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EM - Interview

Mahesh Tyagi,
Managing Director,
Heller India (p. 12)

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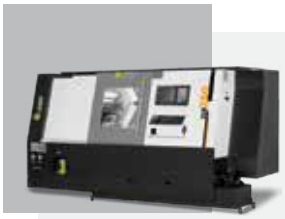

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EFFICIENT MANUFACTURING

"EVs are key in driving innovation"

Metamorphosising the future of mobility

With the start of 2023, it's time to unleash the potential of India's manufacturing sector by celebrating the progress that the industry has witnessed over the past year. We would like to thank all our partners and friends in the industry to contribute to this magnum opus development while wishing you all a glorious 2023!

As manufacturing has played a key role in the economic development of India, we have also seen the Indian government introduce several reforms and measures to boost India's manufacturing sector. A special mention to the role of integrated industrial ecosystems that is providing ease of doing business for foreign investors too.

The first issue of EM this year explores revolutionising concepts like 3D Printing, Cybersecurity, Digital Transformation, Industrial Maintenance, Industrial Bearings, Lean Production Management, while at the same time hitting on the trends in the metal cutting industry and vision versatility.

The highlight of the issue is the 4th edition of the International Automotive Manufacturing Summit (IAMS) 2022 held on December 20, in Pune. Do check out our post event report where industry giants present at the event have emphasised that the future of mobility is evolving, and electric vehicles have hugely transformed the automobile industry. We witnessed that EVs are key to driving innovation and building a sustainable future, thus contributing towards controlling climate change.

Covering such advanced concepts, EM will continue capturing and circulating relevant content, facilitating manufacturing enterprises, and identifying and applying technology upscaling strategies to transition their businesses forward towards a successful 2023.

Team EM

MANAGEMENT NOTE

"We appreciate the feedback and suggestions from our readers. Based on the feedback received over the last few months, we have begun working on some of the areas, such as

- Strengthening our editorial content
- Adding new columns
- Improved and customer friendly website, which will focus on the local Indian context
- Dedicated space for Indian customers on business promotion related activities

We will update our readers regularly in this column.

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SPECIAL FEATURE

Columns

New Products

Cognizant signs MoU with Garuda Aerospace

Cognizant recently announced that it has signed a Memorandum of Understanding (MoU) with Garuda Aerospace, to power its drones with advanced digital capabilities and bring innovative solutions at scale for enterprises aiming to achieve greater agility, productivity, and overall outcomes. Cognizant and Garuda Aerospace are collectively set to bring a plethora of end-to-end drone-based management and monitoring offerings for businesses across sectors. For energy and utilities, an aerial intelligence solution helps in asset inspection, storm impact assessment, and fire safety, among other operational areas. Also, in warehouse management, the drones can be used for inventory audits, tracking of products, video surveillance, and even helping move lightweight objects. These drone-based solutions will also enable businesses to achieve their sustainability goals by helping drive the efficient use of resources. Speaking about the advanced digital capabilities, Achal Kataria, Vice President and India Country Head, Cognizant, said, "Drone services are one of the fastest growing technology segments with the potential to provide extraordinary value to industries such as agriculture, manufacturing, energy and utilities, retail, and logistics."

Cummins Group to debut its Destination Zero™ product line in India at Auto Expo 2023

Cummins Group India will present its Destination Zero decarbonization strategy and product portfolio at the 16th Auto Expo in New Delhi, India. Destination Zero™ is Cummins' strategy to go further and faster to reduce its products' greenhouse gas (GHG) and air quality impacts and reach net-zero emissions by 2050. The group is pursuing a dual-path approach, acting today to reduce emissions from internal combustion engines while simultaneously investing in new, zero-emissions products. Speaking about the decarbonisation strategy, Ashwath Ram, Managing Director, Cummins Group in India, said, "Climate change is the existential crisis of our time, and we need to act urgently to mitigate it. India has set itself the ambitious target of reaching net zero by 2070. The commercial transportation sector has a major role to play in helping the country meet this goal. The technologies showcased at the Auto Expo next month result from this desire to build a cleaner, greener world combined with our brand promise of innovation and dependability."

Marquardt Group opens R&D centre in Pune

Marquardt India has recently opened its global R&D centre at Hinjewadi Phase 3 in Pune. The centre will have skilled engineers who will be well-equipped to cater to the demands of global and local automotive customers. The company has invested more than Rs 100 crore in the new R&D facility. The R&D centre is spread across approximately 300,000 square feet. More than 450 highly-skilled engineers in the automotive domain are committed to serving global and local automotive customers for the Marquardt Group. The team develops solutions for electrically driven vehicles, as well as entry and authorization systems and human-machine interfaces for cars, trucks, and off-road vehicles. The facility was inaugurated by Dr Harald Marquardt, Chief Executive Officer, Marquardt Group, Marquardt India, and Vishal Narvekar, Managing Director. During the inauguration of the R&D center, Dr Harald Marquardt, said, "With this cutting-edge facility, we will increase our competitiveness and R&D capabilities not only in the Indian market but also globally."

Granules joins forces with Greenko ZeroC to develop Green Molecule Solutions

Granules India collaborates with **Greenko ZeroC** to enable carbon-free energy and Green Molecule Solutions for its wider applications in pharmaceuticals. Granules & Greenko ZeroC will develop and promote state-of-the-art Integrated Green Pharmaceutical Zones (GPZ) with the first collaboration taking place in Kakinada, Andhra Pradesh. Granules will build a greenfield facility based on sustainability principles for the large scale manufacturing of Key Starting Materials (KSMs), Intermediates, APIs and fermentation based products.

The facility, spread across 100 acres, will be commissioned in a phased manner. The project is expected to cost around Rs 2,000 crore over five years. Greenko ZeroC will supply carbon-free energy and enable green hydrogen along with its various chemical derivatives. Granules envisions utilising carbon-free energy and Green Hydrogen derivatives to produce value-added products. Commenting on the partnership, Dr Krishna Prasad, Chairman & Managing Director, Granules, said, "The partnership with Greenko will power our sustainability journey by minimising carbon footprint and impact of our operations on the environment."

ALUMINIUM CHINA launches online B2B marketplace

ALUMINIUM CHINA, an annual tradeshow for the entire aluminium industry chains organised by RX Greater China, has announced the launch of ALU connect, an online B2B marketplace and supply chain platform for aluminium products, processing equipment, and, auxiliary materials. This launch has been designed to create a space to help global buyers connect with high-quality Chinese suppliers in a seamless end-to-end digitised experience, ALU connect allows users to access over one hundred manufacturers on a platform where they can easily discover, source, and procure thousands of curated products. ALU connect is an online supply chain eco-system for the aluminium industry players that streamlines the process of connecting, quoting, and ordering products that cover the entire aluminium value chain, with the main categories including aluminium materials, aluminium processing equipment, and accessories. The platform's background verification team checks the credibility of suppliers, with the images, documents, and certification information uploaded by the suppliers approved by the platform to enable buyers to make informed decisions. It also provides updates on China's aluminium industry and organises virtual exhibitions that help users discover new aluminium materials, aluminium processing equipment, and accessories.

Statiq bagged REIL contract

Statiq recently bagged a Rajasthan Electronics & Instruments Limited (REIL) contract, to supply approximately 253 fast chargers for four key highway projects connecting Agra-Lucknow, Meerut-Gangotri, Chennai-Bellary, and Mangaldai-Wakro. The company already has several chargers operating in Jaipur, Beawar, Jaisalmer, Udaipur, and Jodhpur. Along with this, there will be an additional host of Statiq chargers on these expressways. With this, the company aims to ensure a reliable, affordable, and accessible four-wheeler charging network along these corridors. For this tender, REIL required an assortment of 210 fast chargers of more than 50 kW charging capacity and another 43 fast chargers of more than 100 kW charging capacity that will charge 4-wheelers quickly. According to Aman Rehman, Head Government Relations and Corporate Affairs, Statiq, stated, "The Electric Vehicle Supply Equipment (EVSE) space is going to play a critical role in helping the nation make a smooth transition from conventional ICE vehicles to eco-friendly EVs. The transition will become a feasible reality only when there is a strong network of charge points."

Schaeffler India to showcase product portfolio at Auto Expo Components 2023

Schaeffler India will be showcasing its wide product portfolio from its automotive aftermarket division at Auto Expo Components 2023. The company will showcase local solutions engineered and manufactured as per global quality standards, offering reliability and efficiency, backed by a strong distribution and supply chain network. The automotive aftermarket division is responsible for the spare parts' business of Schaeffler India and delivers innovative repair solutions meeting the highest quality standards. The three brands – LuK, INA and FAG – offer clutch release systems, engine and transmission applications, as well as chassis applications. Additionally, a wide range of lubricants and other consumable products under the Schaeffler TruPower brand will be showcased. Debasish Satpathy, President, Automotive Aftermarket, Schaeffler India, said, "Today, the Automotive Aftermarket division has close to 1,800 SKUs in our portfolio and a strong presence in around 125 cities across India. Moreover, the Schaeffler TruPower product line, which has been initiated and executed completely in India, now has a strong market presence and availability across the network, supporting the business.

Siemens India obtains contract from Indian Railways

Siemens India was selected as the technological partner for the manufacturing and maintenance of 9000 HP electric freight locomotives at Dahod in Gujarat. In April, Indian Railways issued a Letter of Award (LoA) for manufacturing and maintaining the 9000 HP electric locomotives in Dahod. The estimated value of the order is ₹26,000 crore (around $3.2 billion), excluding taxes and price variation. About 1,200 high horsepower (9000 HP) electric locomotives will be manufactured over a period of 11 years, while the maintenance period will be 35 years. An agreement with Siemens India will be signed within 30 days of the issue of the LoA, with prototype locomotives to be delivered in the coming two years. The engineering firm will manufacture these locomotives at the Dahod locomotive factory in Gujarat and maintain them at four depots at Visakhapatnam, Raipur, Kharagpur, and Pune, according to an official statement. Suitable economic drivers will ensure complete indigenization of the manufacturing, which in turn will lead to the development of ancillary manufacturing units, making it a true 'Make in India' initiative.

"Creating an environment for manufacturing"

In an interaction with Sanjay Jadhav, **Shobhit Singh,** Director, Stone Sapphire India describes the challenges that the Indian toy market needs to address and gives an overview of the manufacturing environment of the market.

How is your company working towards the toy manufacturing market in India?

We are developing a robust distribution system to create demand, especially for toys, where consumption is not very high in India and toys are sold as part of gifts. As a result, we don't go toy shopping as a special event or occasion. Secondly, as parents, we are more focused on educational toys as we always want to impart education to our children. To make toys, we are using technologies like 3D printing & cat drawings for making prototypes and helping them make molds. So, we are investing in those areas. We are also collaborating with some of the premier institutes in India, like NID and encouraging local institutes from Baroda to send their children to our labs. This will help us create demand in the Indian market.

According to reports, the Indian toy market is expected to double to USD 2 billion by 2024-25. What is your take on this?

The current figure of 19–20 is authentic, the only thing is that when we're projecting 24–25 figures of like 2 billion, so rather, I would say that instead of 2 billion, it can go to 5 or 6 billion. Thus, we need to increase our manufacturing capacity together. Currently, it's about how we increase our infrastructure to support manufacturing. To develop manufacturing in India, doing things in the right manner is vital. To develop manufacturing, we require the input of resources, one of which is labour and manpower. So, if our technical manpower is not strong and is going out of the country, we certainly need to act on this.

What are the challenges in the toy manufacturing industry that the Indian industry need to address?

Even today, there are students going abroad to study. Therefore, I feel the government should think about that because, for any manufacturing operation, manpower is a major component. To attract all the benefits and investments into India, we must create an environment in which they believe their investments are secure. They also need to feel that they can access a huge manufacturing base here where they can get their product manufactured at the same quality and at the same competitive pricing.

With the government policies gaining prominence, domestic players are breaking away from the dominance of China. How has this helped the Indian toy manufacturing scene?

To develop a manufacturing process, a whole environment needs to be created. By environment, I mean the temperament and mindset of entrepreneurs and the infrastructure that the financial institutions must start supporting with a similar working mindset from the government. I also believe that instead of giving an incentive like PLI, the government should invest that money in creating infrastructure and technical expertise.

"Revolutionising the Indian e-scooter market"

Mukesh Taneja, Co-founder and CEO of GT Force speaks to Sanjay Jadhav about the growing presence of EVs in the Indian market

The Indian EV market has witnessed a scare in the past few months when it comes to fire incidents. How is your company working to address the issue?

A few isolated fires this year cast a pall over a dependable and affordable mode of transportation. Recognising this, GT Force high-tech batteries come with a flame arrestor feature, which is a porous filter on the vents of the battery that prevents flames from reaching the battery in the event of a breakdown or malfunction. Besides this, the company's two-wheelers are designed with the understanding that each region of India is distinctive, with climate, geography, and road surfaces varying significantly. Since GT Force's testing procedures and benchmarks consider various variable factors, its product line is safe in comparison to the offerings of other market players.

With a vast product portfolio, which offering of yours has seen the highest sales?

GT Force is an electric two-wheeler manufacturing company that was founded to revolutionise the Indian electric scooter market. The brand's objective is to introduce the Indian EV consumer to the unparalleled perks and absolute pleasure of riding a dependable e-Scooter as opposed to a fuel-powered vehicle. After identifying serious shortcomings in individual urban commutes, the company has come out aggressively with its vast EV product portfolio, with the GT Soul, GT One, GT Soul Vegas, and GT Drive Pro leading sales for the brand and proactively capturing the Indian market.

What were the challenges you faced when you commenced operations? How did you address them?

After its launch, GT Force had to not only conquer the crowded two-wheeler segment but also address several other obstacles to dominate the segment. The most significant was overcoming the impact of COVID-19 pandemic, which disrupted the supply chain and halted manufacturing units across the country. Additionally, in absence of widespread charging infrastructure in the country, our company was compelled to design cutting-edge battery technology to alleviate the range anxiety variable, which is something that everyone considers before purchasing an EV.

What are your views on the current charging ecosystem when it comes to EVs?

As the EV industry's expansion is overly dependent on charging stations, its extensive deployment must be undertaken. To guarantee adequate charging access for all regions, all stakeholders, including state and central governments, must work together to fund the construction of charging stations. The installation of home chargers in existing parking spaces should be encouraged and facilitated in general.

When it comes to expansion. How do you see the company placed in the next five years?

GT-Force has already stretched its distributor network in India to 80 cities, with more than 100 dealerships on board. With a monthly production capacity of 5000 units, the electric vehicle start-up has a strong foothold in Maharashtra, Karnataka, Haryana, Punjab, Uttar Pradesh, Uttarakhand, and Rajasthan. Currently, the two-wheeler brand is on an expansion spree, with goals to open showrooms across India by the end of 2023.

"Indian market is critical for our global strategy"

…states **Mahesh Tyagi,** Managing Director, Heller India. In an interaction with Sanjay Jadhav, he throws light on how machines are helping to increase productivity and the company's goal of making the ownership of equipment profitable. Excerpts from the interview…

With a large footprint of your company in the machine tool space, how important has the Indian market been for your business?

We have been present in the Indian market since 1985 via sales representatives. It was in 2010 that Heller India was established to reach out to customers with proximity to after-sales support and management of sales activities. The Indian market is critical to our global strategy, and we are fully committed to growing it with the right product portfolio. As per our global strategy, the APAC region carries around 25% of the target turnover and the Indian market is a key portion of it. Going forward, considering the upcoming relocation of machines from around the world to India (which is an important aspect of services and an important backbone of our business) along with the continued support to global customers who will relocate to India - either with used or new equipment - will be an important aspect of our business.

According to the latest reports, the Indian machine tool industry expects to grow to ₹10,000 crores in FY23. How is your company aligning its business plans to contribute to this?

We are developing products that can be placed with the same capacities across various applications at the same time. For example, the latest model of the Heller HF 3500/HF 5500 is a 5-axis machine that can be used as a standalone as well as in automotive high production lines. It places us in a unique position in terms of maximum productive solutions with the best possible flexibility. Our business plan or strategy is to set up systems with unique propositions. We are working on introducing the new generation of our five-axis machining center series F including mill-turn functionality by the end of 2022. Also, the GEN4 of the H series is already in the market and is getting good responses from existing and new customers.

Can you tell us more about the recent partnership of HELLER Machine Tools with TITANS of CNC, Inc.?

The key points of the recent partnership include cooperation in machining technology, process and practical application. According to the partnership, Titans of CNC has already installed two 5-axis machining centres in their Texas facility. The HF 5500 with the fifth axis in the workpiece and the CP 6000 with the fifth axis in the tool and in the near future a Round Pallet Storage System.

These machines will be pushed and tested by Titan and his team. With our machines, Titan will deliver innovative and educational materials to the machining industry. Titan's mission is keenly focused on the empowering benefits of education to revitalise the

Mahesh Tyagi, a young, dynamic and result-oriented engineering professional has been associated with Heller India as Country Manager since August 2009.He is leading the PAN India operations of the entire product range, services and consumables, with P&L responsibility of company and undertaking aggressive growth initiatives including deep involvement in technical discussion, final contract signing and negotiation.

machining industry. The keys to success are to not accept 'the way we always have done things,', but to test the limits and discover new and better ways to drive profitability.

What are the major challenges you have addressed to cater to complex consumer demands considering the price-sensitive Indian market?

The major challenge for us is to receive funds right at the beginning of the project in line with complex demands or technical specifications. India is marching towards the goal of 'Make In India for the World,' which further increases the demand for achieving global quality standards. While present in a price-sensitive market, the objective is to make the lowest possible total cost of ownership over a period. To achieve this, perhaps the initial investment looks expensive, but eventually, it always shows better figures as compared to the initial price-attractive investments. We, Heller, are working on making the ownership of equipment profitable.

> THE FIRST IDEA FOR MAKING A MACHINE MORE ENVIRONMENTALLY FRIENDLY IS TO MAKE IT MORE POWER-SENSITIVE TO CONSUMPTION

To increase machine productivity, eco-friendly solutions are key. Can you brief us on Heller's sustainable product line that is helping fight environmental concerns?

The first idea for making a machine more environmentally friendly is to make it more power-sensitive to consumption. Our machines are currently using the latest motors and control systems to achieve the lowest possible consumption. Once we achieve this, we can concentrate on coolants and oil management to reduce environmental risk. Our product line for this is called Heller Blue, and it has the additional function of automatically shutting off other energy sources and sending a signal to the machine to go into sleep mode.

With Heller Blue supply, the media on the hydraulic and lubrication units and filters are automatically monitored using sensors, which check filter clogging, their levels in the machine and send signals to the control system. When the machines come to a halt (motor off condition) with blue supply, the air also automatically shuts off.

With changing technology with each passing day, how is your workforce adapting to new tools/technology to be at par with the competition?

The industry's productivity is one of the cornerstones of our society. Machines not only increase this productivity but also enhance the safety and simplicity of industrial production. Heller has always invested in education and growing our own future generations through strong apprenticeship and development programs. We have a well-established training system for existing and new people. Every year at the start of the year, we create a calendar for different areas, and employees can select in which area they would like to upgrade.

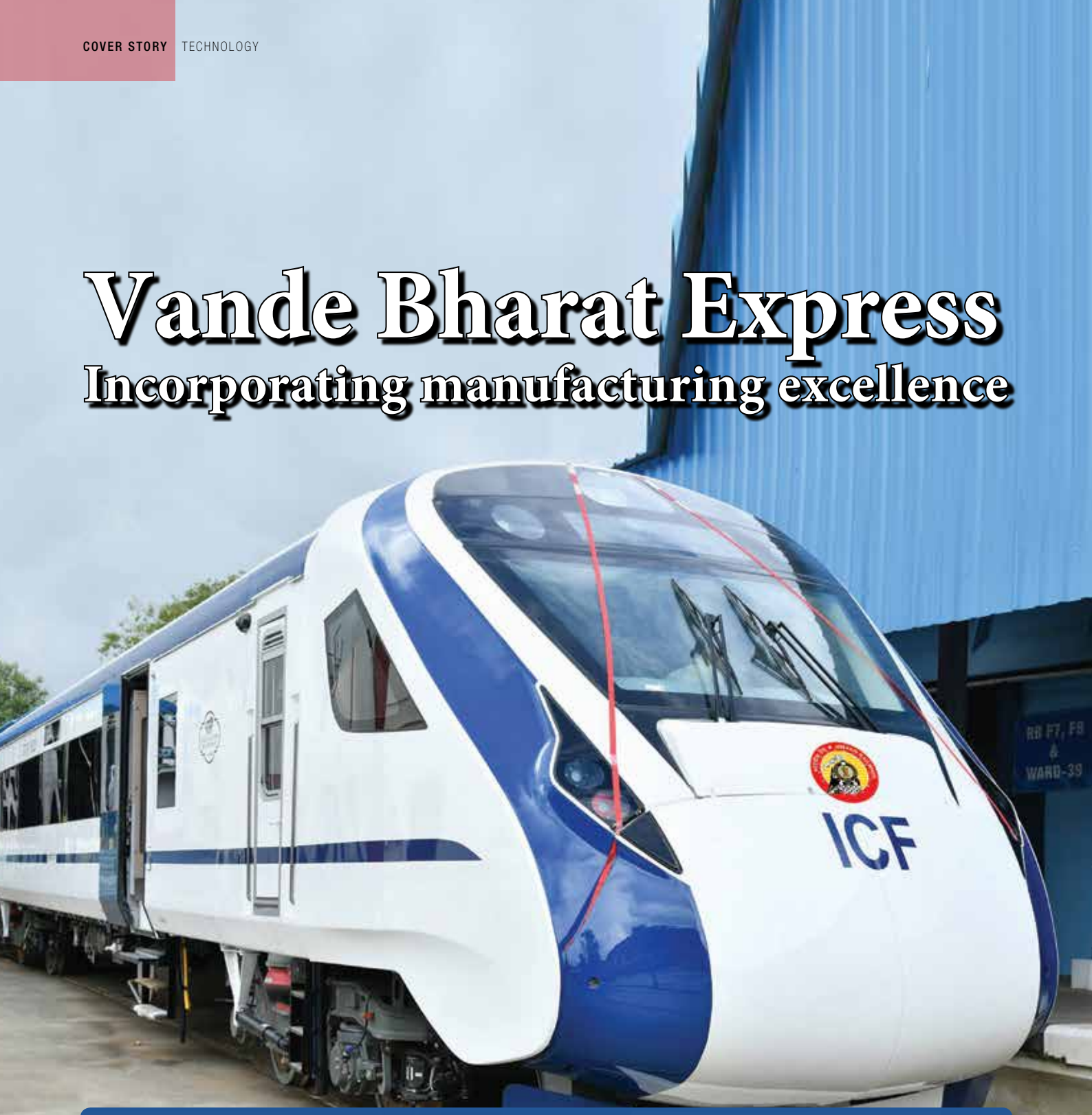
How are you projecting your business with R&D developments to be equipped with the factory of the future?

We believe in discovering solutions beyond the machine. We always think holistically and build on five solution areas: Machines, automation, know-how, services and digital solutions centered on the current needs of modern manufacturing.

Besides, the Heller product managers constantly think about making machining centres even more efficient. One key to higher productivity is complete machining on a single machine. With the present changing scenarios and the increasing demand for new product development, we need to have a considerable amount of investment. Also, In AMB Stuttgart, we have highlighted a new approach with a 360° degree of production that includes machines, processes, automation, digital, and services. This is a concept of connected production or future factories. □

Vande Bharat Express

Incorporating manufacturing excellence



To achieve an extra mile and jacketing the manufacturing ecosystem, Team EM reached out to Sudhanshu Mani, Creator of India's first semi-high speed train set Train-18/ Vande Bharat Express for an exclusive interview. This interview articulates the manufacturing and technological excellence that went into the Making of Vande Bharat Express.

Sudhanshu Mani,
Creator of India's first semi-high speed train set Train-18 Vande Bharat Express, Retired General Manager Integral Coach Factory (ICF)

https://www.linkedin.com/in/s-mani-train18

Can you walk us through the manufacturing ecosystem that went into making the Vande Bharat Express trains?

40% of the train is entirely manufactured in the Integral Coach Factory (ICF), and rest in associated industries. The assembly of all components is done inside the factory, most of which come from the industry. So, India has developed a well-established ecosystem for making modern trains.

For example, the propulsion system, brake system, toilet module, seats, panelling, furnishing, and couplers are all provided by Indian industries. There were only a few components that were imported. Overall, the use of lighter materials or composite materials with the concept of keeping them within the weight limit was specifically used.

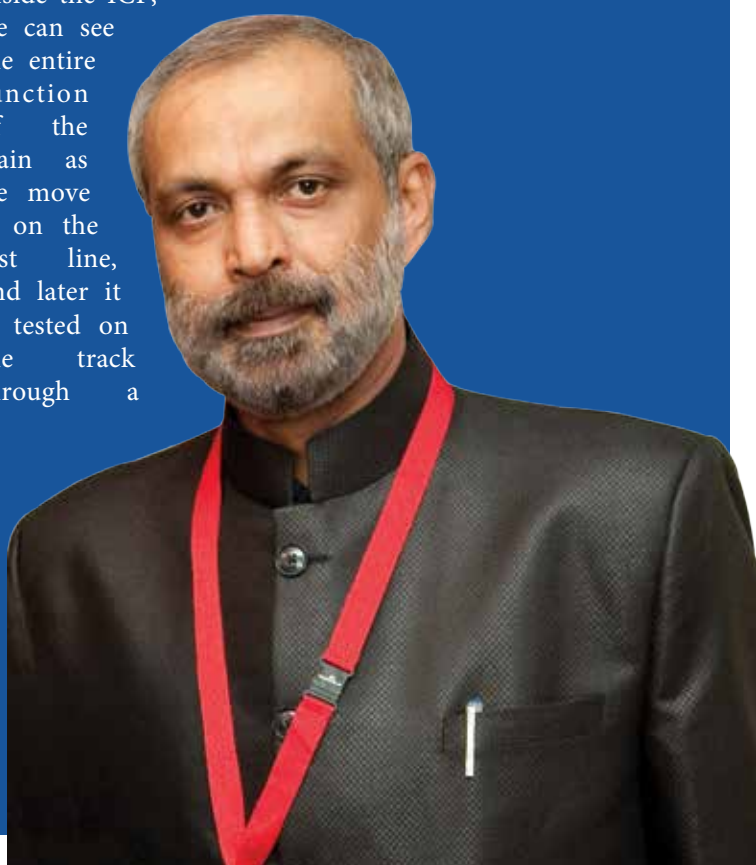
Can you brief us on the technological advancements that went into the making of the Vande Bharat Express or Train 18 semi-high-speed train?

There are four aspects of technological advancements - first is the concept, followed by the design and engineering, the third aspect is the manufacturing, and concludes with validation and testing. The concept is developed first using computer tools, where we have the basic framework on which we work. What we want to build, the type of train we want to build, its maximum speed, how many coaches we want to build, the configuration, the ride index, and the bogies the coaches will ride on—all of these concepts are first developed using computer tools.

The next step is designing. For design, we use 3D software, as there is no manual designing. Large parts of equipment and components are outsourced from various Indian industries; therefore these industries also develop their own 3D models to make the components and equipment. These components and equipments are then bought on the shop floor, and everything is assembled together to evaluate the final design of the train. From the final 3D model, the 2D drawings or the manufacturing drawings are developed, which are then transported physically and virtually to the shop floor.

Then comes manufacturing, which is divided into two parts in ICF. One is the shell, which is the body, and it involves a huge number of series of fixtures on which the train in making moves, and it goes through modern and robotic welding in the final assembly and some measurement tools, for example, the spot welding machines. So, spot welding is operated automatically once it has been placed on the fixture through robotic arms. Then, when the shell is ready, it is moved to the furnishing part, where the job is more on the manual side. Therefore, the components come from the industries, and they have to be picked up and placed in the coach. This process is done on the assembly line.

Lastly, we come to testing and validation. The testing is totally computerised. Inside the ICF, we can see the entire function of the train as we move it on the test line, and later it is tested on the track through a



computerised testing facility that The Research Designs & Standards Organisation (RDSO) has. The RDSO ascertains the ride index and the lateral forces on the tracks, which then go into determining the road worthiness of the train. Based on this data, the sanction is applied for from the Commission of Railway Safety which gives the go-ahead for the train to be operated commercially. Artificial Intelligence is used in the maintenance part. In addition, the Industry 4.0 standards, which are used by the industry to some extent, are only limitedly used by ICF.

How do you think the Vande Bharat train is different from other express trains in India when it comes to technology, manufacturing excellence, and design? What kind of manufacturing breakthrough has been implemented to make this train a success?

A conventional train is made up of coaches and a locomotive, along with an engine in common parlance, at one end or either end, which requires to be attached and detached as per requirement, say at stations for reversal or at destination for maintenance. A train set is a train of permanently coupled coaches such that all the equipment for powering or train braking, for train lighting, and for train air conditioning, i.e. all equipment is mounted under the train chassis itself, and there are no locomotives.

Train 18/Vande Bharat Express is a train set that has many advantages over a conventional train. It affords higher speed with faster acceleration and deceleration as power equipment is packed all over the train and not limited to a locomotive. It offers better maintainability because the entire train is maintained as one unit, unlike a conventional train, which is broken into locomotives and coaches that are maintained in separate depots. It requires no reversal at the destination, which saves precious time at terminals.

It is more spacious for passenger comfort, as the entire onboard space from one cabin to another is totally available for passenger amenities. It is provided with wide gangways between coaches, unlike the rickety vestibule we have in our trains; one can move from one cab to another over the entire length of a modern train set with ease.

A conventional train has additional coaches with generator sets called power cars, for supplying electricity to hotel loads, train lighting, ventilation, air conditioning, and other auxiliary demands, whereas a train set has all the equipment placed under the board. Since the number of individual rolling stocks per train set for the same number of passengers is significantly less due to the elimination of locomotives and power cars, it is more energy efficient. With the absence of locomotives and power cars, all the coaches of the train, have more or less the same uniform look, lending it a very aesthetically pleasing appearance.

A clear benefit of a train set is operating flexibility and cutting down on travel time. The trend worldwide for the last 25–30 years has been to totally switch over to such trains and discard the conventional trains. All countries with advanced or large railways systems, e.g., Europe, particularly Western Europe, and Japan, for nearly three decades, and even China, South Korea, and several middle-income countries for recent 15 years, have been deploying only train sets for medium and high-speed services, either with two power units at the end or with distributed power all over the train.

It makes great sense in India to introduce such

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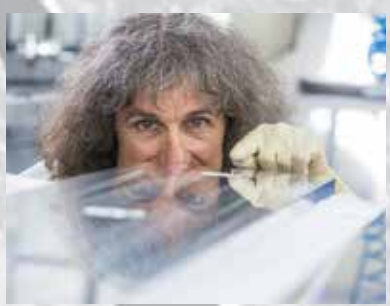






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modern trains as India has the heaviest passenger railway network in the world. It would not only make trains more punctual but also help run more trains. Overwhelming patronage of train travel in India calls for great stress on punctuality, and since the network is saturated, it imposes an undue strain on operations. In this context, any rolling stock that reduces travel time would clearly meet a critical need. Train sets can offer great relief to our system, which is bursting at the seams due to the overexploitation of train handling capacity.

What factors were considered while designing the standards and specifications, right from making it an aerodynamic structure to reducing its weight? What were the simulation technologies used, and what were the challenges faced?

The concept of the train was designed for top speed, ride index, acceleration, and deceleration, and the configuration of the train in terms of seating capacities. Since the train runs above 130 kmph, apart from the ride index, a bogie was required that would accept traction motors. Every alternate coach is powered and every piece of equipment is under the board. Because air resistance plays a significant role at speeds above 130 kmph, aerodynamic structures are required.

We measured the performance technologies using specialised software, from bogie performance to aerodynamic performance, to either design it itself or, more likely, validate the design through the software and tweak it based on the simulation results. Hence, these techniques were used extensively for practically every part of the train that starts with the car body, where the stress test is carried out.

In addition, there were many other tests that were carried out. For example, for bogies, the riding test was carried out, and the aerodynamic performance was measured through a computational flow dynamic test. To measure the propulsion after performance, test were carried out entirely on the software pcakages for its suitability to propel the train. Thus, all these simulation technologies were used. The train was built with stainless steel and aluminum components.

With a boost in the semiconductor industry in India, how are they used to power this semi-high-speed train?

In the Vande Bharat Express, semiconductors are used extensively in power electronics, which are employed in propulsion system. To begin, a converter converts electricity into a form suitable for powering the traction motors. This is a large power electronics component of a train that uses semiconductor family devices. There are a large number of controls for this propulsion as well as other components like the brake system, door mechanism, train control, and management system for the entire train; all of these equipments use semiconductors electronic and digital interfaces.

As of now, a large number of chips are imported, and individual component manufacturers have to depend on importing semiconductors. It could have a domino effect in either direction, not only on trains but also on semiconductor-based products in India. It will boost the semiconductor manufacturing industry in India, which is growing through the PLI scheme.

According to reports, railways are stressing on the

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Making of Vande Bharat Express coaches at ICF Chennai

need to upgrade the OHE wires to 2x25kV so that the railways are ready not just to run more Vande Bharat trains, but also to make the future national transportation system ready for high-speed trains. What is the impact on energy consumption, and are railway tracks ready to handle such pressure?

This is more about higher capacity than speed. As the train gains speed, a higher capacity of current carrying in the OHE is required. But it will not bring in high speed. This is something that is necessary for going up from 160 kmph to 180 kmph. So, for 160 kmph, the track has been upgraded, which is necessary, but it will not usher in high speed as such.

On the existing track, we can go at the most, through upgrades, to 200 kmph. For really high-speed trains, it may take years, but we are working towards it. For anything above 200 kmph which is a true high speed, new and dedicated tracks have to be laid down, which is currently being done for the Mumbai-Hyderabad project.

Where do you place the journey so far of Vande Bharat in the context of 'Make in India' and 'Atmanirbhar Bharat' schemes?

Even now, the brake system is imported, however, it does go under some value additions in India. Today, plug in door systems are imported. Seats were previously imported, but now we have them thanks to Indian manufacturing. However, wheels are still imported.

The 'Make in India' concept, according to me, is that the train should be overall designed, manufactured, assembled and tested in India. Semiconductors or any other small component that has come from abroad to make a part doesn't necessarily mean that we are not sticking to the concept of 'Make in India'. The local content can vary, but there is definitely a global supply chain behind everything. So, the components, which are now imported, should be made in India gradually as the number of trains increases. But I would say that yes, the trains are Made in India.

Do you recall any memorable moments in your journey so far? In terms of manufacturing potential, what are your upcoming plans in the coming years?

It obviously feels good and elevates each and everyone of the ICF team members. And it gives us great pride when the Prime Minister himself inaugurates these trains. He, and indeed the people of India, do see it as a symbol of a resurgent India. We just made a train, but it has achieved a symbolic status because of the commitment and sense of purpose shown by the ICF team.

One of the most memorable moments was the day the train was unveiled on October 2018 to a tumultuous welcome by the staff of ICF and their families, along with the media and general public. The disappointment was the negativity and venal machinations of certain people, which unnecessarily delayed the train, but since we are now in the ascendancy stage, there is no point in talking about this sordid past.

As for me, I will simply quote the words of the bard through Cressida in Troilus and Cressida, "Things won are done, joy's soul lies in the doing." ☐

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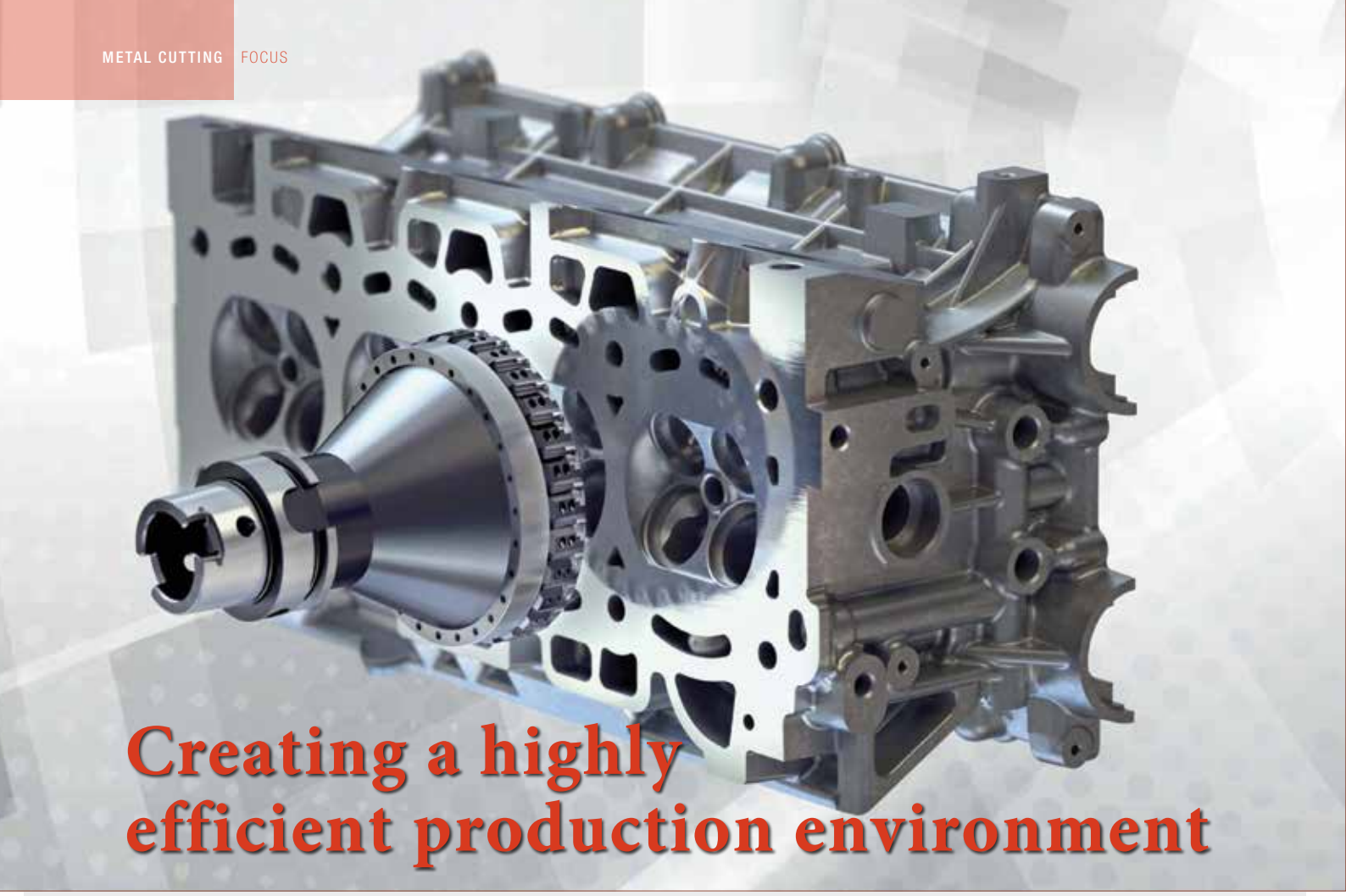

Creating a highly efficient production environment

Metal Cutting has been the essence of manufacturing since it was invented. The process of bringing the metal to the required shape has transformed itself from a basic form of work to a strategically focused and specialised activity.

Gautam K Ahuja,
CEO & MD,
Guhring (India)

The interaction between cutting tools and workpieces has undergone several changes since the advent of manufacturing. The reason has been the demand for productivity and quality arising due to increased competition among the manufacturing industries.

Modern manufacturing methods boil down to three key concepts:
Reduce waste – Reduce the number of materials, capacity and manpower wasted in the process by producing just enough product to meet current demand.
Maintain quality – Devise more effective manufacturing methods to continue making quality products despite strict reductions of waste.
Accelerate production – Decrease the amount of time needed to manufacture products, making up for the lack of surplus.

Reducing waste for chip management

When we talk about metal cutting, the waste that becomes visible at first glance is the material getting removed from the workpiece in the form of chips. Chip management is key to ensuring better productivity in terms of reducing tool breakages and component scrappages. Two important aspects of chip management are chip breakage and chip removal. Breaking the chips is important to avoid chip clogging, which in turn leads to tool jamming and breakage.

Chip breakage also facilitates easier chip removal. It can be achieved by introducing chip breakers into the tool geometry and varying the tool feed. Chip transportation is important to carry the heat away from the cutting area. 75% of the heat generated is carried away by the chips, and if the chips are not cleared away, then there is overheating of the cutting tool and the component. The overheating of the cutting tool will result in the tool material losing its properties and the tool's life being reduced. Overheating of the component will result in quality issues like burn marks, an improper surface finish, and size issues. Precious time will be lost in reworks and corrections.

- **Advanced threading methods**

Another major reason for rework or scrappages is when a

tap breaks during the threading operation. It becomes difficult to remove the broken portion of the tap stuck in the component, and many times the component needs to be scrapped. Advanced threading methods like synchronised tapping and thread milling offer a solution to avoid tap breakages in blind holes in steel components. Tool holders that have a combination of hydraulic holding and synchronised tapping (GuhroSync) are available. They produce highly accurate threads while avoiding tap breakage.

- **Handling the used coolant**
  Another form of waste that is visible is the used coolant after the machining process. A lot of effort and infrastructure are required to handle the used coolant. Coolant filtration and sludge disposal operator safety are some of the issues faced during the disposal of coolant. The latest coolant distribution technologies, like Minimum Quantity Lubrication (MQL) help avoid the issues listed above. Implementing MQL technology reduces overall plant costs by 25%. Coolant consumption is drastically reduced from approximately 1000 litres per hour to 0.5 litres per hour. As coolant consumption is lower, coolant filtration and coolant disposal are easier, as the almost-dry chips will be easier to handle than the wet sludge that is a by-product of conventional cooling.

- **MQL technologies**
  MQL technologies have been demonstrated in high-volume automotive powertrain manufacturing to reduce operation costs, energy, and waste compared with traditional flood cooling, and result in capital and operational cost reductions. As a result, MQL is seeing increasing adoption in automotive powertrain machining and airframe and other large structural applications. MQL implementation involves multiple facets, including machine tools, cutting tools, delivery systems, and optimised parameters. As this implies, the development requires joint efforts from machine tool makers, tool designers, MQL system developers, and the end users (manufacturers and engineers). Full usage of MQL will significantly impact the global-manufacturing industry. The goal is to create a clean, sustainable, and highly efficient production environment.

MQL is seeing increasing adoption in automotive powertrain machining, airframe and large structural applications.

Maintaining quality for achieving required parameters

Coolant plays an important role in ensuring a better surface finish on the component and achieving the required quality parameters. Using advanced tool materials like PCD enhances product quality. Other advantages of using PCD tools are better tool life as well as higher cutting parameters, which will result in a reduction in cycle time.

Accelerating production for addressing customer demands

Increasing productivity while maintaining quality is of utmost importance to satisfy customer demand as well as to sustain the business. Doing it right the first time and doing it fast will be the goal of any manufacturing setup. To achieve that, we must seek out advanced tooling solutions.

There are two approaches for machining different types of components: High-Speed Cutting and High-Performance Cutting. In High-Performance Cutting (HPC), PCD milling cutters with chip guiding elements perform at speeds six times faster than those of regular milling cutters. The chip guiding elements ensure 100% of chips are guided away from the component, thus eliminating the headache of cleaning the component. In this way, cycle time is drastically reduced.

Combining different operations in one tool like drilling, counterboring and chamfering in one tool in a single operation will save tool change time and cycle time.

- Using versatile tools that can perform multiple operations like plunging, slotting, roughing, finishing, and ramping will help reduce tool inventory and facilitate communising of tools.
- Using a universal type of tool which can work on all types of materials will benefit manufacturing firms that are into batch manufacturing as they will have to different materials at different points in time.

In cases where there is mass manufacturing involved using high-performance tools is recommended as they will give a better Return On Investment (ROI) in the long run.

Efficient machine monitoring

Chip-based monitoring of machining parameters and interfacing of machines with ERP and CNC programme software interfaces is possible through the Guhring Machine Control Centre (GMCC) software, which offers the benefits of effective job management and devising fool-proof work plans. Process data, run-time monitoring, stand-still monitoring, magazine monitoring, machine status monitoring, and failure response management are some of the other features of the software that help in monitoring the machines and ensuring a healthy and efficient production setup.

Real-time production monitoring and preventive maintenance schedules can be implemented to extract higher output from existing resources. Customised software packages are available that can completely automate the management of production and quality. □

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How AI-based Industrial Bearings are accelerating Industry 4.0?

The article talks about the revolutionary impact that Artificial Intelligence bearings are bringing upon technology today.

Shaleen Khurana,
Vice President,
Moglix

A bearing is what makes the world go round in a highly industrialised era.Take any industrial technology propelling the world forward, and chances are that there is a rotating or rotary mechanism operating at its heart. Be it a pressing machine, pump, motor, bike, car, escalator, elevator, turbine, windmill, heavy equipment, or capital machinery, everywhere you look, you are likely to find the humble bearing, hidden from plain sight yet working away tirelessly in the background. The industrial bearing is perpetually hard at work, ensuring complex machines' health, viability, and efficacy. They may be small, but their impact on the industrial milieu is prodigiously large. Since the very dawn of the industrial age, bearings have registered a towering presence over the manufacturing landscape, and their role is only growing larger as manufacturing graduates to the next level of industrial evolution, namely, Industry 4.0.

These bearings, which are now augmented with AI, are yielding cost savings and optimising strategic Capex investment decisions for companies choosing to use them on their factory floor. When artificial intelligence powers industrial operations, productivity, efficiency, and unit economics improve, while maintenance costs fall dramatically.

What is Industry 4.0?

Without wading into technicalities and taxing nuances, it would suffice to define Industry 4.0 as primarily a merger of manufacturing prowess with new-age technologies. A distinctive marker of the Industry 4.0 revolution is that it is occasioning an industrial evolution that has been long due, namely, the arrival of smart machines on the factory floor scene.

The criticality of lubrication

The dimensions of Industry 4.0 can be best understood

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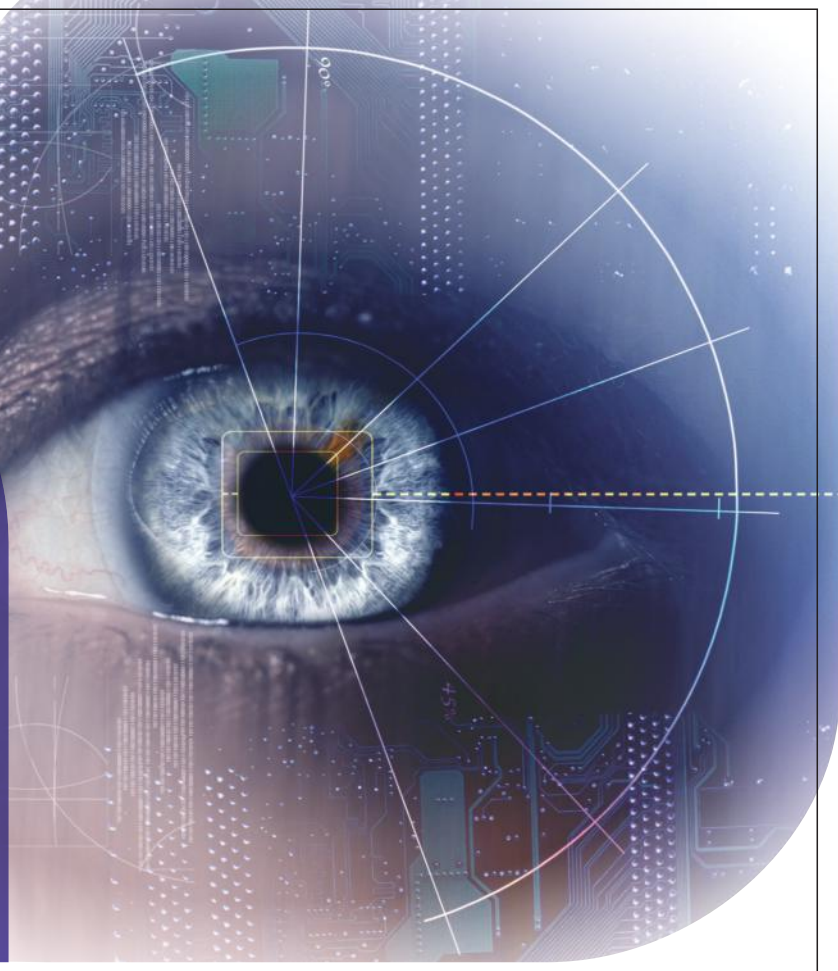

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through the lens of bearings and lubrication. Those in the know would have first-hand knowledge of the regular upkeep, maintenance, and frequent lubrication required by machines employing bearings. Lubrication enhances the longevity and performance of the bearings and, consequently, the machine. However, the converse is also true; lack of lubrication can stifle performance, arrest productivity, and choke the machine's longevity in the long run.

Traditional machines, by their very design, require frequent lubrication. This opens the field for human intervention, which unwittingly raises the prospect of a service technician either inadequately lubricating the bearing or not lubricating it at all. Either way, the smallest of mistakes by a technician kickstarts the snowballing of the machine's premature corrosion, rusting, and decline. Slowly and steadily, the machine's clock starts ticking downward, and with that begins the journey of a massive loss barreling down threateningly toward the company.

How are AI bearings a game changer?

This is where AI-equipped industrial bearings can make all the difference. Imagine the scenario above, where an errant service technician was remiss in lubricating the machine adequately or appropriately. With sensors at work in your bearings and your machine, a maintenance dashboard will start glowing red, so to speak, issuing notifications and alarms that the bearings have not been adequately serviced. SKF, a pioneer in AI-powered bearings, uses pre-trained machine learning algorithms on real-time data to identify flawed and anomalous patterns in the machines. Thanks to their predictive technologies, these machines warn the technicians of an impending failure.

The software tapping into this technology has received an overwhelming response from the industry and ecosystem for unveiling cutting-edge mechanics that can intelligently issue warnings, helping to prevent large-scale breakdowns and collapses of the production pipeline on the factory floor.

AI-powered bearings have been an absolute hit in the shipping industry as well. Players that have pivoted to intelligent bearings benefit from machines that can help predict fuel consumption, speed, wear and tear parameters, and other metrics.

The problematic trappings of traditional bearings

The lineup of hiccups and snags regarding bearings operating in a traditional mould is long and rather trying. Any industrialist or factory floor manager worth his salt would undoubtedly testify that machine failure stemming from bearing breakdown can stall a machine for anywhere from 30 minutes to a day and a couple of days in worst-case scenarios. Research carried out in overseas settings indicated that a breakdown in a ball bearing worth $50 sometimes leads to catastrophic damages as high as $25,000–$30,000. Indian industrialists are no strangers to such production breakdowns. Be it small-scale manufacturers or stupendous plants and factories with geographical areas spanning hundreds of acres; production glitches have the power to scar the P&L statements of all firms. So it should be of no surprise that those production breakdowns recurrently and quite menacingly dent the top line of blue-chip firms across India.

All these overheads, be it on maintenance or servicing expenses, can see an exponential reduction with the help of advanced sensors located within industrial bearings. However, these AI-powered bearings are naturally more expensive than traditional bearings. That does not mean that they are not cost-effective. Whether one should pivot toward an AI-powered industrial bearing installation depends on the volumes being churned out by your firm.

Are AI-powered industrial bearings meant for your firm?

To better understand if your firm can benefit from the predictive analytics capabilities of AI-powered industrial bearings, one will have to draw up a cost-benefit matrix, which should ideally clear up the air on whether they turn out to be productive or revenue-sapping for the firm in question.

The problem may be better explained with the help of a real-life example. A prominent FMCG player in India has a 20-gram chips packet in its product lineup, and the potato chips product is a star performer in cumulative sales for the company. A problem arose when the machine on the factory floor-powered by traditional bearings, instead of limiting the chips to 20 grams, would exceed the limit by 3–4 grams. Over a quarter, this excess of 3–4 grams would lead to an erosion of 15-20% of the EBITDA margin. This particular FMCG player consequently upgraded from machines with traditional bearings to AI-powered bearings and was able to decisively weed out the mounting expenses with the superior prowess of industrial bearings. The shift to AI-powered bearings made sense for the

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Industrial bearings are destined to become cheaper, more widely accessible, and far more cost-efficient.

particular FMCG player because of the high volume and quantum of products passing through his pipeline. This FMCG, in particular, has a quarterly top line that runs into thousands of crores, and just a single factory would see products worth lakhs, if not a crore, pass through its assembly line in a day. The same cannot be said of millions of other MSMEs in India. The majority of these MSME units in India have a product pipeline with output volumes in the tens of thousands. For these small firms, investing in AI-powered industrial bearings would simultaneously be a costly affair that won't be cost-effective.

The next technological horizon of AI-powered bearings

It should be no surprise that multinational firms like ABB, GE, Schneider, Siemens, and many more are eagerly embracing, adopting, and implementing AI-powered bearings within their industrial set-up. A global leader in bearings, SKF, has spearheaded the industrial bearing revolution and deployed machine learning technology to turn big data into actionable insights. A company can incur a considerable upfront Capex cost to upgrade its factory floor machinery with AI bearings. However, if the company finds these costs prohibitive, it can opt for a subscription-based model where industrial bearings are retrofitted into traditional machinery.

Bearings metadata and its utility

Further, with continuous usage of the machines, the reserves of metadata at the company's disposal only grow deeper. This metadata helps the company make incremental decisions that deliver exponential savings in the long run. For example, metadata troves help companies determine which bearing has a longer shelf-life or which grease is more conducive to elevated performance, or changes, if any, are required in the underlying mechanics of the bearings that can yield better cost savings. These decisions might not look like they result in capital conservation or spending reduction when seen discretely. However, we would not consider the second-round effects emanating from such metadata-based decisions.

A case in point is a major pulp and paper company in Latin America, which relied on SKF's Enlight AI to identify inefficiencies that could have been easily avoided. The AI solutions were applied to a set of motor pumps, which were critical assets for the company. Results revealed that the total losses from operations, which amounted to $400,000, could have been limited to $150,000, thereby resulting in a possible savings of $250,000.

AI-enabled software can also be a game-changer in streamlining product inspections and detecting anomalies. Bangalore-based AI solutions provider Qualitas Technologies has an interesting use case in this domain, where automated visual inspection of bearings reduced human intervention by 66% and led to a significant reduction in labour and training costs.

These instances show us that minuscule decisions can yield savings of lakhs and crores on a quarterly and annual basis. Further, the real savings they engender will never make it onto the income statements for the simple reason that the predictive analytics of these bearings save crores in maintenance that would have been otherwise forked out in the case of traditional bearings.

Fast forward

The next order of evolution for industrial bearings forebodes that they are destined to become cheaper, more widely accessible, and far more cost-efficient. Currently, it is only the industrial bigwigs that can truly afford to tap into the immense potential of industrial bearings. As the technological progression lurches forward, predictive analytics capabilities will be available even to those at the bottom end of the industrial pyramid. What's more, tomorrow's machines will be able to be retrofitted with diverse bearings, and the manufacturers of tomorrow will be able to make smart choices on the kind of bearings and lubrication that better serve them. One thing would remain unchanged: The world would still be going around because of bearings. □

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Vision metrology versatility

Up until the late 1970s, the contour projector, or optical comparator, was the mainstay of automated two-dimensional inspection systems. Since then, while there have been many advances in comparator technology, video-based electronic image analysis has jumped to the forefront for non-contact inspection and measurement tasks. A read on…

Shreyansh B Hippargi, Managing Director, QVI India

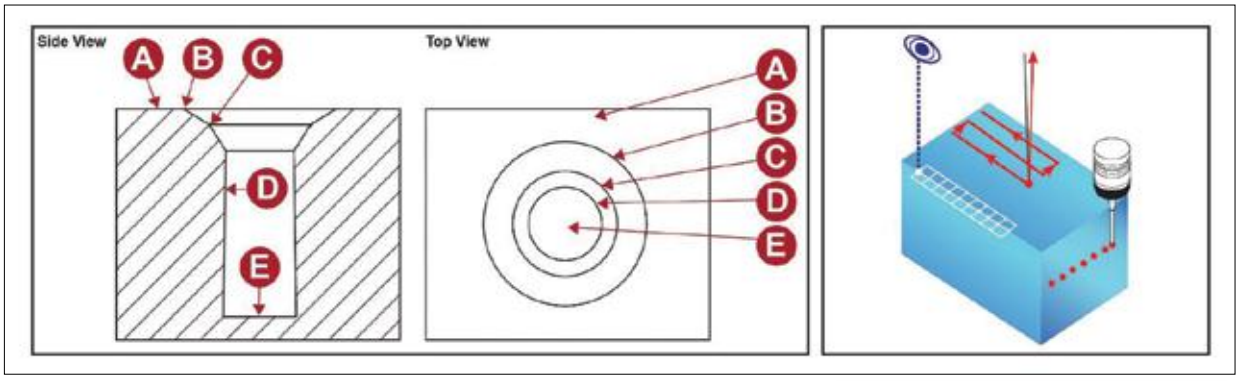
Driven by advances in optics, cameras, electronics, and software, video metrology systems have increased in performance, speed, and versatility. The ability to automatically collect and analyse hundreds, or thousands, of accurate measurement points makes the purchase of a video-based, noncontact metrology system a high Return On Investment (ROI) decision.

Vision versatility

Three key factors make automatic video measuring systems an attractive investment:

1) Measurements are fully automatic, eliminating the variation in judgment from one operator to the next.
2) They provide very high accuracy and repeatability compared to traditional, manual methods.
3) The most advanced Video Measurement Machines (VMM) integrate additional sensors, such as tactile probes and lasers, to enable the measurement of features that cannot be measured using the optical sensor alone.

It is this latter capability—the ability to use additional sensors—that sets OGP (Optical Gauging Products) SmartScope® systems apart from other video measuring machines on the market today. The schematic picture (refer to image 1) gives a brief idea of how a multisensor system works. The camera can measure all the features that it can see. It can, for example, see Dia B and C and thus measure them. It also sees the top surface A, so it can check the distances within that plane. The camera, however, will be unable to see Dia D and the bottom surface E. So, to measure Dia D, a touch probe is used. Similarly, the height of bottom surface E relative to top surface A can be measured



(Image 1) Working of Multisensor System

with the help of a probe. Similarly, areas like side grooves and cuts can be measured with the help of a touch probe.

A laser is used to measure the contour surface as well as the depth or thickness of the surface (in the Z axis). For instance, to determine the thickness of a coin. Lasers are very effective in scanning surfaces that are very odd in shape and difficult to measure by the probe. Also, laser scanning is much faster compared to touch probe scanning.

Multisensor systems

Although a video-only measurement machine may be well suited for in-process inspection of certain parts, multisensor systems combine video data with data from laser and tactile probes, providing the capability of several different measuring machines in one. This added utility provides complete first-article inspection capability, without the added measurement uncertainty inherent in measuring parts with several different tools or machines. This added utility provides complete first-article inspection capability, without the added measurement uncertainty inherent in measuring parts with several different tools or machines. In the picture (refer to lead image), a special ultralight probe (called the "feather probe," which is an OGP proprietary product) is used, having a very small probe diameter of up to 0.125 mm. The probe's small size and sensitivity make it perfect for measuring micro–miniature components and features, that can be deformed by traditional touch probes. Even the camera cannot see these small holes, so it's very difficult to measure with the camera.

A high-resolution metrology camera is the heart of any video measuring system – whether it is a single or multi-sensor system. Video is used for high-speed, non-contact measurement of a wide range of part features. As long as a feature can be "seen" by the imaging optics and camera, it can be measured. Bear in mind that the camera will accurately measure the image that is presented to it. For truly accurate part measurements, the imaging optics must produce an accurately magnified and undistorted image of the part.

Thus, the combination of imaging optics, illumination, and camera must all be designed and integrated as a system to achieve the desired accuracy. The best sensor for measuring a particular feature depends on the feature's position and geometry. Generally, features that are oriented perpendicular to the optical axis can be viewed and measured using video. Although, individual points or complete features on curved surfaces can be measured using the video sensor, but it may be measured faster and with greater precision using a scanning type sensor, such as a laser (refer to image 2). Integrated laser probes can rapidly collect vast amounts of data points to characterize complex shapes, contours and profiles. Laser probes may also be suitable for measurements on transparent, or translucent, surfaces and difficult geometries, such as deep narrow slots or small blind holes.

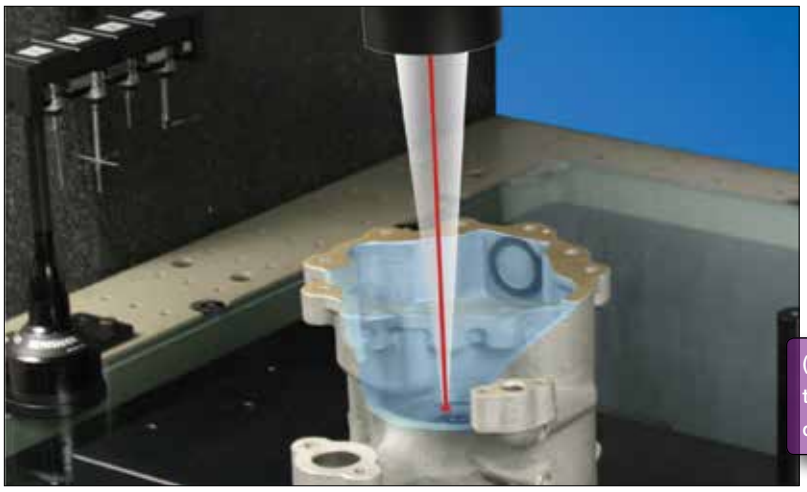
Touch probes

Other types of features, such as vertical surfaces, blind holes, and cavities, may not be easily accessible either with optics or a laser. In these cases, a touch probe or scanning probe can measure contours, vertical surfaces, bores, cavities, and underhangs and combine those measurements with video and laser measurement results in the same automatic routine.

Noncontact (video and laser) and contact (touch probe) technologies allow for the measurement of a myriad of parts and features, on a single measurement machine. One multisensor metrology machine will most likely be less expensive than several individual machines and will occupy less valuable facility space. Additionally, personnel training costs will be minimised, as operators will only need to master one measurement system, rather than several. The greatest efficiency will be attained with systems and software that have been designed with multiple sensors in mind, rather than as an afterthought.

Advantages of LFOV systems

While measuring microscopes traditionally offer a very



(Image 2) A laser is used to measure the contour surface as well as the depth or thickness of the surface

small field of view and a shallow depth of focus, a new class of benchtop video metrology machines feature a large Field-of-View (LFOV), up to 100 mm, which makes them ideal for 2-D measurements of small parts. The large viewing area allows entire parts to be viewed and measured in one video snapshot, rather than multiple, successive, snapshots with stage movements. Compared to other measurement methods (a touch probe, for example), LFOV systems can complete measurements in seconds rather than minutes, and even allow for the simultaneous measurement of multiple small parts. In some cases, a part may be aligned automatically by the software, thereby, eliminating the need for expensive fixturing while allowing for quick, accurate, measurements and maximising throughput in a production inspection environment.

Higher-performance video measurement systems are driven by software that is compatible with 3-D CAD models and, through sophisticated optics, provide high-accuracy measurements and dimensional analysis for small, intricate, part features. These advanced metrology tools extend the many productivity advantages of vision-based systems to high-value microparts. Automated video measurement systems optically magnify the image of a part, capture the image with a high-resolution video camera, and use advanced edge detection software algorithms to measure edges and feature locations. It is the speed and precision of this software-driven process that makes video measurement so well-suited for production environments. Some video metrology systems offer advanced telecentric optics.

Telecentric optical system

Telecentricity is an optical characteristic that assures that the image of an object remains a constant size throughout the depth of field of the optical system. A fully telecentric optical system ensures image size consistency at all zoom magnifications. Telecentric optics are ideal for prismatic parts with 3-D shapes whose images are easily distorted when imaged by non-telecentric optics.

High-performance optical systems also ensure a flat image, across the full field of view, without any curvature or distortion, so that a part can be placed and measured anywhere within the field of view and still be measured accurately. Distortion-free optics are particularly critical for LFOV systems, where it is intended to measure sizes throughout the viewing area, not only at its center. Other types of video metrology systems may use fixed lens optics, zoom optics with internal calibration, or dual-magnification fixed lenses. The choice of system optics is made to match the part's feature sizes and throughput needs against the optical characteristics for the best efficiency.

Making in-process production inspection machines

With a multitude of vision metrology manufacturers and models currently available, performance and prices vary widely. The key to making a wise choice is to make sure the measurement machine's capabilities match the intended use. A LFOV video measurement machine offers high-throughput measurements for small parts, making them ideal as in-process production inspection machines. For parts that have very small features, video metrology systems with advanced optics are the best choice, while for complex parts with a range of feature types and sizes, multiple sensors, including video, touch probes, lasers, and micro-probes, allow complete, automatic inspection.

Additionally, most video metrology machines offer integrated functionality with Statistical Process Control (SPC), reporting, or analysis applications, further enhancing the utility of the investment by performing these additional beneficial functions. In the manufacturing world, speed and accuracy are high priorities. Video technology provides both and may be one of the most versatile of all metrology solutions, providing rapid payback as a quality and/or manufacturing expenditure. □

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Why should manufacturing companies adopt cybersecurity?

The article illustrates how cyber attacks are affecting the manufacturing industry.

Shibu Paul,
Vice President – International Sales
Array Networks

A cybersecurity attack can have a significant financial impact on any business, and manufacturing is no longer an exception. Cyber attacks can cause a manufacturing company to lose sensitive data, fail to fulfil customer orders, and close one or more plants. Many attacks involve intellectual property theft, implying a competitor can use that information to launch a better product without investing in research. It could also lead to a loss of market share or push the manufacturer out of business. It is also possible for severe attacks to permanently damage a manufacturer's equipment and plants.

How are manufacturing companies being affected?

Unlike other industries, the manufacturing industry has long been unaffected by cyber attacks, but the trajectory changed a few years ago. There were two main reasons for this: their lack of connectivity with the outside world served as a comfortable barrier against cyberattacks, and their perception that they had little to offer cyber attackers.

Earlier manufacturing companies used to be interconnected within a single organisation. The connection with the outside world via the internet was negligible. On the other hand, the financial and medical industries have always been connected, making them ideal targets for hackers.

But with technology evolving and Industry 4.0 coming into the picture for the manufacturing industry, the old ways of communication no longer work. Manufacturing firms are now subject to the same threats as other industries. So, the

lack of awareness and the series of possible vulnerabilities through enormous endpoints make manufacturing companies susceptible to hackers.

Records of cyber attacks on manufacturing companies

- Verizon observed that 73% of attacks against the manufacturing sector were financially motivated in its 13th annual Data Breach Investigations Report. Verizon also found that 75% of the attacks were external, while 25% were internal threats.
- A study of the manufacturing sector by Sikich, a U.S based accounting firm, stated that 50% of manufacturing companies experienced a cyberattack during the last one year.
- The manufacturing sector became cyber attackers' 8th most targeted industry in 2019.
- The problem multiplied in 2020 when most companies had to adopt remote working. It was a boon for the cyber attackers.
- The manufacturing industry moved to the 2nd position to be targeted by cyber attackers. According to the Global Threat Intelligence Report (GTIR) in 2021, it represented a 300% increase within a year.

How does Industry 4.0 play a role in increased cyber threats?

The notion that manufacturing companies are safe from cyber-attacks is gradually being eliminated. Industry 4.0 awareness and an increase in cyber theft gradually gained traction in 2017 and 2018. The manufacturing industry was exposed to hackers as it continued to adopt Industry 4.0.

Below are a few security challenges that manufacturing industries face due to Industry 4.0:

- All devices have a potential risk of being attacked.
- Industry 4.0 connects older isolated systems, increasing the chances of attack.
- Manufacturing systems like Industrial Control Systems (ICS) have vulnerabilities making them prone to cyberattacks.
- Manufacturing has fewer regulations to comply with as compared to other sectors.
- The visibility is weak across interconnected systems and isolated environments.

Top 5 cyber threats

As manufacturing companies adopt digitalisation, the industry will continue to be an ideal target for cybercriminals. To give you an idea of what threats you need to be aware of, here are five cyber threats and three cyber attacks that caused significant issues for manufacturing companies.

1. **Phishing:** Business enterprises often receive phishing emails that appear to come from within or from a trusted partner company. It is one of the oldest cybersecurity threats, accounting for almost 85% of the threats to manufacturing industries. These emails look authentic, with the correct logos and terminologies, tricking employees into providing access to a secure network. Once the hackers get entry, they can move around unnoticed, acquiring sensitive information to help them complete the attack. Manufacturing industries are more vulnerable to phishing attacks than other sectors because a supply chain comprising different organisations provides more entry points for hackers.

2. **Ransomware:** The manufacturing industry is at a high risk of ransomware attacks because of the ample use of computer-aided design (CAD). Manufacturing cannot proceed without access to these files, so making them unusable can have a crippling effect on the company. In North America alone, 13.9 percent of attacks were directed at manufacturing companies last year. A ransomware attack encrypts files on a network, making them unusable until the demands are met. The hackers threaten to leak information in exchange for a ransom. The attacks primarily work within the manufacturing industry because losing time is equivalent to losing money. It is common for manufacturing companies to agree to pay a ransom because sometimes the amount paid out is less than the losses caused by the delay.

3. **IP theft:** Information is one of the most valuable resources for manufacturing industries, and its breach can have disastrous consequences. A manufacturing company's intellectual property (IP) is a high priority and a key differentiator from its competitors. Therefore, IP theft is reported as one of the most expensive cyber threats. It can be done by external parties wanting to steal sensitive data or by employees intending to sell information for quick money. Theft of data can give competitors

Information is one of the most valuable resources for manufacturing industries.

an upper hand in developing better technologies, making them compete for sales. Moreover, IP theft is complicated to prove, which is why it is crucial to take measures to prevent it.

4. **Supply chain attacks:** Supply chain attacks are among the most effective attacks that target multiple groups simultaneously. A disruption in one link within an organization's supply chain can cause significant disruption. Manufacturing companies are particularly susceptible to these attacks due to the abundance of endpoints across many suppliers. This permits hackers to access a network in multiple ways. Once they have access to the network, they can either plant malware, steal data, or disrupt the supply chain to pause production. Supply chain attacks halt operations not only of the leading company, but also of all the companies that the company supplies, within days of the initial attack.

5. **Nation-State attacks:** Cyber threats carried out by the governing bodies of other nations can often be sophisticated and cause severe damage. These attacks can be financially motivated and used to bring down the economies of other countries. It is usually challenging to detect and prevent threats coming from nation-states because they are typically well-funded and equipped with high-end tools. These can affect infrastructure and military contractors, and they can even disrupt the operations of the government.

Examples of cyber attacks in manufacturing

Example #1: Mondelez

Mondelez, a food, and beverage company, suffered an attack in 2017 that damaged 1700 servers and 24,000 laptops and impacted global production. The attack was an encrypting malware that stole thousands of credentials and prevented the company from completing orders worth $100 million.

Example #2: Visser Precision

Visser Precision, a defence and space manufacturer, succumbed to a ransomware attack that encrypted sensitive data. The Russian authorities are believed to be behind the attack that first surfaced in April 2019. The documents included NDAs with Tesla, SpaceX, and other companies and were published on a hacker's website to publicly display the stolen files.

Example #3: OXO International

OXO International, a manufacturer based in New York, experienced an attack that disclosed customer information between June 2017 and October 2018. The company found malicious code on the website intended to steal customer data, including payment information and addresses.

Cyber security best practices

Cyber attacks sabotage a company's sensitive information and customer data and cause irreparable damage. Here are a few tips that can help prevent such attacks:

1. Encourage cyber security awareness
2. Protect critical assets from unauthorized access
3. Create a secure network and a robust cybersecurity policy
4. Take measures to protect sensitive information
5. Maintain a secure identity management system

Key takeaways

The success of companies is tied to data privacy, making it essential to establish a sustainable approach to cyber hygiene. Companies failing to do so will fall behind, harm consumers, and weaken their trading capabilities. As a result, companies must comply with the regulations outlined in the recently introduced legislation to prevent becoming easy targets for hackers. □

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Digitalising the manufacturing industry

Today, digital transformation is influencing every aspect of the manufacturing industry. The article explains the significant evolution of digital transformation in the same.

Dr.Rakesh Patra,
Associate Professor,
KLH Global Business School, Hyderabad

Manufacturers' business models have shifted because of Industry 4.0. The phenomenon has improved the way industries manufacture, package, and distribute their finished products. New-fangled technologies such as the Internet of Things (IoT), cloud computing and analytics, and AI and Machine Learning are becoming part of the production facilities while the business is undergoing a digital transformation. The factories are becoming smarter as they are now equipped with sensors, robots, and software that allow precision in the manufacturing process and collect data for analysis.

The evolution of digital transformation

Despite being a new concept, digital transformation has a relatively long history. The first traces of this phenomenon can be traced back to the 1970s, when the manufacturing industry was introduced to Computer-Aided Design (CAD). Following this, in 1980, the industry got Enterprise Resource Planning (ERP) and Customer Relationship Management in the 1990s, which helped the manufacturing industry grow spontaneously. These technologies were mainly focused on enhancing the productivity and efficiency of the processes by digitising them. Moreover, the NC (numeric control) then got a new variant, the CNC (computerised numeric control), with the advent of new computing technologies.

With Industrial Revolution 4.0, the value of previously siloed data is now increased when it is combined with operational data from ERP, supply chain, customer service, and other enterprise systems to produce entirely new levels of visibility and insight. The emergence of smart factories presents a fantastic opportunity for the manufacturing sector to enter the fourth industrial revolution, as real-time visibility of

manufacturing assets is ensured by analysing the massive amounts of Big Data collected from sensors on the factory floor. Additionally, it can give users access to tools for performing predictive maintenance to reduce equipment downtime.

Digital Transformation in the manufacturing industry

In recent years, we have observed the significance of Digital Transformation as a tool to have a competitive edge in the market and to build a global presence. DT in manufacturing and design can aid in enhancing speed, efficiency, and production capacity while reducing operational costs and collectively improving the customer experience. It has become a phenomenon to harness the power of technology at all nodes of a business to create revolutionary operational models.

The ecosystem of an organisation is changed through Digital Transformation on an operational, cultural, and organisational level. This is accomplished by integrating intelligent technology and processes into all levels and functions of the organisation in a purposeful, forward-looking manner. The analysis of the interviews reveals distinct trends. Customer experience, operational procedures, and business models are three crucial elements of executives' organisations that are being digitally transformed. Additionally, there are three distinct elements in each of these three pillars that are shifting.

With fewer workers needed to perform dangerous, routine, and physical jobs, digital technologies are making the manufacturing sector safer and more secure. Additionally, because the products' performance is constantly being checked, it is extending their lifespan and lowering operational costs for the customers. Reduced manufacturing lead times, management of right-first-time launches, enhanced customer service, and complexity management are all effects that customers can observe.

Of course, there are also the positive effects that come with less environmental impact, which are made possible by lower emissions, less waste, and more effective use of energy, water, and raw materials. Additionally, DT has a significant impact on ESG, as IoT can be used to reduce or eliminate water consumption in a plant or for environmentally important processes. All these factors demonstrated that digital transformation has proven lucrative for manufacturers, and as a result, new trends have emerged in the industry.

Emerging trends

With changing manufacturing methods and the advent of new technologies, various trends have emerged that are changing the course of the industry. Let us discuss some of them:

IIoT (the Industrial Internet of Things) is becoming the norm.

IIoT refers to a system of sensors, software, and related networking equipment that operates together to collect, control, and analyse data in a manufacturing unit. This configuration typically improves overall visibility while also facilitating troubleshooting and machine maintenance. IIoT can be implemented at any place where there is a need to collect data on performance, as it can aid in increasing efficiency, reducing costs, and ensuring the safety of industrial processes.

Manufacturing process automation: Automation in manufacturing is the process of creating a physical product using production management software or robotic tools. Businesses can use automated manufacturing processes to help with tasks like processing, assembly, inspection, inventory management, and production planning to ease their operations and reduce manual intervention and the chances of errors.

Composable manufacturing industry: Composable businesses are those that choose a modular strategy for creating a unique tech stack to adapt to changing markets. To stay ahead of competitors and satisfy customers, the composable enterprise can select from a variety of tools that they have developed or customised to meet their needs.

Impact of the digital revolution in the manufacturing sector

Digital transformation in the manufacturing sector can play a variety of roles, including leveraging the skills of employees, designers, managers, and suppliers; accelerating innovation; reducing production and maintenance costs; and amplifying the marketing impact. For instance, manufacturers are using virtual prototyping, which incorporates 3D Printing technologies, to lessen or even replace the need for physical prototypes.

Additionally, equipment based on cloud computing enables suppliers to collaborate as a more effective team while maintaining data security. Furthermore, digitalisation improves enterprise-wide insight to build value, save costs, predict and eliminate inefficiencies, and optimise production while adhering to regulations and maintaining data integrity. The advantage that digital transformation offers the manufacturing sector is that it ensures customer interactions and initiates engagement processes with new goods, services, tools, & apps. Additionally, it can help with modernising supplier contracting structures, back-end systems, and internal processes for integrated and straightforward operations. Despite these benefits, industries face numerous challenges in fully implementing new technologies and undergoing digital transformation.

Challenges in the adoption of digital transformation

Many businesses unintentionally create independent delivery teams that are cut off from business leaders, site operations, manufacturing excellence, and central IT by pursuing digital transformations as a theoretical exercise. Others fail to recognise the complexity of larger networks because they concentrate too much on replicating a single-site experience. Additionally, businesses use a one-size-fits-all strategy and pass up the chance to incorporate the customisation and adaptation required to take advantage of the particular circumstances, culture, and values of various factory locations. Some manufacturers experience "analysis paralysis," which is a condition in which excessive monitoring can confuse and divert manufacturers from their intended course. Additionally, some businesses use a lot of technology that does not add value. Business challenges will only get more difficult because of this technology, which has no obvious connection to actual value creation. Costs rise, and ultimately, it is the customer who bears the bill. The largest obstacle to digital transformation is the slowness of experimentation. This is closely related to businesses' unwillingness to change how they have been operating for a long time. Most businesses don't want to accept the significant risk of abruptly shifting lanes.

Ramping up digital innovations

How these few organisations began their impact journey is a key lesson from their success in ramping up digital innovations. Leading businesses invest time in determining the full potential of Industry 4.0, pinpointing high-leverage areas throughout the manufacturing value chain, and facilitating a laser-focused digital manufacturing strategy and deployment roadmap before diving headfirst into procurement and deployment. Digital Technologies (DT) today includes people, processes, and things in addition to tools and technologies. It encompasses elements like industrial operations, value chains, and services that are made possible by the expansion of the use of Digital Technologies in people, knowledge, and workplaces.

In a connected enterprise, systems, data, connected operations, and connected supply chains are replacing traditional systems, business models, and older work processes along with disruptive technologies. Companies must create a solid manufacturing strategy and deployment roadmap to speed up their Industry 4.0 transformations and map out a clear course to success in the future. ❐

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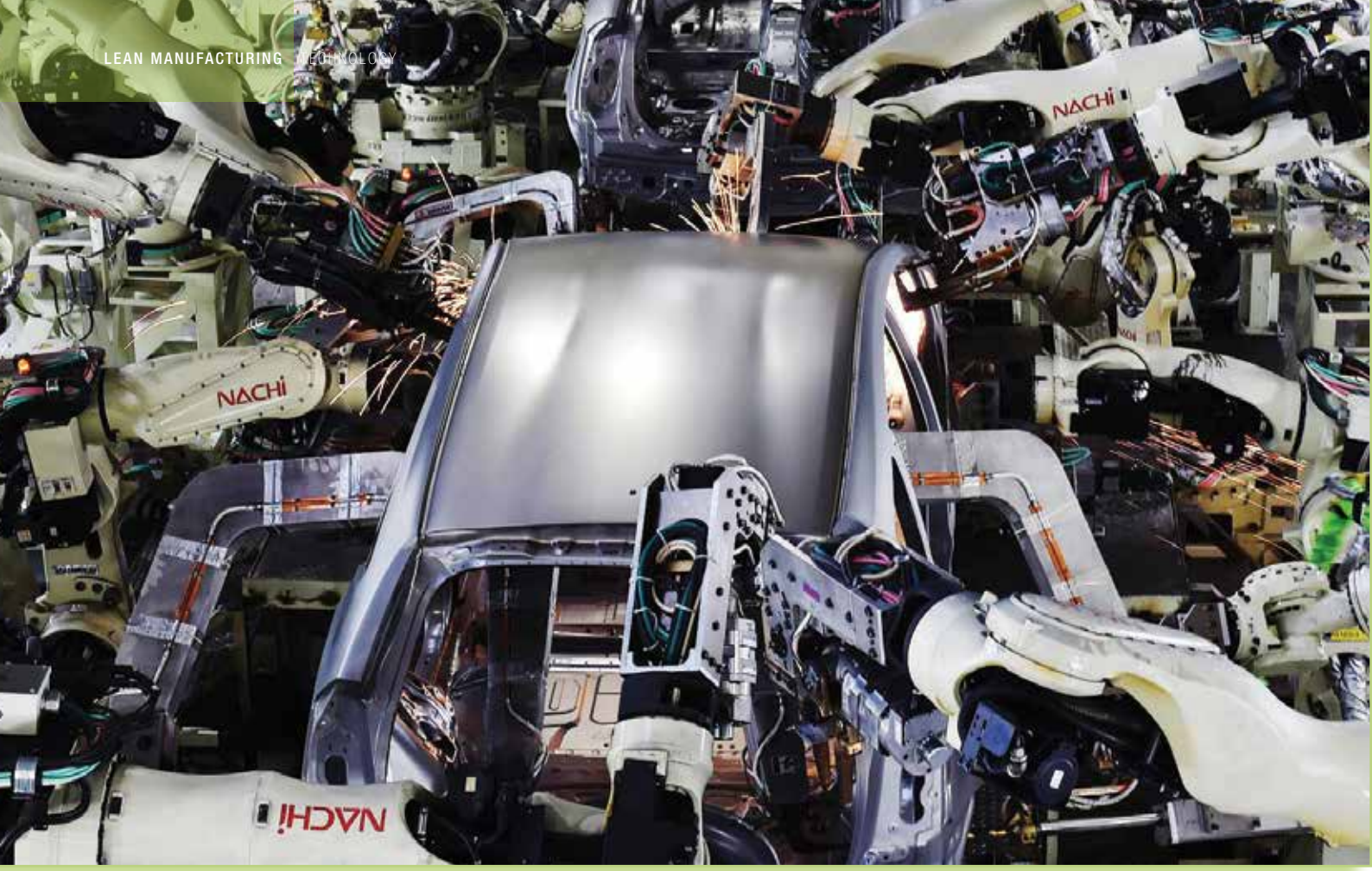

Why Lean triumphs?

The article describes how Lean production management can be considered a high risk – high return venture

Sanjeev Baitmangalkar,
Founder & Principal Consultant,
Stratmann Consulting

In a lesser-known part of the world, there was a machine tool factory that was truly remarkable. The workers not only performed the machining and assembly tasks, but also quality control, inventory management, pulling material from external vendors and internal suppliers, identifying and solving problems, thereby, improving productivity, quality and reducing cost through the elimination of wastes.

What was remarkable was, once the customer order came in and was recorded, based on the principle of First In First Out (FIFO) the workers controlled all activities until loading the machines on the trucks with little or no intervention from the supervision or management staff, like a 'human automated factory in motion'! The teams were autonomous, did not require white-collar staff, and could react to shifts in production content. That is the gold standard today for manufacturing. It was this similarity to their system that caught the eyes of Toyota and paved the way for their India entry.

Operating principles

Compared to the manufacturing culture of the time, everything here was different. The operating principles were pull production, moving inventory, quality control by process and not by inspection, production planning done by the customer and not the PPC department, stopping the process when a defect surfaces to eradicate it, and developing people who will be able to identify waste, solve problems, and eliminate them. Many companies of that time visited us to study what we were doing and how, some came repeatedly, but success eluded those whose CEO's or top management did not get involved. IIM Ahmedabad invited Mysore Kirloskar to teach this case in their Operations Management program, and subsequently, this case has been used by universities in Europe and the USA, besides becoming a reference for manufacturing industries.

Some production philosophies produce better results than others. There are some links between high productivity,

quality and product complexity. High technology is often not a solution for poor performance if technology is employed without suitable production management policies.

Eliminating potential failures

When people are asked , why do they design a factory with a store? Are you a warehouse or a manufacturing company? They look stunned. Who said that a manufacturing company needs to have a store? The concept of doing everything from a huge inventory is an old American concept! They find it difficult to comprehend the possibility of running a very busy factory without a store or a minimal amount of it. This is because that thinking is founded on 'what if something fails' rather than Poka Yoking or eliminating potential failures, which may be harder than the status quo.

We demonstrated this possibility in a Tier 1 company where they eliminated a few months of inventory and replaced it with a daily moving requirement, and when the vehicle business was low, they came out with flying colors. As the saying goes, 'shoot at the star; if you miss, you'll still be high'. So, however inordinate, thinking about and working towards these five good zeros can take you there: accidents, delays in delivery, defects, inventory, and lead times.

Case Study – BPMT, Indonesia

The tropical islands of Indonesia are known for their synthetic fabrics and garments. Despite textiles being a major export, they are little known for engineering goods, let alone machine tools. Bridgeport Perkasa (BPMT) limped for over five years without generating any revenue, they had neither produced a single machine, nor acquired any customers. When we changed our thinking, in less than six months, BPMT was flooded with orders from Europe and Asia, thumping out production.

A sight that brought the President, Ministers, and Ambassadors to see the magical change! When Electronica was in a dire state of losing money, a different way of working made their monthly P&L profitable in six months. When the technical textile unit of Precot had not made money for over five years since its inception, a different way of working turned their monthly P&L profitable in seven months and put them on a roll. And there are so many such examples and more of people who, during bad market conditions, saved their companies from colouring their P&Ls red. So, what is this new

Lean production can be considered a high-risk – high return venture, much of which can be mitigated with experience, a well-trained work force, responsive suppliers, and good product design.

way of thinking that has made such a big difference? What is this outperforming philosophy?

Unfolding the transition

The Henry Ford era saw manufacturing transition from craftsmanship to mass production. Scientific management became the buzzword where leagues of industrial engineers and foremen broke down tasks into simple elements, removed wasteful motion, and set job standards to match the ever-increasing pace of the assembly lines. The byproduct of standardisation was increased efficiency. The craftsmen who built automobiles before Ford used both hands and heads. The Ford way of thinking removed the head, leaving only hands-on work like a machine's gears. The Toyota Production System (TPS) was a great innovator, making use of both philosophies - the use of hands and mind by the operator, multiskilling them for an assortment of tasks, standardisation and flow—with the added glue of teamwork to produce astonishing results.

Inventory is one of the distinguishing features differentiating efficiency from inefficiency. In a perfect world, inventory would ideally be low, as it frees up the company's resources since idle parts & assemblies add zero value. Many factories have mimicked the west by carrying large inventories and will argue to reason the 'Just In Case' (JIC) failures such as supply shortages, breakdowns, rejections, strikes, etc. We can also call this a 'Buffered Production System' where one buffers against fears instead of solving problems. They have all eschewed the 'Just-in-Time' (JIT) philosophy & embraced the 'Just-in-Case' philosophy. Efficiency is minimising the time between the start and finish of a part or product's manufacture. Ford is known to have used high inventories, standardised products, huge volumes, and vertical integration. Toyota adopted a large-scale, highly efficient, constant-flow production philosophy. They built a local network of adaptable suppliers and integrated them with assembly plants, helping them grow to become JIT suppliers. Today, mastering this type of flexibility provides a significant competitive advantage.

Maximising efficiency with Lean

Lean production management philosophy presents some higher risks, as any hiccup will stop production. But the potential gains are stupendous. Thus, lean production can be considered a high-risk – high return venture. Much of the risk can be mitigated with experience, a well-trained work force, responsive suppliers, and good product design. A good Sensei can guide where one does not know how. With superior systems and deep thinking, JIT companies Poka Yoke all potential failures.The most successful lean companies have all developed these characteristics. The buffered production management, or JIC policy is a safe bet for steady but "unexceptional" returns. The short-term risk may be low, but so is the potential for long-term gains.

Why is there such a huge difference in the efficiencies between a lean company and a buffered or Just in Case managed company? Lean management systems encourage the full development and integration of all existing technologies, policies, and human resources in a way that traditional or buffered policies seem to miss. At Mysore Kirloskar, we had one person in every cell who had no direct responsibilities but was responsible for activities performed by operators (self-inspectors), audit quality, a trainer, and other specialists. This involvement is key to the integrated, continuous incremental improvement of skills, machines, and processes that elevates a lean production system over its buffered counterpart.

The answer is Lean

Where the desire is high returns, enhanced customer value, low order to delivery times, happy employees, a fast-responding, agile company, delighted customers, etc., then lean management, lean manufacturing, or just-in-time production is the answer to best fulfil such requirements. Think no more; partner with an experienced Sensei who has experience in transformational successes, not a random tool trainer, and embark on your journey. □

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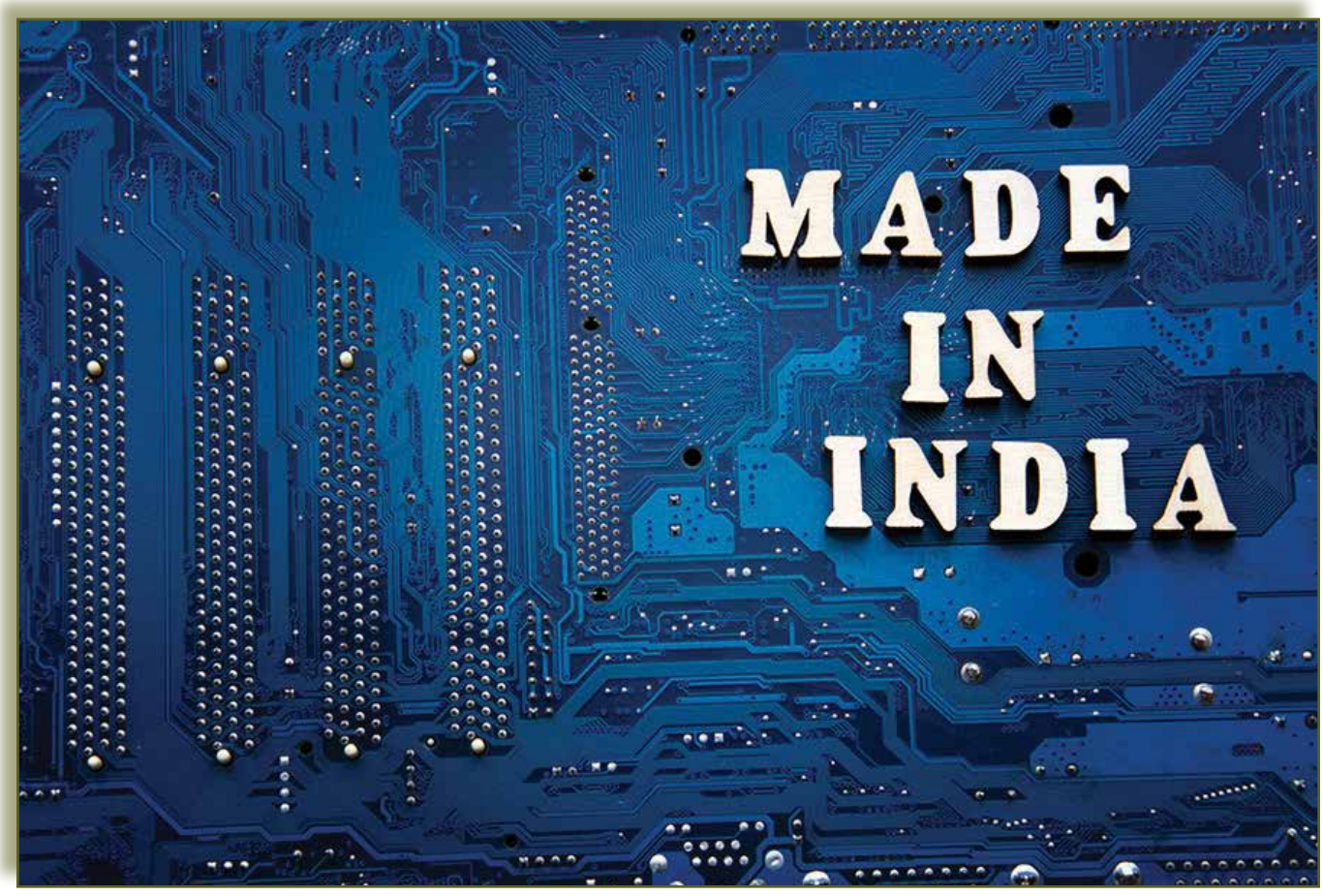

How are government policies helping the Indian manufacturing industry?

According to Cushman & Wakefield, India has ranked second in the 2021 Global Manufacturing Risk Index, overtaking the USA. The article evaluates the different government policies that will help India become the next manufacturing hub

Sukrit Bharati,
MD,
Virtuoso
Optoelectronics
Limited (VOEPL)

The Indian government recently set the goal of making India a global manufacturing hub. This is also partly due to the need to reduce import bills. India needs to generate more employment opportunities for the youth, and the rise in the manufacturing sector has given much, especially to the rural youth. The number is estimated to be close to 400 million when the manufacturing sector reaches the needed scale.

While China still ranks first in the global manufacturing risk index, many companies are looking at a second manufacturing hub to meet their growing demand and fill in unforeseen logistics gaps. The world is quickly moving towards a secondary supply hub that can meet the demand of this fast-paced industry. The global manufacturing supply has already been disrupted a few times in the recent past, resulting in massive delays and losses. This is a golden opportunity for the Indian manufacturing sector to step up and fill the void created by this new necessity. However, the time at hand is short.

Accelerating the required infrastructure

The competition is strong and fast-evolving. Many global players have already invested in India or are on the verge of doing so. The government needs to make progress and fast-track the development of necessary infrastructure. Not to say that plans aren't in place or aren't being worked on. However, speeding up the infrastructure's development rate will help the

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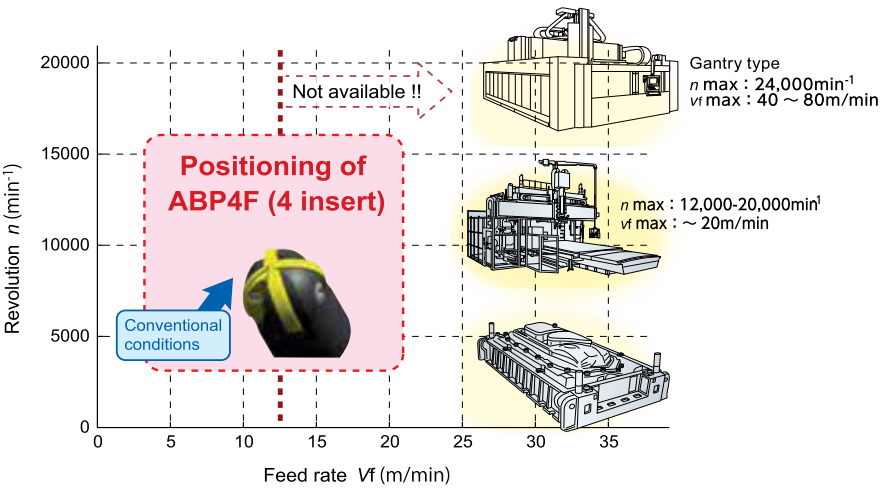
ABP4F type

Ball Precision Multi Flutes ABP4F

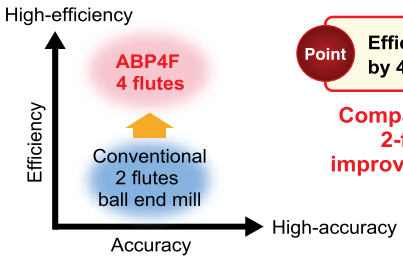
・New product: 4-flute ball end mill (ϕ20 to ϕ30) compatible with machines ranging from general-purpose manufacturing machines to the latest high-speed machines

Example of large press die for automotive parts



Processing advantage of 4-flutes end mill

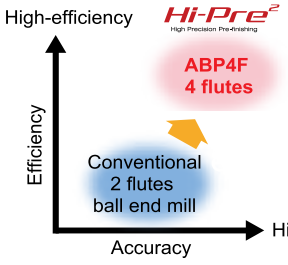
Figure Finishing



Point **Efficiency improves by 4-flutes end mill**

Compared with conventional 2-flutes ball end mill, improves cutting performance.

Figure Semi-Finishing



Point **Efficiency processing with small pitch**
↓
Reduce the processing load on semi-finishing
↓
Improve finishing accuracy

Compared with conventional 2-flutes ball end mill, improves cutting performance and accuracy.

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YOUR GLOBAL CRAFTSMAN STUDIO

Workers during the regular shift at a manufacturing unit

economy move a few steps ahead more quickly. The most basic and reliable infrastructure, to start with, for the manufacturing hubs will immensely help boost the sector and its global impact.

This will also help India reduce its dependence on imports and increase exports, - a crucial factor in strengthening the Indian economy. If a nation relies completely on imports, it has long-term negative effects, which no country would so desire. The right impetus for the manufacturing sector at this stage can exponentially increase India's growth rate.

To increase local manufacturing, there are a few key factors that need to be in place. Starting with demand, and right now, favourably, there is a huge and growing demand locally as well as globally. These demands, in most cases, have huge supply lead times, leading companies to look at alternative sources to meet the requirements.

To make the most of this, we need a holistic development of the whole ecosystem. Right from raw material suppliers to component developers, MSME entrepreneurs need the right legal and financial support from the government. This can include rebates, subsidies, low-interest long-term loans, and minimal red tape to gain benefits from such services.

Government schemes

The government has introduced Production Linked Incentive Schemes, new FDI policies, and segregated responsibilities between state and central governments to ease expansion for new and existing manufacturers. The PLI scheme, or Production Linked Incentive scheme was launched in March 2020 to boost the domestic manufacturing sector. As a part of the 'Make in India' initiative, this scheme offers an incentive to eligible firms on incremental sales for five years. Some of the industries covered under the new PLI's include white goods, food processing, aviation, textiles and apparel, mobile and allied equipment, etc.

PLI's also help ensure that local players' growing segments like air conditioners, air panes, mobile phones, etc. are shielded so that they can develop and set their processes until they can sustain themselves. Such policies help domestic businesses emerge at a global level. The more manufacturers perform at par with global standards, the more foreign players will want to source from India.

Boosting the manufacturing realm

Two key instruments of India's boost to the manufacturing sector are the National Investment and Manufacturing Zones (NIMZ) and Special Economic Zones (SEZ). NIMZs are set up to boost manufacturing, while SEZs' objective is to boost exports. In a broader sense, NIMZ's come under the purview of the state governments, and SEZ's fall under the central government. Both zones offer some sort of economic support to the companies operating in them. However, the benefits are not only for the companies but also for individual employees in the form of job security and upskilling programs.

The government's push for an increase in manufacturing also comes into play when major international players are looking at shifting their vendors from China to other markets, considering geopolitical reasons. A nudge in the correct direction can help India become a major global manufacturing hub. This will also need major infrastructure development, which is happening under the NIMZ's and SEZ's. However, the government is also focusing on developing road connectivity and electricity supply in areas surrounding these zones. This

Redefining precision

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JUNKER partner for precision

LTA

Zema

Sustained infrastructure development will be key to boosting India's manufacturing prowess

will help the manufacturers have a steady production line without any interruptions. Sustained infrastructure development will be key to boosting India's manufacturing prowess.

Another aspect of the NMP is Foreign Direct Investment (FDI). Under the policy, the FDI regulations have been eased to a certain extent, and in some cases, even 100% FDI is allowed to attract multinational conglomerates to India. Foreign investors can come in by partnering up with local players or can go big by investing in greenfield manufacturing plants, which will generate large employment and boost the local economy.

Hence, we as a nation must act now. While the government is constantly working on developing more opportunities and benefits for manufacturers, entities vested in manufacturing should make the most of the opportunities they have and should not waste time awaiting future economic packages and policies to be offered. These benefits will arrive in due course, however, if the manufacturers act today and take advantage of the current scenario, they can take better advantage of what lies ahead.

India becoming the next superpower

India's plan to develop the manufacturing sector is set to be achieved in the next 10–20 years. For that, the government and the manufacturers need to fulfil their commitments without faltering. Infrastructure needs steady, sustainable development, which would be a sensible choice instead of quick, unreliable development. Avoiding major setbacks will help us achieve the development goals in time. A keyword here is sustainable development, which will ensure the new processes that are set under this policy are also energy-efficient and can help rebuild the ecosystems that have been affected previously.

This can be further aided by helping the youth hone their skills and technical knowledge. Systematically designed technical courses for the learning generation are one way, while seminars, workshops, and expert panel discussions can help the already working youth upskill themselves to keep up with the upgraded trends. Empowering the youth today will also help generate more potential entrepreneurs in the future. A young generation that has spent a considerable amount of their early working years learning about an industry is more likely to continue working in that industry and strive towards setting their footprint in the same. Giving them the right education, knowledge, and skills, and the opportunity to keep expanding even as they grow in their jobs will solve the smaller equations of the bigger picture.

Key takeaways

We, as a nation, must come together and work towards achieving a common goal of becoming not only a manufacturing superpower but also an economic superpower. While these are long-term objectives, they will necessitate systematic progress monitoring in the short term so that courses can be aligned to compensate for deviations. These can be in the form of revising policies and strategies and taking appropriate actions to meet the changing demands of an ever-evolving world.

The government's call to self-dependence came at a time when the future was unclear and where society was headed was foggy. As the world came to a standstill, there were uncertainties in every industry. While many still rely on their foreign vendors for supplies, processes are underway to reduce this reliance. Lower lead times, lower logistics costs, and better control over quality are just a few highlights. The urge to develop in India has many economic benefits, which will lead to a better India for everyone. □

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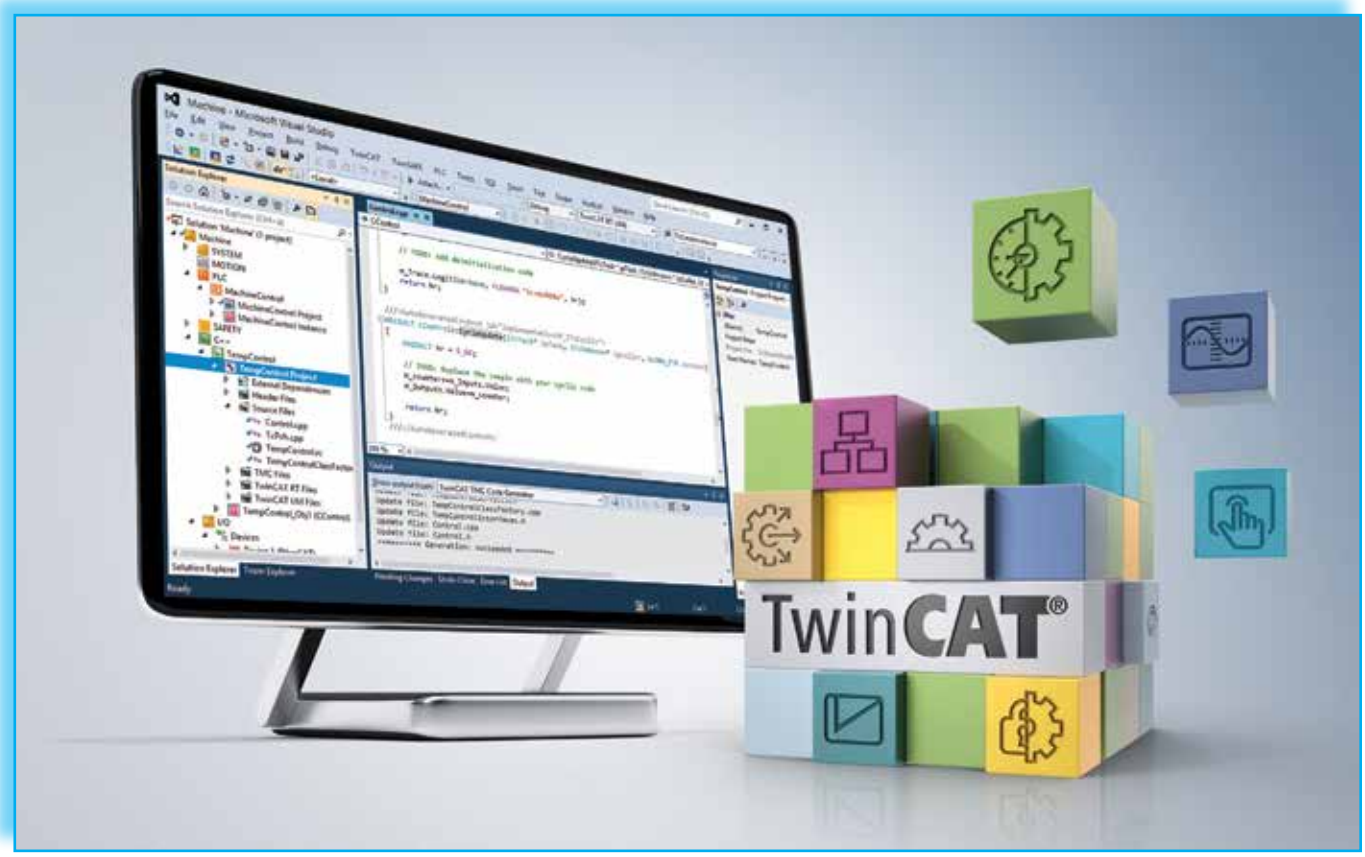

Accelerating digitisation process

The article explains how Beckhoff's TwinCAT analytics tool offers a constant eye on the production processes to achieve maximum performance.

Pascal Dresselhaus,
Product Manager TwinCAT,
Beckhoff Automation

When it comes to evaluating production in a manufacturing plant, individual analysis of each piece of equipment is not enough. More often than not, the process of calculating characteristic values calls for a bigger picture, which is precisely where TwinCAT Analytics comes in. This tool makes it incredibly easy to adopt a more comprehensive approach, calculate key production figures, and monitor equipment. With the corresponding engineering carried out entirely by the machine builder or system integrator, this opens up a whole new spectrum of data-based business models.

TwinCAT Analytics maps a complete workflow for achieving these all-important goals, ranging from data acquisition and communication, through data storage, sifting, and analysis, to the continuous analysis of machine and plant data via a web-based dashboard.

Workflow openness and simplicity

The software can be used across all sectors of the manufacturing industry and beyond since it is also possible to analyse information such as building data. Even significant differences in sampling rates ranging from microseconds to a few seconds can be combined within a single analysis. In addition to PC-based control technology from Beckhoff, data from third-party systems can also be acquired via corresponding gateways, with OPC UA serving as the downward interface.

Perhaps the most essential contributor to a well-founded analysis is reliably stored machine and production data. This backup can be performed directly on the machine's control computer, on an on-site server computer or edge device, or even in a cloud system, allowing users and end users to decide for themselves where the data should be stored. To achieve maximum performance, especially in the case of high-resolution sampled data, the information is communicated and stored in a binary format without compromising on openness. The data can be converted into readable data formats such as csv, either manually using tools, or even automatically.

In terms of engineering, a variety of algorithms can be used

Dashboard with interactive functions enabled, allowing controls on the displayed grid in the web browser to be moved, enlarged, reduced and shown or hidden

to analyse the communicated data in just a few clicks, with the spectrum ranging from simple to comprehensive. Simple piece counters and cycle time monitoring, or key figures such as overall equipment effectiveness (OEE) can be calculated in the same way as, for example, frequency spectra, clustering procedures, or dynamic time warping for finding correlations. The option is also available to integrate machine learning models, which is where the TwinCAT Machine Learning inference products come into play.

Wizard support for a customised dashboard experience

The integrated software wizard in the TwinCAT Analytics Workbench assists with creating continuous data analyses and can be used to automatically generate a One-Click Dashboard. As its name suggests, this dashboard can be easily customized with the users' logos, header colors, background images, and themes, as well as different languages, without any programming effort. The functions are all based on the comprehensive options offered by TwinCAT HMI. User management, for example, is integrated into the dashboard generation process. It is even possible to map different roles for end users, allowing machine operators, production and plant managers, as well as managing directors alike, to access the information they need in the HTML5-based dashboard. This feature is platform-independent, which means that the dashboard can be used on a machine control panel, an office PC, or even a mobile device.

The tile-based design used by Analytics is the ideal choice for creating a responsive interface. Raw data, including states or temperatures of machine parts, can be displayed in the dashboard alongside analysed data, such as the number of pieces produced per minute or quality indicators. Appropriate HMI controls can be selected for all data, whether that's tables with colour coding, individual tiles with count values, pie and bar charts, trend line charts with fast range switching, or animated tiles displaying minimum, maximum, and average values.

Greater runtime flexibility

The dashboard enables users to switch data sources in runtime mode. The option is available to display both live and historical data side by side; however, once a particular dashboard configuration has been set up, it is unlikely that this will always be suitable for every user role going forward. With this in mind, the TwinCAT Analytics dashboard now offers a range of new interactive functions. Depending on the respective user, the dashboards can be customised further still during runtime within the web browser.

HMI controls can be shown and hidden, and their position and size can be changed. The individually selected theme and language can also be saved for each user. In the future, there will be an interactive chart available, that can be easily added to any dashboard page during runtime and freely configured with data from different sources—for example, it will be possible to superimpose consumption data from different periods. Users can also adjust the display format in the chart and switch from line to bar charts or similar representations. For these changes, it is no longer necessary to return to engineering mode.

Displaying user data

The dashboard and its data displays are far from being the end of the data processing functions. The reporting functionality, which is also new, makes it possible to summarise raw or processed data into reports in an automated way based on scheduled times or triggered by events. This information can then be output as a PDF, JSON, or HTML file. Individual headers can be added depending on the particular application, which for test bench applications might include the test item number, test procedure description, and test duration.

The user data itself can be listed in tabular form, in charts, or with simple labels. The function is, therefore, also suitable for simply recording daily production and building data, and the time-consuming process of manually filling out lists can be eliminated. With the integrated email function, a report can also be used to implement a notification system. It is through functions such as these and the simplified workflow they afford that TwinCAT Analytics represents an undeniable asset when it comes to accelerating the digitisation process. □

Transforming with Industrial Maintenance

Traditionally, 'Industrial Maintenance' refers to processes used to reduce breakdowns or increase uptime. This includes delivering high-standard upkeep to allow equipment to function consistently and reliably. But this definition is now undergoing an amendment. Areas within Industrial Maintenance are undergoing a transformation. A read on...

Sudhir Gurtoo,
MD and CEO,
Leadec India

Around six decades ago, at an academic conference, John McCarthy coined the term 'Artificial Intelligence', and mankind has since been on a quest to discover new possibilities for what computer software can do. Now, around 65 years later, Artificial Intelligence (AI) is in almost everything that surrounds us; it is embedded into the very existence of human life. To speak in a layman's language, AI can be understood as a computer's ability to comprehend and execute complex tasks or a set of tasks that are usually carried out by humans; hence, require human-brain-like cognitive functionality. This is made possible by programming software to identify and replicate the thinking patterns of human beings and also with the help of huge data; it can then be processed in numerous combinations to solve new problems or execute complex tasks.

Technologies fostering Industrial Maintenance transformation

We, at Leadec, are initiating a transformation. One that may be faster to market is what may be termed Remote Industrial Maintenance. This concept was unheard of earlier. But with new technology allowing us to e-travel, wearing our virtual headgear, the diagnostic skills can be much better shared across larger geographical horizons. In the past or even today, skills were kept localised, typically at a point close to the machine location. This will soon change! As an example, we can now have two PLC/robot programmers, sitting in our Pune office, but accessible to our 3000-strong workforce, working at 40 industrial sites, and geographically spread across India.

The plant manager can open his screen and check all the data that he needs.

IoT helps make this remote maintenance become a reality. The obvious benefit of Remote Industrial Maintenance is better utilisation of resources. at present, today, it is imperative to station, one programmer at each of say, 20 industrial maintenance sites, where we may need fast programming if a breakdown kicks in. But mostly the programmers, at present are idle or underutilised and need to wait for a breakdown, where they will get pulled in. Tomorrow one can plan a team of two maintenance programmers, located centrally in Zone A and on standby, another team of two, positioned centrally in Zone B.

Assuming IoT and internet connections do support, these two central zones can serve all our sites, across India. This way, the critical skills get shared. From 20 remotely spread-out programmers, we can consider downsizing to four specialists. The team begins to report a better percentage of utilisation too. And on top of that, it allows savings for all—both OEMs and the service providers of industrial maintenance.

Allocating the right skill to the right place

Thus there is no need to position our high-cost skills at industrial plant sites. The high-cost skill can be positioned in a central place. Of course, one can't imagine Industrial Maintenance without personnel at the site. So, one will need a few low-skilled personnel at the site. These support teams can be guided by the skills at the center. If a robot breaks down on a paint line, the low-skill person will reach the robot immediately, wearing his VR headgear, and the colleague at the centre will guide him step by step.

The other transformation we see happening is in the way we monitor Industrial Maintenance. The use of apps and common dashboards helps get all relevant information on one screen. Thus, the plant manager can now open this one screen and check all the data that he needs. In the past, the person had to either call some personnel to seek the same data or walk to various points and ascertain. Data about machine uptime, power consumption, utilisation rate, data on PM, spare parts availability, etc. can all be accessed on one screen.

Needless to say, decision-making is better and speedier, with real-time data at hand. The dashboards can be easily configured to suit the requirements of the user or management. For tracking activities, cloud-based applications are used for timely PM of each machine, predictive checks, spare parts management, breakdown management, work order flow, etc.

Kaizen maintenance

Kaizen in maintenance is another interesting activity, that needs special mention. It is a known fact that personnel working in industrial maintenance are either too busy or get free time. If you have an unplanned breakdown, it can eat up hours of a maintenance team's time, including the need to stay back (overtime), while other colleagues may have gone home! But there are also moments of freedom. These can happen if a machine for PM is not available, or you come across a shortage of spare parts. And here comes what I call a "Kaizen moment!"

We encourage our site teams to grab or create Kaizen moments at the site. These are opportunities to look at improving existing SOPs, reviewing tool inventory and tool usage, reviewing skill sets, etc. It could also mean reviewing the PM process and activities listed in manuals. A simple walk through spares stores can generate some new Kaizen ideas, like reconfiguring the location of spare parts, based on usage

The plant manager can open his screen and check all the data that he needs.

area or labelling spares as red, green, or yellow.

Phase 2 of Kaizen then extends to the OEM's practices and premises. Here, our team looks at ideas to reduce movement, or improve flows using the famous '7 Wastes' principle. Kaizens must be documented and shared with the superior or OEM supervisor. While we do award our best Kaizens, we also recommend and get these awarded by our customers if we can get savings through our Kaizen ideas.

Valuing people is essential

Across many industrial sites that we came across, we noticed the maintenance team was given less respect than usual, whereas production personnel commanded higher respect from their site management. This is something that needs to be reviewed and changed. Interestingly, while production personnel do seem to deliver output, the strength behind that delivery is the maintenance team. Keeping machines healthy and making them work non-stop, while also tolerating abuse is a tough ask.

If the machine misbehaves, typically it requires a high level of diagnostic skill to get it back to normal mode. Here comes the expertise, brought in by team maintenance. Outwardly, production personnel are seen moving in front of machines and being active. They are also the first to record or report any issues with machine behavior. Maintenance personnel mostly work behind the machine and are less visible. Also, a stoppage easily gets blamed on maintenance and slackness in PM.

Equilibrium between production and maintenance

The management must maintain an equal balance between the two critical areas - production and maintenance. Also, the selection of maintenance personnel is quite critical. It is not easy to gauge the diagnostic skills of a person while interviewing for a job. It is advised conducting quick tests or giving physical exercises in assembly, disassembly of equipment, or planning a diagnostic test panel, to filter the incoming talent.

Some people are good at predictive sensing. For example, one of our employees suggested stopping a large AHU fan as he felt the noise had decreased by just 5%. Many others felt no change. When a thorough check was done, it was observed that a crack had begun to form on the large blade. It saved the OEM from expensive potential damage at the site if the blade would have sheared off.

How are machines helping themselves?

It is evident how Industrial Maintenance is transforming. Virtual Reality is allowing the use of remote guidance and diagnostics. IoT is allowing everything in the plant and beyond to stay connected with real-time data. Machines are now able to talk to each other and talk with remotely positioned resources. Utilisation ratio of maintenance personnel at the site or remotely positioned thus sees an upward trend.

Future Maintenance 5.0 will see how machines can help themselves and how they can indicate their pain points. For example, the machine sends an SMS, "my spindle bearing is feeling heavy and wobbly...please check ". Such a message gets triggered from the machine without physical intervention, basic vibration sensors, etc. Self-diagnostics and self-healing techniques get introduced in our Industrial Maintenance world! □

Fast-tracking towards sustainable future:

Industry leaders speak on achieving cleaner, safer, and futuristic mobility

With focus on 'Cleaner, Safer and Futuristic mobility', our magazines - Efficient Manufacturing and Automation & Digitisation, hosted the 4th edition of International Automotive Manufacturing Summit (IAMS) 2022 at Pune recently. A post-event report…

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The future of mobility is evolving, and electric vehicles have transformed the automobile industry. EVs are key to driving innovation and building a sustainable future, thus contributing towards controlling climate change. With the above backdrop, EM and A&D hosted the 4th edition of the International Automotive Manufacturing Summit (IAMS) 2022 at the Sheraton Grand, Pune, on December 20, 2022.

EVs are key

The day-long event witnessed more than 130 participants and industry professionals that complemented strong minds, positive energy, and seamless collaboration between speakers and delegates. With Technology Partners – EPLAN India, Carl Zeiss and Mitsubishi Electric, along with ARAI and C4i4 LAB as Knowledge Partners. There were constructive talks on EVs, battery, automation, Industry 4.0, localisation, digitisation, automotive light weighting, MSME's and IT in EV landscapes. We also had a strong line-up of speakers from different facets of the automotive industry that ensured the right pain points and solutions to focus on today.

What did our speakers talk about?

Keynote on Digital Factory

"Automotive sector operations are becoming more complex day by day. Therefore, virtual digital factory of complete operations can be useful to simulate and visualise, foresee product quality issues and manufacturing issues."

Vivek Sharma,
Sr. Vice President & Head –
Central Manufacturing Engineering,
Automotive Sector, Mahindra & Mahindra

Keynote speaker

"It is high time, we realise that if at all we are having any second doubt, EV is the future. Overall initial pricing of EVs need to be worked upon. There is going to be huge requirement for skill sets as we move towards EVs."

Arvind Goel,
MD & CEO,
Tata AutoComp

Keynote speaker on Addressing Light Weighting through Manufacturing Simulation

"According to the Automotive Research Association of India (ARAI) (Design, Engineering, & Simulation), Manufacturing Simulation will help achieve stringent delivery and control throughout the development cycle, along with smooth development, reduced cycle time, and delivery date, and finally achieve innovation without risk."

Jagannath Paranjpe,
Dy General Manager, Automotive Research Association of India ARAI

Presentation on new energy vehicles and quality assurance of components

"The government has laid out a clear plan for electric passenger vehicles to be 30% of the market by 2030, and by 2030, we can have 70% of the last mile connectivity electrified. Also, renewable energy should be promoted."

Manoj K Sundaram,
Head - Business Development,
Carl Ziess

Role of Steel in Automotive Lightweighting

"There is a strong growth of aluminium in premium cars. However, steel has an advantage in terms of carbon footprint, cost, and speed of manufacturing the component. With proper selection of ultra-high strength steel with advanced forming methods there is a light weighting reduction by 30 to 40%."

Ankur Kumar,
Head Marketing,
Automotive & Special Products Tata Steel

How localisation trend among automotive OEMs will help domestic technology supplier

"The key advantage of localisation is shielding from global economic fluctuations leading to reduction in time, reduction in investments, and supply chain time is also reduced. This leads to revenue generation and better stability in the market."

Divya Ramaraika,
Managing Director,
Star Engineering

Changing Landscape of Future Automotive

"The new way of manufacturing requires mastering complexity and individualism. Also, there are other game changers, including predictive analysis, powertrain electrification, advanced robotics, AI, IoT, automation, new materials and structures, autonomous transportation, and ubiquitous connectivity."

Sudhir Gurtoo,
Managing Director,
Leadec India

Special Address by the Keynote on a perspective on role of MSME in Auto + EV Manufacturing – Opportunities & Challenges

"Worldwide, major technology partners are exploring partnerships for the absorption of technologies and manufacturing their products in India. For this, we will have to raise our levels, get in sync with Industry 4.0, and match the global culture. MSMEs are going to stay and they will really cater to the manufacturing global industry."

Shailendra Goswami,
Chairman & Managing Director,
Pushkaraj Group

Fire Side Chat – MSME Challenges & Future – Automotive

It was hosted by Shirish Kulkarni, Founder & MD – Strota ConsulTech. He touched upon how ARAI helps to regulate the policies and technological advancements between government, OEM's and startups.

Shirish Kulkarni,
Founder & MD – Strota ConsulTech

"Apart from certifications, we also work in technology development, where we identify the future trends in the Indian industry and also do validation testing for the industrially developed prototypes. Here, we carry out a comprehensive validation exercise so that the industry gets a good, finished product"

Anand Deshpande,
Director – ARAI

Panel Discussion 1: Digitalisation in Automotive Manufacturing

The Moderator was Rajesh Nath. He touched upon points such as difference between digitisation & digitalisation, adopting digital strategy, challenges for MSME in adopting digitisation, meeting challenges of evolving customer demand in automotive sector, robust supply chain ecosystem to meet digital transformation, can digitalisation of Industry 4.0 catalyse the growth of exports, way forward for Indian automotive industry in their digitalisation journey.

Rajesh Nath (Moderator),
MD, VDMA

"The clear difference between digitisation and digitalisation is that digitisation plus intelligence can result in digitalisation, and this process of digitising and digitalising has been widely used across the value chain, including marketing, sales, support, and everywhere."

Umesh Pai,
MD,
EPLAN Software & Services

"With the introduction of Industry 4.0, entrepreneurial and organisational qualities have manifold effects, as getting the right data at the right time benefits not only the organisation but its representatives as well."

Sandeep Chaudhary,
MD, HUF India

"This new age being the smart manufacturing age, the MSME's, SME's, and the big giants should not be afraid of any new technologies as the solutions available for these are very easily available"

Sunil Mehta,
General Manager,
Mitsubishi Electric

"MSME's still do not have proper skills and have misconceptions about how to implement Industry 4.0. Industry 4.0 is not a destination; it must be a journey where organisations need to take baby steps to keep adding to the journey."

Vijay Jawade,
Director,
Sales & Marketing,
Emerson Automation Solutions

"MSMEs can identify the problem, understand the challenge, and put it through the process by applying common logic. Expensive programmers and software will not solve the issues pertaining to the organisation."

Ajey Pathak,
Head of Marketing & Business Development, Beckhoff Automation

Panel Discussion 2: Indian EV Ecosystem – The Challenges & Opportunities

"It was hosted by Shirish Kulkarni and the points were elaborated on Adoption of EVs and constraints in the EV ecosystem, Success story of EV OEM in Indian context, Streamlining EV Supply Chain, Reliability & Sustainability playing a key role."

Shirish Kulkarni (Moderator),
Founder & Managing Director,
Strota ConsulTech

"There is a strong growth of aluminium in premium cars. However, steel has an advantage in terms of carbon footprint, cost, and speed of manufacturing the component. With proper selection of ultra-high strength steel with advanced forming methods there is a light weighting reduction by 30 to 40%."

Srikumar Maganti,
General Manager -Technical,
EDS Technologies

"Lithium is going to stay here at least for a decade, with lowest atomic weight and high energy. Unless and until there is a breakthrough material, which is not through a normal alternate material but through a composite, I think lithium and batteries will continue to have their presence, especially for the onboard applications."

Abhay Patwardhan,
Director & Co-Founder,
PowerSwap R&D

"In the process of stepping up in the EV ecosystem, there are chances that a few things can be overlooked. Therefore, we provide support right from all the physical domains to all the safety standards."

Nitin Dhande,
Head of Marketing, ARAI

"When it comes to EVs, there are multiple components that are totally different from ICE engines. When it will reach the stage of implementation, there must be trials and prototypes so that the whole engine plays right during its performance."

Krishna Bhojkar,
Ex Skoda,
Manufacturing Planning

Transforming Capabilities of Auto Supply Chain for Electric Future

"The future of India will be changed by engineers, and manufacturing has always brought massive growth to the country. GDP will bring growth to the country only if productivity increases."

Dr Sanjeev Kumar,
Head of Business Development India,
Renishaw Solutions

Panel Discussion 3: Future of E-Mobility Manufacturing and way forward

This panel discussion was chaired by Ravindra Utgikar, Praj Industries. The discussion points with the panellist were – Auto OEM perspectives on EV – Challenges & Solutions, Robust ecosystem to manage component value chain, Standardisation, testing and certification as a key processes, Quality, safety and lifecycle aspects of EV.

Ravindra Utgikar (Moderator),
Vice President Corporate Strategy & Marketing, Praj Industries

"The progression of EVs last year resulted in the sale of 3.5 lakh vehicles, of which only 4% were passenger vehicles, and the main sale was in 2, 3, and 4 vehicles. And the reasons for less sales in commercial vehicles were range anxiety, whopping prices, and battery degradation"

Ajay Kavade,
Sr. GM-Manufacturing, VW

"Start-ups are really in a bit of a hurry, and they do understand the importance of right designing and right testing. Testing and design should be followed religiously. However, EV's in other countries like China, London, UK, USA function smoothly"

Dr Manoj Mondani,
Director, ATS

"In the EV landscape, IT's role is one of support or enablement for the automobile players. Other enablers are lower computing costs, upgraded connectivity, emerging cloud computing, and AI and ML play. Also, the role of auto manufacturers has broken its boundaries and evolved to that of ecosystem orchestrators."

Nisarg Suthar,
Domain Expert, TCS

"When it comes to light weighting, there are three main issues that we found out- what kind of material to use, characterisation the material and the porosity of the battery tray."

Rohan Tonde,
Marketing Manager,
Carl Zeiss

Solution to address EV thermal runaway

Honeywell India recently announced its strategic alliance with Nexceris, developer of Li-ion Tamer® lithium-ion gas detection solutions, to help make electric vehicles (EVs) safer. The alliance will offer advanced automotive sensing technology to help prevent conditions leading to thermal runaway in EV batteries, a phenomenon that causes extremely high temperatures within the battery cell and can result in a fire.

Global sales of EVs doubled in 2021 from the previous year to nearly 7 million , and India's electric vehicle market is expected to grow at a CAGR of 90% in this decade to touch $150 billion by 2030. Many of these vehicles today use lithium-ion batteries as an energy source, which can pose safety risks that can impact EV owners. To help mitigate these risks, automobile manufacturers are looking to incorporate technology to provide enhanced safety. Honeywell battery sensors, gas detection monitoring portfolio, and manufacturing expertise combined with Li-Ion Tamer gas detection solutions will address electric vehicle thermal runaway, one of the primary risks that can cause vehicle failure and fires.

Advanced automotive sensing technology

Elaborating about the technology, Rajesh Rege, President, Honeywell India, mentioned, "As more people switch to electric vehicles, automakers need to supply lithium-ion batteries that are reliable, safe, and secure at every point of their lifespan. EV sales are likely to increase exponentially in the coming months and years due to the demand incentives provided under FAME II, the launch of state policies, rising fuel prices, tightening emissions laws, and increasing awareness of the green environment. Honeywell is assisting this transition to more EVs on the road by providing ready-now solutions to help reduce safety concerns. Honeywell's collaboration with Nexceris to develop an enhanced suite of battery monitoring sensors will help automotive manufacturers strengthen their battery health monitoring systems with the ability to detect thermal runaway conditions even earlier,"

Speaking about the empowerment of the global transition to the EV, Kyle Shen, President and CEO, Nexceris, said, "Our work with Honeywell will help us empower the global transition to electric vehicles through enhanced battery monitoring. Fires from lithium-ion batteries are dangerous and often difficult to contain once they start. By combining our shared expertise in battery sensing and gas detection technology with Honeywell's extensive manufacturing capabilities, we will be working toward offering our vehicle manufacturing customers a more advanced safety solution and meeting the growing demand for lithium-ion batteries."

Honeywell India | Pune

New solutions to reduce costs and improve manufacturing processes

Meltio recently facilitated the use of its unique metal 3D printing solutions. The Spanish multinational has today presented two new innovations to increase the reliability of metal part manufacturing for creating accuracy parts- the Meltio Horizon software and the new Laser Calibration System.

Speaking about the solution, Ángel Llavero, CEO, Meltio, said, "We have developed the Meltio Horizon software and the Laser Calibration System with the aim of facilitating the use of Meltio's metal 3D printing technology for industries around the world. It should be noted that metal additive manufacturing has historically been associated with complex and expensive software, limited to the use of very few people because it was very specialised. These solutions will facilitate and shorten the learning curve for democratising metal 3D printing."

Meltio laser calibration system

Features of Meltio Horizon:

- **Easy to use:** Only settings relevant to Meltio's laser-wire metal 3D printing process are available.
- **Cost calculation:** Easily configure printing cost model and automatically calculate the cost per part in each project
- **Future proof:** Builds a dedicated platform for toolpath generation
- **Tailor-made to laser-wire:** Made to measure Meltio's wire-laser metal 3D printing process
- **Combined material profile:** Everything is in the slicer
- **Custom gas profile:** Configure gas source & cost directly within Meltio Horizon
- **Custom build plates / work spaces:** Build plates can be defined by the user and stored as presets.
- **Automatic updates:** Updates of the Meltio Horizon & new printing parameters are available through slicer.
- **2D and 3D previews:** Meltio Horizon provides a 2D and a 3D preview of the toolpath.
- **Project files incorporated:** The complete project file can be conveniently stored and shared.

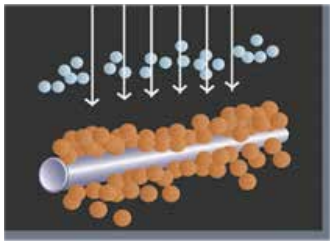
Features of Laser Calibration System:

- **Accuracy:** Calibrate Meltio's multi-laser deposition head accurately and effortlessly
- **Speed:** Reduces calibration time by half
- **Compatibility:** Tailor-made software interface with portable tablet
- **Packaging:** Comes in a protective case
- **Ease of use:** Simple to set up, and run.
- **Repeatability:** It allows calibration of the lasers to be done in the exact same way every time
- **Traceability:** The kit keeps a track of the calibration process

Meltio | Spain

Specially formulated rust preventive oils

ZAVENIR DAUBERT INDIA offers NOX-RUST® RUST PREVENTIVE OIL providing a range of specially formulated rust preventive oils giving excellent protection in areas of high humidity & temperature. Because of thin film technology, NOX-RUST® oils offer significant cost and performance advantages over other poorly formulated rust preventive oils on the market.



Specially formulated rust preventive oils

It comes with four benefits:

i. Low evaporation losses - Higher Flash Points
ii. Thin tack free film - Very Low aromatic content and strong Demulsification
iii. Higher coverage, low consumption - Lower viscosities based on Thin Film Technology
iv. Excellent rust protection in severe conditions - High Salt spray and Humidity chamber life

In most manufacturing industries, part protection during shipping or storage before final assembly is crucial, and the use of RP oils is essential. The performance of an RP to get the best corrosion protection can be demonstrated by its high Salt Spray (SST) Life. An aspect in which Contact Corrosion Inhibition (CCI) based RP oils exemplify enduringness.

ZAVENIR DAUBERT INDIA | Haryana

Compressive and tensile strength gasket

Trelleborg announced the debut of its new Turcon® Tran-SECURE™ PTFE manway lid gasket. The new manway lid gasket offers customers an enhanced sealing solution with an improved design featuring Trelleborg's proprietary, high-performance Turcon® PTFE material. The glass-reinforced polytetrafluoroethylene (PTFE) delivers improved compressive and tensile strength, while minimizing creep relaxation to ensure a tight seal over an extended period of time. Explaining about the gasket, Thijs Menzel, Segment Director, Chemical Transportation, Trelleborg Sealing Solutions, said, "Chemical industry faces many challenges both in the processing of materials and in the transportation materials to customers. To fulfill the need for a single-source supplier for sealing requirements, we developed the new Turcon® PTFE manway lid gasket. Our materials engineers specially selected the proprietary Turcon® PTFE compound because of its superior sealing qualities when transporting a broad range of chemicals and other liquid commodities." The chevron-based design of the gasket uses the PTFE's inherent elasticity to create its own sealing pressure, which helps it resist the deformation common to other manway gasket materials without sacrificing sealing force or surface pressure.

Turcon® Tran-SECURE™ PTFE manway lid gasket

Trelleborg Group | Karnataka

Wiper geometries increase in productivity and quality

Walter recently launched two turning indexable insert geometries that combine the "wiper effect" with new chipbreaker geometries and extremely wear-resistant Walter Tigertec® Gold grades. The curved wiper edge sweeps over the surface again, making it possible to either double the feed & increase productivity by 100 percent or double the surface quality while maintaining the same feed. With the new geometries, Walter is now also transferring this effect from the FW5 and MW5 double-sided cutting inserts to indexable inserts with a positive basic shape. The result is the FW4 geometry with a narrow chip breaker for finishing operations and the MW4 geometry with an open chip breaker groove and a longer radiused wiper cutting edge for medium machining. Both geometries are designed for universal application in ISO materials P, M, and K, as well as for secondary applications in ISO S. Both the FW4 and MW4 geometries make it possible to achieve improved surface quality, productivity, and process reliability. Thanks to the wiper edge's curved design, this also applies when the machine is not aligned 100 percent precisely (for example, after a crash or if the turret is slightly offset).

Walter MW4 turning indexable insert

Walter India | Pune

Critical components in metalworking

Quaker Houghton offers Metal Removal Fluids to many industries, including automotive, aerospace, fabricated metal goods, bearings, machinery, and more. Our coolants and lubricants are optimised for use with cast iron, compacted graphitic iron, stainless and carbon steel, aluminium alloys, superalloys made of titanium, nickel, and copper alloys, carbides, glass, and composite materials. The Metal Removal Fluids are formulated to be used with the various metals and local conditions encountered in a variety of operations. With these specialised products combined with industry-leading service, Quaker Houghton can support ongoing business, resulting in increased productivity and improved total cost of ownership Metal Removal Fluids are critical components in metalworking processes. Acting as lubricants and coolants, these fluids reduce friction between the workpiece and the machine tool. Quaker fluids are formulated to solve today's major metalworking challenges and offer the following benefits including, increase in tool life, improved surface finish, enhanced fluid life, optimized cycle time, improved environmental impact from low consumption, foam and soap reduction, elimination of harmful chemicals, and more.

Quaker Houghton | Kolkata

Liquid Tool ensuring a smooth production process

Blaser Swisslube offers liquid tooling solutions to its customers, meeting high quality standards along with productivity, cost-effectiveness & processing quality, which are considered as major factors depending on the selection and quality of the metalworking fluid.

Punit Gupta, Managing Director-West Asia (India and SEA) says “With our extensive machining know-how, customised services and first-class products, we can help our customers to fully exhaust the potential of their machines and tools furthermore to convert the metalworking fluid into a central factor for success – a Liquid Tool,”

When it comes to achieving the best possible efficiency in production processes, many factors play a role. The right choice and care of the metalworking fluid should not be underestimated.

Once the right metalworking fluid is in use, you can't just sit back and relax. After all, water-miscible coolants do a lot of hard work: they cool, lubricate, transport chips, protect machines and tools from wear, and ensure a smooth production process. During their use, they become contaminated with dirt, slideway and hydraulic oil, metallic abrasion, and other substances. Contamination can have a direct impact on quality aspects of the product, such as performance, foaming, or skin compatibility. To ensure long-term process stability and limit health and environmental risks, it is essential to continuously monitor metalworking fluids.

Below described five steps ensure a smooth production process

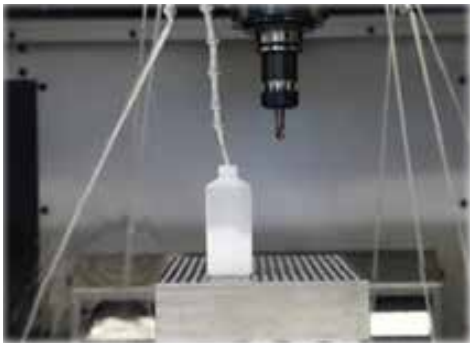
Step 1: Daily check of the fill level

The first step is to check the level of the coolant tank daily. According to Dr Manuel Schläppi, Head Customer Service, Blaser Swisslube, "This check is essential for the correct use of metalworking fluids. Inadequate supply to the feed pump due to a lack of coolant can result in increased air suction and foaming. Other consequences can include insufficient cooling of the workpiece and reduced tool life or performance,"

Machining with the B-Cool MC 600 coolant from Blaser Swisslube

Visual inspection of the metalworking fluid

Testing the coolant with a refractometer



Sampling via nozzle

Step 2: Visual inspection

The second, equally important daily check is the visual inspection of the metalworking fluid.

A floating oil layer on the surface can be regarded as the first warning sign of coolant quality degradation. "If an oil layer has formed on the surface, it should be continuously removed. For example, with the help of an oil skimmer," explains Schläppi.

Step 3: Measure concentration = measure success

Daily visual inspection is a basic requirement, but it is not enough when it comes to monitoring the most important parameter - the concentration of the coolant. Because without a stable concentration, there is no stable process. The expert explains, "The concentration of the metalworking fluid is decisive for aspects such as cutting performance, corrosion protection, foam formation, skin compatibility, and tool life. That is why the concentration of the coolant should be checked every time the tank is refilled or topped up,"

Step 4: Support from customer service laboratory

If any changes in the metalworking fluid are detected, the causes must be investigated and a remedy provided. "Our customer service laboratory will be happy to provide support with further metalworking fluid analyses," adds Schläppi.

Step 5: Smart Coolant Management

The concentration and other measured values can be recorded manually or automatically. Liquidtool Systems AG offers specific products for this purpose. Thanks to Liquidtool's own app, the data can be accessed anytime and anywhere. This is another step for companies towards automation and digitalisation.

Blaser Swisslube | New Delhi

EM

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2 QUALIFY YOURSELF

1. Select a title that is most appropriate for your position

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

2. Select a title that describes your principle job function

- ❑ 01. Management
- ❑ 02. IT
- ❑ 03. Safety & Security
- ❑ 04. Risk Management, Accident Management
- ❑ 05. R&D
- ❑ 06. Design Engineering (Plant Engineering)
- ❑ 07. Project Planning, Production Planning
- ❑ 08. Laboratory, Test, Field Service
- ❑ 09. Explosion Protection, Fire Prevention
- ❑ 10. Manufacturing, Production
- ❑ 11. Quality Assurance
- ❑ 12. Reliability, Evaluation, Services
- ❑ 13. Energy & Environment Technology
- ❑ 14. Facility Management
- ❑ 15. Sales, Marketing
- ❑ 16. Purchasing
- ❑ 17. Warehouse, Transportation, Logistics
- ❑ 18. Consulting / Advisory
- ❑ 19. Education
- ❑ 20. Other

3. Select the industry which best descibes your company's primary business activity

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

4. What is the approximate number of employees in your company?

- ❑ 1 to 9
- ❑ 10 to 19
- ❑ 20 to 49
- ❑ 50 to 99
- ❑ 100 to 199
- ❑ 200 to 499
- ❑ 500 to 999
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Highlights – February 2023

» **Frontline Digitization**
Frontline Digitization enables frontline workers to connect digitally. Industrial operations are managed by a network of connected sensors and machine learning and AI are providing data that is making every decision easier. This segment will throw light on how frontline digitization is empowering companies to have a core set of digital capabilities in place that improve the quality, safety and productivity of care, and also provide a platform to enable wider innovation.

» **High Speed Machining**
High Speed Machining is an advanced and emerging machining technique employed universally to machine complex parts with high productivity, improved quality, sustainability, and economy. This segment discusses the nuances of high-speed machining and its benefits for the manufacturing sector.

» **Data Analytics in Manufacturing**
Data Analytics give manufacturers insight by identifying patterns, measuring impact, and predicting outcomes. The ability to analyze equipment failures, production bottlenecks, supply chain deficiencies, etc., enables better decision-making. It is the pursuit of extracting logical data from raw data with the help of specialized techniques, like computational algorithms, machine learning models, visualization etc.

» **Composite Manufacturing**
Composites consist of two distinct materials, which together improve product performance and/or lower production costs. The article will elaborate on composite manufacturing processes and how it helps industries from the engineering to the finished product.

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MITSUBISHI ELECTRIC
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Walter innovations are setting standards.

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As a premium manufacturer of metal cutting tools, Walter enjoys an excellent reputation among customers and users worldwide. Whether it is innovative milling bodies and indexable inserts, new drill concepts or multi-stage thread milling cutters: Walter is setting standards in turning, milling, holemaking and threading – across the industry. More than 35% of the products we sell are less than five years old. With our innovations, we are ensuring that tools from Walter will continue to rank among the best in future.

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