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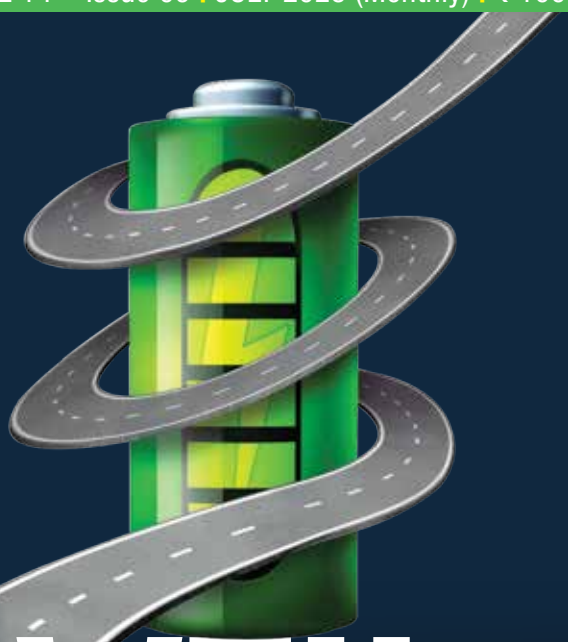

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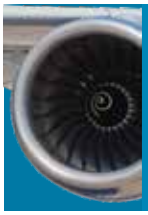

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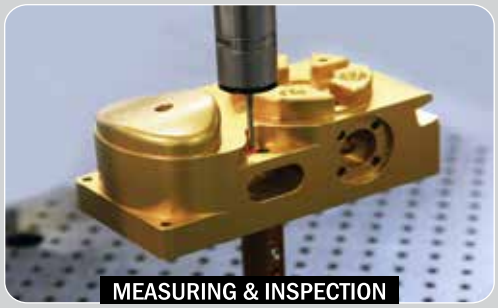
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FOR DETAILS

"Rise of electrifying roads in India"

The future heads towards automotive electrification

Recent reports from the International Energy Agency declared that electric car sales are smashing all-time highs, and the momentum is ready to endure throughout 2023. With an anticipated surge of 14 million EV sales by the year end, the second half of this year is set to witness a remarkable acceleration in new purchases. As a result, electric cars are projected to capture a significant 18% share of total car sales for the entire calendar year, proving that the Indian EV industry emerges as the shining star in the country's business landscape, captivating consumers as a compelling alternative to internal combustion vehicles. This growing appeal is further amplified by government regulations encouraging EV adoption to meet emission targets by 2030.

Amidst this promising landscape, our in-house Cover Story for this issue delves into the EV realm, exploring the surging demand and necessity for electric vehicles with insights from industry experts. With this promising industry outlook, Efficient Manufacturing had organised the Manufacturing Technology Summit in Pune, a detailed report on which is also added in this edition. This issue of our magazine centres on the convergence of 5G technology and manufacturing, shedding light on the transformative potential it holds. Additionally, we talk about the scope of Lean Manufacturing and present a Special Feature explaining the Growth of MSMEs.

Efficient Manufacturing remains steadfast in its mission to capture and disseminate relevant concepts, empowering manufacturing enterprises by identifying and implementing technology upscaling strategies. As we drive towards a successful year, we are committed to facilitating the transition of businesses into a prosperous future.

Neha Basudkar Ghate
Joint Editor
neha.basudkar@pi-india.in

MANAGEMENT NOTE

The manufacturing industry is on the precipice of a significant transformation. As we walk further on this digital expedition, we are gratified by the support we have received since our inception. This past month, we successfully conducted the ***Manufacturing Technology Summit Pune 2023***. We were thrilled to share some remarkable success stories showcasing organisations that have achieved extraordinary results

Our digital journey has set a benchmark, with our weekly podcast '***Morning Bytes with Anushka***' becoming the first of its kind in the country. It has established an industry platform to showcase current insights and trends in automation and manufacturing. Following the success of our Flip Magazine, we are thrilled to announce that we have planned a series of interactive upgrades, such as accessing articles, author profiles, relative videos and much more…

Watch out for updates on further events, initiatives and webinars where we bring together major industry leaders to discuss the biggest developments in the manufacturing, automotive and EV sectors. We will be targeting Chennai, Ahmedabad, Delhi NCR and other industrial hubs in the country. Stay tuned to our events and other highlights through our official website https://pi-india.in/magazine.

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CONTENTS

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42
INDUSTRIAL SAFETY
Safety First!

Shivkar Talpade, Pioneer of Aviation

(1864–1916)

The untold story of the Indian scholar who invented the aeroplane before the West

In aviation history, the Wright Brothers are credited with inventing and successfully flying the first aeroplane. However, buried in the shadows of this widely known achievement lies an Indian scholar named Shivkar Bapuji Talpade, who constructed and flew an unmanned aeroplane in 1895, a remarkable eight years before the Wright Brothers' historic flight!

Born in 1864 in South Bombay, Talpade displayed extraordinary vision from a young age. Rooted in the Arya Samaj, Talpade's deep knowledge of Sanskrit literature and the Vedas fuelled his fascination with aeronautics. His childhood dreams of flying and exploring space were nurtured by his voracious reading on the subject. Talpade eventually earned a PhD at the prestigious Sir JJ School of Arts.

Talpade's interest in aeronautics deepened when he crossed paths with Pandit Subbaraya Shastry, the author of Vaimanika Shastra, a text that claimed to contain ancient Indian knowledge of aircrafts. Shastry, who had learned the art of plane-making from an ascetic in Karnataka, shared scriptures with Talpade, asserting that they were the teachings of the ancient sage Bharadwaja. This connection with Shastry and his introduction to Swami Dayanand Saraswati's works further propelled Talpade's quest to construct the Vedic Vimana, an aircraft described in the Vedas.

Talpade's unwavering determination led him to embark on the construction of an unmanned aeroplane named "Marutsakh", meaning "friend of the air". Fuelled by a mercury ion engine, Marutsakh was a bamboo cylinder that soared above Bombay's Chowpatty in 1895, reaching a modest height before landing safely. The aircraft remained airborne for 18 minutes, powered by Naksha Rasa accumulators that utilised the aforementioned mercury ions. Among various literary sources that covered this was an editorial by Bal Gangadhar Tilak in the Marathi newspaper Kesari that brought attention to Talpade's achievement, and two other English newspapers.

The question of whether Talpade was truly the first person to build and fly an aircraft remains debatable. The censorship imposed during that time hindered the dissemination of information about Talpade's invention beyond Indian shores. The British government also arrested him under the false accusation of manufacturing explosives from mercury, leading to his imprisonment for several years. By the time he was released, the Wright Brothers had already accomplished their feat, forever overshadowing Talpade's pioneering work.

Shivkar Bapuji Talpade's story serves as a testament to the untold tales of innovation and genius that exist in the annals of history. His determination, driven by a passion for flight and exploration, led him to construct and fly an unmanned aeroplane years before the Wright Brothers' iconic achievement. While his name may have been overshadowed, Talpade's ground-breaking work laid the foundation for future advancements in aviation and serves as a reminder of the countless unsung heroes whose inventions shape the course of human progress. ☐

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ABB India awarded electrification and automation contract by ArcelorMittal Nippon Steel India

ABB India has been appointed to provide electrification and automation systems for ArcelorMittal Nippon Steel India's (AM/NS India) advanced steel cold rolling mill in Hazira, Gujarat. The contract at the flagship manufacturing plant comes through John Cockerill India, the original equipment manufacturer for the project. ABB India is providing advanced electrification and automation systems, including the ABB Ability™ System 800xA distributed control system and associated equipment and components, to support enhanced energy efficiency, optimised zinc consumption and high levels of corrosion resistance throughout the steel production process. This will support AM/NS India in its bid to reach greater levels of sustainability at Hazira. Dilip Oommen, Chief Executive Officer, AM/NS India, said, "The new processing lines are designed to produce new-age value-added steel, embedding the most demanding quality standards. This expansion will help us meet the growing demand for high-end steel, while also enhancing our portfolio of value-added, sustainable steel".

Blue Energy Motors shifts gears with 100th truck rollout

Blue Energy Motors (BEM), the Zero Emission truck technology company, has recently set yet another significant milestone with the rollout of its 100th truck from its smart manufacturing facility in Pune. Each BEM LNG truck emits fewer greenhouse gases as compared to diesel-powered trucks. The heavy-duty trucking industry has an economically viable option available to immediately decarbonise the sector, contributing positively to climate change. The rollout celebration was conducted at their Chakan facility, Pune, in the presence of Anirudh Bhuwalka, CEO, Blue Energy Motors, and their senior leadership team. Speaking on this occasion, Bhuwalka, said, "No longer should sustainability be an option, but rather a way of life. Our trucks were conceptualised and built with the conditions and demands of the Indian duty cycle in mind. They are the most effective and immediate viable solution for the pollution issue that the heavy-duty truck industry produces".


HPC Continental's Plug & Play

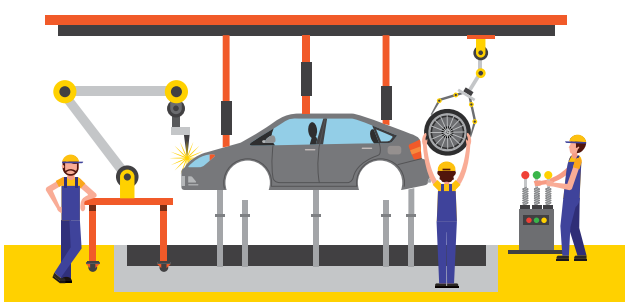
Continental sets standards with its new flexible cooling concept

Continental has presented a modular and highly scalable solution with its Plug & Play concept for the integration of High-performance Computers in vehicle architectures. The highlight states that individual computing modules can be replaced or upgraded even when the vehicle is already in the field. Combined with a new type of liquid cooling based on flexible cooling pads, the system always maintains a safe operating temperature. As a result of the great leaps forward in SDV development, more and more functions in the vehicle are being controlled, monitored and maintained by software. Jean-Francois Tarabbia, Head, Business Area Architecture and Networking, Continental, said, "We focus on a flexible and scalable concept for cross-domain HPCs, including an innovative cooling solution for all vehicle classes. Our Plug & Play solution requires less installation space and reduces the complexity of the vehicle architecture as well as the wiring harness".

Rockwell Automation study reports 85% of Automotive Manufacturers plan to maintain or increase workforce

Rockwell Automation recently announced the results of the 8th annual 'State of Smart Manufacturing Report: Automotive Edition'. The global study encompasses the responses of 197 leaders from automotive manufacturers and automotive suppliers and electric vehicle manufacturers across 13 of the leading manufacturing countries. This year's report emphasises the evolution of the automotive industry.

Key global findings: 85% automotive manufacturers expect to maintain or increase current workforce; 'Minimising costs' and 'improving quality', number one drivers for acceleration of digital transformation; 31% automotive manufacturers plan to/have invested in AI and ML; 42% automotive manufacturers expect to repurpose their existing workforce and 27% believe they will hire more workers due to technology adoption. Paul Epperson, Vice President, Global Industry, Auto, Tire & Advanced Mobility, Rockwell Automation, said, "Over the last few years, the automotive industry has been tasked with navigating many new challenges and obstacles. It is evident from reviewing the survey findings that navigating these challenges by adopting new technologies, while balancing quality with profitable growth, is top of mind for automotive leaders".



L to R: Sagar Bhosale, Managing Director, Schmersal India, welcomed guests AA Ghogare, Deputy Director, DISH; Rajesh Nath, Managing Director, VDMA India; Michael Ambros, Managing Director, Schmersal Group; Henning Carl, Chief Product Officer, Schmersal Group and Nina Schmersal, Shareholder, Schmersal Group at Schmersal India's 10th Anniversary Celebration conducted at their production facility at Ranjangaon MIDC, Pune..

Schmersal India celebrates 10 years of manufacturing excellence

Ranjangaon

Schmersal India celebrated the tenth anniversary of their manufacturing and production facility in Pune on 1 July 2023. The company commemorated this jubilee celebration along with its channel partners, suppliers, customers, and employees in their facility at Ranjangaon MIDC, Pune.

The event had dignitaries like AA Ghogare, Deputy Director, Directorate of Industrial Safety and Health (DISH); and Rajesh Nath, Managing Director, VDMA India, in attendance. Other eminent guests involved Nina Schmersal, Shareholder, Schmersal Group; Henning Carl, Chief Product Officer, Schmersal Group and Michael Ambros, Managing Director, Schmersal Group. In discussing the company's progress so far, Ghogare mentioned that Schmersal India's progress in the country has been significantly transforming. More so, their progress has been highly influential for the industrial safety practices in the country as well.

Schmersal is the only MNC to have a manufacturing facility for safety products in India in line with international safety standards, true to the motto 'Make in India'. Over the years, due to the growing demand for safety products in India, the Schmersal Group went from just three employees in Pune to a giant manufacturing facility at Ranjangaon MIDC, Pune.

In the last 10 years, Schmersal India has written an unprecedented success story. The company has continuously expanded its production and business activities, headed by Sagar Bhosale, Managing Director, Founder Member, Schmersal India. Discussing the German group's commitment to safety, Bhosale said, "Our basic mission is to protect the lives of people. Schmersal is the founding member of the Elevator and Escalator Component Manufacturer Association of India. We have taken the initiative with other companies and formed this association to create awareness".

The company is planning on expanding for better access to clients and manufacturers alike. Discussing Schmersal India's biggest achievement in the past 10 years, Ambros stated, "I am proud to have been a part of the Schmersal family and the success it has had in the last ten years. Today, we have teams from China, Brazil, Germany and India working as a family. Our biggest achievement is that we believed in India and still do. The development in India in the last decade has been quite impressive".

This new location is an important milestone for the company, signifying its continued growth and expansion in the Indian market. The company's intensive goals for localisation and safety awareness are expected to bring consequential change in the future as well.

“Advising safety solutions to customers”

…says **Tobias Thiesmann,** Systems and Solutions Manager, Schmersal Group, in an interaction with Sanjay Jadhav, commenting on how user software is the responsibility of its developer.

An ever-increasing number of safety functions are being mapped in software. What should users pay attention to during realisation?

Mapping safety functions in software is not really a problem. What is important, though, is that this software runs on hardware that is suitable for use in the field of functional safety. This can usually be identified by the manufacturer specifying the respective characteristic value, such as the Safety Integrity Level, Performance Level or Safety Category. The software itself must also satisfy certain requirements; standards ISO 13849-1 and 13849-2 offer an introduction to this. Programmable hardware allowing safety functions to be mapped in software is usually supplied by the manufacturer with a suitable programming environment.

What impact do re-engineering solutions have on safety certification under the relevant safety standards?

In this case, there isn’t a lot that can be done to prevent it. If the alternative components are within the given specification and have the same design, we evaluate it all internally and notify the respective notified body of the change. If the alternative component necessitates a significant change, such as a layout, circuit or software change, the notified body will have to verify these changes, all the way up to and including recertification.

What is the impact of user software in safety controllers on compliance with safety certification?

The safety parameters specified by the manufacturer tend to apply only to the hardware and firmware of the safety controller. As the name suggests, user software is the responsibility of its developer. Software errors in the narrower sense are often intercepted by the programming environment, although the actual program logic is not a part of this test. This means that not everything that is compiled is necessarily functionally safe. In addition to using safe hardware and a suitable programming environment, the user must also document the suitability of the software by means of validation. Moreover, questions relating to concrete application also play their part in attaining certain safety parameters.

Which questions and challenges are you consulted about more often?

The first question users ask is often about the right hardware for a specific job. This tends to be followed by advice to the customer on how the safety solution can and should be integrated into the application. State-of-the-art, programmable safety logic often offers the option to standardise safety solutions and provides other features such as interfaces for documentation, diagnosis and communication. This potential is often wasted because it does not immediately give rise to new sales for the user; users just prefer to `leave things as they are’. Sadly, the long-term increase in productivity often gets ignored.

"Digital controllers that allow building calibration profiles"

…says **Satish Pathak,** Founder, Executive Director, Samiep Technology Innovations. In an exclusive interview with Neha Basudkar Ghate, he shares his thoughts on standardisation of core technology products that can be easily adapted and configured by OEMs and system integrators for varied applications.

What inspired you to start Samiep Technology Innovations, and how did you get started in the manufacturing industry?

Working on the shop floor had been my passion since my early days. After working for more than six years, I started a company called ClnL, offering tailored automation systems that were not generally addressed by System Integrators. After offering unique, one-of-a-kind systems, I floated Samiep to commercialise my unique products and technologies and take them across borders.

Can you share some of your company's technological developments that have helped standardised solutions transform manufacturing practices?

Samiep's Patented Digital Controlled Valves are one such path-breaking technology for liquid dispensing applications. This technology eliminates the customisation of valves and machines based on them. Exclusively developed for liquid dispensing applications, the valve can be configured to offer versatile, precise and accurate industry-agnostic liquid dispensing applications. I have built a tech experience unit in Pune using grants I have received. The technology has been honoured with highly prestigious awards from countries like the USA, China, Serbia, Croatia and India. We also received a Letter of Satisfactory Demo from ISRO after conducting a live demonstration at Shriharikota by invitation.

What risks and challenges have you faced as an entrepreneur, and how have you overcome them?

Commercialising a new path-breaking technology impacting all industry verticals across borders for the next several decades is a very big challenge for a start-up with limited resources. It is hard to make anyone believe that any such disruption exists, as no one could relate to their experience for the last few decades. Conducting live demonstrations makes more sense. Nevertheless, it demands ongoing costs to conduct demonstrations at various plants across locations. Carrying out demos at our tech experience unit is more viable; however, getting someone to visit from distant locations takes time.

How are you positioning your company to commercialise the upcoming emerging opportunities in the industry?

We are focusing on the standardisation of core technology products that can be easily adapted and configured by OEMs and system integrators for varied applications. We aim to make the machines and systems more generic and avoid or minimise customisation. It will help us mass-produce our valves with minimum variations in valve sizes. We encourage design engineers and process consultants to come forward and understand the new tech as they are good influencers to penetrate the technology. We would also like to have a strategic alliance with existing automation players, having their network of system integrators in place to help the technology reach every corner of the world faster.

“We are strategically working towards building our Pan-India presence”

…says **Venkat Srinivasan,** COO, Trimaster Metrology, in an interview with Neha Basudkar Ghate, explaining the significance of metrology and its evolution with technological developments.

Q The next-generation industrial metrology and inspection market size is expected to reach $16,104.2 million by 2030 registering a CAGR of 6.9% from 2021 to 2030. How is your business model helping to contribute to this development?

Currently, the Indian metrology industry relies primarily on imports. There are a few manufacturers whose capabilities are still developing in comparison to the established and recognised brands in Metrology. This is due to the technological complexity of metrology products in general. Because metrology is a niche, investing significantly in product development and marketing is made more difficult due to the smaller size of the market. Going forward, we see the Indian manufacturing capabilities improving. We have been evolving with these trends, slowly pioneering the concept of metrology AMCs in the Indian market. This led to the first step of capability-building, where we acquired local repair and complete refurbishment capabilities.

Going forward, we are investing step-by-step in two areas:
The primary aspect of our business model relies on establishing a Pan-India established field sales and support network.

- Developing a local supplier base of child components for metrology instruments. We are identifying these capable suppliers who can meet world-class standards for quality.
- Developing electronic/software solutions to enhance the ease of use of metrology instruments.

Q Trimos is known for its precision metrology equipment and user-friendliness. Could you elaborate on the technology upgrades and advancements that Trimos India has implemented to maintain this reputation?

Traditionally, Trimos is known world-over for two products: electronic height gauges and horizontal length measuring systems. However, over the last 3–4 years, Trimos has invested significantly in newer areas to expand its product portfolio and now has a full-fledged product vertical focused on 3D metrology. Further, at Trimaster, since the world opened up after COVID, our efforts have been on identifying the measurement capability niche in Indian manufacturing. We have collaborated with select original equipment manufacturers to serve these gaps and improve production. We are bringing products from exciting companies such as Werth, Diribet, QASS and more to the country.

Our philosophy behind product upgrades and new product research has focused on:

- Detailed inspection
- Identifying sensing technologies and reporting solutions
- Adjusting for manufacturing process variations and environmental variations
- Enhancing user-friendliness using human–machine interfaces and software
- Enhancing measurement data availability and analytics

Q How does Trimos India manage its workforce to ensure sustainability, skill upgrades and empowerment of its employees? What initiatives are in place aligned with your business line to support workforce development?

We have a centralised training program that all new employees are subjected to. Our field employees are trained at our head office and subsequently released to field activities. Training program content is derived through annual visits to our OEM principals. In each product vertical, two or three experts are trained at first and are tasked with carrying the training onward to our larger field team. We ensure that all technical and sales information is readily available to everyone. We hold periodic webinars to keep our team updated regarding product and technology improvements. Our field teams congregate around once a year, for re-training on service issues, information exchange on field issues, best practices and general knowledge sharing. Our employees are empowered to prioritise their activities themselves to ensure the complete satisfaction of their local customers.

Q How can today's highly-productive solutions address current manufacturing challenges such as productivity improvement, cost reduction, efficient processes?

In the metrology realm, the emphasis is along two areas:

- To move the process of measurement from the standard room to the shop floor to reduce lead time and improve response time in case of quality problems
- To analyse real-time measurement data and feed it back to the manufacturing process for closed-loop control to improve process quality and productivity

The instruments we promote are mostly progressing towards one or both of the above directions.

Q Are there any upcoming projects or initiatives at Trimos India that you would like to highlight? What can we expect to see from the company shortly?

We are working strategically on different fronts:

- Cutting-edge measuring technology: We are bringing technologies from OEMs like Werth and QASS to India, who are building instruments with unique and never seen before sensory technologies to address complex measurements that could not be done before
- Pan India presence: We are expanding our footprint to have employees in all India locations to make sure the customer gets the services immediately which in turn helps their products to run smoothly without any hindrances
- Metrology experience centres: We are setting up Metrology experience centres in major cities around India. Customers can send in their components for measurement evaluation studies and get exposed to the latest in measurement technology.

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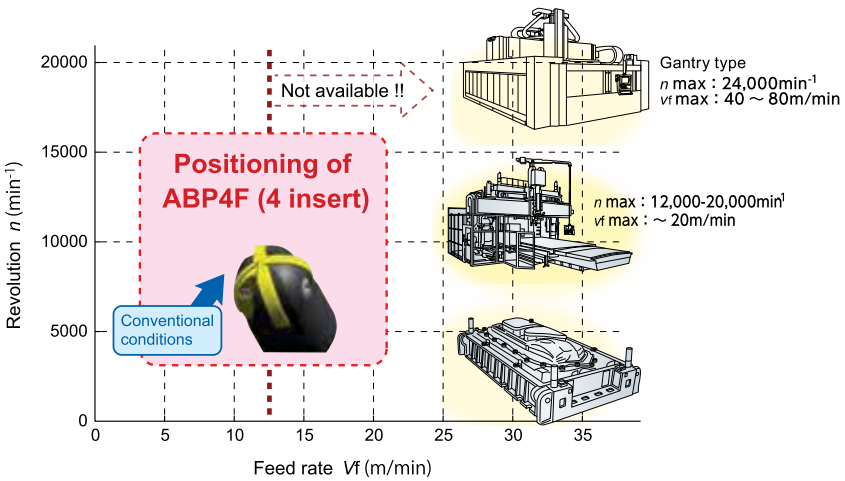
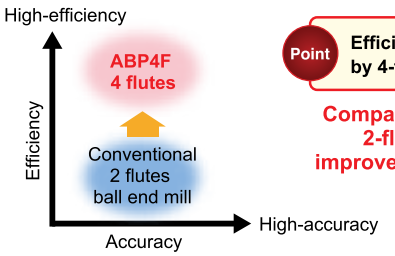
Example of large press die for automotive parts



Processing advantage of 4-flutes end mill

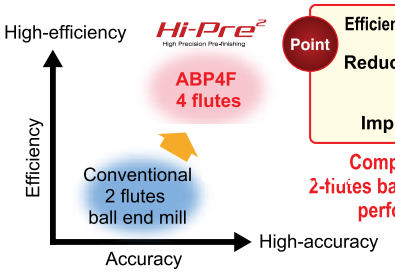
Figure Finishing



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
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Improve finishing accuracy

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

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STEERING the EV GROWTH

The E-mobility Industry in India is predicted to grow at a CAGR of 90%, with rising demand for EVs. Team EM, in a detailed article, collaborates with industry officials from Star Engineers, Zimmer Automation, Jendamark India and Fyn Mobility to assess the current e-mobility solutions in transportation services.

Anushka Vani,
Digital Content Developer,
Efficient Manufacturing

India's dedication to environment-friendly transport and lower carbon emissions is fuelling the country's e-mobility sector and its rapid rise. Electric Vehicles (EVs) are in high demand, and the e-mobility industry has enormous potential for both economic growth and environmental preservation.

A report by IEA states that Electric car markets are seeing exponential growth as sales exceeded 10 million in 2022. A total of 14% of all new cars sold were electric in 2022, up from around 9% in 2021 and less than 5% in 2020. Three markets dominated global sales. China was the frontrunner once again, accounting for around 60% of global electric car sales. More than half of the electric cars on roads worldwide are now in China and the country has already exceeded its 2025 target for new energy vehicle sales.

In Europe, the second largest market in the world, electric car sales increased by over 15% in 2022, meaning that more than one in every five cars sold was electric. Electric car sales in the United States, the third largest market in the world, increased by 55% in 2022, reaching a sales share of 8%.

In this article, Efficient Manufacturing vies the current market situation of the e-mobility industry in India and evaluates the difficulties encountered in the supply chain as well as import and export into account with the help of some prominent industry leaders in the field...

Divya Ramraika,
Managing Director, Star Engineers

"The e-mobility industry in India is experiencing a notable surge in growth, driven by several factors and supported by favourable market projections. With a projected CAGR of 90%, the Indian electric vehicle market, encompassing two-wheelers and three-wheelers, is expected to reach a substantial value of $150 billion by 2030, according to a recent report"

This growth signifies a significant shift towards e-mobility in India, as the demand for e-mobility solutions in the transport service sector continues to rise. The increasing adoption of EVs reflects a growing awareness of the environmental benefits they offer, along with efforts to reduce carbon emissions and combat climate change.

However, despite the promising growth prospects, the e-mobility industry in India faces its fair share of challenges. One of the major hurdles lies in the supply chain, which needs to be strengthened and expanded to support the increasing demand for EVs. This involves developing a robust infrastructure for manufacturing components, batteries and charging stations. Investments in research and development, as well as collaborations between industry stakeholders, will be crucial in overcoming these challenges and ensuring a smooth supply chain for EVs.

Furthermore, the dynamics of imports and exports play a significant role in shaping the current state of the e-mobility industry in India. While the country is witnessing a rise in domestic manufacturing of EVs and components, imports still play a vital role in meeting the demand. Collaboration with international manufacturers and suppliers and strategic alliances can help in accessing advanced technologies and expertise to further strengthen the domestic e-mobility ecosystem. Simultaneously, focusing on promoting exports of EVs and components can enhance India's position as a global player in the e-mobility market.

The current state of the e-mobility industry in India is optimistic. In the coming years, we can expect a significant growth in the market demand for e-mobility products. While challenges exist in the supply chain and import-export dynamics, concerted efforts from industry players, government initiatives and strategic collaborations can help propel the e-mobility industry to new heights.

Anuj Prasad,
Head, Technical Sales & Applications, Zimmer Automation

> Robotic automation in EV manufacturing has gained significant importance, and smart manufacturing is the way forward to meet the dynamic requirements of the EV industry. In this context, The Zimmer Grup has been playing an instrumental role in developing smart EOAT's for high-volume production"

The EV industry in India is thriving and the production of electric vehicles imposes new challenges on production technology. Producing battery cells and packages economically is an important factor in ensuring that this market can grow successfully. For this purpose, a high degree of automation — as it already exists today in motor production — is critical. The competition for the best production technology has been underway for a long time.

Robotic automation in EV manufacturing has gained significant importance and smart manufacturing is the way forward to meet the dynamic requirements of the EV industry. In this context, the Zimmer Group has been playing an instrumental role in developing smart End-Of-Arm Tools (EOATs) for the EV industry in varied applications. The EV space is evolving faster than ever before, and one of the biggest requirements for line builders and equipment suppliers is the reliable automation components' supply to build smart and flexible systems that can accommodate the fast-changing designs of the batteries.

Himanshu Jadhav,
CEO & Director, Jendamark India

> The e-mobility industry is undergoing a dynamic revolution, marked by the convergence of innovation and sustainability, which is developing a fascinating narrative for the future of transportation"

To increase the use of EVs in the nation for both economic and environmental causes, the government has set high targets. The infrastructure for charging is also being improved. The rapid growth of this industry is also fostering employment opportunities in India. It is predicted to produce over 9 million job opportunities by 2030, including opportunities for EV engineers.

The introduction of numerous government policies and initiatives has helped the e-mobility industry. It is fast expanding because of increased environmental consciousness, lower battery prices and an increase in fuel costs. Moreover, this industry is significantly reliant on a stable supply chain for the production of critical components such as batteries, power electronics and electric motors. Exporting e-mobility solutions to other countries can also aid the growth of the industry in India. The rising demand for EVs reduces pollution and gasoline costs. However, it is compounding the industry's existing supply chain issues, including component and shortages of commodities, elevated production costs, delays in shipping and inefficient manufacturing procedures.

Visakh Sasikumar,
Founder, Fyn Mobility

> "The E-mobility space has been growing significantly in India. Businesses are making the shift to EVs for delivery, galvanised by the increasing demand for sustainable transportation solutions"

While supply chain issues still pertain, companies have started moving to the localisation of component and battery manufacturing and distribution of EVs. This helps us scale our deployments as EVs get localised. Localised EVs also help us to reduce our downtime due faster service and easy availability of spare parts.

With the number of EVs growing rapidly on Indian roads, there is a dire need for proper infrastructure and charging facilities to support these vehicles. To overcome these hurdles, stakeholders must collaborate and invest in robust supply chain networks, charging infrastructure and advanced battery technologies. The localisation of manufacturing will be instrumental in reducing dependence on imports and establishing India as a manufacturing hub for e-mobility.

With smart EVs, we can now build a sustainable platform that helps all stakeholders in making key decisions. The data collected can be critical in making business insights and help them be more efficient and cut down on operational costs. With a platform like this, we can also cross-utilise the available EVs, reducing the number of vehicles in use while utilising them successfully.

The future of manufacturing

As the world is moving towards Industry 4.0, the manufacturing industry is experiencing a significant transformation, utilising digital technologies to improve efficiency, productivity and performance. The latest technology in this field is 5G wireless communication, which will change the dynamics of the industry and benefit several sectors...

Dr S Kumar,
Head of Artificial Intelligence (AI) Technology Strategy, Sony Research India

With its promise of faster, more reliable and more efficient communication, 5G is helping manufacturers streamline their operations and improve their bottom line. However, with the help of generative AI, 5G is poised to usher in a new era of innovation and creativity.

Revolutionising the industry

One of the most significant benefits of 5G for manufacturers is its ability to enable real-time communication and data transfer. With 5G, manufacturers can gather and analyse data from a wide range of sensors

and devices in real time, allowing them to identify and address issues before they become major problems. This can help manufacturers save time and money, increase productivity and improve quality control.

5G is a wireless communication technology that provides faster, more reliable and secure connectivity. It is designed to meet the demand for increased bandwidth, lower latency and higher network capacity, enabling the development of advanced applications that were previously not possible. In manufacturing, 5G can revolutionise the industry in several ways, from optimising the supply chain to enhancing the overall production process, with the following benefits and can enhance future features:

Real-time communication

One of the most significant benefits of 5G in manufacturing is its ability to connect and control many devices and sensors in real time. With 5G, manufacturers can use sensors and Internet of Things (IoT) devices to collect data from machines and other equipment, analyse it in real time and use it to optimise the production process.

Thus, manufacturers can reduce downtime, increase productivity and improve overall efficiency. With 5G technology and its advancements, manufacturing equipment and devices can be connected in real-time, allowing manufacturers to monitor production processes and make necessary adjustments immediately. This can help reduce downtime and increase productivity, leading to cost savings for the manufacturer.

Predictive Maintenance

Another important area that 5G can significantly impact is predictive maintenance. By collecting data from sensors and other equipment in real time, 5G can help predict when a machine is likely to fail and alert maintenance personnel before it happens. This can help reduce downtime, minimise repair costs and improve overall equipment efficiency. With 5G technology's ability to enable real-time connectivity, manufacturers can use 5G to connect robots and other machinery in the production and maintenance process. Thus, manufacturers can then reduce human error, increase efficiency and improve the quality of the final product.

Remote connection

5G can also enable remote monitoring and control of machines and equipment, allowing manufacturers to diagnose and fix problems remotely. This can reduce the need for on-site visits, saving time and money and improving overall productivity.

Increased efficiency

5G networks offer faster and more reliable connectivity, allowing for real-time data collection and analysis. This can enable manufacturers to optimise processes and reduce downtime, leading to increased productivity and cost savings.

Improved quality control

With 5G, manufacturers can collect and analyse data from sensors and equipment in real time, allowing for immediate identification and correction of quality issues, leading to better product quality and customer satisfaction.

Enhanced safety

5G can support advanced safety features such as real-time equipment and worker safety monitoring, leading to reduced accidents and improved working conditions.

Futuristic with generative AI and DT

The combination of 5G and generative AI can enable even more advanced features in the future. With 5G, manufacturers can use Digital Twin (DT) technologies to create virtual replicas of their factories, machines, and equipment. For example, generative AI can be used to simulate and optimise manufacturing processes, identify potential issues, suggest improvements and reduce downtime.

Improving operational efficiency

In addition to these benefits, 5G can also enhance communication and collaboration between different stakeholders in the manufacturing process. For example, 5G can enable real-time collaboration between engineers, designers and manufacturers, allowing them to work together more efficiently and effectively, in various sectors.

In the automotive manufacturing industry, 5G can provide a host of benefits. With its ability to enable real-time connectivity, manufacturers can use 5G to connect robots and other machinery in the production process. Similarly, in the steel and metal industry, 5G can be used to connect different machinery and equipment, allowing for real-time monitoring and control. Another area where 5G can be beneficial is the chemical and pharmaceutical industry. With its ability to provide real-time connectivity, manufacturers can use 5G to monitor and control the production process, ensuring that products are of the highest quality. This can help reduce waste and improve efficiency, leading to cost savings for the manufacturer.

In the power and energy sector, 5G can be used to monitor and control power plants and other energy-related equipment. Manufacturers can then monitor energy usage and make necessary adjustments to reduce energy waste, leading to cost savings for the manufacturer.

Apart from these sectors, 5G can also be used in the food and beverage industry, textile and leather industry, machine tools, mining, oil and gas and other such sectors, providing real-time connectivity and enabling manufacturers to monitor production processes in real-time, leading to cost savings and increased efficiency.

Improving productivity levels

Manufacturers can also expect to see even more innovative features in the future. For example, with the development of 5G-enabled wearable technology, manufacturers can provide their employees with real-time data and analytics, helping them make better decisions and improving their overall productivity. Furthermore, 5G can enable the use of Augmented Reality (AR) and Virtual Reality (VR) in manufacturing. AR and VR can provide workers with virtual training and simulations, enabling them to learn new skills and operate machinery safely and efficiently.

From optimising the supply chain to enhancing the production process, 5G has the potential to benefit several sectors, including industrial machinery, electrical and electronics, communication and information technology, power and energy, automotive manufacturing, steel and metal, optics and precision mechanics and much more.

Towards industry enrichment

As the manufacturing industry moves towards Industry 4.0, 5G is poised to play a critical role in driving innovation, improving efficiency and enhancing productivity. The manufacturing industry has always been at the forefront of adopting new technologies to increase productivity, reduce costs and improve the quality of products. With 5G, they can see a host of benefits in various sectors.

In short, 5G wireless communication has the potential to revolutionise the manufacturing industry. As 5G continues to evolve, manufacturers can expect to see even more innovative features in the future, leading to even greater benefits for the industry. ☐

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Industry 4.0 to 5.0: Inception, Conception and Perception

The main idea of Industry 5.0 is to use technology developed in Industry 4.0 and bring its benefits to human beings. The article discusses the seamless emergence of Industry 5.0 in detail.

Kamal Goyal,
Technical Advisor, Rimaco Group of Industries

The term Industry 4.0 is considered to be technology-driven, whereas Industry 5.0 is value-driven. However, between March and April 2020, entire production chains came to a standstill due to the COVID-19 pandemic on a global scale. If the disease only affects humans, why did the machines not continue to do their job? This moment helped us reflect on the role and importance of humans in the job market. We realised that, even though machinery and equipment can operationalise tasks, all industries still need people.

Industry 4.0 refers to the intelligent networking of machines and processes for the industry based on Cyber-Physical Systems (CPS), a technology that achieves intelligent control using embedded networked systems to do much of

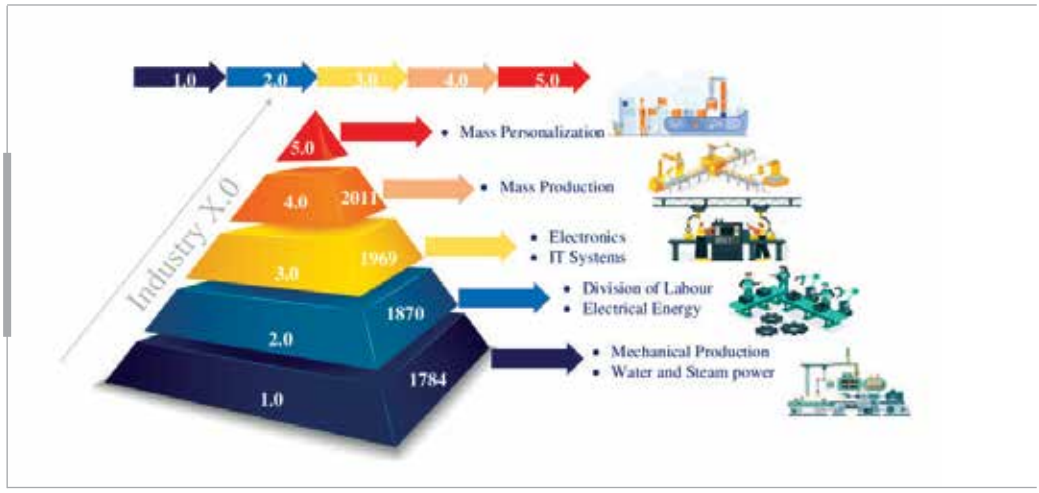
the work in factories and production facilities. This is a technology-driven revolution to achieve higher efficiency and productivity as a high-tech strategy. Some considerations and projected impacts from societal needs, such as sustainability, human-centricity and resilience, are also visible. It intends to address challenges such as resource and energy efficiency, urban production, societal needs and demographic change. To reduce the consumption of energy and resources, changes in manufacturing processes and design of machinery and plant were required.

CPS promotes new socio-technical infrastructures by transforming different aspects of a workplace such as health management and work organisation, lifelong learning and career path models and team structures and knowledge management. This initiative is leading a paradigm shift in human–technology and human–environment interactions. It is anticipated that a worker's role is set to change significantly due to the increased use of technologies that are more open, virtual and extensive.

Smart assistance systems release workers from routine tasks so that they can focus on more creative and value-added activities. Flexible work organisation is promoted to enable all workers to continue professional development more effectively and have a better work–life balance. The relevant technologies will also allow older workers to extend their working lives and remain productive longer. It has been recognised that, in a smart factory, the role of employees will change significantly. Implementation of a socio-technical approach to work organization will offer workers the opportunity to enjoy greater responsibility and enhance their personal development. Simultaneously, there is a risk that some parts of society might feel left out due to the perception that jobs are being taken away by automation and immigration or because they lack the skills required for the newly created jobs. Hence, Industry 4.0 may not be considered a human-centric initiative.

Perhaps the greatest learning from the 4.0 era was the understanding that technology alone does nothing. Machines depend on operators, programmers and maintenance. Not everything can be automated. Additionally, we know that our human cognitive power and analytical capabilities remain irreplaceable. Industries work by transforming resources into goods, and the most irreplaceable resource in any industry are its workforce and consumers. The rapid pace of change is challenging the entire workforce, governments, legislators and regulators to an unprecedented degree. Business leaders can no longer focus on developments and trends in their sectors alone but need to understand potential transformations and disruptions in the entire world of suppliers, customers and global markets.

Until a few years ago, Industry 4.0 was the latest thing; however, as we know, the world changes quickly and the fourth Industrial Revolution evolved into a new concept. The world of the work–life merge describes a life in which work and free time are no longer neatly compartmentalised but seamlessly jumbled up together. As most will know, this jumbling has been accelerated due to COVID-19 and has highlighted the need to re-think existing working methods and approaches, including the vulnerability of global supply chains, with an aim to make their industries more future-proof, resilient, sustainable and human-centric.



What is Industry 5.0?

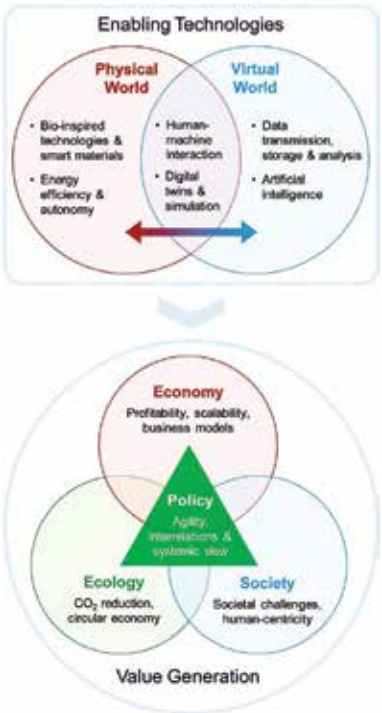
Industry 5.0 is the future and already an emerging trend, the interaction and collaboration between man and machine. This cyber-physical systems revolution that was summarised in Industry 4.0 has evolved into Industry 5.0 and is fundamentally changing the way we live, work and relate to one another.

This next wave of industrial revolution needs to define how we collaborate and define the rules between human and machine interaction. The levels of collaboration between people and machines will change to the level that most automation, machine intelligence and even robots are working in the background to support the workforce or taking on large portions of production and manufacturing tasks and processes.

The introduction of Industry 5.0 is based on the observation or assumption that Industry 4.0 focuses less on the original principles of social fairness and sustainability and more on digitalisation and AI-driven technologies for

increasing the efficiency and flexibility of production. The concept of Industry 5.0, therefore, provides a different focus and point of view and highlights the importance of research and innovation to support the industry in its long-term service to humanity within planetary boundaries.

Industry 5.0 complements the existing Industry 4.0 paradigm by having research and innovation drive the transition to a sustainable, human-centric and resilient European industry. It recognises the power of industry to achieve societal goals beyond jobs and growth, to become a resilient provider of prosperity by making production respect the boundaries of our planet and placing the wellbeing of the industry worker at the centre of the production process.



It centres around three interconnected core values: human-centricity, sustainability and resilience. The human-centric approach puts core human needs and interests at the heart of the production process, shifting from technology-driven progress to a thoroughly human-centric and society-centric approach. Resultantly, industry workers will develop new roles as a shift of value from considering workers as 'cost' to 'investment'. Technology used in manufacturing is adaptive to the needs and diversity of industry workers. A safe and inclusive work environment is to be created to prioritise physical health, mental health and wellbeing and ultimately safeguard worker's fundamental rights, i.e. autonomy, human dignity and privacy. Industrial workers need to keep up-skilling and re-skilling themselves for better career opportunities and work–life balance. The industry needs to be sustainable and develop circular processes that re-use, re-purpose and recycle natural resources, reduce waste and environmental impact and lead to a circular economy in the future.

Enabling technologies identified for Industry 5.0

- Individualised human-machine interaction technologies
- Bio-inspired technologies and smart materials
- Digital Twins and simulation to model entire systems
- Data transmission, storage and analysis technologies
- Artificial Intelligence
- Technologies for energy efficiency, renewables, storage and autonomy

Challenges and Responses

Industry 5.0 present some unique challenges that are not seen in the past, such as

- Social heterogeneity in terms of values and acceptance
- Measurement of environmental and social value generation
- Integration from customers across entire value chains to SMEs
- Inter disciplinarity of research disciplines and system complexity
- Ecosystem-oriented innovation policy with agile, outcome-orientation
- Productivity is required, while large investments are needed

Similar to Industry 4.0, Industry 5.0 will need substantial investment from government agencies. Its core values — human-centricity, sustainability and resilience, have become major driving forces for societal progress instead of as a by-product of GDP-driven prosperity development. Moreover, Industry 5.0 brought about the importance of including human beings in the process, thus increasing employment rates as well.

We may even think: "I'm not even finished adapting to Industry 4.0! Does this mean that I have to start from scratch all over again?" There is no need to discard or forget Industry 4.0 to be a part of Industry 5.0, because they are mutually complementary, not exclusive. The notion of Industry 5.0 complementing and extending the hallmark features of Industry 4.0 suggests that they are to be considered side-by-side, i.e. the co-existence of technology-driven Industry 4.0 and value-driven Industry 5.0.

Many companies are on their journey of Industry 4.0, and this journey is not to be derailed. It may need to be re-purposed and/or adjusted with a more prominent consideration of some of the core values of Industry 5.0. Therefore, there is and should be just one journey for a business. ☐

Battery Swapping accelerates EV adoption in India

In the aftermath of the FAME II Policy's release, Electric Vehicles' (EV) adoption in India has further increased due to the Battery Swapping Technology.

Kaushik Burman,
General Manager,
Gogoro India

India has sped up its journey towards net-zero carbon emissions and embraced the clean energy transition, reaching an inflection point. Our Government, along with national think-tanks and Ministries of Heavy Industries and Consumer Affairs and Finance, has collectively led to the success of the FAME-II policy's success, reaching 1 million electric 2-wheelers.

Indeed, goal to reach 100% electrification in our transportation, while ambitious, has the potential of not only reducing the fiscal burden of expensive fossil fuel imports but also creating an ecosystem of upstream manufacturing and downstream infrastructure players,. This, in turn, has created employment in millions of people in the process.

Opportunity to grab

Two wheelers are an integral part of India's mobility ecosystem, especially in dense urban cities. Currently, the country stocks ~240 million units of internal combustion engine-powered two wheelers, which increases by 18–20 million units per year. Based on the statistic, the total stock of two wheelers in the country may reach the 300 million range by the end of this decade. Out of these, India has ~1.5–2 million units of EV two wheelers, which amounts to less than 1% market penetration.

Relevance of battery swapping

Building an EV charging infrastructure that not only parallels that of a gasoline refueling network but also converts the entire stock of ICE two wheelers into EV implies setting up anywhere between 6–8 million DC fast-charging points, and ~5 times the number of AC slow-charging points.

The adoption rates in the two-wheeler and three-wheeler segments can be significantly accelerated in densely populated metropolitan areas and tier 1 and 2 cities, where real estate is scarce and expensive, and proper battery-swapping infrastructure is available.

- **Cost benefits:** While conventional batteries have larger sizes (kWh), the battery-swapping technology allows for smaller, swappable batteries that will reduce overall costs. Because batteries account for a significant portion (4%–50%) of the total vehicle cost, the battery expenditure is borne by the Battery Swapping Station (BSS) rather than the vehicle owner, resulting in cost savings.

For commercial fleet owners, battery swapping provides a quick refueling solution that offers a means of reducing capital expenses while enabling them to utilise their assets more efficiently. In fact, a well-established network of swapping centers could prove to be a critical enabler for the mass adoption of EVs within India's public transport system.

- **Reduced operational downtime:** Charging electric vehicles with existing technologies can take several hours, causing inconvenience and range anxiety for drivers. However, with battery swapping, pre-charged batteries are readily available at swapping stations, allowing for a quick battery swap that takes only minutes. This drastically reduces charging time and provides a more convenient, hassle-free experience for drivers. Gogoro's 6-second Swap & Go solution is a near-zero downtime for customers, which creates higher revenues using higher operational uptimes.
- **Increased battery range:** A dense network of battery-swapping stations allows drivers to extend the range of their electric vehicles without lengthy charging stops. By swapping out depleted batteries for fully charged ones, drivers can continue long journeys without worrying about running out of power, thus eliminating range anxiety. Consequently, this provides a more enjoyable and seamless driving experience.

All images courtesy: shutterstock

- **Job creation:** Battery-swapping stations can create new job opportunities in India, especially in rural parts, where traditional charging infrastructure may not be feasible. Staff and maintenance requirements at these stations provide employment opportunities, contributing to the local economy.
- **Higher asset utilisation:** Gogoro has demonstrated multiple use cases in deploying battery swapping infrastructure in generating additional revenue streams from the network, which is a value add for network partners, whilst also leading to higher infrastructure utilisation. Services such as demand response help balance the grid demand and supply during peak and off-peak hours.

Need for infrastructural incentives

Battery-swapping infrastructure creation requires similar treatment of incentivisation as received by the direct charging solution providers under the FAME-II policy. While the Finance Minister of India, Nirmala Sitharaman, has laid strong emphasis on green growth in the Union Budget 2024, she has also announced than an EV battery swapping policy is being framed in the Union Budget for FY2023. However, the much-awaited battery swapping incentivisation policy is yet to be published, which has a huge potential to invite the FDI into the battery swapping network infrastructure creation.

Thus, there is a pressing need for the government to incorporate the inputs received through numerous industry–policymaker consultations and announce the battery swapping incentive policy. In this regard, the industry applauds the Ministry of Consumer Affairs' decision to defer interoperability standards, and hopes that the policy will reiterate this and not foist any standards, keeping in line with the recent developments.

Providing a level playing field in terms of FAME II incentives and equal GST rates will help the nascent nature of this industry. Present-day incentives are provided to vehicles powered by direct charging, but not to vehicles enabled by battery swapping, invariably resulting in a skewed market. As the creation of the enabling battery swapping infrastructure is capex-heavy, suitable incentives will catalyse the EV adoption rates. This makes the level playing field even more pertinent.

This year is India's moment of reckoning, as the country heralds its rise globally through its G20 presidency. Electrification of the transportation sector, with emphasis on Smart Mobility and innovative driving technologies and business models are quintessential to India's sustained leadership in achieving net-zero goals. ☐

Pioneering Sustainability and Shaping the **Future of Manufacturing**

Igniting the fires of 'Innovation, Integrate and Accelerate', Efficient Manufacturing and Automation & Digitisation India unveil the Manufacturing Technology Summit (MTS) 2023 in Pune.

Neha Basudkar Ghate,
Joint Editor
Efficient Manufacturing

In a realm where technological advancements fuel the manufacturing sector's growth, the profound benefits of sustainable business practices come to the forefront. Sustainable manufacturing, achieved through economically-sound processes that minimise environmental impacts while prioritising energy conservation and resource preservation, has emerged as a catalyst for financial gains, employee well-being, community welfare and product safety. Acknowledging the rising significance of sustainability in global competitiveness, an array of industry-leading companies gathered at the Sheraton Grand in Pune on June 27, 2023, for the Manufacturing Technology Summit hosted by the magazines Efficient Manufacturing and Automation & Digitisation India.

The event, spanning half a day, brought together over 100 participants and industry professionals, fostering a harmonious blend of innovative ideas, positive energy and seamless collaboration. With esteemed technology partners such as Star Engineers, ifm Electronic India, Atlas Copco and Cognex Corporation, along with supporting partners like WALTER, Yamazaki Mazak, Sandvik Coromant, LAPP, Grün, LAMCON and media partner Turbocharged, the summit showcased enlightening discussions on various pertinent topics. These included sustainable supply chains, next-gen mobility,

IoT-driven automation, assembly and joining technologies for vehicle and battery assembly, smart manufacturing with cutting-edge machine vision solutions, the competitive three-wheeler industry and the art of building sustainability while managing financial balance.

Furthermore, an illustrious panel of experts from diverse facets of the manufacturing and technology industry engaged in a meaningful panel discussion, addressing the pivotal role of sustainable manufacturing and identifying pain points and solutions for a better future. ☐

What did our speakers talk about?

Keynote Address: Sustainable Supply Chain and Next-Gen Mobility

"Emerging next generation mobility fields like Electric Mobility, Autonomous Driving and Vehicle Motion Control hold immense transformative potential for India's transportation sector. As India embraces these technologies, suppliers play a pivotal role in driving innovation, providing cutting-edge solutions and ensuring sustainable practices. By harnessing electric mobility, India can reduce emissions, enhance energy efficiency and create a cleaner and greener transportation ecosystem. As suppliers focus on readiness, sustainability and collaboration, they will fuel India's transformation towards a future where next-generation mobility is not just a vision but a tangible reality, delivering safer, greener and smarter transportation solutions for all".

Mandar Vaidya, Director, Material Management, ZF Group

Empowering Local Manufacturing through Global Partnerships

"Star Engineers ensures effective, upscaled and sustainable knowledge transfer from global partners to local manufacturing facilities through a systematic approach. Furthermore, Star Engineers focuses on creating a culture of continuous improvement and learning within their manufacturing facilities. They encourage innovation, provide resources for experimentation and promote cross-functional collaboration. By fostering a learning-oriented environment, they ensure that knowledge transfer is not a one-time event but an ongoing process that evolves with the changing needs of the industry. Overall, Star Engineers' approach towards knowledge transfer emphasises strong partnerships, comprehensive training and a culture of continuous learning, resulting in effective, upscaled and sustainable knowledge dissemination across their global and local manufacturing facilities".

Divya Ramraika, Managing Director, Star Engineers

Role of IoT in Automation

"AI-assisted predictive maintenance reproduces the principle of dynamic monitoring on several influential parameters with the help of Machine Learning, based on AI algorithms and data history. The Y-connection from the smart block has an IoT port that enables double communication of sensors with the PLC and the server. For the first time, sensor data can be directly transmitted to the business software on a factory-wide or even worldwide level. Transparency, flexibility, individualisation and integration are key principles from sensor and sensor data to networking, pre-evaluation to ERP. Cloud 3D and Software Solutions are the main priorities for consistently implementing an industry 4.0 product strategy and digitalisation within the company".

Arvind Talange, Sales Manager, ifm Electronic India

Assembly and Joining Technologies for Vehicle and Battery Assembly from Atlas Copco keeping the latest trends in the EV Industry

"I believe that the industry is on the right path to achieving the mission of 30% penetration by 2030 to get ready for this transformation despite the challenges it faces. The adoption of EVs as we see is gaining momentum in the two- and three-wheeler segments at a good pace. From our interactions with a few Industry players, we can see the challenges in meeting the market demands. The pace of adoption would increase with further developments in Greener Grid, improved charging infrastructure and supply chain support for cost reduction. All mentioned parameters are moving up positively to achieve this transformation successfully".

K Arunagiri, Head, Business Development E Mobility (Motor Vehicle Industry), Atlas Copco

Smart Manufacturing with Cutting-edge Machine Vision Solutions

"Traditional computer vision is used to process images with a set of general rules or Algorithms. At the same time, AI is a field where machines can learn to perform complicated tasks for themselves. For example, Challenging OCR, Cosmetic defects inspection, Classification of objects etc. Deep Learning solutions from Cognex expand the limits of what a computer and camera can inspect. Applications that previously required vision expertise are now solvable by non-vision experts. Deep learning technology transfers the logical burden from an application developer, who develops and scripts a rules-based algorithm, to an engineer training the system. In this way, deep learning makes machine vision easier to work with, while expanding the limits of accurate inspection".

Sudhir Gaikwad, Sales Head, India West Region, Cognex Corporation

Current Competitive Three-wheeler Industry and How to Build Sustainability

"While transportation is a necessity in today's world, the traditional internal-combustion engine is slowly becoming a second choice. Vehicles powered by petrol or diesel emit significant amounts of pollution, which is why their use is rapidly being phased out in favour of fully electric vehicles (EVs). At BAXY Mobility, our EVs have zero tailpipe emissions and are much better for the environment. The per kilometre expense to run an EV is much lesser than diesel-powered vehicles. We advise using zero-emission vehicles only, and not tailpipe".

Naveeth Menon,
VP, Sales & Marketing, BAXY Mobility

Romancing the Balance Sheet

"The business of running a business enterprise is to make a profit, only the methods are different. The real finance people, i.e. the owners of the businesses, call themselves 'non-finance', and this flawed perception is responsible for almost 95% of business failures worldwide. This area is not to be neglected, because just because you have the finest finance department in the world doesn't mean your company finance is at its peak unless financial literacy percolates down to the lowest level".

– Dr. Anil Lamba,
Chartered Accountant, Financial Literacy Activist, Author

Panel Discussion: The Role of Sustainable Manufacturing

"India is currently undergoing a massive transformation in all aspects. Propelled by Demographics and aspirations of the population and fuelled by Government initiatives, we are currently the 5th largest economy in the world. Make in India, New FDI, Digital Initiatives, China +1 and our overall GDP growth will fuel the manufacturing operations in India. Taking India from a $3 Trillion economy to a $5 Trillion one in the coming years will put a huge demand on all aspects of business, from new products, supply and demand side of the value chain, finance, resources and production itself. Resources are scarce and valuable, and the impact of value chains on the Environment becomes the Focus for all organisations. A large and growing number of manufacturers are realising substantial financial and environmental benefits from sustainable business practices. Sustainable manufacturing is the creation of manufactured products through economically-sound processes that minimise negative environmental impacts while conserving energy and natural resources. Sustainable manufacturing also enhances employee, community and product safety".

Krishna Bhojkar,
Ind Partner, Bhojkar Consulting, Ex-Head, Mfg Eng, Skoda Auto Volkswagen India

"To embrace sustainable manufacturing practices as a company, you need to set clear goals, assess your processes, foster a sustainability culture, optimise resource efficiency, use renewable energy, engage suppliers, design for sustainability, implement a circular economy approach, monitor and report progress and collaborate with others. Emphasise employee engagement, efficiency, and transparency while considering the entire product lifecycle. By doing so, companies can integrate sustainability into their core operations, reduce environmental impact and contribute to a more sustainable future".

Harish Acharya,
Prdt & In Segment Mgr, Asia, Sandvik Coromant

"At BPC, it is our constant effort to ensure sustainability by promoting e-mobility adoption and streamlining our daily production and operations. Since solar power generation for self-consumption is not viable within the ecosystem of our location, we have opted for "Green Power" procurement from our power DISCOM by paying a nominal premium above the basic per unit cost. As we expand, we will also be budgeting to purchase "Renewable Energy Certificates" to offset our carbon footprint. We look forward to the liberalisation of the "Open Access" model for purchasing clean electricity for our processes".

Jugal Shahdadpuri,
Director, Bombay PowerCo

"Manufacturing is a vital industry for the economy and has been going through radical transformation. The real challenge for the industry today is the balancing act, be it automation, employability, compliance or market dynamics on skills, scale and sustainability. There is an increasing need and demand for green manufacturing, a process that is necessary to bring a change in business processes, manufacturing practices across the supply chain, and customer experience. At Rubiscape, we enable and empower enterprises and their teams to ideate, adapt, accelerate and sustain AI and Machine Learning-based solutions to make this possible".

Dr Prashant Pansare,
CEO, Intelliment Group

Lean technology in manufacturing

Operational excellence, which involves maximising value and minimising inefficiencies, has become a top priority for manufacturing companies. To achieve this, many companies have turned to lean manufacturing, a robust methodology that optimises manufacturing processes, creates efficient workflows, reduces lead times, increases productivity, improves quality and ultimately enhances customer satisfaction.

Senthil M
Vice-President, Product, Zetwerk

The advent of technology and its application in advanced analytics has brought about a paradigm shift in manufacturing. Technology has become reliable for consistently achieving value creation and process efficiency goals. Manufacturing companies are embracing technology across all facets of their operations, from forecasting and planning to resourcing, utilisation, operations management, cash flow operations and execution excellence. This widespread adoption of technology has led to remarkable breakthroughs in the industry, including the concept of autonomation, which combines intelligent automation with a human touch.

Technology plays a crucial role in the application of lean manufacturing principles. Lean concepts revolve around increasing value by reducing waste, increasing uniformity and avoiding fatigue. To effectively implement poor practices, a comprehensive study of all activities involved in the manufacturing process is required, distinguishing between value-adding and non-value-adding tasks.

Technology tools are available to visually represent the flow of work and provide real-time insights into value stream maps. Advanced analytics, powered by statistical models and historical data, help identify bottlenecks, inventory pile-ups and workload imbalances, enabling efficient resource utilisation.

Technology systems can employ sophisticated algorithms to plan and orchestrate manufacturing orders. A pull system can be established by utilising customer demand data and systemised process models, ensuring just-in-time order execution and minimising inventory levels. Visual Kanbans powered by technology applications help visualise inventory levels and resource utilisation, enabling prompt anomaly detection and communication. Furthermore, algorithm-driven sorting and process standardisation contribute to the 5S requirements, while automation and robotics play a pivotal role in eliminating manual labour, reducing errors and enhancing overall productivity. Robotic Process Automation (RPA) automates repetitive tasks, freeing up human resources for more value-adding activities, while robotic arms and sensors facilitate safe material handling.

The application of big data analytics in lean manufacturing enables actionable insights by analysing vast amounts of data collected from various sources, including IoT devices and enterprise systems. Machine learning algorithms can predict demand variations and machine maintenance requirements and optimise resource utilisation. Statistical and mathematical models help improve processes to six-sigma standards. By identifying bottlenecks, inventory pile-ups and underutilisation of resources, organisations can make globally optimal adjustments to achieve higher efficiency. IoT devices sensing relevant parameters can predict machine maintenance needs, optimising downtime.

Lean methodology and technological applications extend beyond factory settings to create a connected ecosystem. By analysing processes and integrating with suppliers, partners and customers, communication cycles can be shortened and delivery timelines accelerated. Customisation of products based on customer requirements is a key success factor, and technology-driven processes enable faster adaptation to changing needs. Technology solutions like streaming and simulators also expedite training and skill development, allowing employees to practice complex tasks. Real-time streaming and image processing techniques are increasingly used for quality inspection, significantly reducing inspection errors and turnaround times.

In conclusion, technology has become an integral part of lean methodology and practices in manufacturing. The application of technology accelerates the benefits of lean outcomes, and emerging technologies such as artificial intelligence, IoT and augmented reality are poised to take lean manufacturing to new heights. Organisations that embrace these cutting-edge technologies and adapt quickly will likely achieve remarkable success in the evolving manufacturing landscape. ❐

Cost-effective **3D Printing for metals**

Wire Arc Additive Manufacturing or Direct Energy Deposition (Arc-DED) is arousing a great deal of interest in the industry. Manufacturing using arc-based layer deposition enables a high degree of flexibility in component geometry. The process is particularly cost-effective and resource-efficient for prototype construction, repairs, restoring damaged components and small-batch production. The welding process is the key factor that determines the quality of the components produced. The Cold Metal Transfer from Fronius effectively fulfils all the conditions for Wire Arc Additive Manufacturing.

Additive production methods generate components by building up material layer by layer. The best-known example of an additive method is 3D printing. Direct Energy Deposition or Wire Arc Additive Manufacturing, which is based on the arc welding process, also produces metal parts layer by layer, with the layers formed by the consumable wire electrode. Generative methods like this are particularly advantageous when complex component geometries must be produced, as the design options are virtually limitless. What's more, parts can be manufactured at low cost and extremely quickly, which makes Wire Arc Additive Manufacturing a very attractive option for prototype construction and small production batches. Processing time, tool wear and material loss during machining — especially with the conventional approach of milling out the workpiece from a solid block — all generate significant additional costs.

What Is Direct Energy Deposition?

There are several generative production methods for metal. Essentially, these can be divided into two fundamental types: powder-based processes and wire-based processes. In powder-based processes, the layers are built up using molten metal powder. The most common method, the powder bed process, produces extremely precise results but is somewhat slow in production. Wire-based processes, on the contrary, build up the component by melting a filler metal in the form of a wire. These processes require the use of a laser, electron beam or arc. They also have a high deposition rate and therefore help to cut production times.

Direct Energy Deposition is a wire-based process which uses the gas metal arc welding process (GMAW). There are several advantages to 3D printing, not least its high deposition rate (up to four kilograms per hour with steel materials) and multi-wire solutions could even increase deposition rates in the future. Equipment and material costs are also important criteria, which is another strength of Arc-DED: All that is required is a suitable welding system and there is no need for costly special equipment, such as the vacuum chambers needed for the faster electron beam process.

Challenges with wire-based 3D metal printing systems

"With Arc-DED, you have a semi-automatic process at your disposal, which already uses the benefits of Computer-Assisted Manufacturing (CAM). However, the manufacturing process has not yet reached the highest level of autonomy", explains Philip Roithinger, New Business Employee Perfect Welding, Fronius International GmbH. He adds, "The welding specialist's welding expertise is still required for path planning". To ensure a stable production process, optical and thermal sensors are used. For a good 3D printing result, it is first crucial to identify the right weld path and appropriate welding parameters. In addition to this, an automated welding system is required, which can ensure the necessary geometric precision. Maximum welding process stability, good heat management and exact predictability are also essential for this. Construction strategies are also required for series manufacturing, where results are repeated and can be transferred to multiple welding systems via 'copy and paste'.

"Cold" welding process for strong layers

A stable welding process and effective heat dissipation are essential for component production using large-scale 3D metal printing. The welding process needs to be sufficiently low-energy such that when a new layer is applied, the existing layers do not melt again. In other words, the process needs to be as "cold" as possible. Furthermore, the weld layers need to be continuous, spatter-free and consistent; this is because any flaws would be replicated in each subsequent layer.

The CMT GMAW process from Fronius and its process control variants meet these requirements. They produce a stable arc and a controlled short circuit with long short-circuit times. This means that the heat input is lower, and the

material transfer is practically spatter-free, which helps to prevent flaws.

Two process control variants of CMT are particularly well suited to Wire Arc Additive Manufacturing. One is the CMT additive process characteristic, which has been optimised for large-scale 3D metal printing. It achieves high deposition rates while transferring very little heat into the component. With the CMT Cycle Step variant, each droplet detachment can be individually controlled, enabling high-precision work and increasing reproducibility. The CMT Cycle Step variant reduces the arc power even further through the controlled deactivation of the arc during the process phase. However, this particularly "cold" process does take longer to build up the layers, as the deposition rate is lower.

The key factors determining the quality of a component produced using Wire Arc Additive Manufacturing are the stability of the welding process and low heat input — the Cold Metal Transfer GMAW process from Fronius fulfils these requirements. The reversible wire electrode used in the CMT welding process mechanically supports droplet detachment. This means that less energy is needed and long short-circuit times are achieved — for a "cold" welding process.

Focus on the precision with real-time monitoring

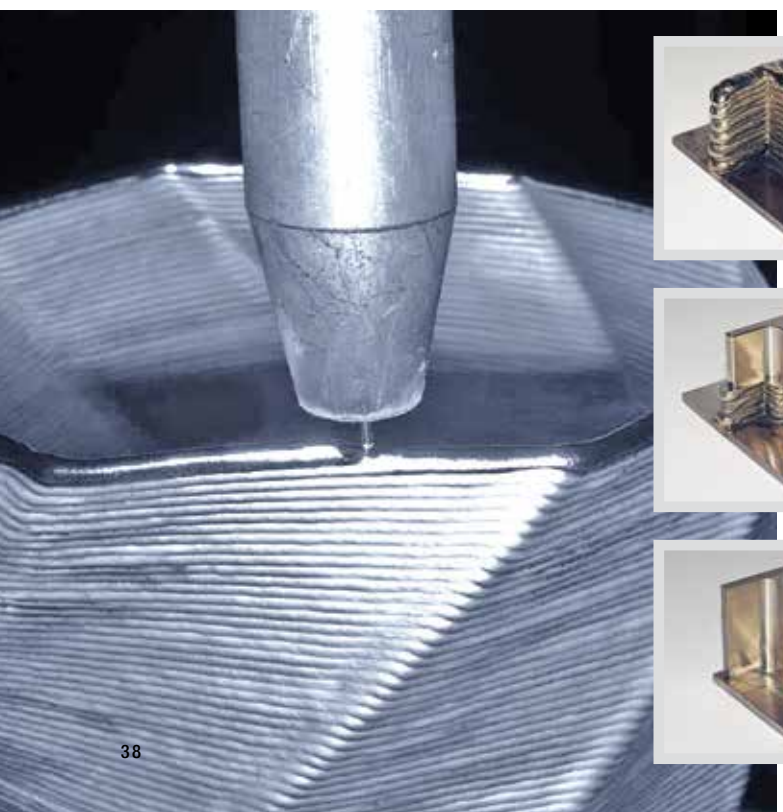
During 3D printing, deviations are replicated from one weld layer to the next, thereby affecting the geometry of the resulting product. This means it is even more important not only to avoid deviations as much as possible but also to correct them immediately, should any still occur. The Fronius ArcView camera system provides a direct view of the arc and the layer structure. The welding process can be visualised in exceptional detail using impulse-controlled image generation in the dark phase of the arc. This provides real-time monitoring of the ongoing welding process. If necessary, the welding technician can take corrective action immediately and directly, allowing them to achieve the desired result. Fronius Arc View offers a continuous, real-time view of the welding process and layer structure.

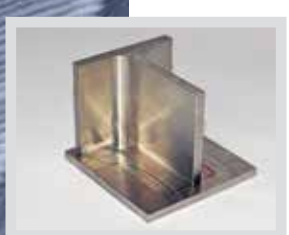
Real-world Wire Arc Additive Manufacturing applications

Countless large-scale components have already been produced using Fronius welding technology and 3D metal printing in a variety of sectors. These include fan impellers for energy generation, which are made from high-grade materials. Milling the workpiece is very expensive due to the high material consumption rate, while casting is not always able to meet the critical metallurgical properties required for walls that are only 1.5-mm thick, for example. Using 3D printing and Wire Arc Additive Manufacturing, based on the CMT Cycle Step, these fan impeller blades can be produced from a nickel-based alloy using an additive approach. It is even possible to repair components using Wire Arc Additive Manufacturing.

Fronius has also implemented another application with a partner in the aviation sector. Titanium is a frequently used material in aircraft construction thanks to its tensile strength, resilience, corrosion resistance and low weight. The majority of the components are manufactured using subtractive methods, whereby up to 90% of the material is milled away. This causes high costs, long machining times and costly tool wear. By contrast, components produced using 3D metal printing, only need to be reworked to produce a smooth surface. The titanium components produced using the CMT additive process do not exhibit any problems with lack of fusion and have impressive metallurgical properties. As a result, tool costs, machining times and wear can be reduced, meaning that overall machining costs can be brought down.

With Wire Arc Additive Manufacturing, components are "welded up" layer by layer before being mechanically reworked. In the example here, a component is being produced from titanium. □





Courtesy: Fronius India

Phases of MSMEs **deconstructed...**

Technology will be the main fulcrum of any business in the future. One basic lesson for businesses that has remained constant over centuries is its ability to adapt, react and respond, all at the proper time as dictated by the business environment. Here is an article summarising the stages of setting up an enterprise briefly.

Raju Varghese,
Director, IQAC & Global Programs,
Lexicon Management Institute of
Leadership and Excellence

Business longevity

What is common to Otis Elevators, Alembic Pharmaceuticals, Shalimar Paints from India and companies like Kongō Gumi of Japan or Stiftskeller St. Peter of Austria?

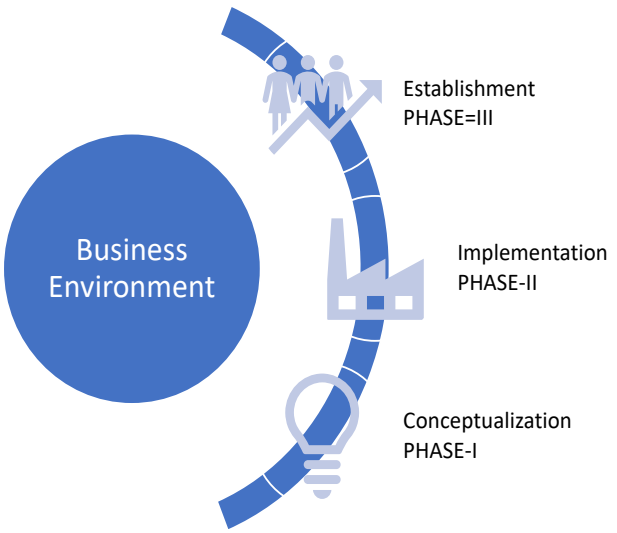
Their years of existence.

While Kongō Gumi has had an existence of 1443 years and Stiftskeller St. Peter has had an existence of 1218 years, these Indian companies have had an existence of only 100 years, breaking records with their sustenance in the market. The 'third generation rule' seems to suggest that businesses do not survive beyond the third generation, a debatable theory that conforms to a famous Brazilian saying, "Rich Father, Noble Son, Poor Grandson".

Challenges to MSMEs: The Indian Context

How does one ensure MSME longevity?

To understand this, it is necessary to note that MSME formation goes through three phases, namely Conceptualisation, Implementation and Establishment.



Phase 1: Conceptualisation

Any MSME unit needs to go through three phases to come to a competitive business environment. As expected, a business exit can happen at any of the three phases. Conceptualisation is dependent on the entrepreneur and the strength of their belief in the venture. At this stage, the entrepreneurial venture depends upon the conviction of the entrepreneur and their struggles to implement their plans. The greater the belief in the entrepreneurial venture, the higher the chances of conceptualisation. This phase is ideation oriented. Hence, it must cross through all the pre-conceived conviction barriers of the entrepreneur and the people closest to him. Many entrepreneurial ventures are born in this phase and many may exit through it as well. What helps entrepreneurs most in this phase is their research on the venture, opinions of the people closest to them and their ability to bounce their ideas off of experts. This phase is marked by information gathering about the product/service.

Information on start-ups, MSME formation strategies, Industrial Development Corporation norms, rules of the District Industries Centre, research on the forms of the organisations, product information and more are some of the core areas of this phase. Information strengthens conceptualisation.

Phase 2: Implementation

Once a project clears the first phase, it further develops into the next phase: implementation. The idea now starts converting itself into a more tangible form. The unit/shop/business entity now starts getting a form and features. If the proposed unit is a production unit, it would prefer to establish itself in an industrial area with access to amenities like electricity, land, water, workforce etc. On the contrary, if it is an IT-based unit, it will seek existence in an IT/Software Technology Park. If it is a trading entity, it will look for the proper location, accessibility to its target audience and more. Thus, the establishment of the proposed idea will be implemented in this phase.

This phase is also marked by governmental and tax compliances, actual construction, nodal authority clearances, identifying human resources and establishing operations. This phase is called implementation as the entrepreneurial dream has cleared all hazes of doubt and lack of clarity and is now an entity. The enterprise is thus born. Facilitation by government agencies and ease of information on laws, start-ups etc. and their implementation are the characteristic features of this phase. Previously, this phase was marked by bureaucracy and red-tapism, which resulted in several ventures getting grounded. However, with the increasing open-era norms ushered by the erstwhile LPG era, this phase is becoming more conducive due to the heavy emphasis on production through schemes like Make in India, transparency and openness.

In the recently concluded surveys on ease of doing business, India is ranked 63rd amongst 190 nations in the ease of doing business parameters. What is encouraging is the fact that it was ranked 142 in the year 2014. Moreover, 39,000 compliances have been reduced and 3,400 legal business-related provisions have been decriminalised. This phase can be very challenging for entrepreneurs as complying with varied norms could become a major roadblock.

Examples of businesses shutting down due to an inability to negotiate the hurdles of setting up are well known. Openness, transparency and single-window clearances by the government will promote entrepreneurial ventures. Entrepreneurial tenacity and government openness mark the important landmarks in the setting up of a new business. Progressively, there is still a long way to go for ease of norms. Hence, the entrepreneur needs to have greater conviction and patience during this phase.

Phase 3: Establishment

After clearing the first two phases, a venture enters the business arena. This is the most critical phase as the business is now judged by the customers, evaluated by competition and measured by the government. A serious transition that may be required by entrepreneurs is a transition from entrepreneurial qualities to managerial qualities. A transition from a person-driven entity to a system-driven entity is urgently called for during this phase. Entrepreneurs may fall into the trap of trying and keeping all control of the business entity with them. This is a catch-22 situation: how much power should one let go and how much power should one retain, for business control? It has to be the best fit. No business owner would want to end up in a situation where the entrepreneurs get caught up in operational decisions and lose track of strategy. Any strategy measure for MSMEs requires an entrepreneur with an organised and de-cluttered mind.

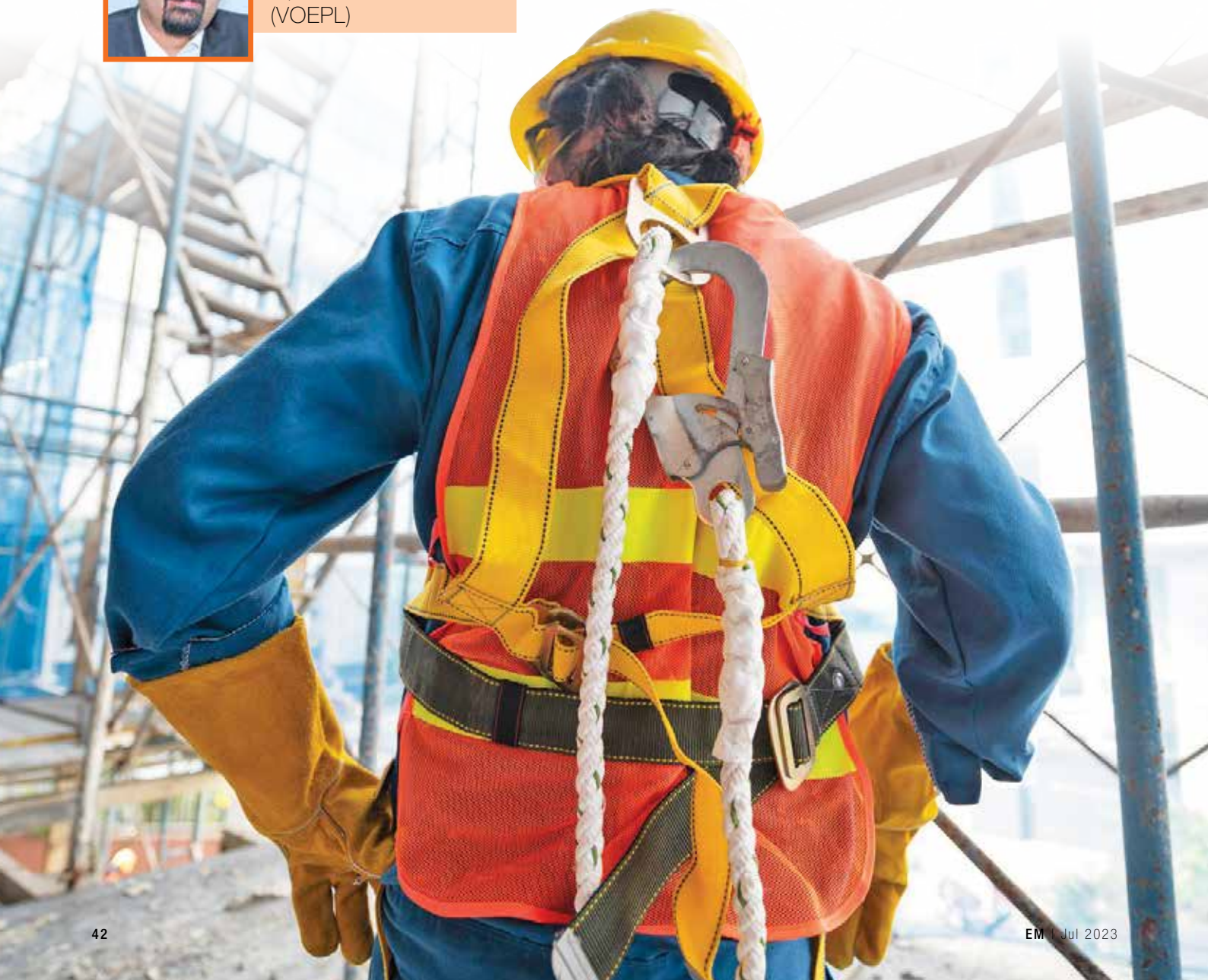
Another major transition is that the business entity now starts competing in the business environment. The competition amongst similar businesses and competition to capture the minds of the customers. Success in this phase depends on how competition is tackled and how consumers are retained. The unit will need to adapt, be flexible as well as rigid at times and most importantly keep track of the happenings in the business environment. The latest competition can come from within the country or outside the national boundaries. There could be new research or technological innovation that may make the existing product/service obsolete. The consumers of the current generation thrive on receiving multiple offerings of the same commodity. Hence, tackling competition and capturing customer attention are the most critical areas of business survival. In present times, tools like AI and Machine Learning are available to help understand consumer preferences. The present era of business and the era to follow will be dictated by changes in technology. Technology will be the main fulcrum of any business of the future. One basic lesson for businesses that have remained constant over centuries is its ability to adapt, react and respond, all at the proper time as dictated by the business environment. ☐

Safety First!

Working in the manufacturing industry requires a great deal of skill, expertise and knowledge of how to manoeuvre around the factory floor safely and efficiently. From the top guns to the lowest rung of workers, safety protocols are in place every step of the way. Let's discuss how workplace safety plays out on the management end...

Sukrit Bharati,

MD, Virtuoso Optoelectronics Limited (VOEPL)



The risks undertaken by manufacturing workers is immense, with potential threats from faulty and heavy machinery, chemicals and multiple other avenues. Slips, trips, falls and injuries are a part and parcel of the job; however, standard operating procedures when it comes to safety help lower the risk and deal with the situation better in a post injury scenario. Ensuring safety and preventing mishaps is a key objective of the industrial safety sector. Hence, they necessitate a proactive strategy that puts workers' health and safety at the top of the priority list.

Awareness of Safety SOPs

India has seen too many factory mishaps over the years and a lot of it has to do with not following the standard safety operating procedures put in place by the law. While ensuring these protocols are met is the manufacturing unit or factory owner's responsibility, every employee across all rungs of the organisation can contribute to the overall safety of the place. Reporting inconsistencies to supervisors, ensuring your own personal safety or even just checking the safety logs to make sure it is all in place at the start or end of your shift could prevent catastrophic events at these workplaces.

On the contrary, the workload on several manufacturing units is huge. Employees have to produce several high-quality products in tight time-frames. Moreover. it is only fair that, occasionally, they might either find shortcuts that may put their safety at risk. The other way is to push things like broken edges or equipment servicing to a later date, because of the time crunch on hand. It is these small but seemingly looming safety issues that backfire when neglected.

Take for example the pandemic. Several routine inspections and servicings were put on hold during the lockdown, and the fact that there were so many incidents when factories and manufacturing units opened back up, only goes to show that these timely checks are important and a must. Hence, not only is it important to ensure that the checks are done, but also to stay up to date with the changes and effectively prevent any kind of mishap from occurring.

Recognising the current gaps

The Factories Act 1948 applies to every factory that has 20 or more workers. However, irrespective of the rules that the law enforces, it also becomes the responsibility of every worker to individually take care of themselves and their co-workers. Some of the most basic things that can be done to ensure safety at the workplace, especially on the factory floor of any manufacturing unit, is to keep work areas clean, use the right tools for the job and ensure that you wear the proper apparel as well as props like helmets, gloves and boots to match your task at hand. Additionally, ensuring that chemicals, wherever used, are properly labelled and stored under the right conditions is important.

The lack of any enforcement of law when it comes to violations of the Factories Act 1948 or any other laws encourages and allows for owners, supervisors and managers of manufacturing units or factories to take a more relaxed approach. However, it is equally important to understand that the factory is also under a lot of pressure to deliver products as multiple supply chains may depend on it. Hence, taking the right judgement call becomes crucial.

Often ignored, but equally, if not more, important is the mental well-being of a worker working absolutely any job. Managing stress and ensuring that the workers are mentally and emotionally healthy allows for them to be more productive, alert and aware of things that could endanger their lives in the workplace. Awareness around different kinds of mental stresses factory workers could face is step one, as many are often unaware of any mental stressors. The next step would be to have on-ground counselling via a counsellor to better manage that stress and deal with it correctly. The benefits of this are umpteen.

Government intervention needed

Celebrating safety awareness month and/or week is not enough to ensure that workplaces are and continue to remain safe. Stringent policies around violation of the safety norms are also not a complete solution, as nurturing MSMEs is equally important. Thus, the most important requirement remains basic guidelines for safety in all new machines that are being manufactured. Moreover, detailed trainings and awareness about health and safety should be made easily available, which is very difficult for a MSMEs to make on their own. Government intervention in the form of setting up laws is not the only solution; changing the culture, educating the sector and installing correct guidelines at the product/machine design level need to be incorporated.

Training is one of the easiest ways that the government can effectively inform and protect employees as well as organisations. Providing visual and print materials, making detailed training modules/videos for all kinds of safety precautions and drafting guidelines for all common tools, products and machines will make factory equipment safe and reliable. This can be achieved via regular awareness camps, TVCs, posters and more.

Futuristic views

It is a lot easier today to make workplaces safer than it was a decade ago. Technology of various kinds allows for companies to not only find ways to minimise risk but also deal with accidents and mishaps better. Automation and improved equipment design have allowed for heightened safety in several industries. With everything happening at

the click of a button today, physical harm to the worker in terms of their exposure to risk has been considerably reduced. This is not to say that catastrophic accidents or mishaps do not happen, but our ability to predict and prevent them has increased. Thus, further technological advancement will only aid the prevention of accidents further, as long as they are used in the right way and at the right time. Factories, if designed for efficiency, will change the game for their respective industries; however, even one accident can set their progress years behind. □

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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
- ❑ 1,000 to 2,999
- ❑ 3,000 & more

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Sustainable production for paint application

Dürr is setting benchmarks in sustainable production with its new EcoBell4 atomiser family. The innovative application technology achieves up to 98% efficiency for clear coat application. It reduces paint loss and rinsing agent consumption by 50% during colour changes, or up to 91% in combination with the EcoProBooth modular paint booth concept. The unique 4-main needle technology and process parameter changes make improvements for paint application possible. Higher paint application efficiency reduces material, resource, and energy consumption for a more sustainable production process. With the latest atomiser generation, EcoBell4 Pro Hu with direct charging and EcoBell4 Pro Ux with external charging, Dürr is scaling new heights. For clear coat application, the Dürr atomizer achieves application efficiencies of 95 to 98 percent according to DIN EN 13966-1. For the first time, the product family includes a basic version for standard applications and a pro version for special processes such as 4x1C or 3x2C.

EcoBell4 Pro Ux

Dürr India | Chennai

Precision tooling to provide increased material savings

Guill Tool recently announced the availability of its Spiderless Pipe Die. This new offering utilises precision tooling to provide increased material savings compared to conventional basket dies for pipe extrusions. In the coming years, the global market for pipes used in irrigation/sewage systems, and industrial applications is expected to grow. This increased demand for pipes is driven by the increasing need for water and wastewater infrastructure, as well as the growth of industrialization and urbanisation. Used by tube and pipe producers for larger diameter capabilities, this new pipe die is capable of providing a finished extrusion with OD from 2"-15". It's offered in 4140 steel or stainless with heat treatment. The company's Spiderless Pipe Die design differentiates itself from a basket die with its focus on precision tooling gained from decades of experience in medical tubing, flow analysis, and Guill's ISO 9001 and AS9100 (Aerospace) quality systems. The significance of the Guill Spiderless Pipe Die becomes evident when considering material savings.

Spiderless Pipe Die

Guill Tool & Engineering | USA

Solution for high-resolution characterization of battery cells

Waters Corporation recently announced a new Battery Cycler Microcalorimeter Solution from its TA Instruments™ Division for high-resolution characterisation of battery cells. The instrument and software combination enables non-destructive testing under real-world operating conditions and significantly reduces experiment time from months to weeks while providing decisive insights for greater battery efficiency, safety and stability. The solution combines the TA Instruments high-resolution TAM IV Isothermal Microcalorimeter and integrated TAM Assistant Software platform with a BioLogic VSP-300 potentiostat (battery research instrument) to deliver accurate, rapid detection of parasitic heat reactions, an early indicator of battery efficiency. The Battery Cycler Microcalorimeter supports testing of three common battery types—coin, pouch, and 18650 cylindrical—for charge/discharge and thermal testing in parallel. It can maximise researcher efficiency with support for testing and data collection of up to 12 coin-sized batteries simultaneously—six times more than competitive offerings.

Battery Cycler Microcalorimeter Solution

Waters Corporation | United States

Electric-hybrid solutions to the market

John Deere expands its offerings by introducing new E-Drive and E-Power Machines. These offerings provide customers with an innovative and eco-friendly take on industry-trusted equipment. The E-Power machines utilise battery solutions from Kreisel Electric. Offering a hybrid solution, E-Drive machines feature an electrified drivetrain with an engine as the primary power source. In addition, E-Drive machines enable better fuel economy, improved powertrain component life, and stronger pushing power on the job than traditional models. E-Drive machines are built on customer experience and field-proven electric technology. E-Power technology provides lower daily operating costs, lower jobsite noise, and zero tailpipe emissions. Ryan Campbell, President, Worldwide Construction & Forestry and Power Systems, said, "As we continue to introduce battery-electric and electric-hybrid solutions to the market, we aren't just designing a new way to fuel your fleet. We're also focusing on building an electric infrastructure through innovative and forward-thinking technology".

John Deere 744 X-Tier wheel loader and John Deere 850 X-Tier dozer

John Deere | Pune

Optimum machining strategy for the honing process

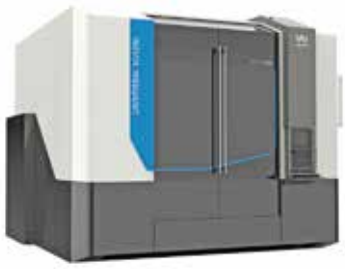
MAPAL recently developed specific solutions for hydraulic valve housings. The gap dimension with the spool depends on the accuracy of this bore, so that the hydraulic oil can only flow in the required direction without leaking. This is very narrowly defined for modern hydraulic valves. The roundness, cylindrical form, straightness, and surface quality of this bore are therefore crucial. The first of the solutions presented for the machining of a hydraulic valve housing is rather unusual, as it does not include a fine boring tool for finishing. After piloting, boring, and circular milling of the spool bore, in this instance, a multi-bladed reamer performs the final machining step before honing. The concept is particularly suitable for smaller and medium quantities. The key difference is the fine boring tool used for fine machining. It meets the high standards for spool bore and compensator bore production. The EasyAdjust-System and guide pads offer reliable fine machining with easy handling.

Hydraulic Valve Housings

MAPAL | Coimbatore

Machining components of massive size

WIDMA recently launched Vertical Turning Lathes (VTLs) which are the preferred choice for many manufacturers looking for high accuracies at high speeds. VTLs are ideal for machining components of massive size and complex geometries such as pumps and valves, railway wheels, bearings, and graphite blocks with accuracy. Ranging from simple turning to complex 5-face machining, these machines are classified under three categories, Multi-Tasking Turn Mill Machines, Vertical Turn Mill Machines, and Vertical Turning Machines, from two-axesed to five-axesed configurations with table sizes ranging from 500 mm to 3000 mm.



Vertical Turning Lathes (VTLs)

Key Features:

- 5-Axis Machining Capability
- Dual Spindles
- Automatic Tool Changer
- High-speed Machining

WIDMA Machining Solutions Group | Bangalore

Improved vehicle safety with brake pad scorching

TRUMPF Photonic Components, is offering VCSEL-based heating systems for the scorching of brake pads to achieve higher quality and, in turn, greater safety with vehicle brake pads. A shorter bedding-in period for new pads and possible initial fading are prevented by the scorching process step. Ralph Gudde, Vice President Marketing and Sales, TRUMPF Photonic Components "Scorching is a key process step in the manufacturing of brake pads to achieve material properties that lead to high quality and safety. Not only is the process quality increased by using our TruHeat VCSEL systems, but the processing also becomes more sustainable". This manufacturing step requires high temperatures. VCSEL-based heating systems offer direct and homogenous infrared laser power, generating high temperatures with reduced energy loss and lower CO_2 emissions. This system also offers high power density and processes the pads without contact, avoiding any contamination or material wear and, thus, increasing processing safety. The production line can be shortened as the systems are compact and require a smaller footprint compared to other manufacturing equipment.

Brake pad scorching with TruHeat VCSEL systems

TRUMPF | Pune

Brushless Slotless Motor for the surgical hand tool market

Portescap recently launched the 30ECA64 Ultra EC brushless DC motor, an autoclavable motor that has been optimised for success in large-bone surgical orthopaedic applications. The 30ECA64 is a complimentary, cost-effective addition to Portescap's well-known premium large bone surgical motor (B1112A4). It is the first brushless slotless product that Portescap has introduced for the surgical hand tools market. The 30ECA64 is available in both a cannulated and non-cannulated version, with the cannulated shaft option featuring a 4.7-mm cannulation to allow for larger K-wires. This motor features an autoclavable design that is capable of surviving up to 500+ sterilisation cycles and delivers a high continuous torque of up to 110mNm. Its 30mm diameter by 64mm length, combined with a low overall mass of 256g, ensures that it provides clean, controlled cutting without stalling in a small and lightweight package. This motor is suited for battery-powered surgical hand tool applications, specifically large bone orthopedic applications.

30ECA64 Ultra EC brushless DC motor

Portescap India | Mumbai

Highlights – August 2023

» **Casting and Forging**
Casting is a manufacturing process in which a liquid material is typically poured into a mould that contains a hollow hole of the desired shape and then allowed to harden. On the contrary, forging is the process in which metals are produced and moulded utilising compressive forces. The shaping procedure is what distinguishes casting from forging. While forging moulds the metal workpiece while it is in a solid condition, casting converts metals to a molten state. The use of casting and forging in the automation sector will be discussed in this section.

» **Engineering Materials**
Engineering materials are a class of materials that are employed in the creation of man-made components and structures. An engineering material's main purpose is to endure applied loads without breaking or showing significant deflection. Material engineering demonstrates how to use engineering knowledge to improve things and resolve manufacturing issues.

» **Grinding Machines**
When the relative movement between the tool and workpiece is rotational or linear, bonded cutting edges that are geometrically non-defined are removed from the material using a grinding machine. Workpieces that need to exhibit high surface quality and great accuracy of shape and dimension are finished with grinding. This article will have exclusive insights from organisations using grinding machines and their peculiarities.

» **Sustainable Manufacturing or Carbon Neutrality**
With a major focus on minimising adverse environmental and social impact, sustainable manufacturing represents an all-encompassing approach to the process of producing commodities. Net-zero carbon dioxide emissions define carbon neutrality, which can be done by lowering emissions, the majority of which are caused by burning fossil fuels, and by taking carbon dioxide out of the atmosphere. This section will have articles focused on sustainable manufacturing and carbon neutrality.

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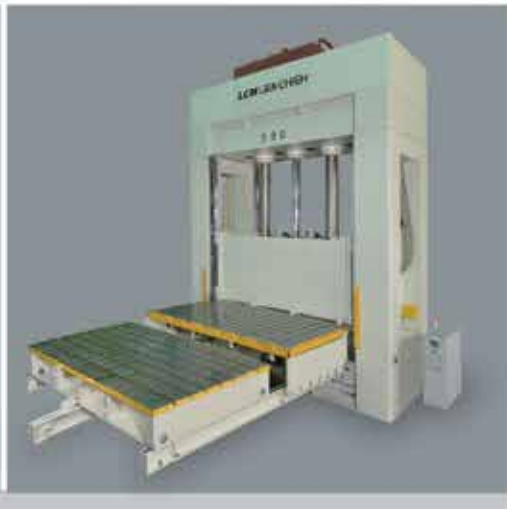
Servo Mechanical & Servo Hydraulic Tandem Line
Tonnage: 2,400 ton~1,000 ton | Bolster Area: 5,000 x 2,500 mm

Forging Presses
Tonnage: 12,000 ton
Bolster Area: 2,700 x 2,500 mm

Tryout Presses
Tonnage: 3,000 ton
Bolster Area: 4,600 x 2,750 mm



Die Spotting Presses
Tonnage: 500 ton
Bolster Area: 5,000 x 2,500 mm

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