

# THE MACHINIST

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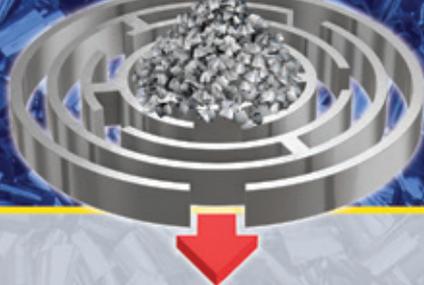
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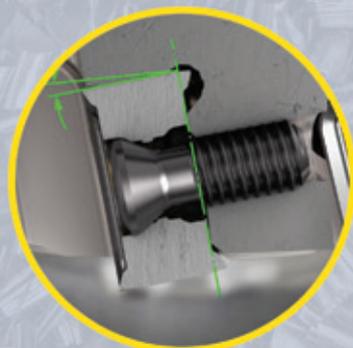


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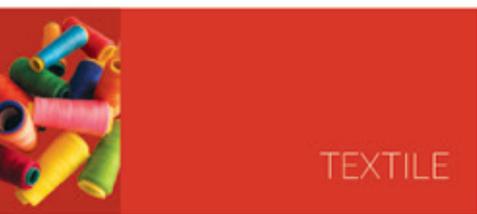
DEFENCE



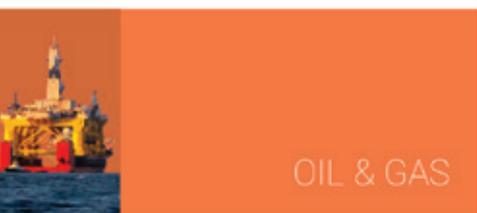
INFRASTRUCTURE



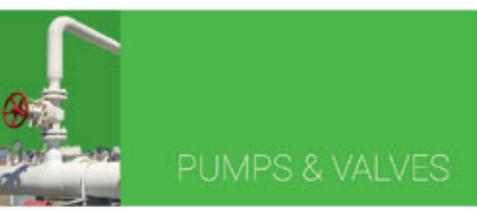
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## THE 24/48 RULE

Ciao Readers!

I was attending a virtual insurance company event a couple of weeks back. And the CEO of that insurance company spoke about what he said was his 24/48 rule. My interest was picked because it's a rule I hadn't heard of. And then, as the insurance company CEO went on to explain the rule, I was fascinated and I said, wow, this is interesting. So what is the 24/48 rule?

He essentially says that organisations are compartmentalised into two parts. There is a 24 part and 48 part, and the 24 and the 48 refer to the ambient temperature at which those two parts operate. So 24 degrees is the head office, the corporate office, the folks inside the offices who take decisions and make policies. And the 48 degrees are the folks out there in the marketplace, the sales guy, the supply chain, the people working in factories and plants, the people who work at 48.

And his point was that businesses depend on the 48s for their success. And if you want to be a successful business, he said, you got to make sure the people who operate at the 24-degree temperature are always keeping the 48-degree folks in mind. What a great thought that was.

The Machinist also echoes this thought. Come this September, the Machinist team is putting together a brilliant on-ground event – The 7th Super Shopfloor Awards 2021 in Mumbai where we will felicitate the deserving 48s of the manufacturing sector in 11 categories.

Truly, businesses are not built inside air-conditioned conference rooms, they are not built inside boardrooms. They are built out there in the marketplace where typically customers part with hard-earned cash for products and services. And if you want to be a successful business, you want to make sure that you are paying heed to what's happening in that 48-degree environment. If you're making a policy inside a head office, try and ask yourself, what does this mean for the folks in 48-degrees? If you're trying to make a great strategy, and you might think you've got the world's best strategy sitting inside your boardroom make sure you've tested it out there in the 48-degree environment.

And as I thought of it, I said this is probably true across spheres. And my mind, of course, went to cricket. And I thought that think of the 24-degrees as what happens in the dressing room or even in the nets or in the dugout. And 48 is what happens out there in the field, right. You can have great strategies and you can have terrific tactics. But in the end, it's the execution on the field that will make a difference.

48 Always Trumps 24!

I hope you enjoy this reading this edition as much as enjoyed putting it together. Do share with us your opinions, comments and thoughts at [Rahul.kamat@wmm.co.in](mailto:Rahul.kamat@wmm.co.in)

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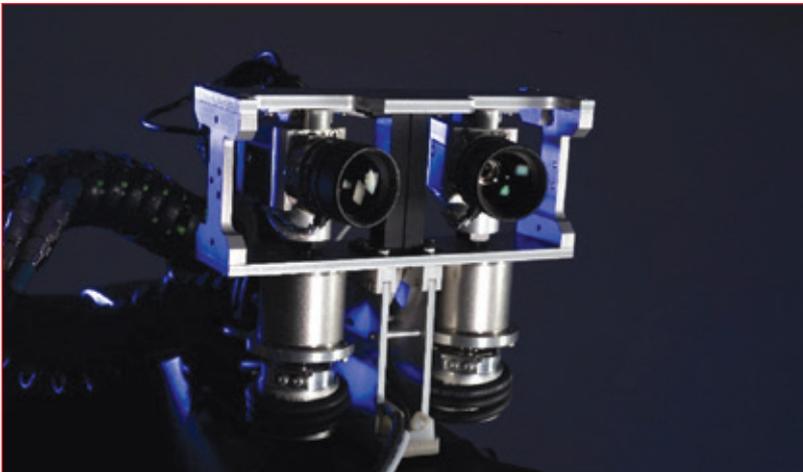
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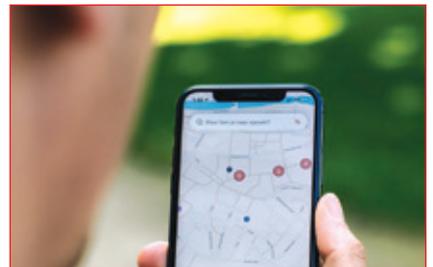
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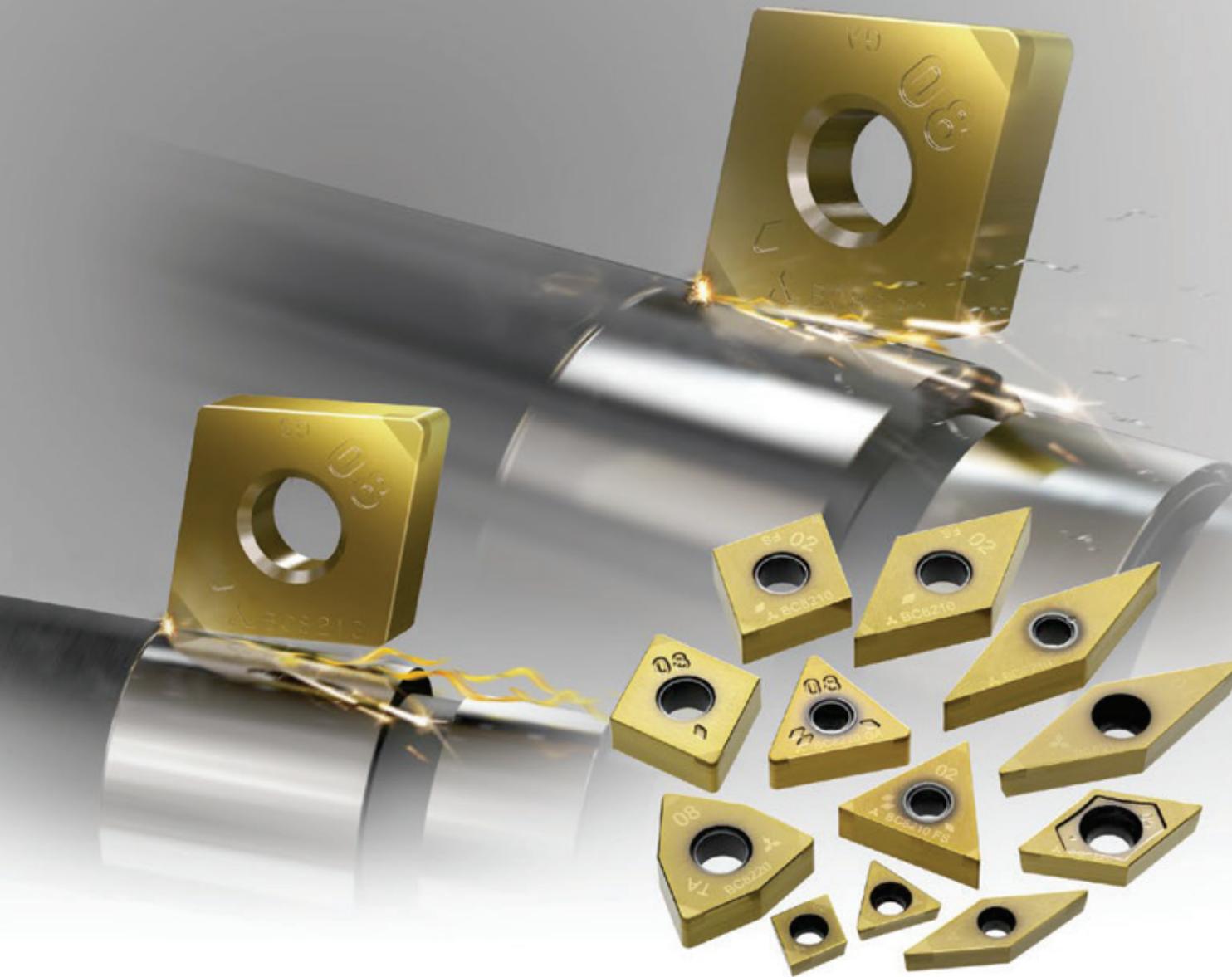
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YOUR GLOBAL CRAFTSMAN STUDIO

## Mumbai Metro Rail Corporation Collaborates With Bahwan Cybertek

**BAHWAN CYBERTEK (BCT) GROUP**, a global provider of digital transformation solutions, has been awarded a contract to build the Common Asset Management System (CAMS) for Mumbai Metro Line-3, by the Mumbai Metro Rail Corporation



Limited (MMRCL), the nodal agency responsible for the implementation of the MML-3 project in India. Bahwan CyberTek will provide the end-to-end design, implementation and support for CAMS, leveraging its expertise in delivering enterprise-class EAM solutions. The project was kicked off in the presence of Ranjit Singh Deol, IAS, Managing Director, MMRCL, and Mr V M Muralidharan, Chief Operating Officer, Bahwan CyberTek.

Bahwan CyberTek will build an integrated CAMS to optimise processes, perform lifecycle cost monitoring and improve cost efficiency of MMRCL. The CAMS project is scheduled to be

completed in 18 months, and BCT will deploy a dedicated team of technology experts, enterprise solution architects, and integration and quality assurance experts for the total project period of 4 years.

The CAMS solution will help MMRCL manage different types of assets such as rolling stock, tracks, power supply systems, traction systems, signalling and control systems, platform screen doors, telecommunication systems, plants and equipment, automated fare collection systems, escalators, and lifts, tunnel ventilation systems, security systems, infrastructure, and related systems and electro-mechanical systems like fire

alarms, domestic water, lightning, etc. through a single-window enterprise application.

The MML-3 project, a 33.5-kilometre-long corridor running along Colaba-Bandra-SEEPZ, aims to decongest the traffic situation in Greater Mumbai. Apart from better connectivity, it will help reduce travel time, air and noise pollution and provide better safety and security for citizens.

Commenting on the partnership, Muralidharan said, “We’re happy to partner with MMRCL on the prestigious CAMS project. MML-3, which is expected to commute over 16 lakh people daily, is a massive project in terms of scale and application. Having executed large-scale EAM projects across the world, we understand the scale and volume of assets involved here. Our AI/ML-driven integrated asset management solutions are proven for keeping critical assets operating at maximum efficiency. We look forward to driving the same results here.”

## Happiest Minds Technologies Wins Award

**HAPPIEST MINDS TECHNOLOGIES LIMITED** announced it has been recognised by Information Services Group (ISG), a leading global technology research and advisory firm, with two 2021 ISG Digital Case Study Awards™, presented to select IT and business services providers for best-in-class digital transformation work with their enterprise customers.

ISG selected case studies from 39 providers for this year’s Awards from a record of nearly 250 submissions. A majority of digital transformation initiatives submitted for consideration were focused on improvements in customer and user experience, with the related goal of driving top-line revenue growth.

Happiest Minds had two case studies recognised:

1. Implemented IoT and advanced analytics combined to deliver new insights in construction and civil infrastructure for DYWIDAG. DYWIDAG conceptualised and partnered with Happiest Minds to build a new digital platform that ingested data and build insights for construc-

tion and civil infrastructure projects. Called “Infrastructure Intelligence,” the platform brought together IoT, Industry 4.0, cloud data management and advanced analytics to help customers optimise operations and costs, or to extend the life of critical civil infrastructure.

2. Happiest Minds partnered with a Fortune 500 Global logistics and shipping for a digital pathway to submit customs declarations. The solution automatically submits paperwork and related payments for customs clearance in multiple countries, integrating with their systems. This helped the logistics provider improve customer experience and enable hassle free transport of goods between countries amidst the challenges of BREXIT. Automating ~10,000 declarations led to reduction in manual work leading to better productivity and cost optimisation. Manually the process would be challenging, expensive, including hiring and training of multiple customs experts.

## Signify launches EcoLink Air Purifier

**SIGNIFY INDIA**, today launched its EcoLink Air Purifier with UV-C technology in India. This air purifier is designed to purify and disinfect air at the same time and is equipped with a HEPA filter and UV-C lamps. While the HEPA filters help purify the air by removing dust, pollen and other particulate matter, the UV-C technology helps to inactivate airborne pathogens, including SARS-CoV-2.

The EcoLink Air Purifier with UV-C technology offers dual benefits of air purification and disinfection. It follows a two-step process, wherein the air first passes through an H12 HEPA filter, that filters out dust, allergens, spores, pollen, pet dander and other particulate matter. Next, the hi-powered UV-C lamps inside the chamber emit UV-C radiation, inactivating all known bacteria, viruses and other microbes giving out pure and healthy air. The UV-C lamps are placed inside the HEPA drum which in turn also helps to inactivate microbes and pathogens that maybe trapped in the filter itself. A single unit can purify a standard size room in just ten minutes.

## Hitachi ABB Power Grids Commissions Project in India

**HITACHI ABB POWER GRIDS IN INDIA** has successfully commissioned one of India's longest ultra-high voltage direct current (UHVDC) transmission links for Power Grid Corporation of India Limited.

The +/-800 kilovolt (kV), 6,000-megawatt (MW) link has the capacity to meet the electricity needs of more than 80 million people and stretches 1,800-kilometers to connect Raigarh in Central India to Pugalur in the southern state of Tamil Nadu. Reliable power can now be transmitted in either direction depending on demand, with exceptionally low power losses and minimal environmental footprint. The link supports the Indian government's mission and the UN Sustainable Development Goal No. 7 of increasing access to affordable, reliable,



sustainable, and modern energy for all.

Hitachi ABB Power Grids worked with the customer, government agencies, local authorities and suppliers to deliver the link during the COVID-19 pandemic. Responsible project execution with health and safety at the forefront were key to this achievement.

"We strive to be a socially responsible business. Supporting society and protect-

ing our people is at the centre of our operations," said **N Venu, Managing Director and CEO, Hitachi ABB Power Grids** in India. "With the commissioning of this ground-breaking UHVDC link, we have kept our promise to enable more clean and reliable power for millions of people, helping to build a future where electricity will be the backbone of the entire energy system. During the entire project, the health and safety of our customers, employees and partners remained our top priority."

The link strengthens grid resilience and stabilizes the power infrastructure by combining traditional and renewable power generation. It enables further development and integration of sustainable energy, supporting the government's goal of reaching 450 gigawatts (GW) of renewable energy by 2030.

## Piaggio Vehicles Inaugurates Two Exclusive (EV) Dealerships

**PIAGGIO VEHICLES PVT LTD** has inaugurated two new Ape' Electric Experience centres in Delhi.

The 1st Experience centre, Sincere Marketing Pvt Ltd, was inaugurated by **Mr Saurabh Bharadwaj, MLA- Greater Kailash**. This exclusive experience centre is in South Delhi, Okhla Industrial Area, Phase-2. Celebrate Motors Pvt. Ltd., located at Wazirabad road in East Delhi, was inaugurated by **Mr Mohan Singh Bisht, MLA Karawal Nagar Assembly**.

Also present on these occasions respectively were **Mr Amit Kumar, National Head EV - Sales, Piaggio Vehicles** and **Mr. Abhinav Dhingra, Dealer Principal, Sincere Marketing Pvt Ltd** and **Mr Gaurav Bhatia, Dealer Principal, Celebrate Motors India Pvt Ltd**

Both these experience centres will allow customers to access Piaggio's entire range of electric vehicles. Piaggio had recently launched their FX range (fixed battery) of electric vehicles in both cargo and passenger segments. These new products will be available at the New Delhi outlets.

Speaking on the occasion, Mr Saurabh Bharadwaj, said, "It gives me

immense pleasure to be here today to inaugurate this new Ape' Electric Experience centre of Piaggio vehicles Pvt. Ltd. In an effort to promote the use of electric vehicles in the national capital, the government of Delhi had unveiled its own EV policy last year. We also recently unveiled a new 'Switch Delhi' initiative to promote efforts to increase the use of electric vehicles in the city as well as to help tackle air pollution."

Speaking on the occasion, Mr Mohan Singh Bisht said, "It gives me immense pleasure to be here today to inaugurate Delhi's first of its kind EV Experience centre of Piaggio Vehicles Pvt. Ltd. With the scrappage policy coming into effect it is important for providing customers with electric vehicle options for them to make the shift. Direct financial advantages are provided to electric vehicle (EV) manufacturers under the FAME II program to assist in lowering the cost of acquisition by end-users."



Mr Saju Nair said, "We are happy to open our two new experience centres together in Delhi. We would like to extend our congratulations the Delhi government for being the pioneer in Electric Mobility initiatives across the country. The Delhi government has been the first to launch the all-inclusive EV policy envisaging OEM's, charging points, EV incentive, EV Finance Corporation & Ease of EV Adoption. Delhi Government has laid immense focus on the transition to EVs with its 'Switch Delhi' Campaign which is the resultant of a robust Delhi EV Policy."

## igus Honoured as SPE Network Pioneer Member

**SINGLE PAIR ETHERNET** is currently one of the biggest trend topics in the field of data communication in order to be able to communicate with even the smallest sensors. In addition to compact connectors, slim cables are also in demand. For this purpose, igus has developed a highly flexible Single Pair Ethernet cable especially for dynamic use in the energy chain, and now also offers it harnessed as a ready-to-connect and tested ready cable. To further advance the research of the technology, igus joined the SPE Industrial Partner Network in 2019 and has now received the "PIONEER Member" award.

Single Pair Ethernet - also known as SPE for short - has been on everyone's lips since 2019. A lot of hope lies in the new compact data technology, which the industry now wants to harness in order to enable Ethernet-based communication with even the smallest sensors or cameras. One of two networks driving SPE research is the SPE Industrial Partner Network. Together with six other members, connector specialist Harting founded the network in 2019. Shortly afterwards, igus

joined as a partner for the dynamic use of cables. The motion plastics specialist has now received the Pioneer Member Award for this collaboration.



"We have been working with Harting on various projects for several years. So we also got involved quite early in the development of a Single Pair Ethernet cable that is specially designed for use in the energy chain and is compatible with the Harting T1 connector", says **Andreas Muckes, Head of Product Management chainflex cables at igus GmbH**. "We are looking forward to advancing the technology together with many renowned companies and implementing new applications together in the near future." igus presented the first highly flexible cable for Single Pair Ethernet at SPS 2019

## Volvo Car Introduces 24x7 Customer Service Support

**SWEDISH LUXURY CARMAKER VOLVO CAR INDIA** has announced the commissioning of a 24x7 customer support service. The Consumer Relations Centre (CRC) reachable at a toll free number 18001029100 has started to provide Customer Service, queries handling & Roadside Assistance to all Volvo customers. This Centre is also unique as it makes India the only country in the Volvo Asia Pacific ecosystem to provide round the clock customer support.

"We pride ourselves in being a customer centric company and this is our latest offering towards superior customer satisfaction. The Consumer Relation Centre enhances customer confidence in the brand with the conviction that the company is contactable round the clock, year round in the unlikely event of a customer having to reach out. We are committed to grow the Indian market and will continue to invest in initiatives that focus on customers" said **Jyoti Malhotra, Managing Director, Volvo Car India**.

The company introduced several customer centric initiatives during the past 12 months including 'Volvo Contactless Program' to ensure customer safety and to promote online purchase. Volvo Car India is committed towards bringing the latest technologies in upcoming cars for customer convenience.

## Vedanta Scores Hatrick

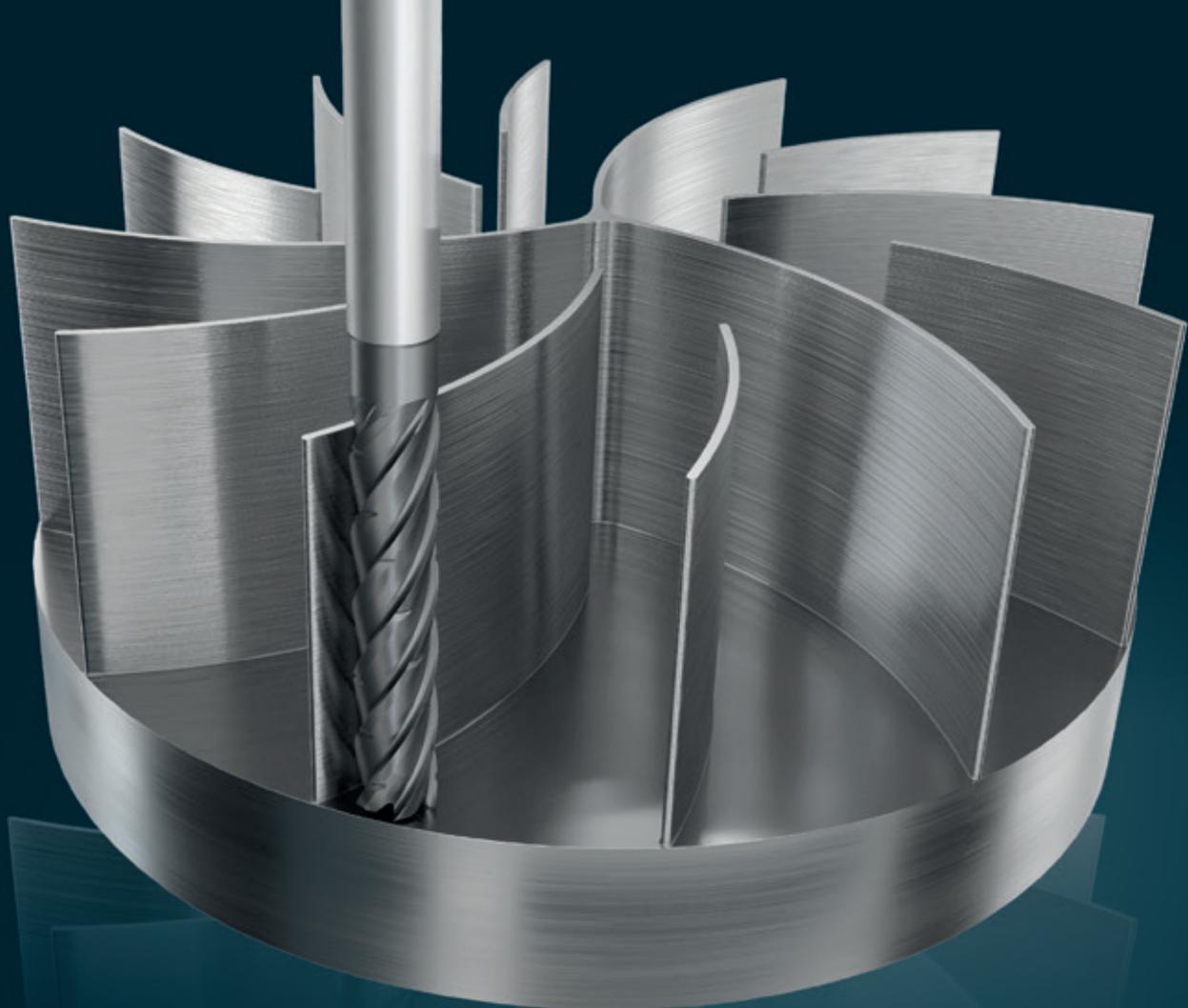
**VEDANTA ALUMINIUM BUSINESS**, India's largest producer of the aluminium and value-added products, has bagged three 'Gold Awards' at the SEEM National Energy Management Awards (SNEMA) 2020 for excellence in energy management at its Aluminium Smelters I & II and 1215 MW Captive Power Plant at Jharsuguda, Odisha. An Aluminium Smelter is a plant where aluminium oxide or alumina undergoes electrolytic reduction to produce pure aluminium. Vedanta Jharsuguda's 1215 MW Captive Power Plant and 2400 MW Thermal Power Plant have also won at the Thermal Power Plant Operation & Maintenance Conference and Awards 2021 for overall operational excellence.

**Speaking about Vedanta's energy stewardship, Mr. Rahul Sharma, CEO**



– **Vedanta Aluminium Business**, said, "As India's largest producer of aluminium, a 100% recyclable metal, we are cognizant of our responsibilities towards sustainable development and climate action. We are working towards it through a three-pronged strategy of ensuring judicious resource usage, energy-efficient

operations, and renewable energy sourcing. We have adopted global best-practices in energy and resource management and deployed cutting-edge solutions to reduce our carbon footprint. We are also exploring viable options of renewable energy sourcing for producing aluminium, the green metal."



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## amace solutions - New Launch

**amace solutions pvt ltd**, an Ace Micro-matic Group company and the metal AM solutions provider based in Bangalore, India has launched the ALM-400 metal 3D printer. The machine has been designed and developed to suit serial production applications not just for prototype manufacturing. The machine has a build volume measuring 410mm x 410mm x 450mm allowing for large sized parts to be printed. The machine features a dual laser system with full scan field covered by the two high powered 1kW lasers. The machine can also print a wide range of materials such as Stainless Steels, Aluminium alloys, Maraging Steels, Inconel, Titanium alloys and many more.

The machine can print parts with layer thicknesses varying anywhere between 30 microns to 120 microns. For superior precision in axes positioning, longer life and enhanced serviceability the machine has on board all

axes controlled by servo motors. A lot of research and innovation has been brought about through this machine and this is evident from the many smart features on the machine that exist. One such feature is the innovative multi-blade recoating system designed to enhance the productivity of printing especially during the production related activity. The smart powder management system, in-situ inspection of part dimensions, automatic filtration system, user friendly digital cockpit format for data display on the Graphical User Interface (GUI) and the remote monitoring & control of the machine are some of the many features that make the machine a smart one and most suited for a production environment!

“The ALM-400 has been designed keeping high productivity in focus. With some of the unique features of the



machine, ALM-400 will meet and exceed the expectations of additive machine users. With enhanced user experience and intuitive feedback, the machine is convenient to operate and troubleshoot,” said **Mr TP Sridhar, CEO & Director, Ace Designers Ltd.**

## New Partnership: Continental and Siemens Mobility

**CONTINENTAL'S** development and production service provider, Continental Engineering Services (CES), and Siemens Mobility will collaborate in the development and production of current collectors for trucks, so called pantographs. The aim is to electrify key sections of the highway network with an overhead line system, and thus significantly reduce CO2 emissions from trucks, in line with EU regulation 2019/1242. The new partnership brings together the expertise of two worlds of technology: Siemens Mobility is a specialist in rail electrification, while Continental Engineering Services is a development and production service provider for sophisticated automotive technologies. Both companies are now pooling their expertise in order to achieve volume production of current collectors quickly, thus making them available for widespread use in Europe. The eHighway technology supplies trucks with electric drives (e.g., hybrid, fuel cell, or battery-powered electric trucks) on heavily frequented stretches of highway via an overhead cable. Trucks can drive completely electrically while also charging their batteries without consuming



fuel. “We are transferring the principle of rail electrification to the road. The current collectors will be developed and produced in accordance with automotive standards. The partnership between Continental Engineering Services and Siemens Mobility is a major step toward climate-neutral freight transport,” explained **Dr. Christoph Falk-Gierlinger, Managing Director of CES.**

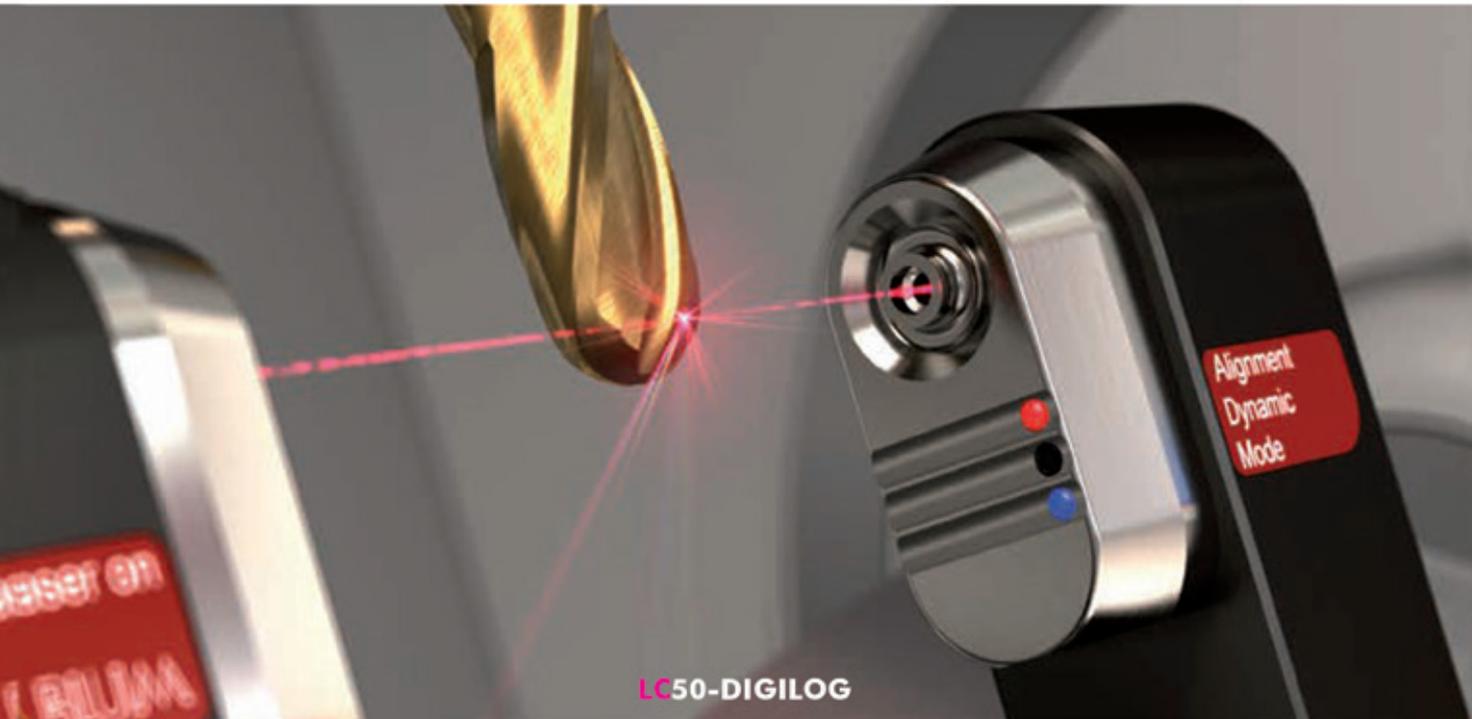
The eHighway technology developed by Siemens Mobility is already ready for use today. Now, it is just a matter of developing the current collectors, especially for trucks, so that they can be offered to commercial vehicle manufacturers cost-effectively and in any desired number of units.

## Vedanta Aluminium Scores A Hat Trick

**VEDANTA ALUMINIUM** Business has bagged three ‘Gold Awards’ at the SEEM National Energy Management Awards (SNEMA) 2020 for excellence in energy management at its Aluminium Smelters I & II and 1215 MW Captive Power Plant at Jharsuguda, Odisha. Vedanta’s Power Plants at Jharsuguda have also bagged awards at the Thermal Power Plant Operation & Maintenance Awards 2021.

Speaking about Vedanta’s energy stewardship, Mr. Rahul Sharma, CEO – Vedanta Aluminium Business, said, “As India’s largest producer of aluminium, a 100% recyclable metal, we are cognizant of our responsibilities towards sustainable development and climate action. We are working towards it through a three-pronged strategy of ensuring judicious resource usage, energy-efficient operations, and renewable energy sourcing. We have adopted global best-practices in energy and resource management and deployed cutting-edge solutions to reduce our carbon footprint. We are also exploring viable options of renewable energy sourcing for producing aluminium, the green metal.”

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By Team Machinist

## “WE PROVIDE SEAMLESS DATA INTEGRATION”

**Umesh Pai, Managing Director, EPLAN Software & Services Pvt Ltd,** speaks about how the company is addressing the requirements of digitalisation, standardisation and automation

### Selecting appropriate product data in engineering is often time-consuming. How is EPLAN helping its clients to overcome this challenge?

This is one of the pillars around which our strategy of eHORIZON is articulated with. We endeavour to make this activity for our engineers as smooth as possible with high quality of data. We have multiple initiatives being executed, be it EPLAN Data Portal or ePULSE, the goal is to get appropriate product data to engineers at the right time and right place. We work with all the component manufacturers/suppliers to join our Data Portal initiative so that it's a win-win situation for all the stakeholders - be it, owner-operators, for planning as well as maintenance or system integrations, equipment suppliers for their detailed engineering, all need high-quality product data with the varying application. Hence getting the right data at the right time is very critical and our EPLAN Data Portal initiative caters to that need.

### Which are the industry sectors you cater to? And how are you helping these industries in implementing Industry 4.0 efficiently?

We cater to almost all industries viz, automotive, machine building, energy, process industries like oil and gas, water and wastewater treatment, pharma, food and beverage, maritime, etc. We have specific industry practice teams which work exclusively on some of these verticals to develop tools, practice, etc. As far as Industry 4.0 is concerned for all these industries we provide enabling tools to build their “digital twin”, the single source of truth, be it plant or equipment or systems. We help all the stakeholders in these industries to be a single platform catering to their unique requirements as far as the electrical and automation aspect. We are an important cog in the mammoth machine that is Industry 4.0, working seamlessly with all corresponding systems. We provide seamless data integration with all adjacent building blocks.

### The pathway to industrialisation and more efficient product development leads through three central



We are very excited about the prospects we see in the Indian context as there is a huge ongoing investment.

### steps: digitisation, standardisation and automation. Tell us about innovative concepts and solutions developed by EPLAN in these areas?

This is a topic very close to us a company, as you notice our tagline is “efficient engineering”! And this involves the steps of standardisation as well as automation. Digitalisation, we consider as the “necessary” step. We have evolved a whole set of practices known as “EPLAN Experience” to address the requirement of digitalisation, standardisation and automation. In the EPLAN experience, we have eight fields of action in which each field addresses a specific aspect of our customers engineering process, be it IT, design methods, codes and standards, product structuring or workflow. As a whole, these eight fields result in holistic digitalisation of the design and engineering process starting through standardisation and culminating in automation or what we call configurations. We address this process as a transition from “Engineered to Order (ETO) to Configured to Order (CTO).

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**The industrial transformation is in full swing, because of which, market conditions are changing. How is EPLAN is adapting to these changes?**

We are at the forefront of these changes. Rather, we are setting the pace for these changes as far as the automation and electrical engineering segment is considered. We are the trendsetters, be it cloud or augmented reality or digital twin. With our ePULSE application, we are very well positioned to harness the capabilities offered by new transformative technologies and provide tools to our customers to be ahead of their game. We have a robust strategy framework namely “eHORIZON 2023” wherein we have articulated three aspects viz, “Become digital, enhance and extend the core and create cloud solutions” as a guiding light for us to contribute to this transformation of the industry we are currently witnessing.

**Panel building and switchgear manufacturing is becoming ever more digitised. Tell us about some of the solutions provided by EPLAN?**

When it comes to panel building, which is our home turf, along with our sister concern Rittal, we offer a complete value chain. We offer tools for engineering, sourcing, manufacturing and operations. In a completely “industrialised” switchgear manufacturing set-up, one will be able to witness the complete value chain from engineering, sourcing, manufacturing and operation. The data created digitally in engineering flows seamlessly into sourcing, manufacturing and will be used till the end of life through operations. The manufacturing with the application of Rittal Automation systems in work has a very high possibility

of implementing industry 4.0 solutions in toto. The whole value chain when implemented completely provides huge efficiency as well as cost-benefit to the customer.

**Companies in the construction industry face many challenges, including technological changes due to digitisation, implementation of the BIM method and a pronounced shortage of skilled workers. How can they navigate these changes and remain successful over the long term?**

This is an emerging challenge or rather opportunity in terms of maximising efficiencies. We have centrally set up a practice to offer our solutions in the building automation field. This industry would benefit tremendously by implementing our tools in their endeavour of digitalisation journey and automate their electrical as well as automation aspects. We are developing specific “use cases.” Construction, as well as building automation, is a vast field covering even industries like maritime, port automation etc. We have engaged actively with all stakeholders and are working very collaboratively with all to develop solutions that suit their requirements. We are very excited about the prospects we see in the Indian context as there is a huge ongoing investment. The industry would need all the tools to navigate the aggressive requirements, efficiently.

**What solutions are needed to efficiently plan to build automation, schematics and control cabinets?**

The most important aspect is the creation and utilisation of the data. As is evident that various stakeholders develop, contribute to the data at different stages of the project. The solution needs to use the data, efficiently. Eplan with our platform approach is ideally suited to address this requirement. Right from pre-planning to detailed engineering to construction of control cabinets, we offer robust solutions. With the “ePULSE” offerings, we also provide simultaneous cloud-based sharing of projects with all the sensitivities and data security requirements. 

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Ampere Vehicles is accelerating EV adoption and ownership across the country and has seen noteworthy increase in demand for electric scooters from smaller towns and cities. The EV market has experienced good jump in demand due to growing need for personal mobility vehicles during Covid-19, increasing petrol prices are putting a strain on daily commuters as well as logistical players, and lastly favourable policy interventions by the Central (FAME-II) as well as various state governments.

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By Peter Jacobs

## CNC MACHINES IN THE ELECTRONICS INDUSTRY

A brief overview of how CNC machining is used in electronics manufacturing

With the rapid development pace of technology, electronics today have revolutionised our personal and professional lives. Be it a kid playing games on a smartphone or a worker operating humongous industrial monitoring systems; electronics are everywhere.

However, with the demand surge and the increasing complexity of customer needs, electronic device designs are becoming more complicated, which has called for an automated manufacturing process called CNC machining.



### IMPACT OF CNC ON ELECTRONICS

CNC machining is a manufacturing process where a pre-programmed computer program governs factory tools and complex machinery operations. Here are some quality parameters assured by CNC machining for businesses of all scales:



All electronic equipment and circuitry are built from components that produce heat while in operation. As a counter, thermal management systems get installed to drain heat and maintain ideal operational temperatures

1. **Exceptional Accuracy**

The accuracy and versatility rendered by CNC machining make it a compelling manufacturing technology for the electronics sector. CNC machines can process conductive as well as non-conductive metals, including a broad range of plastics.

2. **Highly Reliable**

CNC machining also assures high reliability, implying that electronics manufacturers can utilize this process for small and extensive production

scales of electronic parts, besides the prototyping of components.

With the advent of small CNC mills, small-scale industries have also begun leveraging the potential of CNC machining in the manufacturing process.

3. **Staggering Pace of Manufacturing**

CNC machining is competent enough to produce a wide range of electronic components within a tight timeframe. This perk directly results from the absence of tooling stage before production and no quality limitations associated with additive manufacturing.

Designs can quickly get iterated and modified via CAD software, which requires little to no manual operation once the toolpaths have been set by the computer or the machinist.

4. **Tight Tolerances**

Most electronics manufacturers demand tight tolerances for complex internal components. Tight tolerances provided by CNC machining imply that machined parts are ideal for end-use after minimal post-processing.

### IMPLEMENTATION OF CNC MACHINING

CNC machining is ideal for the prototyping and manufacturing of parts for electronic devices, ranging from

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simple handheld devices to valuable pieces of industrial machinery.

Here are some examples where manufacturers employ CNC machining to build complex electronics and other designs:

1. **Printed Circuit Boards (PCBs)**

PCBs are crucial to almost all electronic products and are used to electrically interlink intricate components of a device. PCBs employ conductive tracks and other elements, which get manufactured by etching. However, etching is not an efficient approach as it involves hazardous chemicals, making it impractical for usage in offices or non-industrial workspaces.

As a substitute for etching, CNC machining enters the picture. CNC machining carves out functional PCBs with greater precision and does not involve hazardous chemicals.

2. **Casings and Enclosure Parts**

Casings and enclosures are crucial to any electronic device as they keep all internal components fixed and protect fragile parts from foreign hazards such as liquid, dirt, and bumps.

While die casting is the most extensively used process for fabrication, CNC machining is expanding into this industry as a more reliable and higher precision method.

CNC machining helps manufacture more intricate geometries, provides tighter tolerances, and renders greater build strength than die casting or injection molding.

3. **Semiconductors**

Semiconductors are the backbone of the electronics sector, with the MOSFET (metal-oxide-semiconductor field-effect transistor) being the most extensively produced device in human history.

Machinable semiconductor parts comprise wafer chucks, wafer carriers, gas distribution plates, flex circuit stiffeners, and solder pad stencils, all of which must be made to tight tolerances.

The CNC machining process has streamlined the processing of semiconductor materials such as silicon and aluminium. It has provided tighter tolerances, which has made it an ideal choice for semiconductor manufacturers.

4. **Heat Sinks**

All electronic equipment and circuitry are built from components that produce heat while in operation. As a counter, thermal management systems get installed to drain heat and maintain ideal operational temperatures.

Heat sinks serve the components that drain heat from the operational parts to a liquid coolant or air and are widely manufactured using CNC machining technology. CNC milling machines enable



a machinist to fabricate heat sinks with intricate geometries from metal blocks.

CNC machining technology provides a faster turnaround, a broader range of options for material usage, and tighter tolerances. Besides, CNC machined heat sinks provide better thermal conductivity compared to bonded heat sinks.

5. **Connectors and Sockets**

Electronic devices interact with other devices by the usage of sockets and connectors. A socket enables the transmission of electrical, electromagnetic, as well as optical signals.

Sockets and connectors have varied sizes, shapes, and functionalities and demand extremely tight tolerances while manufacturing. A minor error while fabricating leads to a failure of connection between devices. CNC machining enables product designers to fabricate intricate geometries that have a fast turnaround. Besides, tooling costs are economical, and prototypes can get modified conveniently via CAD/CAM software with CNC machining.

## CONCLUSION

As the customer demands rise and the electronics industry evolves, the need to build intricate electronic parts with high-quality parameters is becoming paramount. With the influx of CNC machining in the electronics industry, the manufacturing process has gotten revolutionized.

Several electronic component manufacturers are taking advantage of the perks of CNC machining, be it small-scale businesses or large-scale enterprises. Besides rendering unparalleled precision and efficiency, CNC machining also provides better safety in the workplace.

Peter Jacobs is the Senior Director of Marketing at CNC Masters. He is actively involved in manufacturing processes and regularly contributes his insights for various blogs in CNC machining, 3D printing, rapid tooling, injection molding, metal casting, and manufacturing in general. 

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By Kruti Bharadva

## THE ROBOT WITH HUMAN-LIKE VISION

CynLr is a robotics research start-up that is combining a form of machine learning called reinforced learning and machine vision to create a visual object intelligence platform

**W**hat do you get when you put together two intelligent minds together? Brilliance of course.

The brainchild of **Nikhil Ramaswamy and Gokul NA**, CynLr is a robotics research start-up that is combining a form of machine learning called reinforced learning and machine vision to create a visual object intelligence platform. CynLr's work allows manufacturing companies and industrial units to deploy robotic arms that can see, recognise and manipulate objects in random unstructured environments, which makes it easier for such systems to be deployed in unconventional facilities.

### A BRIEF HISTORY

Gokul and Nikhil met when they joined as applications engineers at National Instruments (NI), a US-headquartered leader in test, measurement and automation. At NI, they took different paths – Nikhil ended up becoming a Key Accounts Manager responsible for \$1.5 million in annual



consistently failing. That's when they identified that there are concrete gaps in the vision technology for robotic guidance and decided to step out in 2015 to solve this problem. Subsequently, the founders consulted for and delivered over 30 customised vision guided robot solutions that were previously unsolved by incumbents, to select manufacturers like Sansera Engineering, Timken Bearing and GE X-Rays.

"CynLr is focussed on solving the vision guided robotic manipulation problem – enabling robotic arms to learn how to pick, orient and place objects even if they are presented in a cluttered or unpredictable way," commented Nikhil.

Today, robot arms can only perform pre-programmed trajectories and cannot pick an object if the object is not already located and aligned in a very precise manner prior hand. The ability to pick from a random pile and know how to manipulate accurately has been an elusive globally unsolved problem for robotics for over five decades now. "Through over a decade of fundamental research in dynamic vision, CynLr has built a human-inspired dynamic vision hardware and

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CynLr is focused on solving the vision guided robotic manipulation problem – enabling robotic arms to learn how to pick, orient and place objects even if they are presented in a cluttered or unpredictable way

sales from Key accounts like GE, Honeywell and Bosch; while Gokul became a Machine Vision and Embedded Specialist for large geography including Eastern Europe, India and South-East Asia. It was at NI that they got access to study the problems faced in manufacturing automation and the gaps in machine vision technology.

They discovered that whenever these machine vision principles built for identification were applied for more dynamic applications like robotics, they were

software platform that can solve this elusive problem,” Nikhil added.

#### END-USER MARKET

The company’s go-to-market target is discrete manufacturing industries like automotive, electronics, white goods, aerospace, jewellery, etc, as well as select use cases in e-commerce warehousing and logistics. Customers choosing to deploy robots enabled with CynLr’s visual intelligence can automate previously non-automatable tasks effortlessly. For instance, today world over, it is impossible for a robot to pick a bolt from a bin and place the bolts while assembling a car or a two-wheeler such that the bolt is aligned to the screw hole and the first two threads are tightened without slippage. Torquing of the bolt can be automated, but this coordinated and oriented placement of the bolt is very difficult to automate as it not only requires visual guidance, but also tactile feedback and knowledge of how to operate the bolt.

“Look around you, almost all products you use contain bolts, screws or other fasteners and today each of those fasteners must be placed physically by a human. It is estimated that close 70 per cent of effort in producing a product is in the fastening activity and that is manual across all product lines.

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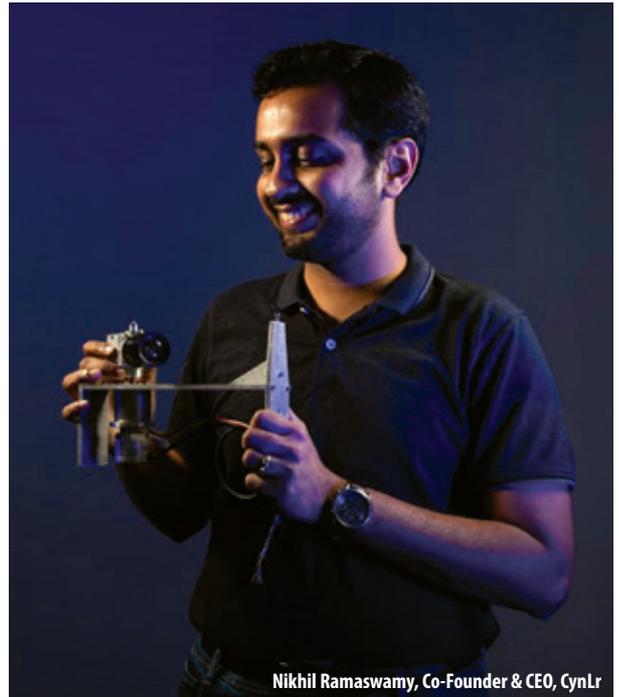
It is estimated that close to 70 per cent of effort in producing a product is in the fastening activity and that is manual across all product lines. We can automate this and many other previously non-automatable tasks using our visual intelligence technology

We can automate this and many such other previously non-automatable tasks using our visual intelligence technology,” Nikhil added.

For tasks that are automatable today using custom infrastructure, CynLr platform allows for a much more simplified deployment, with no need for hardware customizations from task to task or object to object.

#### THE ROAD TO HERE

Contrary to popular perceptions, historically to date, AI and machine learning have made very few inroads into the world of industrial robotics. When you visit a shop floor and study the robots functioning there, it is apparent that every deployment of a robot in a shop floor works in a highly structured environment,



Nikhil Ramaswamy, Co-Founder & CEO, CynLr

with pre-programmed and pre-fixed trajectories that cannot adapt to even the slightest of variations. This is largely because today’s AI and machine learning technology has evolved on the backbone of a large trough of digital data – be it text, images or audio, and these data sources are insufficient to learn the intricacies and high variabilities of real-world objects and how to manipulate them. Besides, the world of robotics expects a very high level of accuracy and repeatability that today’s AI models seldom achieve. For instance, an automotive factory expects that manual intervention is permissible only once in a million tasks done by a robot and such accuracies are unheard of in today’s ML models.

Expanding AI to the realm of real-world objects and tasks requires looking at problems fundamentally from what types of data and dimensions of data one needs for systems to learn how to work in these environments. Humans don’t require millions of sample sets of data to learn to pick and manipulate an object – you might have never seen a particular auto-component in your life before, yet you are quite capable of picking it up, re-orienting and placing it accurately in just a few attempts. And we don’t need so much data to learn new objects and how to manipulate them because we see the world in multiple dimensions of information beyond colour and depth. CynLr is working on some of these fundamental innovations enabling ML technologies like CNNs and reinforcement learning to expand to the realm of real-world objects and tasks.

“The problem we are solving is a globally un-solved technical challenge and one that involves fundamental research in neuroscience and the science of how humans and animals see and learn. This problem has always been a decade away from being solved,” mentioned Nikhil.

He further added, “We have built a hardware platform comprising over 400 carefully designed parts. We have built the world’s first convergence and auto-focus based event imaging camera that looks beyond colour and depth. In the process, we have also built a depth perception camera that has at least 10x more speed and 2x more resolution than the industry’s best.”

“And we are also building a ground up a strong intelligence framework based on reinforcement deep learning to learn an object visually from a manipulation point of view, all of which, from our purview, are unique innovations even from a global perspective,” stated Nikhil.



Gokul NA, Co-Founder & CTO, CynLr

## ROBOTICS IN INDIA

When compared to more developed economies like the US, China, Europe and Japan, India is still in its infancy in terms of industrial robot deployments. In 2019, India deployed a mere 4.3 thousand robots, while the US deployed 33 thousand robots and China a whopping 140 thousand robots. However, there are some silver linings - India doubled its operational stock of robots to 26 thousand robots in the last five years and is ranked third globally in the annual rate of increase in its robot fleet – lagging only after China and Japan, and it is estimated to show strong growths in the next decade.

There are, however, certain sun-shine industries that much fare better than others in India. Automotive manufacturing leads the race, with production in-



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**The ability to pick from a random pile and know how to manipulate accurately has been an elusive globally unsolved problem for robotics for over five decades now**

frastructures of plants in India matching global standards, thereby driving strong growth and demand for robot technologies. As India prioritises a global manufacturing economy, more manufacturers in different industries are bound to increase their robot fleets to achieve better repeatability, higher quality, higher production and insulate themselves from labour unavailability and disruptions.

“We have now built and validated hardware and core software layers to solve this global challenge. We are looking to raise further capital this year to commercialize the technology and go to market. We have pilot interests from Indian Automotive OEMs and component manufacturers,” commented Nikhil.

“While India is a fantastic test market to deploy initial systems and validate our platform, the demand for such advanced robotics capabilities is much riper, and the price point much more attractive in advanced manufacturing economies like the US, Japan, South Korea and Western Europe. After product validations in India, we intend to set shop in the US and Japan before globalising our sales to more countries,” he concluded. 

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The Machinist Super Shop-floor Awards are organised by Worldwide Media (WWM), a fully owned subsidiary of The Times of India Group (BCCL).

The Machinist Super Shop-floor Awards is India's first and only red-carpet ceremony for the country's discrete manufacturing industry. Started in 2015, the platform has created a benchmark through its credibility, industry acceptance and popularity over the last six years. The 6th edition was celebrated on November 03, 2019 in Pune.

#### THE PROCESS

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#### OVERVIEW

There are two segments to create a

#### Categories

- Maintenance
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#### Editorial Choice Categories

- Lifetime Achievement Award
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- Super Women of The Year
- NextGen Leader of the Year

level playing field - Large Enterprises (Annual company turnover Rs.1000 crore and above) & SMEs (Annual company turnover less than Rs.1000 crore). Although MNC companies sometimes get treated as SMEs due to their India turnover being less than Rs.1000 crore, they are treated separately from home grown SMEs to be fair to the latter.

Sending entries is simple and the nomination form is self-explanatory. Nomination FAQs are also provided to help plants create their nominations. The shortlisted nominations are assessed by an eminent panel of jury members, who are top management industry experts with substantial experience. The winning companies are selected based on their thorough evaluation.

The winners are felicitated at a Grand Awards ceremony and take home the coveted 'Machie' trophy. The Machie trophy has now become so popular that many now refer to the awards platform as the 'Machie Awards'.

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By Kruti Bharadva

## MANUFACTURING 4.0 IN THE NEW NORMAL

Our four esteemed panellists share insight on how to be ready for the new era in Indian manufacturing



**JAGDISH GANDHE**  
EVP - Manufacturing & Technology  
Piaggio Vehicles Pvt Ltd



**SEKAR UDAYAMURTHY**  
Co-Founder & CEO  
Jidoka Technologies



**UDAY NARANG**  
Chairman  
Omega Seiki Mobility



**VIVEK SHARMA**  
Managing Director-India  
Lenovo ISG

In just over a year, COVID-19 has brought in a whole new reality. Virtually every organisation has been scrambling to adapt to this – evolving – new reality on multiple levels at the same time and at an unseen pace.

Even before the pandemic struck, forward-looking manufacturers had implemented Industry 4.0 technology, which includes innovations such as Machine-to-Machine communications (M2M), Smart Automation, and Business Intelligence. As these tools help companies anticipate, understand, and respond to changing production levels at their sites, they were able to handle the disruptions caused by the pandemic much better. Industry 4.0 helped transition legacy manufacturing systems to smart, connected, automat-

to speed up our efforts and move faster for a far more digital economy in the new normal? Is the COVID-19 pandemic the most significant digital transformation catalyst we've seen in decades? And, if so, what can we do right now to survive, recover, thrive and be ready for the 'new normal'?

The Machinist Team got together virtually with four esteemed panellists during the felicitation of the Economic Times Promising Plants, and endeavoured to deliberate upon these compelling questions, through a holistic approach.

### THE ROLE OF INDUSTRY 4.0 IN INDIAN MANUFACTURING

India has been well on the way of becoming a global manufacturing hub, with government initiatives such as 'Make in India' 'Skill India' and the most important one of all- 'Digital India' taking centre stage.

"Industry 4.0 is pivotal in fulfilling the promise of Digital India," stated **Uday Narang, Chairman, Anglian Omega Group and Omega Seiki Mobility**. "It requires a pragmatic approach and organisational alignment in securing connected solutions that drive forward operational efficiency, while boosting manufacturing but reducing costs."

While every company and organisation operating today is different, they all face a common challenge—the need for connectedness and access to real-time insights across processes, partners, products, and people.

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Manufacturers have to become more efficient at each stage of the supply chain, and the whole eco-system of business has to work in harmony

ed systems. The remote-enabled technology, which uses a combination of Internet of Things (IoT), Cloud Computing and Real-Time Analytics, helped companies with business continuity, as businesses stopped and then resumed during the COVID-19 pandemic

But questions arise: Can we afford to transform our businesses gradually in this context? Or do we need

“This need for connectedness is where industry 4.0 fits in,” opined **Vivek Sharma, Managing Director-India, Lenovo ISG**. “Connectedness has to be across partners, processes, products and people. Industry 4.0 isn’t just about investing in new technology and tools to improve manufacturing efficiency—it’s about revolutionising the way your entire business operates and grows.” Lenovo ISG provides technology and insight to power the data-centred heart of smarter retail, smarter manufacturing, smarter cities, smarter healthcare, smarter finance, and beyond.

Piaggio Vehicles Ltd, being a leading automotive manufacturer, distinctly knows the value of digital technologies in their field. **Jagdish G Gandhe, Executive Vice President, Manufacturing and Technology - CV, 2W, and Engine Business**, described his company’s take on the industrial revolution – “It all depends on how ready one is to adapt. Of course, the pandemic has brought about the need to adapt faster. But businesses have always needed to be flexible to meet situations.”

**Sekar Udayamurthy, Co-founder and CEO, Jidoka Technologies** – a company which delivers cutting edge engineering solutions and specialises in automating cognitive inspection of visual defects in manufacturing by leveraging Deep Learning, AI/ML and Analytics- said simply, “We need a two pronged approach- one for the short term in the pandemic, and the other for the long term. Resilience and transformation are indisputable requirements for both.”

#### INDUSTRY 4.0 DURING THE PANDEMIC

A recent McKinsey report stated that the early adopters of Industry 4.0 reported a stronger ability to respond to the COVID-19 crisis. Analysis of the survey’s results further suggests three outcomes: a win for companies that had already scaled digital technologies, a reality check for those that were still scaling, and a wake-up call for those that hadn’t started on their Industry 4.0 journeys.

#### Procurement Guides for the New Normal

1. Recalibrate cost-saving targets by zero-basing category and value-creation strategies
2. Unlock new opportunities by investing in supplier partnerships and joint innovations
3. Accelerate value capture, leveraging digitisation and spend analytics
4. Enable remote-working models by transforming to a future-ready operating model
5. Help employees adapt to new working models by reinvigorating both core and new capabilities



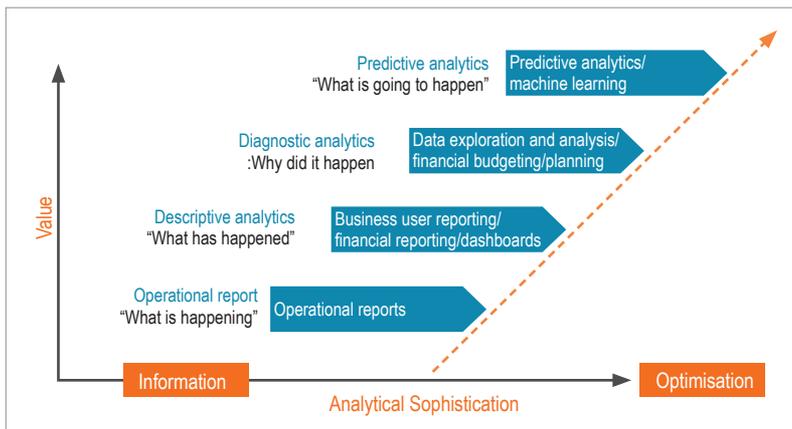
**Industry 4.0 is about revolutionising the way your entire business operates and grows**

Working Examples: Companies that had scaled Industry 4.0 use cases prior to COVID-19 found themselves better positioned to respond to the crisis. A consumer packaged-goods (CPG) company in Asia had built a digital twin of its supply chain before COVID-19, for example. It was able to use that to run multiple scenarios during the pandemic, preparing itself for sudden shutdowns of manufacturing locations or disruptions in raw-material supply. On the opposite side of the globe, a personal-protective-equipment (PPE) manufacturer in North America, in the process of increasing its capacity by installing a new manufacturing line, was able to commission the line using augmented reality-based remote assistance for project execution. (Source, McKinsey)

“The ability to respond better if you had already implemented 4.0 solutions was true across all industries and business, not just manufacturing,” stated Vivek Sharma. “Solutions were always available. Companies which had them enabled, indeed responded faster and better. We have global supply chain capability and the existing AI solutions enabled us to manage inventory, project needs and remain dynamic.”

Mr Sekar shared, “As a provider for automation solutions for quality control, we noted that early adopters had at least 33 per cent increase in throughput and approximately 10 per cent increase in accuracy.”

“We resumed operations after the break as if we had just been closed for a Sunday – that is the testament to the technology which kept us connected with



all our suppliers and colleagues,” concluded Mr Gandhe on this particular debate.

#### THE INTRICACIES OF PROCUREMENT

A particular vulnerability the pandemic’s global nature exposed is in supply chains, which have been stressed at a scale with few precedents. Procurement leaders have been no exception to the changing needs of industry. As economies begin their transition to the next normal, crisis management is evolving into recovery, with a few signs of growth starting to return.

“Procurement was a nightmare, if I may be honest,” laughed Mr Gandhe. “We do a lot of imports and we had to go over and beyond to procure material.”

“Nobody was prepared for the lockdown,” shared Mr. Vivek. “The new normal requires asset tracking and procurement systems to be in place, to be predictive in nature and to be able to identify patterns at the back, keeping in mind manufacturing for the future.”

According to Mr Vivek, three factors will be crucial for a smarter, newer, normal:

- Supply Chain Management and optimisation of the same
- Predictive maintenance and analytics, automated processes to ensure minimal disruptions
- Shop floor asset tracking and optimisation

“Manufacturers have to become more efficient at each stage of the supply chain, and the whole eco-system of business has to work in harmony,” Mr Vivek added.

#### INVESTING IN 4.0 – COST VS BENEFITS

Most early adopters of artificial intelligence (AI), augmented reality, data analytics, digital twins and other advanced technology have been large companies, such as automotive OEMs and their suppliers. But that doesn’t mean the concepts and tools are out of reach for small shops. The challenges are just more pronounced.

Earlier this year, the World Economic Forum re-

leased an updated list of “lighthouse factories” that are at the forefront of applying Industry 4.0 technology. The companies in that elite group represent a who’s who of the manufacturing world, with names like BMW, Foxconn, General Electric, Haier, Hitachi, Johnson & Johnson, Procter & Gamble, Siemens and Unilever. Each organisation is a global powerhouse with an unlimited amount of resources and state-of-the-art factories.

However, in reality, more than 90 percent of manufacturers can be classified as either “small” or “medium.” To survive, those companies must learn how to identify, assess and scale Industry 4.0-enabling technologies

that will help them achieve greater agility, efficiency, productivity, reliability, speed and quality.

“Technology is no longer an enabler- executed well, it is the difference between your success and failure, and in the situation today, a matter of survival,” stated Mr Uday emphatically.

“The case is different for every organisation, every company, implementation will be different all across. But technology adoption must be in the very DNA of the organisation. The top leadership needs to drive the implementation, and this implantation must be customised as per the needs and value added to the activities of the company,” he added.

“In today’s environment, connectivity of the eco-system has to be in place, for example if you an SMSE supplying to an OEM, you have to be connected and they can help you pull together you adoption of 4.0. The level of adoption can come gradually, based on your supplier and who you supply to,” added Mr Vivek to the question.

Any small manufacturer that is involved in a multi-tier supply chain is actively pursuing Industry 4.0 technology. Investing in systems that are connected and integrated will create efficiencies that ultimately make their own business perform better.

#### SKILLS REQUIRED FOR 4.0

India views manufacturing as vital to the country’s digital transformation strategy. With smart factories re-imagining manufacturing jobs, there is a growing need for professionals’ savvy with emerging technologies to lead the digital transformation in the sector. Additionally, when implementing Industry 4.0, one of the biggest challenges small manufactures face is having a workforce equipped with enough expertise and knowledge to tackle new opportunities.

“There is no specific age to learn!” stated Mr Uday. “We all have to constantly upgrade our skills and keep

learning. And most importantly, we must invest in the reskilling and upskilling of our employees. This is where the ROI will come from at the end!”

“India, from a tech point of view, represents a very competent pool of professionals. Nevertheless, the focus definitely must be on skill adaption for the current new normal as well as for the needs of the future. There has to be a constant effort to ensure the right set of expertise is available across the right set of domains,” added Mr Vivek.

Mr Sekar opined, “The key here is to nurture talent which has a high degree of adaptability. If you hire resources which can adapt and match them up with existing experience, there will be great things happenings.”

There is no doubt that technological progress is enabling machines to complete many of the tasks that once required human beings. That new automation revolution will have a major effect on employment in the coming years. Nearly every job will change, many quite profoundly and the overwhelming majority of today’s employees will need to develop new skills. Preparing for the future of work is definitely one of the defining business problems of our time.

The changes brought about by the pandemic will also have significant effects on the requirements for workforce skills and capabilities, from a dramatic increase in home-based and remote working to a need for shop-floor personnel to master new tools and newly urgent health and safety requirements. The future of work

goods and people severely impacted workforce capacity and disrupted supply chains, bringing nearly all manufacturing activity to a stand-still. Low-scale operations eventually translated into a negative impact on production volumes. Over a period, this adversely affected the turnover and revenue.

The IIP also fell to a negative growth of 9.6 per cent indicating that core manufacturing activity also suffered setbacks resulting from the first and the second wave.

“Manufacturing has no doubt been disrupted immensely, though it varies from vertical to vertical. Some sectors have bounced back faster and will continue to do so with the effect of factors such as vaccination drives, increased safety and health regulations, and automated solutions available,” shared Mr Vivek.

“Preparedness for the future is where the spotlight should be – what checks and balances have you put in place? Automation will no doubt be crucial to getting back on track as will be the undisputable need to be more nimble, agile and more resilient. This translates into every nook of manufacturing as we step into a new normal,” he further added.

Mr Sekar seconded the same by adding, “there is no going back to what was. We have to go further, be ready for the new normal.”

“Most of us have adapted quickly to the new normal- it has become part of our lives, this new way of working. But of course, markets before the pandemic and markets now have a vast gap. Product portfolios have changed, balances between domestic and export markets have changed. We were conditioned to one kind of a business, but now everything is dynamic,” added Mr Gandhe.

“Industry 4.0 will further help us in being the kind of dynamic required today, to prepare us for the new normal. Technology will definitely dictate be the way we respond to the need of the hour,” he concluded.

#### KEY TAKEAWAYS

The pandemic has buffeted manufacturers in every sector. Companies serving industries that are thriving—technology, health care and home repair and remodeling, among others—have experienced a sharp increase in demand, while those that manufacture components for underperformers such as aviation, energy and the automotive industry have languished. Meanwhile, almost all manufacturers have grappled with supply chain disruptions.

As in many industries, manufacturers are increasingly aware that even when the pandemic ends, it will leave fundamental changes in its wake, such as greater automation and other industry 4.0 solutions. With this transformation comes opportunity- an opportunity to rethink, rebuild and grow. 



**Technology is no longer an enabler- executed well, it is the difference between your success and failure**

will require two types of changes across the workforce: upskilling, in which staff gain new skills to help in their current roles, and reskilling, in which staff need the capabilities to take on different or entirely new roles.

#### BACK TO (A NEW) NORMAL?

Omega Seiki, according to Mr Uday, refused to be bowed down by the pandemic. “We took it as opportunity to get stronger, reinvest, retrain and skill employees and develop ourselves. We upgraded our systems, our factories and ourselves. We simply refused to look back,” he shared.

But was this ‘glass half full’ ethos true across all of India?

The Indian manufacturing sector contributes to approximately 16-17 per cent of the GDP and provides employment to almost 20 per cent of the country’s workforce. During the first wave of the pandemic, lockdown-imposed restrictions on the movement of

By Rahul Kamat

## FACTORY AUTOMATION IS EXPECTED TO GROW TO \$4.43 BN BY 2023

In an interview, **Parminder Singh, Head of Design & Manufacturing - India & SAARC at Autodesk** talks about how companies are adapting and overcoming the challenges posed by technology in a during/post-COVID world and expected growth in industrial automation in India

### Tell us about the role of design, technology and engineering in making India self-dependent?

The Make in India initiative and the more recent Atmanirbhar Bharat campaign are aimed at catalysing India's manufacturing sector and creating strong local supply chains. The government's aim of setting the manufacturing sector on course to create 100 million new jobs by 2022 and contribute \$1 trillion to the national economy by 2025 will necessitate long-term strategic thinking and the adoption of more technology.

While the pandemic has reinforced the need for Indian manufacturing to adopt digital capabilities, 'Atmanirbhar Bharat' — a major element in igniting India's manufacturing sector — will harness the power of connected data and artificial intelligence (AI) to help companies automate their engineering and manufacturing processes, driving push-button automation. Consequently, India is adapting to digitalisation at a faster rate, as technology will play a key role in tackling post-Covid challenges.

Smart manufacturing helps manufacturers become more efficient, stay ahead of the competition and explore new business models and widespread digitisation of all manufacturing practices. It has the potential to improve outcomes for individual businesses and the manufacturing industry.

For instance, automation technology such as generative design, a technology exclusively available in Autodesk's Fusion 360, enables weight reduction, strength, affordability, sustainability, and better aesthetics. A form of artificial intelligence that leverages cloud computing to create better outcomes, it allows manufacturers to explore thousands of designs in less time than they could deliver a single concept using traditional processes. Its ability to solve complex problems faster and deliver more potential solutions than a human ever could yields a shorter time to market, reduced costs and a greater range of innovative solutions.

As design and manufacturing converge, Autodesk



can equip Indian companies with an integrated set of desktop and cloud-based software tools that consolidate design, engineering, simulation, collaboration, CAM (computer-aided manufacturing), additive manufacturing and factory floor management. For example, Magna Advanced Technologies produces prototypes and tooling for the highly competitive automotive market. PowerMill and PowerShape enable users to design and manufacture complex parts faster while conserving capital expenditure.

The convergence of technology and design is vital for India to emerge as a sustainable manufacturing hub. Autodesk aims to create and nurture a holistic design ecosystem that uses 'Design First' as the core approach to manufacture anything using fewer resources, less time and with a lesser impact on the environment. As a design partner to our customers, we are enabling automation through our solutions in the manufacturing

and construction sectors, which aligns with governmental initiatives, including the Pradhan Mantri Awas Yojana – Urban (PMAY-U), which envisions Housing for All by 2022 and the Make in India mission.

### **Do you agree that Industry 4.0 has finally paved the way for smart manufacturing?**

The technologies of the fourth industrial revolution (Industry 4.0)—connected robotics, 3D printing, cloud computing, artificial intelligence (AI), and the Internet of Things (IoT)—have made smart manufacturing possible and sped innovation to a dizzying clip.

One of the most recent trends to have strongly emerged in the Indian manufacturing industry is factory automation. The factory automation or industrial automation market in India is expected to grow to \$4.43 billion by 2023. Increased foreign direct investments and India growing in popularity as a preferred sourcing destination has resulted in rising demand for industrial automation equipment and more cost-effective methods of production.

Smart manufacturing can help streamline processes, increase productivity, stay competitive, and prepare for the future, including for unprecedented events, such as a pandemic.

As the manufacturing industry moves toward increasing digitalisation, trends such as the adoption of a digital twin, 3D Printing, AI and IoT are witnessing faster acceptance and implementation than ever before. For the Indian manufacturing ecosystem, a transformational vision towards Industry 4.0 and smart factories will accelerate the required growth for this industry.

Adopting smart manufacturing requires significant investments of financial and human resources and involves some risk. For businesses interested in smart manufacturing but intimidated by financial or technical barriers, the good news is that they do not have to transition factories in one big leap.

Manufacturers starting on a smart-manufacturing journey should begin by making their analogue data digital. This creates foundational data on which to build feedback loops by inputting more information from factory-floor processes. This additional input could come from sensor data, but it could also be from workers inputting data at different points in the process. Once manufacturers' problems are revealed by data, they can start thinking about making changes on multiple dimensions—that's where introducing more computation and algorithms can help.

Smart manufacturing can help a business become much more efficient with its resources, enhance worker safety, and facilitate worker training. It can also make a business more agile. With the government also supporting the industry through initiatives such as Make in India, Digital India and Aatmanirbhar Bharat, it

only makes sense for India's manufacturing sector to speed up the adoption of digital technologies and reap the benefits.

### **Recently you helped Bangalore based start-up Greendzine launch its revolutionary low-speed EVs. Tell us about it?**

With the new scrappage policy in place, the automotive industry needs to gear up to meet the growing demand for new energy-efficient and sustainable vehicles in the market. AI and machine learning can enable organisations to transition away from linear production methods towards a model that allows goods to be produced more efficiently.

For example, Intelligent problem-solving technologies such as generative design help with everything from reducing weight, to creating standardised components, designing for durability, and designing for easy disassembly at end-of-use.

Greendzine is using design modularity to bring low-speed EVs faster to market and help fight India's poor urban air quality. The company creates low-speed EVs for personal and industrial use through an accelerated product development strategy they call "concept to product in 90 days" – faster than anyone else in the mobility industry. Advanced software helps design everything modularly from the same common platform and create 3D models. Parts and builds are prototyped quickly using 3D printing; non-functional parts are swiftly discarded without excessive loss of time or intellectual property. The result is a product that is easy to assemble or disassemble, as well as being expandable.

Greendzine's current product line features a two-wheeled personal commuter EV, a sporty, three-wheeled EV, and an order picking vehicle tailored for commercial warehousing operations. Ultimately, Greendzine aims to develop EVs that are not only affordable but also sustainable, thereby making electric mobility the preferred choice in India.

### **As a part of the circular economy, how is Autodesk embracing technology as a service that will fuel the circular economy?**

Technology as a service not only makes our economy more circular by breaking established patterns of mismatched supply and demand, but also generates significant growth opportunities for any industry.

Autodesk remains focused on three main areas while working with its customers to achieve circularity.

- **Better design** - Beyond the obvious of being better for the environment, the circular design also has clear business benefits. It helps reduce costs in both design and production, meaning fewer materials are needed and companies can benefit from a simplified supply chain with fewer spare parts

in inventory. With our planet expected to soon host 10 billion people and amidst limited resources, designing for a circular economy is the only way forward.

- **Better use of data** The success of the circular approach depends on ensuring that stakeholders are connected and share information throughout the product lifecycle. Cloud-based tools such as Fusion 360 can help connect workflows between design and manufacturing, ensuring less waste in production.
- **Better materials** - A circular economy depends on selecting better materials – such as recycled material. Technology such as generative design enables users to explore recyclable materials for their designs and help gauge how these materials impact product performances.

#### What is the role of automation and AI in the circular economy?

In manufacturing, circularity begins with design. AI and machine learning can enable organisations to transition away from linear production methods towards a model that allows goods to be designed for extended use from the outset. AI can account for better and faster design due to the speed with which the algorithm can analyse large amounts of data and suggest optimal design adjustments. These inputs can enable designers to swiftly review and approve adjustments based on the projected data. Thus, AI provides designers with more informed insight into the most effective designs to make the best use of their time and expertise.

#### Throw some light on sustainability initiatives undertaken by Autodesk.

We have always been committed to advancing a more sustainable, resilient, and equitable world with our technology, within our business, in partnership with our customers, and beyond our industries. Our efforts

are aimed at three primary areas – derived from the United Nations Sustainable Development Goals (UN SDGs) – on which we believe we are best placed to accelerate positive impact at scale:

- **Energy & Materials:** Enabling better energy and materials choices, reducing carbon emissions and waste
- **Health & Resilience:** Accelerating the design and make of products and places that are safer, healthier, and more resilient
- **Work & Prosperity:** Advancing equity and access, and facilitate the acquisition of in-demand skills of the future

Autodesk is today a net-zero greenhouse gas emissions company across our business and value chain.

We also met our commitment to science-based GHG emissions reduction targets between 2010 and 2019. It is a culmination of a more-than-decade long effort to make sustainability an essential component of our business strategy and translate that value to our customers.

Our solutions span many industries, empowering innovators everywhere. In the Architecture, Engineering and Construction industry, our customers are increasingly working to make net-zero energy buildings, implement low-waste and industrialised construction, and develop smart and sustainable cities.

Now, we're committing to two new science-based GHG emissions reduction targets:

- Reduce Scope 1 emission (direct emissions from owned or controlled sources) and Scope 2 GHG emissions (covering indirect emissions from the generation of purchased electricity, steam, heating and cooling) by 50 per cent by the fiscal year 2031 (compared to the fiscal year 2020).
- Reduce Scope 3 GHG emissions (which covers all other indirect emissions across the Autodesk value chain) per dollar of gross profit by at least 25 per cent, during the same timeframe. 

## POWERFUL BATTERY FOR ELECTRIC TWO-WHEELERS

Continental's development and production service provider, Continental Engineering Services (CES) is cooperating with the battery specialist Varta. The aim of the partnership is to develop new technologies and products that particularly lead to advances in sustainable solutions in the field of electro mobility. In a first pilot project, both partners have jointly developed an innovative product for the two-wheeler market: A replaceable 48-volt battery pack for electrically powered two-wheelers with a power of 10 kW and more. Such vehicles are comparable in engine power and top speed with conventionally powered scooters from 125 cc engine displacement. The battery pack consists of

VARTA's V4Drive high-performance cell based on lithium-ion technology, which is characterised by its high performance, fast chargeability, low-temperature resistance and compact design.

A specially developed battery management system from CES now allows the use of this extremely powerful battery cell in automotive two-wheeler applications. The special feature: The lightweight (nine kg) battery pack gives a range of 50 kilometers and power of 10 kW. It can be detached from the two-wheeler with a simple pull and charged externally. In addition, any number of battery packs can be connected and controlled via the new battery management systems.

By Manu Tayal, Vice President & Head – Industrial & Manufacturing, Happiest Minds

## A NEW-AGE MANUFACTURING LANDSCAPE

The digital thread refers to the communication framework that allows a connected data flow and integrated view of the asset's data throughout its lifecycle across traditionally siloed functional perspectives. The digital thread concept raises the bar for delivering “the right information to the right place at the right time.”

The COVID-19 pandemic has fundamentally changed the way the world has been operating over the last year and a half. While the knowledge industry might have been better positioned to transition to a remote working model, the more traditional industries, like manufacturing, had to reset and devise elaborate business continuity programs to continue operating in the emerging new normal. Technology has undoubtedly been the difference maker as it has helped manufacturing organisations that are driven by conventional physical models, to become more agile and accelerate their digital transformation journey.

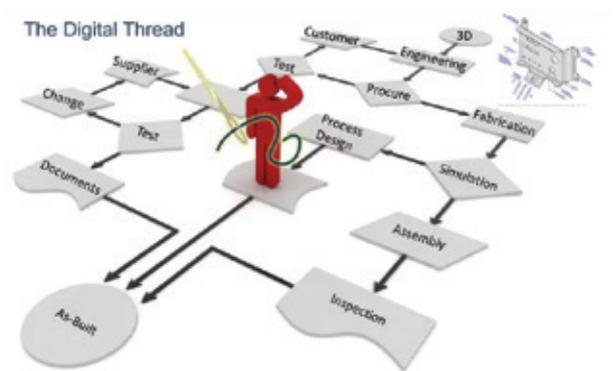
Manufacturers have been transitioning to digital for years. These digital transitions included model-based systems engineering (MBSE), computer-aided design (CAD), computer-aided manufacturing (CAM), product lifecycle management (PLM), enterprise resource planning (ERP), manufacturing execution systems (MES), maintenance, repair and operation (MRO), and supply chain maintenance (SCM) implementations.



One of the exciting areas in the next phase of technological innovation is the ‘Digital Thread’ as it has the potential to help manufacturers achieve unprecedented levels of visibility across the product lifecycle

One of the exciting areas in the next phase of technological innovation is the ‘Digital Thread’ as it has the potential to help manufacturers achieve unprecedented levels of visibility across the product lifecycle while providing stakeholders with detailed, accurate and timely information.

The digital thread is a structural approach that connects digital information throughout a product lifecycle from R&D till the last stage of scrapping the



product. Manufacturers can accommodate connecting an entire product ecosystem by establishing a digital thread between suppliers, production on the shop floor and customers, thereby ensuring efficiencies and lower costs.

This can be a boon to managers of large plants and can benefit them in the following ways:

1. **Accurate Demand Forecasting:** Digital thread enables manufacturers to review data from various sources including customers and other third-party sources thereby facilitating plant managers to fine tune production on the shop floor at any given time with the forecasted current and future demand.
2. **Data Access to all Stakeholders:** Digital thread provides valuable insights to all stakeholders through quality data, thereby assisting in knowing the status of machine operations on a shop floor in real-time. This data can also be utilised to carry out predictive maintenance and help shop floor managers in taking necessary proactive actions, thus ensuring that the desired business results are achieved.
3. **Mitigate Investment Risk and Enable Remote Maintenance:** Digital thread can leverage a digital twin to enable manufacturers to understand the working of a production cycle on the shop floor before an actual installation. This can lead to significant cost savings by detecting any defects and

optimising production through simulating a virtual factory.

Digital twins can also be used for remote maintenance as they create a replica of the original equipment and help in remote monitoring of performance and identification of issues.

However, for the digital thread to yield the benefits outlined above it is imperative that certain crucial aspects of manufacturing operations are stitched together. However, this is usually not the case, and it adversely impacts the potential benefits that can be reaped from establishing a digital thread. Some of the key aspects are:

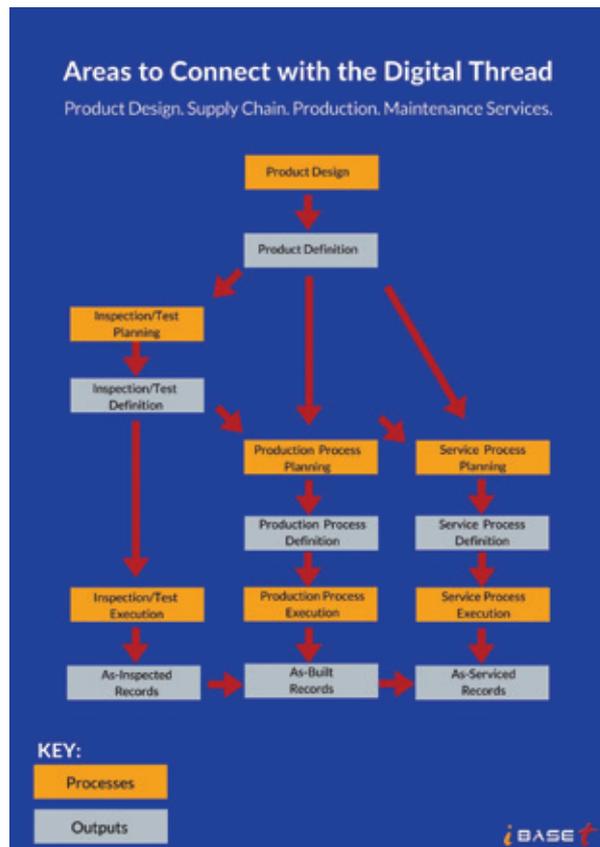
- 1) **Inbound Logistics:** It is quite common to face a lack of real-time material visibility and the absence of unified material tagging, which causes delays and disruptions in the planned production cycles. It is important to improve this visibility of inbound inventory, as it can positively influence the ordering of shortfall and predicting the turnaround based on a supplier's inventory. Triggering such workflows in advance to meet production targets can lead to smooth inbound logistics operations.
- 2) **Production Operations:** Often data exists in silos and there is a lack of visibility of real-time operations of machines, assets or workers which make remote operations quite challenging. This needs to be addressed by connecting



Digital thread can leverage a digital twin to enable manufacturers to understand the working of a production cycle on the shop floor before an actual installation

the production lines, digitising manpower planning, attendance and capacity management, remote monitoring of worker health and safety, energy monitoring and connected utilities for environmental compliance to ensure remote operations readiness.

- 3) **Integration with Dealers/Distributors and Customer Systems:** Dealers and distributors are key for any forecast of the demand for new product sales and customer systems are key for spare parts replacement. The systems that need to be integrated here would vary from spreadsheets to sophisticated ERP/CRM systems.
- 4) **Outbound Logistics:** Disconnected inventory management and distribution management systems can cause various problems for the production efficiency on the shop floor. It would be prudent to



start right from the digitisation of the loading dock allocation process as smooth dispatch is one of the key elements to ensure the efficiency of the system.

## CONCLUSION

It is important to note that many of the above-mentioned approaches are put in place but only as point solutions for certain use cases. The key to a successful digital thread implementation is embracing a platform-based approach that can provide rich insights into the manufacturing process across various key functions.

These are times of change and a few manufacturing entities have already started on this journey by setting up digital organisational units. Given the changing operational models and varying intensity of market demand right now, the opportunity exists to work with the right technology partner to tie together the right knots of a robust and reliable digital thread.

Manu Tayal is the VP and Head of the Industrial and Manufacturing business at Happiest Minds. He brings with him over two decades of rich industry experience and is currently focused on helping our clients make their industrial products and platforms ready for the future. He is deeply passionate about creating business impacting digital transformations for customers by leveraging technologies such as IoT, AI and ML.

By Kruti Bharadva

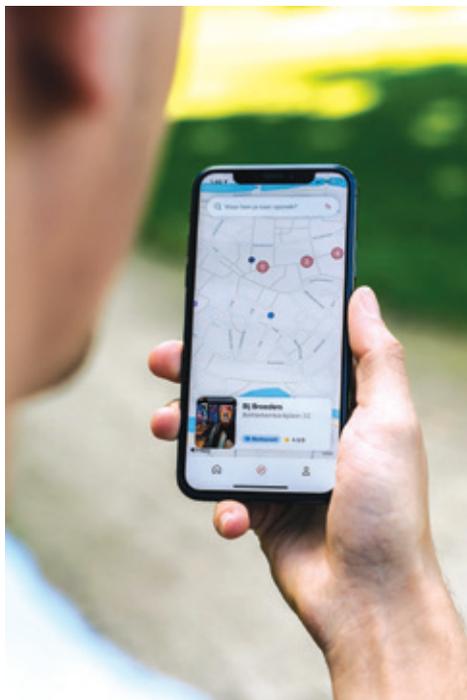
## TRANSFORMING THE FACE OF MOBILITY

MTAP Technologies was established in 2014 with a singular objective: to transform the mobility and transportation domain through technology. We caught up with **Srinivas Chitturi, CEO and Founder** of the company- here is his invaluable insight into the sector.

**M**TAP Technologies was established in 2014 with a singular objective: to transform the mobility and transportation domain through technology. The company's portfolio stands on the four key pillars of optimisation, transparency, safety, and digitisation. Its solution help businesses across sectors become ready for a digital-first future while reaping the benefits of better cost efficiency, operational efficacy and transparency, and near-instant and actionable insights.

### Give us a Brief Overview of MTAP

Our first product, Safetrax, was launched in 2015 to make employee transport safer, simpler, and more hassle-free for all parties involved, be it corporate organisations, employees, or transport managers. The response



that we received in the initial months, both from customers and investors, validated our approach and motivated us to launch SafeBus in 2016 to revolutionise the school bus fleet management landscape.

Building on our strong technological capabilities and expertise, we launched Autologix in 2020 to help smaller taxi owners and fleet operators optimise and future-proof their operations by using a tech-enabled platform. We have also recently launched Autoroutes, our routing optimisation and management software for freight, delivery, and passenger transporters.

In terms of business activities, through our four brands, we are currently catering to more than 250+ clients across India in industries as diverse as transportation, education, IT/ITeS, healthcare, etc; some of our clients in the country include Myntra, 24/7, SAP, ABB, Tesco among others. Apart from our headquarters in Bengaluru, we have regional offices in key regional markets such as Delhi-NCR, etc.

### Tell us about your product/ solutions portfolios and the sectors you cater to in India?

As mentioned above, our product portfolio currently consists of four flagship solutions: Safetrax, SafeBus, Autologix, and Autoroutes.

**Safetrax** caters to the employee transportation domain and uses cutting-edge tech (such as AI, machine learning, locational analytics, IoT, cloud, etc.) to simplify and streamline operations for transport managers. Not only does it drastically cut down on the time taken for critical tasks such as employee rostering, vehicle scheduling, and route planning but also provides transport teams with a real-time overview of the entire fleet through a centralised dashboard. Equipped with a wide range of features such as live tracking, auto-routing, remote monitoring, trip history, detailed reports and analysis and auto-generated paperless invoices, it helps organisations optimise their fleet operations while bringing down the time and costs involved.

**SafeBus** is a school bus management app designed to provide complete peace of mind to parents and

school administrators by making student transport operations safer and more efficient. The parent-facing app and centralised admin dashboard, for instance, provide real-time updates about the vehicle location and ETA, as well as the students' boarding and deboarding status. The student-facing app has a soft SOS button for raising alerts in case of an unforeseen emergency (vehicle malfunction, accident, etc.). Using AI-enabled GPS and location analytics, the system also raises automated alerts in case of undesirable driver behaviour.

**Autologix** caters to fleet operators and taxi owners who are looking to compete with larger transport companies and on-demand online cab aggregator platforms. Designed as a white label technological framework, it enables them to become more future-ready and tap into the increasingly digital-first market without the concomitant expenses of building it from scratch.

Lastly, **Autoroutes** caters to players in the freight, shipping, delivery, and passenger transport industry. It is designed to incorporate multiple parameters - such as pickup/drop-off location, vehicle capacity and type of delivery to automatically generate the most optimal routes that ensure prompt and profitable delivery, as well as high customer satisfaction. It also offers an accurate, real-time overview of logistics and passenger operations to transporters, thus allowing them to factor in variable demand and remain flexible and agile while maximising their business growth and profitability.

**As a company that personifies Industry 4.0, please comment on how successfully it is being incorporated into business activities and how it is changing the way business is done?**

In the post-pandemic landscape, the value of digital technologies is no longer under debate. Integration of cloud-based technologies has enabled companies to not only survive but also thrive in the viral outbreak by allowing professionals to connect and with their organisations. AI, machine learning, data analytics and cloud computing streamlined, automated, and accelerated many tasks that were done manually. The various functions performed by humans - from data collection and analysis to development and implementation - are being automated, allowing professionals to focus on more complicated, creative, and human-centric functions. As a result, operational efficiency and the speed of delivery has increased, benefitting all the stakeholders involved. Businesses have become more agile and responsive to the needs of customers and partners. Moving ahead, modern enterprises will continue to leverage technology to build new offerings that meet their objectives, expectations, and needs in the face of any disruption, seen or unforeseen.

Take, for example, the case of student transport in

the current context. School admins and transport officials in America are now required to follow the CDC's guidelines to ensure the maximum safety for students commuting to and from schools. Technology is helping them to design and implement the most time-efficient and COVID-proof routes for each vehicle in the fleet. Besides helping the vehicles circumvent existing and emerging 'red zones,' the AI-driven SafeBus platform is also empowering transport admins to oversee operations such as regular vehicle sanitisation and temperature checks for students and drivers. Technological aid is also enabling them to ensure the availability of essential items such as masks, sanitiser dispensers and touchless trash cans in each vehicle, and keep track of many other contingencies that are very difficult to achieve with a human-only team.

As is clear, the rise of Industry 4.0 has coincided with one of the biggest humanitarian crises and has been instrumental in helping us mitigate its impact in record time - something that would not be possible otherwise. Its transformative impact is not limited to just the business ecosystem alone; it has also changed the way individuals, governments, and nations function for the foreseeable future.

**Why is technology and solutions such as the ones you provide, vital to the way fleets are run in today's business environment?**

As discussed above, the calculus of fleet management - which was already vast and complicated - has become even more intricate with the addition of the COVID factor. Today, it is not enough for enterprises to ensure timely ETAs for employees while expecting cost-effectiveness by optimising their operations. They now must meet these requirements while also offering their employees a safer commute experience by minimising the risk of accidental transmission. We have upgraded our service suite to help organisations precisely overcome these challenges by optimising their fleet management operations at scale.

For instance, our proprietary algorithms deeply analyse parameters such as vehicle stoppages, stoppage time, distance, transport requirements, fleet/employee schedules, and travel time on existing routes. The data-mined insights then power the automated system to enable optimised utilisation of the vehicle fleet and seating capacity. The platform also empowers transport officials to flexibly create custom routes derived from previous routing schedules or by clubbing pickups and drop-offs across zones. All of this can be done without manually planning for each stop in every trip. By optimising the number of vehicles deployed and reducing the number of trips per vehicle while preventing unpredictable cost overruns, enterprises can bring down their

transportation costs by up to 30 per cent.

The pandemic-specific upgrades offer features such as geofencing, live-tracking, and remote monitoring, allowing the automated system to identify and avoid COVID-19 hotspots based on historical and real-time information. At the same time, features such as contactless boarding and in-vehicle cameras can help transport managers to minimise exposure of employees to physical surfaces while ensuring strict compliance with safety guidelines.

Safetrax also allows transport managers to maintain a flexible health and safety checklist to conduct regular temperature checks for drivers and passengers while sticking to sanitization and maintenance schedules for each vehicle in the fleet. Admins can keep track of all the developments, and attend to any discrepancy, in real-time through a centralized dashboard. Besides helping implement precautionary measures, the automated system can also enable swift containment and remediation. In the unfortunate case that an infected individual is identified, they can be immediately isolated. Transport teams can then rely on the digital roster to conduct swift and effective contact tracing to identify all those who may have come in contact with the person in question, thereby helping curb the viral spread pre-emptively. Such a level of efficiency is unthinkable when it comes to the manual scheduling process.

**What advantages do your solutions offer to a company seeking to make their supply chain more efficient, specifically in terms of making long-term strategic decisions about vehicle purchases, maintenance and eventual retirement, as well as optimal staffing?**

Think of it this way: our solutions enable greater optimisation, transparency, efficiency, safety, and digitisation of transport operations. This unlocks better fleet utilisation, allowing vehicles to meet and exceed previous parameters while travelling lesser distances on average. This not only improves vehicle longevity but also allows businesses to extract the maximum value from them. The automation of repetitive, mundane tasks such as scheduling and route planning also allows for lesser manual intervention, reducing the requirement for human operators and allowing the existing transport admins to take on more value-driven objectives.

Another important way that our solutions assist our clientele is by enabling them to deploy automated checklists for vehicle maintenance. Vehicles that are regularly maintained last longer and perform better, allowing for greater value realisation over a longer-term before they are eventually retired. The ecological footprint and fuel consumption of well-maintained vehicles are also much lower, leading to multifold financial as well as environmental benefits.

**As a solutions provider which is centred on 'data,' please comment on data security?**

Data security is an essential part of the digital-first economy that we are moving towards at a rapid pace. Ensuring that user data remains private and secure, without comprising operational safety and efficacy, is, therefore, a non-negotiable requirement.

This is why, at MTAP, we use the location data only during the transit to and from the school; the tracking stops once the trip is completed. To enable greater data privacy, we also utilise secure cloud servers from leading tech companies such as Google, Microsoft, and Amazon to host the data generated on the app. We also deploy high-grade data encryption/decryption protocols to transmit location data. This allows us to ensure that only the relevant stakeholders (such as parents and school administrators) have access to such sensitive information.

**Tell us how the company navigated the challenging pandemic and how it continues to do so?**

A big challenge that we faced in the wake of the viral outbreak involved attuning our products to the emerging safety norms aimed at minimising the physical contact environment of a person. To achieve this, we altered our approach by using geofencing capabilities to optimise the routes to prevent accidental transmission. We also introduced features including contactless boarding and integration with in-vehicle cameras to facilitate minimal exposure to physical surfaces for each stakeholder — drivers as well as passengers — while ensuring that everybody follows social distancing norms diligently. Other upgrades include automated checklists for vehicle sanitisation, regular temperature checks, and inventory management of essential safety items. The idea was to equip our clients and their transport teams with the necessary paraphernalia to make well-informed, real-time routing decisions to deliver optimal commute experiences to all in the post-pandemic landscape.

**What role does R&D play in your overall business strategy? Kindly tell us about any new offerings coming up soon?**

The technologies are evolving, and a dedicated team is focused on tuning our algorithms and improving the overall performance and efficiency. We are also putting in a lot of R&D efforts in evolving the products and launching new platforms to cater to the changing needs and requirements. Quickly launched multiple features like Face mask verification, Checklists, COVID proof routing etc., during COVID. As the shift is towards enabling all legacy brick and mortar with an online presence and delivery fulfilment, we launched Autoroutes. Autoroutes help businesses to efficiently fulfil the orders effectively utilising field force, map data, traffic data and timings. 

By Naman Shah, Founder & CEO, NowPurchase

## ACCELERATED DIGITISATION IN PROCUREMENT

Following significant technological advances, digitalisation is an emerging front and centre in today's hypercompetitive and intertwined global network, with many firms employing it to enhance connectivity and efficiency across their supply chains.

**Naman Shah, Founder & CEO, NowPurchase,** looks at how technology is driving industrial procurement

**T**echnology-driven procurement has been spoken about for a while now – beginning with the introduction of mainstream computers to the shift to ERP, auctioning sites, and e-commerce marketplaces. Rapid advancements in digital technologies, such as low-cost computing and data storage, have enabled advancements in mobile technology and the cloud, as well as constant connectivity and sensors, which bring devices and machines to life in the Internet of Things, are remaking business supply chains, and are poised to transform how the procurement function delivers value.

Digital procurement solutions enable this future by providing access to previously unavailable data, or bringing order to massive, unstructured data sets; driving more complex analysis and better supplier strategies; and enabling more efficient operations. We are now more likely to witness a progression toward fully autonomous procurement. On the B2C side, there has been a significant amount of technological adoption in terms of individual procurement of goods and services as an individual. The same trend has accelerated in industrial and B2B procurement.



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### THE CHALLENGES

Industrial procurement is extremely complex and has a different side when compared to an individual. It is much more than purchasing one good to produce another. The majority of challenges mostly revolve around quality, delivery, timeliness, and to a lesser extent price. Timeliness is of extremely high value. Although the price must be lower, this is of little value without assurances around quality and delivery.

The quality of the parts and raw materials makes all the difference to the finished products. By ensuring that the parts are of specific quality in terms of physical description, metal/chemical composition, right measurements, and performance specifications, the procurement team is also ensuring the quality of the finished goods.

With the increase in supply chain integrations and lower inventory levels, on-time delivery is another important factor that has become increasingly critical for success. To ensure on-time delivery, large inventories and production capacities were traditionally required. Integrated supply chains, however, no longer require large, expensive inventory buffers to respond to unexpected events and variations in demand, thanks to advanced information systems, deregulation, agile manufacturing organisations with flexible equipment and tooling, and sophisticated logistics systems.

Costs have always been important, and in today's increasingly global economy it is not uncommon for SMEs to discover sudden gaps between price disparities. This is due to the convergence of improved high-speed communications, reduced transportation costs, and universal access to technology and effective management practices.

Another important challenge is that when dealing with businesses a lot of trade or industrial credit is given out, which is very different from dealing with individuals. Furthermore, the goods procured are highly tech-

nical and many of them are purchased from a variety of suppliers, some of whom are organised while some are not.

To put it simply, supply variance and quality of supply, credit piece, and finally delivery and timeliness are of utmost importance.

### CHANGES BROUGHT IN BY THE PANDEMIC

The pandemic has accelerated the adoption of technology in general. The pandemic has compelled more businesses to embrace digital transformation than demonetization could. Various core sectors such as health tech, Edtech, fintech, OTT and food tech, experienced rapid growth in the digital start-up ecosystem. Another notable change was a complete shift in how entrepreneurs viewed success. Indian start-ups have streamlined revenues and innovations, and as they continue to deal with challenges, Indian start-ups are playing the role of a catalyst in reviving the country's economy.

In response to the COVID-19 pandemic, individuals and companies throughout the world have been forced to accelerate the adoption of emerging technologies to mitigate its impact. We have seen students and professionals continue studies through blended learning offered by Ed-Tech platforms, office meets through Zoom, Google meets and the emergence of multiple e-commerce platforms owing to the pandem-



ic. Even in terms of business procurement, we have seen industry professionals become more open to exploring tech adoption. Another significant change is that people have started to take the digital procurement space more seriously and recognise that this is the way of the future.

### THE TRANSFORMATION

At NowPurchase, we are obsessed with transforming industrial procurement and building a true, autonomous platform, that helps metal manufacturers procure. We are dealing with the metal manufacturing industry, which is worth \$140 billion. This could include iron and steel, non-ferrous metals, as well as the foundry and castings industries. We believe that procurement has become extremely inefficient, due to the purchase and production departments working in silos. The purchase and production managers are in two different buckets, which is where a lot of money is lost and it is this gap that NowPurchase is attempting to close.

As a procurement solution, we recommend and deliver the appropriate raw material, depending on the manufacturing process. We have our own WhatsApp bot to provide pricing transparency, as well as a proprietary software called MetalCloud that assists in optimising the production process.

In terms of technology, we have seen widespread adoption of WhatsApp. Currently, 80 per cent of our users use this medium to view prices, track deliveries, raise quotations, and communicate with their account manager, among other things. Also, people now have begun to recognise that technology is the future, which has resulted in a strong adoption of our MetalCloud software. Our proprietary algorithm is being used by factories to optimise the production process. They are taking current inputs, different parameters, plugging data into the software, and determining the most optimal way to make that end alloy. 

## Benefits of Digitising Procurement

- **Happier Users:** It's safe to say that tossing out the pen and paper and replacing it with a customisable dashboard and real-time alerts would make any procurement officer happy.
- **Removal Of Tedious Tasks:** Digital Procurement can automate many of the tedious processes
- **Significant ROI:** Sure, a digital transformation may be costly, but the money saved after a successful integration should outweigh initial spending.
- **Better Decision Making:** Visibility features give users actionable insights into their procurement processes. Not only that but forecasting tools can provide a roadmap for fluctuating demand and layout possible paths to take for the greatest gains.
- **Improved Agility:** An operation that has fully adopted a digital transformation can make changes in the system that will immediately be distributed to all important areas.
- **Cut Costs:** Streamline your operations with a digital platform that focuses on accuracy and error prevention. Fewer errors mean less money spent cleaning up after costly problems.

By Kruti Bharadva

## MANAGING THE HUMAN RESOURCE

An interview with FirstMeridian Business Services about efficient resource management in manufacturing in a post-pandemic era

The past 15 months have been a trying time for manufacturers and a big part of that is recruiting and hiring the right people. With supply chain changes and now the vaccination drives, manufacturing must adapt and shift yet again. As the world changes around us, it's easy to wonder what the future holds. The next 10 years will most likely hold a variety of changes for manufacturing operations as we recover and adjust from the pandemic. We spoke to **Sudhakar Balakrishnan**,

**Group CEO, FirstMeridian Business Services** about efficient resource management in manufacturing in a post-pandemic era:



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Training programs are leaning more and more towards automation, digitisation, shrinking of processes, centralised manufacturing

### How has hiring and manpower acquisition in the manufacturing industry evolved over the past decade?

The past ten years have been about automation integrating into the manufacturing space and increasing production rates, digitisation, using technology to drive marketing etc.

Hiring a new talent pool as well as skilling, re-skilling of experienced employees has also undergone a sea of change. IT professional's strength in manufacturing companies has increased than before. Training programs are leaning more and more towards automation, digitisation, shrinking of processes, centralised manufacturing. The last 10 years have also witnessed higher productivity levels of employees due to automation and also, we see a more knowledgeable workforce.

Hiring criteria has also evolved. Apart from the required skills, the focus has also been on parameters viz., attitude, adaptability, change, embracing new ideas/technology, level of general knowledge etc. Today you will see even a blue-collar employee is far evolved and knowledgeable than what we witnessed 20 years ago.

Hiring will certainly witness sharper and changing criteria in the coming years – certainly adaptability and attitude will continue to be the basic measurement

### Has digitisation and industry 4.0 acceleration changed hiring and training patterns and in what way?

Industry 4.0, also called manufacturing 4.0, is the marriage of IT and manufacturing operations –It presents a “holistic shift from centralised to decentralised manufacturing,” which requires the adaptation of processes, talent, business structure and technology. Technology, including advanced robotics and artificial intelligence, sophisticated sensors, cloud computing, IoT, data capture and analytics, and digital fabrication, are all coalescing into the ushering in of this next industrial revolution

The rise of automation and connected systems also signals workforce transformation. Manufacturers not only have to lure tech-savvy talent but also must

reskill or upskill existing resources to harness the power of the new disruptive manufacturing technologies. A highly technologically advanced environment means more employee contributions revolving around technology, digital, and intelligence roles. The isolated, optimised units need to work together as completely integrated automated units with optimised production flows. These developments change traditional production relationships.

For this, manufacturing companies must look at hiring skilled resources for new job roles, adapting existing roles to the new methodologies, and upgrading the technical skills of all resources. Industry 4.0 also means a greater focus on compliance, regulatory, and security aspects, and demands all investments to be thoroughly updated on all new developments in these areas. With this paradigm shift, manufacturers need to ensure that all resources are suitably skilled to handle their new roles and responsibilities and can manage the change in work patterns and processes. Training and development, thus, becomes a key area to concentrate on to enable this workforce evolution.

This means frequent training and updated learning and development initiatives that address the pain



- Digital literacy and computational thinking.
- Judgement and decision-making.
- Emotional and social intelligence.
- Creative and innovative mindset.

#### **How can senior-level employees (age 45 plus) evolve/train themselves to an increasingly digital work environment?**

Well, senior employees can certainly add a lot of value and can be good blending agents with the youth towards bringing a lot of rich experience. Few key points in training the senior employees are

- Communicate: the right message towards adapting to the new age technology. Do not assume they would know it. Also, do not assume they cannot learn and adapt:
- Value their life experience
- Train them
- Meet their security needs
- Be flexible
- Use them as mentors

#### **How has COVID affected HR acquisition/training in the manufacturing sector and what changes have been noted?**

Covid has certainly affected the regular training programs. Priority in the last 18 months has been towards the safety of employees, vaccination, counselling, Isolation, rostering at work etc.

Regular training programs have certainly taken a back seat in many cases which have been in some ways replaced by Covid awareness, safety precautions for self, co-workers, family etc. We also notice that though training programs have been scaled down drastically in some ways, they also continue online. Today we witness digital onboarding, induction and training etc. 

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“We also notice that though training programs have been scaled down drastically in some ways, they also continue online. Today we witness digital onboarding, induction, and training

points and learning gaps of the existing workforce. It also means accelerated onboarding and skill upgrades for the new hires to make them multi-skilled.

#### **What new skills/skills sets are required to work in the manufacturing industry in today's environment - with automation and digitisation taking on a larger role?**

The next 10 years are probably going to witness updated versions of 4.0 which means the industry has to be more and more futuristic towards embracing and adapting automation and digitisation:

- Cognitive flexibility - the rise of digital technologies means you're going to need to be able to handle the plethora of opportunities and challenges that come with it.

## AMS DTC 400 XL DRILL TAP MACHINING CENTRE UPGRADE TO HIGHER SPINDLE SPEED

The highly popular DTC 400 XL Drill Tap Machining center from Ace Manufacturing Systems is now available with a 20,000 rpm direct-drive spindle. It gives customers the ability to run at higher feedrates and easily work with high-speed machining operations.

The optional 20,000 rpm spindle is ideal for applications that require high spindle speeds, and powerful enough to operate on hard materials. It allows rigid tapping upto 5,000 rpm, with higher retraction speed. The spindle is powered with  $\beta 6$  motor, direct drive system having 10,000 rpm as standard. It yields 70Nm of cutting torque during machining. The motor is coupled directly to the spindle to reduce heat, provide excellent surface finish and increases power transmission.

The DTC 400 XL is a highly productive and reliable machine. It is having compact footprint which is most efficient when it comes to shop floor space. The table size of 750 x 400 mm and load carrying capacity of component is upto 300 kg. With front and side opening, operator can easily access the worktable. Along with this, the



machine provides the faster rapid traverse of 60/60/48 m/min.

AMS DTC 400 XL vertical machining centres have a highly rigid construction. It also offers precision cutting with high metal removal rate and BT-30/BBT-30 tapered spindles. The 16/24 tools pocket tilting tool

changer swaps tools quickly to reduce non-cutting time. The chip to chip time is 1.5 sec which minimizes the ideal time. Adding some more features, we also provide enhanced Z-axis acceleration of 1.35G. Automatic pallet changers (both linear & rotary) are given as optional to increase the productivity.

The machines are equipped with ball screw core cooling for outstanding thermal stability over continuous machining cycles. The LM guideways in all the three axes which increases the quality while machining the component. For efficient chip removal, AMS provides the rear chip handling systems for better work environment.

## SOLVAY INTRODUCES NEW KETASPIRE® PEEK GRADE

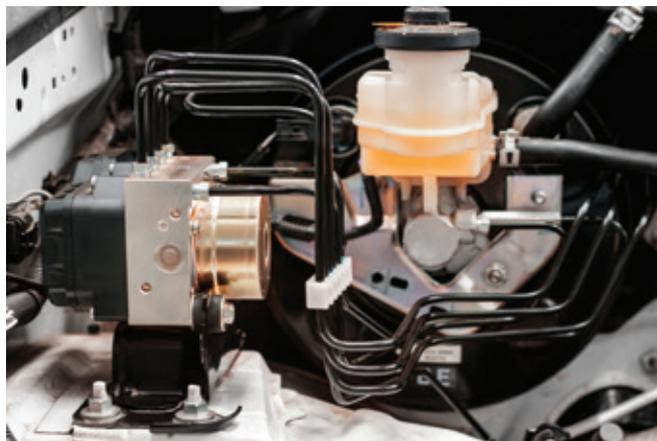
Solvay has announced the launch of a new grade of KetaSpire® PEEK, KT-850 SCF 30, designed for precision brake system and e-mobility electronic pump components. The product was developed to provide better sealing performance over standard 30 per cent carbon fibre filled PEEK grades.

Carbon fibre filled PEEK has traditionally been used for anti-lock brake system (ABS) and electronic stability control (ESC) components, such as tappets, poppets and plungers. The new KT-850 SCF 30 grade enables further metal (aluminium) replacement by improving the flow characteristics of the material and the surface finish of parts.

ABS/ESC plungers play a critical role in the function of the system's hydraulic unit. The system combines an electronic pump, an electronic control unit (ECU), valves which control braking pressure at the wheels, and sensors that measure the speed of the wheels. The plunger is responsible for operating the valve's movement by controlling the brake fluid supply.

Replacing metal with polymeric plungers requires a material like KetaSpire® KT-850 SCF 30 which provides a balance of high performance properties including coefficient of friction, mechanical strength, dimensional tolerance control, and sealing capability.

The replacement of aluminium in precision components, such as ABS plungers, allows for overall cost reductions as well as improved productivity. KetaSpire® KT-850 SCF 30 offers the flowability required for filling the parts, which are approximately 15 mm in length, while also meeting the tight tolerances required for



ABS/ESC plungers. KetaSpire® KT-850 SCF 30 outperformed the processability offered by incumbent materials, allowing for much higher production yields and an enhanced surface finish, enabling better sealing and mechanical performance.

As part of Solvay's One Planet commitment to sustainability, the company utilizes 100 per cent renewable electricity in the production of its PEEK, PPA and PPS base polymers in the United States, and is the only

manufacturing company among the Top 10 Corporate Solar Users in the ranking of the Solar Energy Industries Association.

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## THE CARBLOOP FROM LMT TOOLS

The new trochoidal milling cutter has been specially designed for innovative milling and adapted to the process-specific requirements. One characteristic feature is the completely newly developed chip breakers, which are arranged offset to each other. The chip breakers reduce the chip volume by half and ensure smooth chip evacuation even at high cutting values. Depending on the diameter, the tools have up to 14 chip breakers. This high number not only ensures optimum chip removal, but also significantly reduces vibration, which has a positive effect on tool life. A special cutting edge geometry with defined edge preparation and the latest coating enables high cutting speeds and guarantees maximum metal removal rates as well as tooth feeds. Another advantage is the 2 mm longer cutting edge. This means that the CARBLoop can be reground several times without sacrificing the maximum insert depth.



ISO-K as well as CARBLoop INOX for the machining of ISO-S and ISO-M materials. Cutting geometry, coating and cutting edge treatment have been specially developed for the materials to be machined and are optimally matched to each other. This enables the best milling results to be achieved.

In particular, components with deep cavities benefit from switching to trochoidal milling, because the high metal removal rate means enormous time savings. But thin-walled or unstable components can also be machined excellently thanks to the low cutting forces.

### The Perfect Solution For Trochoidal Milling

Whether in die and mold making, aerospace or general mechanical engineering: trochoidal milling opens up unimagined performance and efficiency potential in roughing and semi-finishing. With the new CARBLoop, LMT Tools makes this accessible and offers a powerful tool solution that sets standards in terms of productivity, machining time, tool life and economy.

### More Efficiency For Deep Cavity Machining

The CARBLoop is available in two variants: as CARBLoop STEEL for the application range ISO-P and

## WOUND TRIBO PLAIN BEARINGS FROM IGUS REDUCE WEAR

Especially for heavy-duty applications in the construction machinery or agricultural industry, igus now has the new tribo-material iglidur TX2 in its product range, which works without lubrication. Because even small excavators still need 50 litres of lubricant every year. The wound plain bearing bushings withstand very strong forces and increase wear resistance by a factor of 3.5 in load ranges with more than 100 MPa surface pressure.



### Machines and agricultural vehicles

The construction or mining industries are exposed to challenging environmental conditions every day. Cold, heat, dust and dirt have a strong effect on the bearing points. The motion plastics specialist igus offers an alternative to frequently used metallic solutions with its plain bearing technology. Another material combination for wound bushings complements the range of injection-moulded bearings in the heavy-duty range.

### High load, low wear

The tribo plain bearings made of high-strength filament fabric are used where very high loads occur. Here, the extremely strong filament in its specially interwoven design ensures maximum resistance and enables a maximum permissible compressive strength of 400 MPa. The newly developed material was extensively tested on

the indoor and outdoor test rigs in the 3,800 square metre igus test laboratory. Pivot tests on hard-chrome shafts showed that iglidur TX2 is around 3.5 times more wear-resistant than the standard heavy-duty material TX1. Like all iglidur plain bearings, iglidur TX2 is self-lubricating and operates dry. This prevents dirt from adhering to the bearing points. This reduces maintenance and repair costs, as well as machine failures due to insufficient lubrication.

As the material is also very resistant to temperature, chemicals and moisture, plain bearings

made of iglidur TX2 can be used in many other areas. Due to the freedom from corrosion and seawater resistance, they can also be used, for example, in moving applications in the maritime sector. Diameters of up to 2,800 millimetres are feasible. In any case, the application of iglidur TX2 takes into account increased sustainability requirements, both underwater and onshore.

“For example, according to the operators, even a small excavator needs between 50 and 60 litres of lubricants per year”, clarifies **Stefan Loockmann-Rittich, head of the iglidur Plain Bearing Technology Business Unit at igus.** “Since the iglidur TX2 bearings do not need lubrication, the customer benefits threefold: not only saving costs for oil or grease and maintenance time, but also no lubricant is released into the environment.” iglidur TX2 is available from May as a standard product range in the diameters 20 to 80 millimetres directly from stock.

By Ravichandran Purushothaman, President, Danfoss India

## RETHINKING ENERGY EFFICIENCY IN MODERN BUILDINGS

A overview of how energy efficiency can meet the needs of India's growing energy needs in the years to come

India is bestowed with a young and rapidly growing population. The United Nations has projected India's probable population growth to reach 1.5 billion by 2030 with 900 million between the age of 15-59. This would mean an increase in industrial opportunities, urbanisation, massive energy consumption and a boom in infrastructure. The challenge that comes with this progress is that building spaces are going to double in number with 70 per cent new construction projects taking over urban spaces. Furthermore, India's energy demand in various forms such as electricity, heating and cooling etc. would rise exponentially. To address these challenges, industries need to provide innovative technologies focused on residential buildings that are energy-efficient and would encourage a sustainable outlook in urban areas.

### INFLATING ENERGY REQUIREMENTS

Today, energy efficiency is recognised as the first fuel in our fight against climate change. It is said that energy is the new oil of the future and sustainable energy is the only way for a greener future. In line with the commitment to the Paris Agreement, the Government of India has pledged to reduce the country's energy consumption by 33-35 per cent by 2030. To achieve this goal, we are addressing the guzzling of energy by buildings in the form of ACs, radiators, heaters, etc and the layout design.

In the last ten years, the consumption of electricity has witnessed a CAGR growth of 6.74 per cent in India. The consumption has increased from 6,94,392 GWh in 2010-11 to 12,91,494 GWh in 2019-2020. A sectoral analysis of the electricity consumption conducted

by Energy Statistics of India indicate that the domestic and commercial consumption alone contributed to about 32 per cent of the total electricity consumed. It is therefore imperative to produce energy sustainably and utilize efficiently for equitable distribution.

### HVAC'S CONTRIBUTION TO ENERGY SAVINGS AND CARBON NEUTRALITY

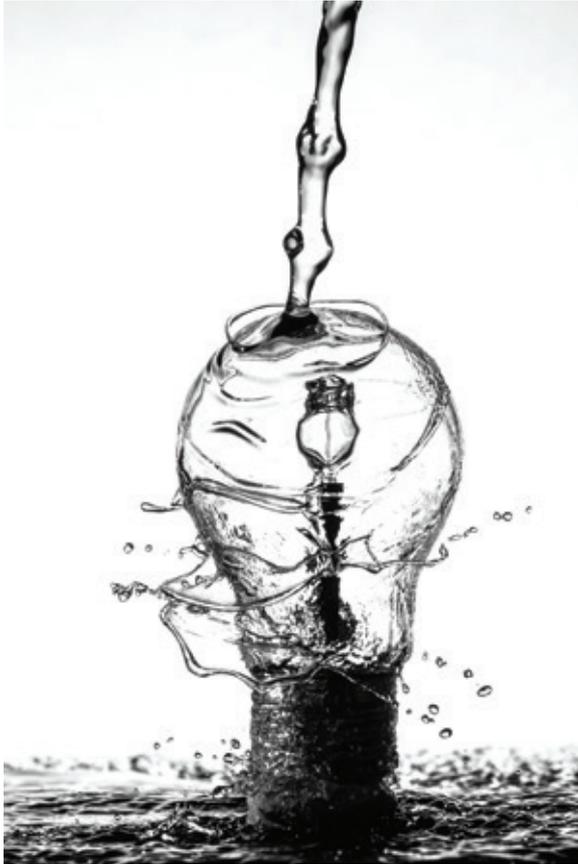
The emission of Green House Gases has been on the rise in urban areas due to poorly designed and engineered heating and cooling systems, leading to higher energy consumption and disproportionate costs. Modern HVAC systems have the capability to reduce the energy consumption by 30 per cent on an average leading to lower energy bills and greener emissions.

This large untapped potential for energy waste elimination can be achieved by centrally controlled HVAC systems that are continuously monitored by multiple in-built sensors. These systems efficiently heat, cool, or ventilate a space with the optimal energy required, akin to a central nervous system for a building. Certain key technologies that enable this potential energy savings are variable demand controls, hydraulic balancing, room control, speed-controlled pumps, and speed-controlled compressors. These key technologies are currently available for a sustainable today and HVAC manufacturing leaders such as Danfoss India have product lines that cover these technologies.

To address the issue of green house gasses and net carbon neutrality, HVAC solution providers are looking into effectively using the heat extracted for other useful purposes. For example, the deploying of water heating systems that use the heat generated by the AC system in large hotels and palaces across India. This heat exchanging technology essentially uses the waste heat from AC systems for productive purposes, which facilitates carbon neutrality, This can only be possible with digitally controlled and connected buildings, that will become the norm of the future. To compound the savings on energy and cost, existing buildings can be retrofitted with digitally controlled advanced HVAC systems.



To address these challenges, industries need to provide innovative technologies focused on residential buildings that are energy-efficient and would encourage a sustainable outlook in urban areas



### OTHER IMPLICATIONS OF EFFICIENT BUILDINGS

Efficient HVAC systems have a larger implication on the total urban ecosystem. It isn't just limited to cost savings or carbon neutrality but also has a key role to play in maintaining a healthy, comfortable, and productive living environment and office spaces. Modern HVAC systems are also equipped with sensors to detect the quality of air that is circulated within a space to help maintain overall wellbeing of its occupants.

Although the initial cost of retrofitting old buildings or providing digital HVAC provisions for new buildings, may seem very high, the total cost of ownership to consumers is much lower than legacy HVAC systems. This is because most the cost of maintenance comes down drastically when all sub-systems can be monitored holistically. With problems pinpointed accurately, the downtime can be drastically reduced.

To promote efficient HVAC systems, industry leading companies such as Danfoss India and The Indian Society of Heating, Refrigerating and Air Conditioning Engineers (ISHRAE) have created the ACREX Hall of Fame. The award aims to recognize stellar HVAC

projects that have set global benchmarks in energy efficiency and sustainability. This award acts as an added incentive for builders, architects, and corporations to promote sustainability and energy efficiency in all projects that they undertake, thereby contributing to the nation's collective commitment towards sustainability.

### EFFICIENT BUILDINGS & SMART CITIES – THE FUTURE

The future of energy efficient buildings lies in the large amounts of data that is collected and analysed every day. Industry leading smart building solution providers are moving towards nascent technologies such as machine learning and artificial intelligence to match the current electricity capacity with the actual demand. This would eliminate the disproportionate supply of electricity and direct it to essential areas. This can be enabled by the future infrastructure projects such as smart cities where all buildings in a city are digitally connected.

Other technologies such as condition-based monitoring of systems within buildings can be used to effectively locate areas of inefficiency within the system. An example of this is the digital monitoring of heating systems which are high power consumers, to understand if the components have degraded thereby making them inefficient. This would mean higher power consumption for the same heating capacity. Therefore, monitoring systems regularly and flagging inefficiencies in the system helps conserve, save, and distribute energy efficiently.

### CONCLUSION

Since the invention of electricity in 1752 to now, electricity has increasingly become an essential part of daily life. The need for efficient buildings is therefore of paramount importance in the modern world. Fortunately, efficient, sustainable, and smart technologies are available today to address these inadequacies.

As we fast forward to a 5 trillion economy, it's also important to maintain our focus on using the latest sustainable & energy efficient technologies in our infrastructure, to help us be better prepared for a carbon peak in India, which will take us closer to a carbon neutral ecosystem and a faster progress towards a net zero target for India. 

*Mr Ravichandran Purushothaman is the President of Danfoss India, the Indian subsidiary of global major in climate and energy solutions since 2013. With experience spanning over 28 years, Ravi has worked extensively in building businesses in India, Asia Pacific and Europe. He has been a key member of the Danfoss Growth strategies in India, Asia Pacific and a key member of the global management teams.*

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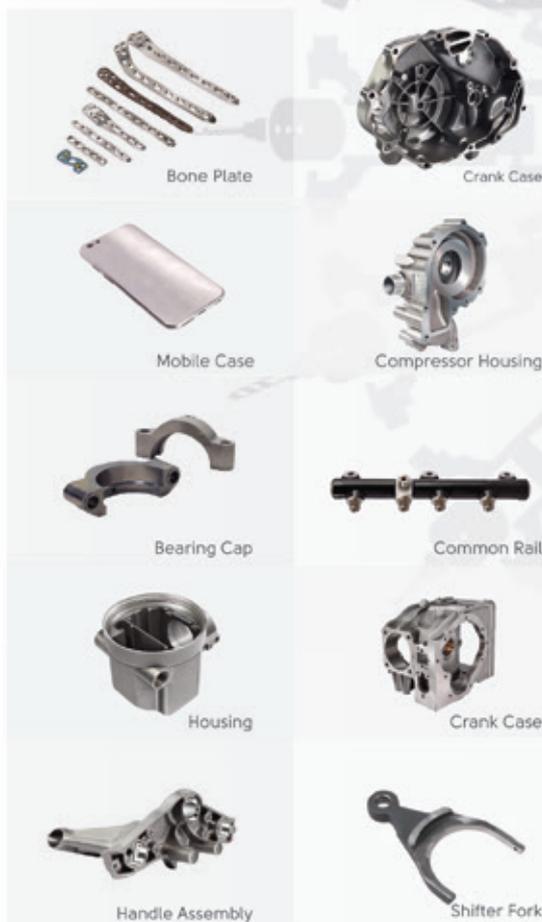
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