAL HANDSHAKE”

## The future of business

In these tough times when on one hand we are all fighting against the Coronavirus pandemic, on the other hand we have to do business and keep our companies going. Which means ultimately we need to do sales and infuse monies into our business.



### The big question is how to do this ?

- When personal meetings are not possible
- When events are getting cancelled
- When safety of the staff is a concern
- When there are huge controls over costs.
- When travelling is avoided.
- When you need to interact and reach out to your potential clients sitting in the office/home

In the view of this we have initiated a “DIGITAL HANDSHAKE” initiative where you can provide your contents on our platforms and reach out to the markets not only during this challenging times, but also in the future.

For more details on our Digital Partnership solutions, contact: **Ms Ananya Choudhary**

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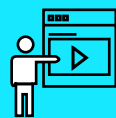
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are contagious.



#### Webinar

Present your solutions to your target audience virtually.



#### Lead Generation

Generate leads, without the physical greets.





#BeSureBeSafe

## Thermal Camera with Automated Monitoring **testo 890**

- Special in-built fever detection function that automatically scans persons for elevated body temperature
- HDMI output for direct connection between imager and monitor so that inspector can be seated away at a very safe distance
- Acoustic alarm – a “Beep” is triggered if person at risk is found, until the face is no longer in the display
- Visual colour code alarm– Temperatures above threshold value are displayed in red
- ‘Save’ function to store both thermal and real images as JPEGS
- Reliable: up to 1280 x 960 pixels resolution (with testo SuperResolution) and good thermal sensitivity
- Mount on tripod for automatic screening instead of manual monitoring

**Yellow**

Person identified.

**Green**

The person is not at risk from fever.

**Red**

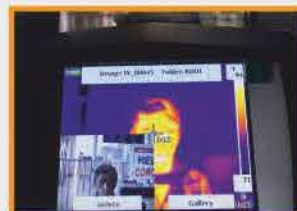
The person is at risk from fever.

### Other Thermal Scanning Solutions

Connect to your Smartphone  
**testo 872**



Get real image with thermal image  
**testo 882**



Scan the QR Code to watch  
Live Demo of **testo 890**



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