

THE MACHINIST

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In an exclusive interaction with the newly elevated Global CEO of Switch Mobility, **Mahesh Babu**, he divulges into the game plan for the year ahead, engineering innovations and more

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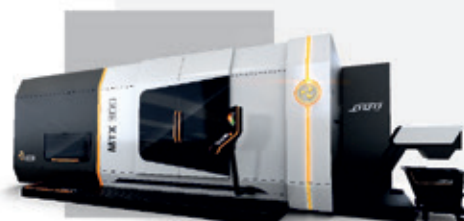
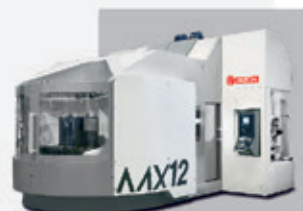
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KNOWLEDGE IS POWER. INDIA CAN'T BE LEFT BEHIND!

Recently, I was going through the NITI Aayog Official Innovation Report 2020. Though many of us are aware of these issues, these plots in the report must be a wakeup call for the nation and policymakers. Major corrections are needed as part of the 2023 budget provisions if we even want to resurrect the situation. Otherwise, we will slowly and steadily lose whatever standing we have been able to achieve in the last 75 years.

Even among the BRICS nations, India's Gross Domestic Expenditure on Research and Development (GERD) is the lowest, hovering at 0.6 to 0.7 per cent of GDP. Brazil, Russia, China, and South Africa spend around 1.2 per cent, 1.1 per cent, 2.44 per cent, and 0.8 per cent, respectively. The world average is around 1.8 per cent. The United States, Sweden, and Switzerland spend about 2.9 per cent, 3.2 per cent, and 3.4 per cent, respectively. Israel spends 4.5 per cent of its GDP on R&D, the highest in the world.

The solution is to allocate more resources as a percentage of GDP. We need at least 2 per cent of the GDP for S&T. It's the investments made in science and technology in the last 75 years that came to our rescue during COVID. The respect we command in IT, space technologies, biotechnology, missile programmes, atomic energy, the green revolution, and startups is all because of our S&T investments.

Another observation about this report is that India has a low number of scientists per million people. In India, it's 252, while it's 1585 in China and 4663 in the US. Solution: The project approval rates of our funding agencies have gone below 10 per cent. This means that only one out of every ten proposals submitted is funded. Add to this the enormous delays in fund disbursement and the associated bureaucracy that goes with it. There is an urgent need to launch new initiatives that connect our tier-1 institutions with tier-2 and tier-3 institutions for research collaborations. There are specific fund schemes for our top scientists, which can be availed of only if they collaborate with scientists at less endowed institutions, including those in the private sector. Let's not differentiate between public and private institutions when it comes to research. Let us fund good ideas regardless of researcher affiliations.

In India, bureaucratic processes in fund disbursement and management are a matter of concern. Through the use of information technology and the participation of private companies, the government has streamlined numerous processes. See, for example, the passport offices. The entire backend process for passport issues is handled by private agencies. I have never understood why the same cannot be done with project grants and fund disbursements.

A lot of reforms are needed. Business as usual with the existing S&T management policies and the ever growing bureaucracy will mean a lot of missed opportunities and a severe underutilisation of national resources.

R Kamat
Editor

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Vice President Marketing **Vidyt Patara**

Brand Publisher **Rishi Sutrave**
rishi.sutrave@wwm.co.in
+91 9820580009

Corporate Strategy and
Subscriptions Lead **Ritika Masand**
ritika.masand@wwm.co.in

Editor **Rahul Kamat**
rahul.kamat@wwm.co.in
+91 9892612075

Assistant Editor **Anvita Pillai**
anvita.pillai@wwm.co.in
+91 9820137351

Associate Art Director **Sanjay Dalvi**
sanjay.dalvi@wwm.co.in

Executive Delegate Acquisition **Shruti Nair**
shruti.nair@wwm.co.in

ADVERTISING

West & North **Ranjan Haldar**
ranjan.haldar@wwm.co.in
+91 9167267474

South **Mahadev B**
mahadev.b@wwm.co.in
+91 9448483475

Vaishnavi Ravindran
vaishnavi.ravindran@wwm.co.in
+91 9930587550

CAREERS
careers@wwm.co.in

SUBSCRIPTIONS
subscriptions.wwm@wwm.co.in

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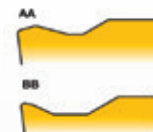
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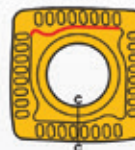


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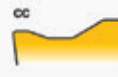
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Jal Kal Varanasi Achieves Uninterrupted Water Supply With ABB Softstarters

VARANASI'S WATER SUPPLY

BODY, Jal Kal Department collaborated with ABB India for its smart technology to facilitate smooth and efficient water supply to the city. The city's pumping station and sewage treatment plants (STPs) have been installed with ABB softstarters for better water management operations. With this technology, ABB enables uninterrupted water supply to 60 per cent of Varanasi city. It also enables effective pumping of treated water at the government's STPs, supporting nation's 'Namami Gange' programme for Clean Ganga.

Varanasi's water pumping station relies on century-old 250 MLD WTP for its water supply. ABB Softstarters ensure smooth water movement and eliminate pressure surges. This enables minimization of leakages and prevents the incidents of pipe bursts. ABB's softstarters technology has



easy applicability with other built-in protections. It also features a display which makes it easy for the users to understand faulty tripping points.

"For Jal Kal Varanasi, our objective was to enable safe and reliable water supply operations. With smart technology and our state-of-the-art products, we were able to support the Jal Kal team in their endeavor to increase water supply reliability, motor lifespan

and lower the maintenance costs. Given the critical challenges faced by the water supply bodies, we are pleased to provide electrification solutions that support our stakeholders in meeting them," said Kiran Dutt, President -Electrification Business, ABB India.

Varanasi generates about 300 million liters of sewage per day. The Clean Ganga or 'Namami Gange' programme is a massive initiative lead by the central government to cleanse the

holy river by tapping the major drains flowing into the river and diverting them to sewage treatment plants (STPs). This initiative stops untreated sewage from flowing into the river and thereby prevents it from polluting the river. ABB India's Softstarters installed at such STPs support the 'Namami Gange' programme by efficiently pumping the treated water from the sewage plants back to the river.

Volvo Trucks India Commences Commercial Trial Of LNG Truck

VOLVO TRUCKS INDIA initiated its switch towards alternate fuels in India with the commencement of commercial trials of its liquified natural gas (LNG) powered class leading FM 420 4X2 Tractor. Aimed at offering alternate fuel solutions for demanding long-distance haulage applications, the commercial trial was flagged off from Nagpur in the presence of senior executives from Dehlivery - a leading Indian logistics provider for e-Commerce, Gas Authority of India Ltd (GAIL), BLNG - the providers of LNG, and Volvo Trucks executives.

Speaking on the occasion, B Dinakar, EVP and Business Head - Volvo Trucks - VE Commercial Vehicles Ltd, said, "Our BS VI compliant Volvo FM 420 4x2 tractor-trailer solution is already the industry benchmark for express cargo clocking over 25,000 kms every month with exceptional uptime. This LNG powered Volvo FM 420 4X2 solution will help our customers to reduce vehicle emissions and improve fuel efficiency levels in their operations even further. We are particularly proud to be introducing such solutions at a time when the Government of India has

defined its vision for modernising logistics in India, as laid out in the recently released National Logistics Policy and Gati Shakti program."

Volvo LNG powered trucks use the diesel cycle to run the LNG engine as opposed to the industry practice to use Otto or petrol cycle using spark plugs for combustion. By leveraging the technology and efficiency of a diesel cycle which is 15-20 per cent better than petrol cycle, Volvo LNG trucks offer superior fuel efficiency and performance. Volvo has been supplying LNG powered trucks in Europe for the past five years and many thousand trucks are operational in severe applications like long haul, petroleum, oil and lubricants distribution, refrigerated container movements and road train combinations.

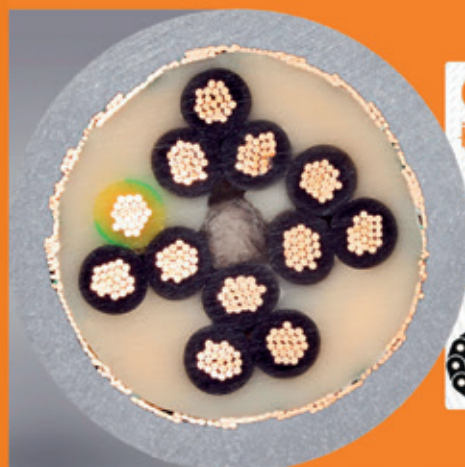
"The LNG powered Volvo FM 420 4X2 is the next step in Volvo Trucks



continuing endeavour to introduce innovative transport solutions that set new standards for productivity, safety & uptime in India. Further delivering on Volvo Trucks core value of safety, the Volvo LNG FM 420 4X2 truck offers advanced driver assist functions like lane departure warning and automatic emergency braking system," concluded Jonas Nilsson, VP India & Indonesia - Volvo Truck Corporation.

Investments by leading players to develop LNG distribution infrastructure and modernizing logistics driven by Government of India Policies will pave the way for LNG powered trucks in the demanding long-haul segment.

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ArcelorMittal Nippon Steel India Commences Rs 60,000 Crore Expansion Project In Gujarat



ARCELORMITTAL NIPPON STEEL INDIA (AM/NS INDIA) – a joint venture between ArcelorMittal and Nippon Steel, two of the world's leading steelmakers – conducted a groundbreaking ceremony to mark the commencement of a Rs 60,000-crore investment programme to increase production capacity of its Hazira plant in Gujarat, from 9 million tonnes per annum (MTPA) to c.15 MTPA.

The ceremony was graced by Narendra Modi, Hon'ble Prime Minister of India; Shri Bhupendra Patel, Hon'ble Chief Minister of Gujarat Government; Jyotiraditya Scindia, Hon'ble Union Steel Minister; Yasutoshi Nishimura, Minister of Economy, Trade and Industry, Japan; Shri Kunihiro Kawazu, Minister & Deputy Chief of Mission, Embassy of Japan; C R Patil, Hon'ble Member of Parliament; Lakshmi Mittal, Executive Chairman, ArcelorMittal; Aditya Mittal, CEO, ArcelorMittal and Chairman, ArcelorMittal Nippon Steel India; Eiji Hashimoto, Representative Director and President, Nippon Steel Corporation; Takahiro Mori, Representative Director

and Executive Vice President, Nippon Steel Corporation, and Member, Board of Directors, ArcelorMittal Nippon Steel India; and Dilip Oommen, CEO, ArcelorMittal Nippon Steel India.

This expansion at Hazira comes nearly three years after AM/NS India was established, and will involve upstream and downstream steelmaking expansion, creating more than 60,000 jobs and strengthening nearby communities with initiatives that deepen sustainability.

As part of its expansion programme, AM/NS India will continue to contribute to the strengthening of India's steelmaking expertise and capabilities, including the development of downstream facilities to produce value-added steels to reduce India's reliance on steel imports for use in sectors such as defence, automotive and infrastructure.

Addressing the groundbreaking ceremony as the Chief Guest, Narendra Modi, Prime Minister of India, said: "My best wishes to AM/NS India for the Hazira expansion, which will open doors for new possibilities in the future with the investment of Rs 60,000 crore.

This project will create job opportunities in Gujarat and across India, apart from inspiring the manufacturing of high-grade steel while playing a critical role in reducing import

dependence in critical and strategic applications. The company's latest technology for this project will prove to be a milestone and provide a fillip to the Make in India and Atmanirbhar Bharat initiatives. I also congratulate AM/NS India for giving utmost importance to green technology to contribute to the circular economy."

AM/NS India recently received environmental clearance for the Hazira expansion project from the Union Ministry of Environment, Forest, and Climate Change after a detailed environmental impact assessment. The state-of-the-art-facilities will comprise Ironmaking process: blast furnaces, sintering facilities, coke furnaces, etc; steelmaking process: basic oxygen furnaces, continuous casting machines, etc; and hot process: hot strip mill, etc.

The company has a long-term ambition to raise its national capacity to 30 MTPA in the coming decade, supporting the government's National Steel Policy that envisages doubling domestic capacity to 300 MTPA by 2030.

Piaggio Vehicles Partners With Common Service Centres (CSC) Special Purpose Vehicle

PIAGGIO VEHICLES PVT LTD (PVPL), a 100 per cent subsidiary of the Italian Piaggio Group and India's leading manufacturer of small commercial vehicles announced partnership with Common Service Centres (CSC) Special Purpose Vehicle to expand its three-wheeler business network through Village Level Entrepreneurs (VLE).

CSC scheme is one of the mission mode projects under the Digital India Programme initiated by Ministry of Electronics and Information Technology, Government of India. It is a self-sustaining network of approximately 4.5 lakh CSC in Gram Panchayats across the country. Under the aegis of

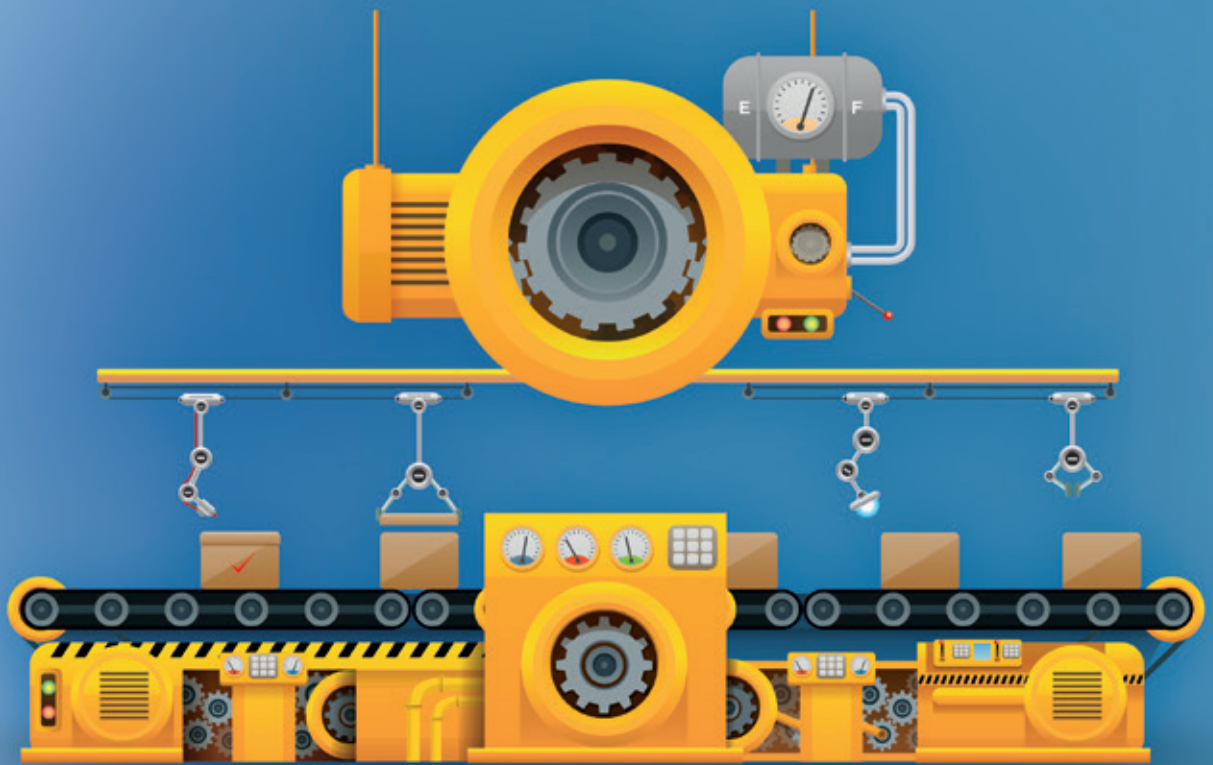


this partnership, the customers can now be facilitated with all information and purchase enquiries related to Piaggio vehicles portfolio by their nearest

Common Service Centres.

Speaking about the partnership, Diego Graffi, Chairman and MD, Piaggio Vehicles, said, "We welcome the central government initiatives like CSC that aims to enhance and enable the Government's mandate of a socially, financially and digitally inclusive society. This partnership will be a step forward for us to cater to our target audience. With this partnership, the customers, especially from rural areas, can now easily connect with Piaggio through the support of CSC VLEs in pursuit of their ownership of Piaggio vehicles."

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Continental Carbon to Invest Approx \$300 Million For Expansion In India

AS PART OF its global strategy, Continental Carbon, the world's leading carbon black supplier, has announced to invest approximately \$300 million in India. The expansion plan covers upgrading the existing plant and R&D centre in the National Capital Region (NCR). Set-up in the year 2000, the current annual production capacity of carbon black at the Delhi plant stands at approximately 85,000 tons with two production lines. With the fresh infusion, the capacity is expected to match the global rising demand.

In addition, the R&D centre in Delhi, which is one of the three global centers along with Taiwan and USA, will be further optimised to assist Continental Carbon in R&D progress and global layouts. It will further strengthen the research related to rubber, plastic, ink, coating, conductivity, and other fields of application. In addition, the centre will also enhance customer experience related to material aspects and provide related



technical services.

Speaking on the occasion, T.M. Chen, President, Continental Carbon India, said, "Currently, there is a rising demand for carbon black from customers worldwide, especially from the automobile and tire industry. The current rate of production is insufficient to

match the demand and supply dynamics. Therefore, it is imperative to upgrade our infrastructure. We are in the process of recruiting young and outstanding talents from India from fields, such as electromechanical, chemical, material, and environmental engineering, and help us increase our manufacturing and R&D output by another 45 per cent."

Recently, as part of its expansion plans in India, Continental Carbon commenced operations at a new manufacturing plant in Gujarat. The business unit has four production lines and is estimated to have an annual production capacity of approximately 150,000 tons.

Continental Carbon has been working closely with its partners in India since the start of the new millennium. Going ahead, the company will focus on the new needs of India's rubber and plastic industry, continue to input R&D momentum and technology, and provide professional services.

ICOMM Signs 'Make In India' Partnership With CARACAL At DEFEXPO 2022

ICOMM, a group company of Megha Engineering & Infrastructures Ltd (MEIL) and a market leader in developing and manufacturing missile and sub-systems, communications and EW systems, electro-optics, shelters, composites, as well as other systems technology, such as drone and counter drones, signed a partnership agreement following a previous Memorandum of Understanding (MoU) / agreement with CARACAL, a leading small arms manufacturer and entity within EDGE Group, UAE. The agreement was signed during DEFEXPO 2022, the Land, Naval and Homeland Security Systems Exhibition.

In line with Prime Minister Narendra Modi's 'Make in India' initiative, ICOMM and CARACAL will partner and develop a complete portfolio of locally manufactured small arms for the Indian Defence forces and market as for international export.

At the signing, ICOMM Chief, Sumanth P, said, "India's Defence industry is constantly evolving, in-line with India's Make in India and Atmanirbhar Bharat initiatives. ICOMM's MoU with Caracal (EDGE



Group, UAE) is a step towards making the defence sector in India self-sufficient and self-reliant in light of the geopolitical shifts taking place throughout the world.

"Under the ICOMM-Caracal cooperation, the complete line of small arms will be produced in ICOMM's world-class design, development and manufacturing centre in Hyderabad. Presently, ICOMM is a one of the large companies in manufacturing missile & sub-systems, communications & EW system, radars, electro-optics, composites, loitering munitions, shelters, drone & counter drone system. Our entry into the small arms is a proud moment for us."

Hamad Alameri, CEO, CARACAL,

said, "Building partnerships and seeking valuable opportunities for collaboration in the Indian market is one of CARACAL's key objectives, and we look forward to exploring these opportunities further with ICOMM, whose experience as an industry leader providing turnkey solutions across multiple sectors, including engineering and defence, complements CARACAL's portfolio of advanced small arms."

"Through our agreement to form a partnership, we can benefit from greater knowledge sharing, and can utilise our individual strengths, and our synergies, to reinforce our support of the overall 'Make in India' strategy," he added.



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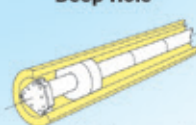
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E-mail : bakerche@bakergauges.com

E-mail : bakerblr@bakergauges.com

E-mail : bakerbar@bakergauges.com

E-mail : bakermp@bakergauges.com

E-mail : bakerrajkot@bakergauges.com

E-mail : bakercal@bakergauges.com

E-mail : bakerchd@bakergauges.com

E-mail : bakerldh@bakergauges.com

E-mail : bakerhyd@bakergauges.com

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for mobility technology SAEINDIA (Society of Automotive Engineers INDIA), is back with the 10th edition of its flagship event SAEINDIA International Mobility Conference (SIIMC 2022), which is the first ever International Sustainable Multimodal Mobility Conference. The SIIMC 2022 conference, scheduled from October 12-14, 2022, revolves around the theme 'Sustainable Multi-Modal Mobility Ecosystem' and takes forward SAEINDIA's commitment, on advancing and promoting mobility engineering.

Munirathinam Dhananjayan, Chair – Organising Committee, Founder and MD of Focus Group, said, "The three-day event will see over 700 mobility experts, including industry leaders and professionals from research and development, manufacturing and services come together and network under one roof. The key highlight of the 10th



edition of the SIIMC 2022, is going to be the presentation of more than 180 papers and 543 abstracts on engineering innovations, with a focus on promoting sustainable and multi-modal mobility in the country. SIIMC 2022 will see a host of panel discussions and individual presentations, putting the spotlight on trends and innovations shaping the future of mobility."

Panel discussions will be led by the industry experts and researchers, featuring speakers from the country's leading automotive and technology

organisations, as well as science and engineering institutes. The key organisations participating in the conference include Maruti Suzuki, Tata Motors, Volvo, Tata Consultancy Services, Ashok Leyland, Infosys, Bosch, Hindustan Aeronautics Limited, Indian Oil Corporation, and the Indian Institute of Science.

Some of the key sessions of the conference will see speakers coming together and discussing themes, including

the role of the automotive industry in meeting the challenges of global warming, the Design and development of low-cost electric microcars for urban commuting, Edge computing for multimodal and intermodal mobility, Building (globally) connected car platforms – Unearthing complexity, Balancing of energy efficiency, Driving excitement and comfort in battery electric vehicles, and Is battery swapping a viable alternative to accelerate the electric vehicle (EV) adoption in India.

Charzer Partners With Nirman Developers To Install EV Charging Stations

CHARZER, a leading EV charging station aggregation platform, has partnered with Nirman Developers to install EV charging stations across all their residential and commercial properties in Pune. The charging stations will be accessible to all the residents and visitors.

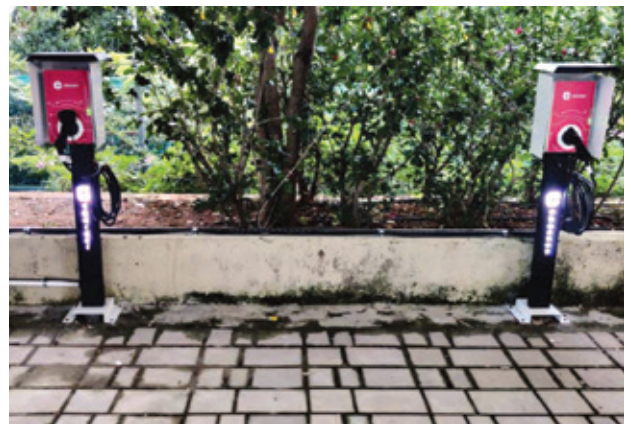
In addition to installing the stations, Charzer will also maintain the charging stations through regular servicing. Through the Charzer app, users can book a slot for charging and make payments.

In 2019, the Ministry of Housing and Urban Affairs issued a guideline directing commercial and residential complexes to set aside 20 per cent of their parking space for EV Charging infrastructure. This new regulation was introduced to promote the adoption of electric vehicles. Similarly, the IGBC (Indian Green Building Council) has said that each premises, residential or commercial, has to dedicate an area for electric vehicle parking space and for installation of charging facilities. To meet the regulatory requirements,

developers have to incur significant expenses. Through its technology, Charzer reduces the cost of setting up charging stations in apartments by 75 per cent.

Sandeep Maheshwari, Partner, Nirman Developers,

said, "In the past one year, there has been a sudden increase in the number of EV vehicles. We found that the flat owners are installing their own charger, which leads to a higher capex cost as well as higher MSEB (Maharashtra State Electricity Board) tariff from their electric meter. After the recent change of MSEB offering reduced tariff for EV charging from a dedicated common meter, we were searching for a



suitable solution. We found the solution from Charzer perfectly matching our requirements and decided to partner with them to install EV chargers at our project Nirman Altius at Kharadi and Nirman Vishnubaug at Model Colony in Pune. The residents of these projects will be able to charge their EV at a reduced cost without investment in the infrastructure"



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By Zurvan Marolia, Sr Vice President - Product Supply, Godrej & Boyce

TAKE QUANTUM LEAP WITH SMART MANUFACTURING

To keep up and remain competitive, manufacturers of all sizes must strive toward smart manufacturing. Embracing smart manufacturing begins with the leadership of a company. The first step is to make equipment investments with an eye toward scalability in integrating smart manufacturing.

The reality of digital transformation is now all-pervasive. Over time, it has affected the manufacturing industry as well, forcing companies to make investments which enhance the “smartness quotient” of their factories. Industry 4.0 or smart manufacturing are terms that describe this development. To succeed in a particular market niche today, growth in terms of quantities and revenue is no longer sufficient. Understanding the latent needs of the customer and having the capability to address this with agility is a crucial factor to win in today’s volatile market.

A DIGITISED SUPPLY CHAIN

The pandemic has created the opportunity for the implementation of digital technology in the manufacturing sector. Businesses that have been successful first-movers in thinking digitally find themselves relevant and expanding profitably. By making the best use of artificial intelligence, cloud, and other platforms,

they are solving complicated challenges in real-time, have greater insights and accessibility, and are becoming agile organisations. Covid-19 has presented opportunities for businesses in terms of global supply chains. Customer patience in terms of lead times is continuously shortening, and to handle supply within these constraints, information systems must be automated and digitalised, providing reliability of commitment, and transparency of progress to the customer.

Digital supply networks employ seamless, integrated technology solutions. This breaks down silos and improves communication among supply chain participants. They use automatically updated real-time information. This enables prompt reactions, facilitating organisations to identify problems or hazards well in advance. Digital warehousing solutions are provided through supply chain digitisation, where sophisticated warehouse management systems are used to communicate data in real-time and expedite the fulfilment and shipping process.

SMART MANUFACTURING ENABLES SUSTAINABILITY

Digitalisation enables supply chains to move quickly, flexibly, and affordably. Along with improving the overall customer experience, digital transformation in supply chain management also benefits businesses as it provides insights into the functioning of the supply chain through data analytics, helping businesses to better plan the complete supply chain management. They also increase



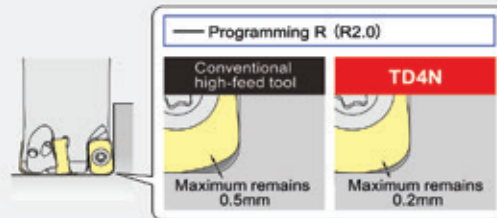
TD4N

Radius mill TD4N

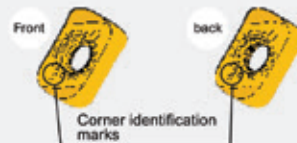


Reduces uncut remnants on work pieces

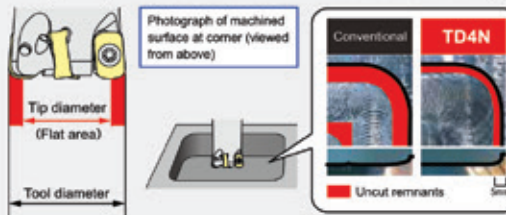
The cutting edge shape was reviewed for TD4N so that uncut remnants are reduced. This enables the load on the next process to be reduced by up to 40% compared to conventional products.



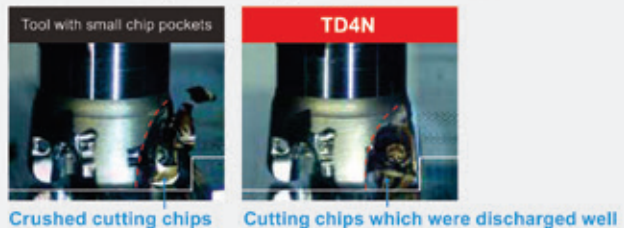
Economical 4-corner inserts with chip breakers for various applications



Large tip diameter for excellent handling

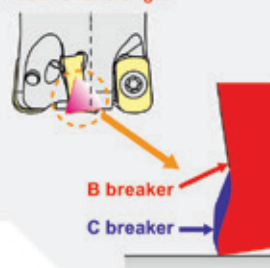


Excellent chip discharge characteristics

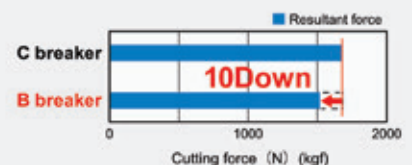


Magnified view of cutting edge cross section

Positive rake angle



Comparison of cutting force



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functional efficiencies through improved forecasting and complex problem-solving.

One can adjust production schedules by understanding the timeline of raw material supply with the aid of technologies like GPS tracking. Similar to how firms may simplify their operations effectively by using digital tools and technology, this is also true for supply chain management. Businesses may identify and address problems or uncertainties at any time with the use of real-time updates, assuring prompt delivery of finished goods or raw materials. They can utilise data to enhance visibility so that the business has the best possible understanding of demand, inventory, capacity, and supply throughout the ecosystem.

MAKING THE WHOLE CHAIN SMARTER

It is truly said that competition now is not between companies but their supply chains. Smart manufacturing is but the starting point in the digitalisation of a manufacturing business. To leverage the benefits of smart manufacturing, it is essential to enhance the smartness quotient of the end-to-end supply chain. A major success factor for a business is the customer experience, and in a manufacturing business, it is all about quality, delivery, and price, coupled with reliability/predictability and transparency/trackability (the latter a customer expectation which has been whetted by the same being provided by e-commerce giants).

At Godrej & Boyce, we took small steps in the journey as long as a decade ago, using sensors on legacy equipment (a “brownfield” project) to gather data to monitor and control process parameters. This gave us control of quality assurance as well as insights into condition-based maintenance. These baby steps prepared us to take our next bold steps into smart manufacturing as opportunities for greenfield projects came our way with the company’s aggressive growth plans fuelled capacity enhancement.

The next phase of working towards a smarter supply chain included bringing the voice of the customer directly on the shopfloor removing the possibility of errors of transmission/translation, and at the same time automating the progress of components through the factory floor in a manner which served the dual objectives of enhancing our ability to customise products as per the needs of individual customers while optimising capacity utilisation.

Bringing suppliers and business partners on board with “appropriate automation” through scalable auto-




mation of processes rather than a big bang approach then helped bring all the elements of the end-to-end supply chain on a common platform from where all can progress together.

MAKING MANUFACTURING BETTER AND CLEANER

It's not only about efficiency when it comes to smart manufacturing. Businesses that embrace smart manufacturing end up lowering their carbon footprint by cutting waste, but sectors that use a lot of energy stand to benefit the most from energy savings because they will not only decrease energy waste but also lower costs for goods.

To keep up and remain competitive, manufacturers of all sizes must strive toward smart manufacturing. Embracing smart manufacturing begins with the leadership of a company. The first step is to make equipment investments with an eye toward scalability in integrating smart manufacturing. This will eventually enhance the procedure, provide cost savings, and boost sales.

For the manufacturer, service provider, and end-user throughout the value chain, a linked supply chain provides optimisation and cost savings. Manufacturers can switch to just-in-time manufacturing, in which items, labour, and resources are planned to arrive or be replaced precisely when needed in the production process. This enables the producer to switch to demand-based manufacturing and avoid expensive excess. When linked machines indicate what they need and when they need it, optimising parts ordering, inventory management, and replacement is simpler for the customer and service provider. By doing this, both the client and the service provider may increase customer happiness. Thus, the time has come to embrace smart manufacturing at every operative point for the business. This is the future, and the future is already here. 

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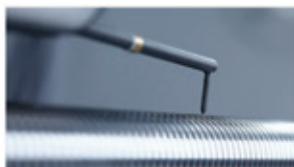


Seeing beyond



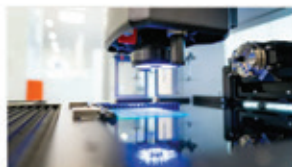
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By Kiran Raju, Founder & CEO, Grene Robotics

CAN AI-DRIVEN HYPER-AUTOMATION REDEFINE MANUFACTURING INDUSTRY?

Artificial intelligence and hyper-automation can offer increased efficiencies, reduced costs, improved quality and reduced downtime, and these benefits together can change the manufacturing industry for the better. It is a one-stop solution for a well-informed and faster decision-making process.



With a changing technology landscape and business dynamic, the manufacturing world faces a unique challenge - manufacturing plants don't know what to do with the data that flows through their systems.

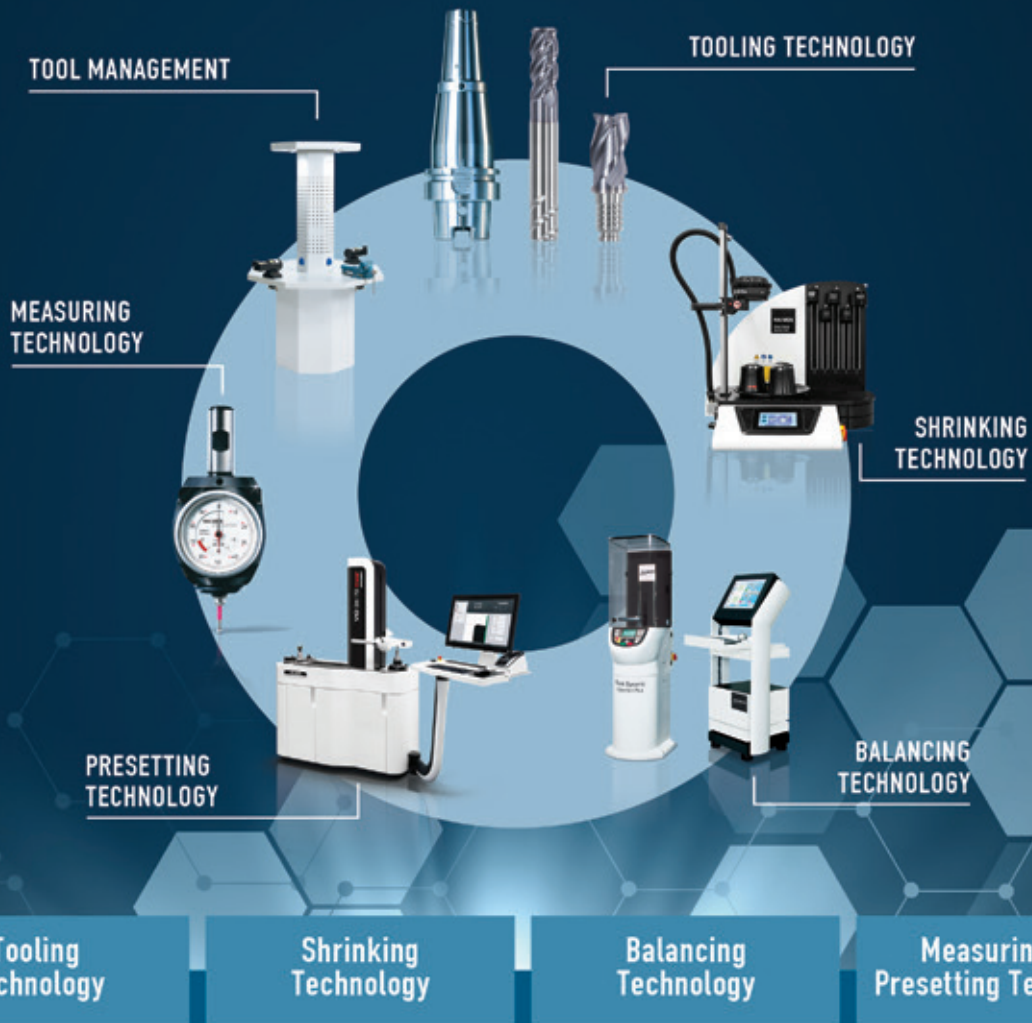
Most factories today have adopted digitisation and follow a seamless digital operational flow. There is a gamut of data flowing through their systems and tools on the factory floor. Some are converted into relevant information, while the remaining is left without further investigation. Unfortunately, organisations do not know what to do with this remaining set of data. The question is how to translate this information and where to use it.

In the manufacturing industry, cement companies were one of the first adopters of automation and used digitised sensors and signals. Even manufacturing plants with heavy machinery and assets have been using automation for over a decade. Despite this, there is no set path to analysing 100 per cent data and utilising it to reduce costs and increase production efficiency. This is where artificial intelligence-powered

hyper-automation can become a game-changer for the manufacturing world.

According to Global AI in Manufacturing Industry Trends, the market is estimated to reach \$78,744 million by 2030, up from \$2,963 million in 2021. The report suggests there is a growing need for artificial intelligence because of the demand for enhanced productivity and automation in the facilities. A recent Forbes survey on AI also mentions that about 44 per cent of automotive manufacturing companies rated AI as extremely important to production in the next five years, while 49 per cent said it was critical to success. Yet, more than half of automotive respondents (56 per cent) said they plan to increase AI expenditure by less than 10 per cent.

Artificial intelligence and hyper-automation can offer increased efficiencies, reduced costs, improved quality and reduced downtime, and these benefits together can change the manufacturing industry for the better. It is a one-stop solution for a well-informed and faster decision-making process. Let us see how.



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PREDICTIVE MAINTENANCE

Since manufacturing systems are flowing with data, evaluating the historic data from maintenance logs can help preempt and predict maintenance issues and even design failures. From analysing when it needs fixing to when it should be stopped for resting, all of it can be assessed through AI intervention.

The problem that AI is solving here is predicting the downtime of the production line in advance and notifying the manager so that maintenance is done immediately. While human calculations have been great, it's not enough to stop a system from failing. All of this can be managed seamlessly by the intervention of an AI-powered hyper-automation platform, which, in the end, will reduce downtime significantly.

QUALITY CHECK

Manufacturing work is all about precision. Attention to detail is critical, especially in the electronics space. Historically, quality checks have always happened manually. However, it creates the chances of human error. With the help of AI-driven computer vision, the job becomes easier. Maintaining quality checks becomes automatic and in real-time with AI.

AUTOMATING ASSEMBLY LINES

Every manufacturing unit has multiple dashboards continuously receiving data day in and day out. Since most systems and equipment are digitised, each piece of equipment generates a vast amount of data that gets stored on the cloud. However, not all data gets utilised, and neither does the operations manager get a holistic picture of the activities happening in the back end. Therefore, the operation manager needs to go through multiple dashboards to get a clear picture. But it is next to impossible for one or even a few human beings to read all the data, analyse and then decide the right course of action. Someone rightly called it "death by dashboards".

Through hyper-automation, a manufacturer can automate the assembly lines, collect data from every nook and corner of the system and get a unified view of operations. Furthermore, this data can create alerts and notifications in real-time. When a system breaks down, the operations manager will get notified immediately and set in motion the contingency plan fed into the system.

INDUSTRIAL ROBOTS FOR EFFICIENCY

Industrial robots are not replacing humans. But they facilitate a human's job by creating efficiency. A robot in a manufacturing plant can help reduce production costs, along with protecting its workers. From monitoring signals in control rooms to material handling, assembly, and even inspection, AI-enabled industrial robots can automate tasks.



DEMAND AND INVENTORY FORECASTING


It is a huge task for manufacturing plants and facilities to manage inventory. Despite digitising bookkeeping systems and people keeping track, the chances of delays and misses are big. Integrating artificial intelligence can generate a plan for inventory management and forecasting demand. It can easily update stock status and order value and notify inventory forecasts.

HOW CAN WE DEPLOY AI?

So implementing AI cannot happen suddenly and not on all parameters in one go. A unit needs to be identified, and within that, a problem statement should be created on which AI-driven solution must be tried. A pilot run is essential here. Also, not one solution will fit all production/machine lines. Each will need a specific solution. The best way to work up AI-driven hyper-automation is to create customised solutions, and this will also prove to be cost-effective for any organisation. One should also invest in data unification - that's the beauty of AI, and can work like a charm in the manufacturing industry.

AI'S THE FUTURE

Hyper-automation can change the manufacturing industry for the better. The idea is to create an autonomous manufacturing unit that can be scaled with ease. From improving equipment uptime to increased bottom lines and better profit-earning opportunities, there are multiple reasons why AI and hyper-automation are beneficial for the industry. Not only does it make taking actionable decisions faster and more accurate, but it also understands anomalies and notifies in real-time.

For manufacturers, AI can be a game changer enabling quality, efficiency, price management, employee management, and production management on one platform. There has never been a better time for the industry to change than now. 



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By Dr Raunak Bhinge, Founder and CEO, Infinite Uptime

DATA ANALYTICS TO ENABLE SMART MANUFACTURING

With Industry 4.0 revolution in place, the article elaborates on how data analytics will be a game changer in truly making a manufacturing set-up smart.

The manufacturing industry contributes about 16 per cent to the global GDP and generates nearly 14 per cent of global employment. As an essential driver in the global economy, the manufacturing industry has to evolve and adapt to the changing market dynamics continually. While the first industrial revolution saw the mechanisation of various processes, subsequent developments have been aligned towards automation, digitalisation, and data-based manufacturing.

Contemporary technological advancements and digital transformation of manufacturing units have led to 'smart manufacturing' – a process infused with responsively designed solutions that rely on data insights and intelligence. IoT, edge diagnostics, cloud computing, analytics, Robotics Process Automation (RPA), AI and ML, and are some of the key enablers in this transition, and they either generate or rely on data.

Data-based smart manufacturing is gaining relevance to the extent that the global market is expected to



Dr Raunak Bhinge

grow at a rate of 13.1 per cent between 2022 and 2029, crossing \$658.41 billion by the decade's end. In all this, data analytics plays a crucial role. Let's see what that is.

DATA ANALYTICS & SMART MANUFACTURING

Analytics is the systematic computational analysis of data for the discovery, interpretation, and communication of meaningful insights. Data analytics in manufacturing enables industrial units

to produce high-quality, customised products at more competitive prices, progressively improving customer experience. Intelligent analytics also allow companies to enhance productivity and profitability. Managers can make quick and better decisions with machine learning algorithms and real-time data analytics.

This makes real-time data generation and capture for important functions critical to the successful deployment of data analytics solutions. With real-time data available, advanced analytics can be performed, and relevant insights can be generated to support business



decision-making. Data availability, accuracy, and processing ensure that manufacturing operations are uninterrupted and run as smoothly as possible. Furthermore, the key focus areas of smart manufacturing can be supported by advanced data analytics.

PREDICTIVE MAINTENANCE

Smart manufacturing facilities follow a predictive maintenance

model to monitor asset conditions, and pre-emptively determine when, and how a fault may happen. Events such as machinery breakdown, improper equipment maintenance, and overrunning assets, which can create a stressful environment in the workplace, can be mitigated with the availability of relevant data insights.

Machine condition data can be collected in real-time with IoT-enabled technologies such as vibration analysis, stored on the cloud, and analysed with sophisticated predictive analytics algorithms. The resultant insights empower the plant operation teams to schedule maintenance events with complete visibility of machine health. Not only does this reduce the inventory-carrying burden and improve resource allocation, but it also sustainably enhances net plant productivity.

EDGE ARCHITECTURE & DIAGNOSTICS

Edge architecture allows for the collection, processing, distribution and visualisation of data in a connected enterprise. Even when assets are distributed across geographies and are not physically accessible to operation teams, edge computing and diagnostics allow key stakeholders to monitor and maintain all assets optimally. Data analytics in edge architecture entails automated analysis of collected data at the source itself, removing any lag that may happen due to the collection of data at a centralised location. The analytical insights thus generated can translate to advance alerts and longer decision-making time for critical reliability measures.

DIGITAL TWIN

The digital twin technology allows research, production, and maintenance teams in smart manufacturing setups to use virtual representations of physical objects to test variables. A digital twin is a real-time digital counterpart of its associated asset and can only




be generated by capturing complete information about the asset's condition and performance. With advanced data analytics and machine learning (ML), rapid prototyping can be done, production environments can be tested, and machine parts and sub-assemblies can be checked for functionality. This, in turn, can streamline the entire value chain and save millions by reducing production downtime.

SCALABILITY

Smart manufacturing setups must be scalable and have a sustainable infrastructure to support plant reliability objectives in all setups. This is only feasible with a data-driven, digital-first approach to manufacturing. Systematic data analytics of mission-critical processes can generate business intelligence that can guide scale-up decisions. A better understanding of the risk factors, underlying causes, costs involved, process bottlenecks, and potential ROI can be developed for diverse projects. Data analytics can also assist manufacturing leaders in planning the stages and scope for intelligent digitalisation relevant to their business model and industry.

FINAL THOUGHTS

In conclusion, data analytics is quickly shaping to be the bedrock of manufacturing strategy and operation. Smart manufacturing outfits that need to meet predictive maintenance and digital reliability goals must rely on advanced data analytics. Real-time asset monitoring, enhanced visibility of production conditions and machine health, as well as prescriptive insights for planning asset maintenance can only be possible when high-quality data is captured and analysed within the organisation.

The sooner manufacturing leaders realise this, the faster they can pivot toward a data-led strategic approach to smart manufacturing. 

MAKING IT BIG, MAKING IT GREEN

Switch Mobility has been setting a benchmark every step of the way since its operational launch in India in 2021, and the driving force behind that has been its newly elevated Global CEO, **Mahesh Babu**. In an exclusive interaction he discusses Switch's business plan, its recipe for success in the Indian market, challenges encountered, new market ventures, and more. Excerpts...

By Anvita Pillai



In a recent interaction with the media, Dheeraj Hinduja, Executive Chairman, Ashok Leyland, proclaimed that Switch Mobility will have a Capex of \$150 million to \$200 million in two years. Considering that your Capex utilisation is almost 3.2x that of your peers, could you elaborate as to how the enormous Capex can contribute to your growth in the next five years?

Our chairman, Dhiraj Hinduja, has talked about investment in Switch as a global entity. So, the \$150-200 million that he mentioned is going to be invested in the UK, Spain, and India collectively. Further, most of the products that we are talking about in India already have sufficient Capex because we are not just going to be in the bus business; we are also going to get into LCV electrification.

We have already announced that we will be working

"The secret is simple. First, the group believes that this is the future, and they continue to support investors in Switch. Second, we have been working on three important aspects in the last year: the team, product, and market."

in these two categories, and with the booming electric market in India, particularly in buses, we foresee revisiting and increasing the Capex plan, if needed, two to three years down the line. We have plans to launch our buses in Spain as well as in the European market. We are working in the UK with a new technology to get into Gen-5 buses. Additionally, our Switch e1 buses, which were displayed in Paris, will also be servicing the European market.

Switch Mobility has focused on a rather under-focused sector of Indian mobility—public transportation—and has managed to make a significant impact, too. How easy or difficult was it for your organisation to make a mark in this part of mobility? Can you elaborate on the challenges you've faced so far?

Public transport right now, if you look at it, in a country like India, is particularly dominated by State Transport Undertaking (STUs) on a city transport level with very few private players. So, the STUs' scaling up their financial structures and bringing in the new model are the areas that we need to work on. Another challenge we face is financing because, for example, if we have 10,000 buses that have to be capitalised, then it requires an investment of more than Rs 15,000 crore, which will have a pay period of nearly 10 to 12 years. Since it is a highly capital-intensive sector, we

are working with the government to secure priority funding for this sector to enable easy funding and, hence, solve the financing challenge.

On the public transportation front, if you look at it, private transportation takes up about 80 per cent and only 20 per cent of the whole bus market is STUs. Before the pandemic hit, 80,000 buses were the peak, of which nearly only 30,000 were purchased by the STU and the remaining were private. We have already received an order for about 100 electric buses from the private sector. The reason is that the private sector is looking at two key areas: one, attaining net zero, and two, achieving sustainability goals. There are major corporations working on achieving this by incorporating electric buses for employee transportation and more. The second thing we figured out is that some applications, especially intra-city applications, have become economically viable. So, we need to educate the masses and possibly do pilot runs in the city, which will eventually become a very viable and economical model for our public transportation system.

For future ease of doing business, how can these challenges be mitigated effectively?

So, if you look at the government policy today, we already have the FAME policy. However, that is only for STU purchases of buses; private players do not qualify for the subsidies. That is one disadvantage to which private players will have to adapt slowly.

The second is that the government has given PLI

and other incentives to promote electric mobility in general. However, there has to be some incentive for private players who plan on entering the business. We need to work in tandem with the government and see what we can do for the private players.

For example, private players could be allowed to charge differently than the regulation currently in place, but this needs to be worked on meticulously. We have been focusing on most of the STU tenders and delivering for corporate and private clients, but we have not explored the other areas, which I believe will happen over the next two-year period.

According to a recent survey, only 18 per cent of BEV manufacturers foresee a profit of over \$3000 per vehicle, and more than half are looking at a profit of less than \$1000. How can the industry collectively work to reduce BEV costs? Would creating a uniform dedicated production line for BEV be an ideal solution, at least for India?

The cost of electric vehicles, not only in our segment but overall, is a challenge to meet. That's the reason companies have a subsidy to offset it. However, subsidies cannot go on endlessly, and we need to find a way to strike a balance. The way the industry can work on it is by working on cost reduction. When we talk about cost, it is important to think about how we collaborate, which is pivotal.

Similarly, if competition can differentiate on the product and not on the base technology, I think there





is a possibility that we'll be able to bring the cost down. So, platform sharing, component sharing, common investment for non-differentiated technologies within the vehicle, etc. are the things that will help.

However, at Switch Mobility, we are thinking a step ahead! We plan on utilising India as our supply base. The country needs to start looking at not just our conception but also how to become a "manufacturing factory" for the world. That's how our neighbours thought 10–12 years ago and started working hard towards it. So, I think the government needs to work on helping the industry aggregate demand across the world and help it become a global supply chain. They can work on offering incentives for exports and not only for imports or domestic concepts.

What do you think is the secret to Switch's success? Can you elaborate on your deployments so far? Also, what's next in the pipeline for Switch Mobility?

The secret is simple. First, the group believes that this is the future, and they continue to support investors in Switch. Second, we have been working on three important aspects in the last year: the team, product, and market. We were able to manage all three successfully—we were able to build a team of close to 400 people within three to six months. We were able to bring back our product with our brand, style, and everything together. And third, we also worked closely with our customers, like BMTC, BEST, and even private players, to get orders, which were reasonably profitable, to get our products onto the market. I strongly believe that it's always a good team that produces good products and a good market, which is what we are.

Prior to joining Switch Mobility, you were leading Mahindra Electric. You took over right in the middle

of a raging pandemic. However, Switch's market presence in India took off after you were roped in. So, what was your recipe for building the company from the ground up as a leader in the public transport segment? How did you work towards pushing the company to success, especially with COVID-19 around?

Switch Mobility started during the pandemic, and I joined in September 2021. We never had Switch operational in India, so the first task was to start our operations here. So, by October 1, 2021, we had started our operations. We brought in all the team members who were there earlier with Ashok Leyland and recruited from outside and quickly formed our team.

As I mentioned earlier, the team is very important. I strongly believe that anything we do is the outcome of the knowledge base of the team and their capability to work in tandem to deliver. So, we built our core team, as well as our critical team, in the first three months to help build the products. If we look, our strategy worked. For example, when everybody was contemplating building the double-decker, we took it up as a challenge and went on to be the first company in India to launch an electric double-decker bus. This was also because our parent company, Ashok Leyland, was a pioneer, and they had that marketplace in double-decker buses.

Speaking of your double-decker bus, EiV 22, it is a trip down memory lane with a touch of innovation. Can you tell us the story behind this innovation? Also, can you elaborate on the engineering side of the vehicle?

The EiV 22 is a unique product that we've made because this double-decker is built on a nine-meter platform with a 231-kilowatt-hour battery with powerful motor and power electronics. We worked closely on the product to meet customer and regulatory requirements.



The Indian government has worked hard with the industry and policymakers to come out with policies such as Make in India-related FAME II, which specifically demands local manufacturing, PLIs, which will boost local manufacturing and local exports, etc. So, the government has brought out some extremely well-framed incentives that have a very productive application.

There were plenty of innovations that went into building the bus. For example, the old double-decker buses that ran in Mumbai only had a rear entry. We worked on building a dual entrance point in the bus without compromising on the seating capacity.

Another pain point, besides the entry-exit, was the air conditioning in the buses. The air conditioners were 52/56 kwh, which had to be efficient in both the upper and lower decks. Our team was able to work out and bring in efficiency with a single AC that would meet all our requirements. They worked very carefully to make the product and launch what is now a very successful product.

Considering buses are heavy-duty vehicles, the battery innovation that goes into them would be entirely different compared to your average four-wheeler or two-wheeler. What kind of innovations went into the battery composition for your buses?

We have a platform called Switch Ion, which is a connected rental platform. From the day we manufactured our first bus to after launching our double-decker, we have increased energy efficiency by about 10 to 12 percent in almost all our products just by using the software and retuning the regeneration. This means that we can now run 12 per cent more kilometres with the same energy we used to have. And it is this type of knowledge that we strive for.

What we do is train our drivers, then collect data on their driving patterns and accordingly change the software to map their driving patterns precisely. We do regeneration and energy management in such a way that it is functioning at optimum utility.

On the battery side, we assemble the battery in our own factory with modules provided by our collaborators. We do a lot of tests and architect it in such a way that we don't lose any energy on transmission. If you look at cables, they are tuned in such a way that they have the shortest minimum losses.

Switch recently partnered with Gulf Oil. Can you elaborate on the details of the deal? How does this partnership benefit your business?

Today, coolants and oils are majorly used in ICE vehicles, and EVs are slightly different because we have to look at efficiency and losses in the oils that we are using in our axles, steering, etc. With regards to our partnership with Gulf Oil, it is a progressive, or rather, technologically advanced company that is very open to working with us.

Both Switch and Gulf Oil have worked on coolant and oil specifically for our EVs to provide the best result. After several trials and tests done by us, they worked on providing us with coolant and oil tuned to our feedback and suitable for our vehicles. Going forward, this will go across our platform, and we will have our spares and service networks use the authorised oil and coolants, ensuring less to no field issues with spurious oil or anything else outside the market.

Union Minister Nitin Gadkari recently launched the pilot project flex fuel-strong hybrid electric vehicle (FFV-SHEV) by Toyota, which can purely run on ethanol. Do you think if the pilot picks up, it is a trend that we can see in public transportation? Further, does it threaten EVs' stance in India considering its ease of use, which EVs still don't offer?

In my view, no new technology will threaten something else. Even EVs will not threaten diesel or gasoline-engine vehicles; in fact, both will co-exist over a period of time. I believe that any new technology has to be tested. Although it may not have the same disadvantages as



an EV, it will have disadvantages. Because every system has advantages and disadvantages, which we will take a significant amount of time to figure out.

I don't think it is a threat to EVs because one of the best, most efficient systems available scientifically is an electric motor. Even Toyota Mirai or fuel cell vehicles have motor-driven axles. So, it's nothing but a range extender where you continuously generate electricity and feed the motor and battery. So, we should try everything because nothing should be left out. As long as it is sustainable, it is most welcome.

Do you think the current EV policies, such as FAME II, PLIs, etc., are enough for the robust growth of EVs in India? Are there any additional industry suggestions that the government should take into consideration?

The policies that the government has implemented are very progressive and significantly better than the benefits offered by other countries, because many governments give only one incentive and then forget about it. But the Indian government has worked really hard with the industry and policymakers to come out with policies, such as Make in India related to FAME II, which specifically demands local manufacturing, PLIs, which will boost local manufacturing and local exports, etc. So, the government has brought out some


extremely well-framed incentives that have a very productive application.

In terms of areas that could use further attention, as mentioned earlier, financing is one area in which the industry will seek help from the government because it is not easy to finance such large-scale adoptions. Besides, many more learnings will come based on FAME-II and PLI for both the industry and the government, which we will need to adapt to together.

Going ahead, what's in the pipeline for Switch Mobility for the long- and short-term future in India?

In the long term, we are committed to achieving net zero. We plan on working on products that will serve Southeast Asia, India, Africa, Europe, and the UK. So, our focus is on every country except the US and China.

In the short term, we plan on venturing into both buses as well as commercial vehicles of up to 7.5 tons. We believe these business models will flourish significantly in the next five years compared to any other business area.

Post-2025, our thinking is that we may enter the US commercial vehicle domain and aspire to become the number one commercial vehicle player across the country. We will look at multiple other adjoining products and segments to expand, but it is too early to talk about the strategy after 2025. 

By Sayeed Ahmed, CEO, Biesse India

RESKILLING & UPSKILLING

The article elaborates on how reskilling and upskilling is a strategic solution to bridge the resource gap in the manufacturing industry.

As Robert Greene, a well-known author said, “The future belongs to those who learn more skills and combine them in creative ways,” it is this quintessential vision that shall cement our future.

India is the fifth largest manufacturer in the world and accounts for roughly three per cent of global manufacturing output. To increase the contribution of the sector, many corporations are finding ways to strengthen their human resources. However, a new survey reveals that there is a clear dearth of talent and abilities, with approximately 90 per cent of the workforce in the furniture industry being unemployed. In addition, there is an imbalance between supply and demand because there is only a five million annual training capacity compared to 15 million annual new workers.

That said, India's manufacturing sector contributes approximately 17 per cent of its GDP, therefore any



Sayeed Ahmed

negative repercussions on its expansion will impede the economy of the nation.

RIGHT SKILL SHORTAGE

It is a known fact that the Indian manufacturing industry is plagued by a shortage of skills and has become an issue of national importance. The Government of India has recognised this concern and has taken steps to fulfil this gap through the ‘Skill India’ initiative to harness the

opportunities in an increasingly digitised world and to make India a talent pool.

Although the manufacturing sector shows a promising future, to produce true results, the country will have to utilise its resources wisely and make the right investment. A widespread misconception that results from a lack of awareness is that having a degree will ensure employment, but in reality, having the right skill set is the need of the hour.

Industries focused on knowledge and technology





show a shortage of manufacturing capabilities. Manufacturing in the high-tech and medium-high-tech sectors respectively employs about 30 per cent and 22 per cent of graduates and certificate holders, who don't have adequate experience to provide valuable services.

In any regular work setting, the employees abilities become obsolete within a few years of employment, and it is estimated that they quit the organisation either because of lack of confidence in quality output, or due to lack of learning opportunities. The lack of confidence to keep up with the rapid pace of technological advancement significantly affects the performance output of the workers. As a result, organisations that provide an opportunity for employees to grow and upskill will see improved employee satisfaction and importantly, retention. It is also a wise business decision to upskill an existing employee because he or she is familiar with the work culture and clients and will not have to develop everything from scratch. Indeed, 93 per cent of CEOs who implemented upskilling programmes observed increases in productivity, talent acquisition and retention, and staff strength.

INADEQUATE TALENT SUPPLY

The industrial sector now has more job openings than workers. Although there appears to be a clear need for competent personnel in the business, the supply is either constrained or inadequate. One of the primary causes of this change is the shift from manual to smart working practices. Earlier, the manufacturing industry required workers to know just the application or machine-specific techniques. Now, a worker must possess knowledge and abilities beyond the simple operations of equipment. Qualifications are now far more competent than before.

Besides, the increasing automation and use of AI systems in various industries have also significantly affected hiring. A lot of organisations are opting lean, and rapidly altering their operating models in response to emerging global trends like automation, robots, and artificial intelligence. The majority of organisations dealing with historical worries of declining productivity have started to opt for lean and are eliminating non-productive staff jobs with the use of technology. This has enhanced efficiency and reduced reliance on physical labour. As a result,

when students graduate from colleges and universities, they are not prepared for the job market due to a lack of industry or institutional engagement. Additionally, adjustments to university curricula have not kept pace with changes in the standards for abilities and skills.

UPSKILL WORKFORCE

The manufacturing industry's employment problem may be triggered by a variety of factors, but it must be addressed. The quickest solution to the problem is to upskill the current workforce. It is possible to offer expanded learning opportunities to current employees. Existing employees who receive the appropriate training may be able to specialise in particular procedures and equipment. It also reduces the cost of employment. To attract educated young people and overcome the societal stigma associated with blue-collar occupations, the industry must make itself economically appealing, with better working conditions, learning opportunities, and career paths.

Employers and local colleges might collaborate to create internship programmes to help learners attain the current knowledge by providing degree and certification pathways while bridging the current skills gap barriers. Another approach employers and educators can take is to lay importance on post-secondary programs that provide students with the most recent learning insights. Students seeking manufacturing jobs can choose better careers by being aware of the skills they need to acquire. Additionally, there are numerous online manufacturing programmes that young workers can join to assist their careers in this interesting industry. Manufacturers should also hold workshops and seminars on how to use specific tools and machines. Giving pupils hands-on experience allows them to further strengthen their



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physical knowledge of tool usage.

On the one hand, the manufacturing industry must provide enough job chances for the 12–13 million people who enter the labour force each year, while also providing opportunities for those who have lost their jobs due to downsizing or skill redundancy. In the event of new entrants, governments and industries must begin to envision future requirements and plan properly to create adequate job possibilities. Government and businesses should work together to forecast future job opportunities based on the manufacturing sector's long-term projections.

The procedure is already underway. As demand grows, organisations are finding new ways to retain their employees and ensure their growth remains linear.



According to Mercer's 2022 Global Talent Study, 42 per cent of organisations are changing their talent strategy to concentrate more on the existing talent markets and the gig economy. Businesses are thinking about upskilling as an investment since they are confident that the procedures will yield a higher return.

As per a NASSCOMM study on Industry 4.0 adoption, more than two-thirds of Indian manufacturers will be embracing the digital transformation by 2025, eventually contributing to the goal of raising India's manufacturing GDP by 25 per cent. In FY21, the Indian manufacturing sector spent \$5.5–\$6.5 billion on industry 4.0. To achieve this goal, companies will concentrate their investments on IoT (Internet of Things), AI (Artificial Intelligence), ML (Machine Learning), Big Data Analytics and automation. 

LVD OFFERS COST-EFFICIENT LASER CUTTING MACHINE

LVD introduces Puma, a new cost-efficient fiber laser cutting machine designed to provide high-technology features and performance at a lower total cost of ownership. Offered with 3-, 6- or 12-kW laser in 3050 x 1525 mm, 4065 x 2035 mm, and 6160 x 2035 formats and automation ready, Puma provides the agility to handle a diversity of cutting applications.

LVD's newest laser cutting machine addresses a growing demand for versatile laser cutting equipment built to maximise the value of a user's investment and lower the cost per part.

Puma is designed to operate as economically as possible with high-end features that optimise cutting performance and robust construction to ensure reliable operation. The welded steel, mono-frame construction provides stability to achieve quality cutting at high feed rates.

The Puma cutting head uses the latest technology to deliver consistent quality and process stability. It incorporates crash protection, motorised focus

position adjustment, and capacitive height sensing, as well as automated functions for sheet referencing, cutting gas selection, pressure control, and nozzle cleaning. High machine dynamics enables productive cutting across a wide range of material types and thicknesses.

Puma's shuttle table system allows one table to be loaded or unloaded while cutting on the other table, keeping throughput at its peak. Table changeover takes just 35 seconds.



To maximise laser cutting output and processing efficiency, Puma can be equipped or retrofitted with any MOVit modular automation system, including Compact Tower (CT-L) for loading, unloading and material/parts storage, Flexible Automation (FA-L) advanced load/unload system, Tower Automation System (TAS) single or double-tower storage, or Warehouse Automation System (WAS) customisable storage tower system.

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By Rahul Kamat

INDIA, THE DEFENCE MANUFACTURING HOTSPOT!

The recently concluded Defence Expo 2022 in Gujarat, was centred around investments in MSMEs, startups, technological developments, government support and initiatives, export opportunities and futuristic technology for defence production.

The Indian defence industry is at an inflection point, which is poised for rapid growth led by the government's thrust on indigenisation and is likely to grow by double-digit over the next five to six years. MSMEs and startups are also expected to strengthen the supply chain of the Indian defence sector. Government initiative, such as iDEX, aims at creating an ecosystem to foster innovation and technological development. On the exports front, India is well on track to achieve its \$5 billion defence export target by 2025, largely driven by private sector players and MSMEs.

What's more? The expo witnessed a total of 451 MoUs, Transfer of Technology agreements, product launches and orders to domestic businesses, worth Rs 1.5 lakh crore in defence and integration between the Armed Forces requirements, R&D and defence pro-

duction by public and private players.

Defence Minister Rajnath Singh stated that more than Rs 300 crore have been approved for over 100 iDEX winners to develop products/technologies in more than 50 technological areas, stressing that the iDEX initiative has changed the perception that defence production is only for big businesses.

FOCUS ON DEVELOPING AN INVESTMENT ECOSYSTEM

To make India Atmanirbhar, the government has taken various initiatives such as Technology Development Fund (TDF) and iDEX to support MSMEs and defence startups to boost technology development. TDF provides startups with a fund for specific solution-based project development. The limit under TDF has been enhanced to Rs 500 million vs Rs 100



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million earlier. Industry experts suggest that venture capital should start investing in Indian defence startups and Defence Public Sector Undertakings or Defence Research and Development Organisation to support MSMEs & startups and large OEMs to partner with startups to support product development and manufacturing process. To support and create a vibrant defence ecosystem in the next five to six years, DRDO will assist and mentor startups and MSMEs.

INDIA IS ON TRACK TO MEET EXPORTS TARGETS

India is very well on track to meet its \$5 billion export target for defence equipment, led by a strong government focus on increasing Indian exports. Currently, a lot of foreign OEMs depend on China and Russia for defence equipment, which provides huge opportunities for Indian manufacturers for boosting exports led by the China+1 strategy. Further, drones and small systems also provide huge export opportunities to India. On a geographical front, Africa is likely to be a big market for Indian manufacturers.

During his speech, the defence minister invited African countries to explore Indian defence equipment and technologies, stating that India has emerged as a leading defence exporter in recent years.

AEROSPACE AND DEFENCE HOTSPOT

Speaking on investment opportunities in the defence

sector, Prime Minister Narendra Modi informed that India is building two defence corridors in UP and Tamil Nadu and many big companies of the world are coming to invest in India.

To boost investments, Tamil Nadu has come up with a draft Aerospace and Defence (A&D) policy which includes, investment promotion subsidies including fixed capital subsidy (ranging from 5-12 per cent of capital investment) and turnover-based subsidy (2 per cent of turnover), skilling subsidy (to train employee), land cost subsidy, stamp duty incentives, electricity tax deduction (100 per cent for five years) etc., special structured package and incentives for MRO - treated as deemed exports etc.

The government of TN has adopted strategies such as creating common infrastructure to avoid large capex by MSMEs, policy level support, promoting A&D startups, creating industrial parks and ease of doing business with a focus on sub-sectors such as Armored Vehicles & tanks, sensors, radars, communication & electronic warfare, rockets, ammunition, drones etc.

That said, Telangana is poised to be the largest defence R&D manufacturing hub. The state provides an ecosystem/infrastructure for product manufacturing led by superior infrastructure, skilled manpower, strong MSME clusters and an attractive industrial policy. Telangana houses over 1,000 defence MSMEs in the precision engineering space along with large players like BEL, HAL, Bharat Forge, etc.





GUJARAT: BOOSTING INDIA'S DEFENCE SECTOR

At a time when India is accelerating in defence production and manufacturing, Gujarat's role has become equally important in the last eight years in the said sector. Larsen & Toubro Limited have established a new green field manufacturing-integration testing complex at Hazira with an investment over Rs 250 crore. At present, the firm is executing the 'K9 VAJRA-T' Self-Propelled Howitzer Guns program - the largest contract awarded to an Indian private company by the Ministry of Defence. Jaivel Aerospace Private Limited has a manufacturing, technology, processes and tooling organisation at Sanand with an investment of more than Rs 20 crore. These are just a few investments that have taken place in Gujarat in the defence sector.

Gujarat ought to rise in India's defence production due to a large number of MSMEs with 83 identified MSME clusters. MSMEs will play a vital role in various areas of the defence sector such as research and development, software development, forging and metalwork, etc.

UTTAR PRADESH DEFENCE INDUSTRIAL CORRIDOR

Since Defence Expo 2020 hosted by the government of Uttar Pradesh in Lucknow, the project has evolved to a stage where the government has reached a significant number of 92 industrial and institutional MoUs. In addition, recently, the UP government has signed 14 new MoUs, crossing the century mark of investors.

Uttar Pradesh Expressways Industrial Development Authority (UPEIDA) was assigned as the nodal agency for implementing the project. The state signed these 92 MoUs with an envisaged investment of over Rs 11,000 crore in the past two and half years. To facilitate the project, the state also released its aerospace and defence

policy to provide incentives to investors and created landbanks in six districts called the defence nodes with the provision of industrial-grade water and power supply along with road connectivity to deliver industry-ready land to investors.

The project gained even more impetus when giants like Bharat Dynamics Limited (BDL), BrahMos Aerospace and Adani Defence Systems joined hands with the state to set up their manufacturing units in the Corridor. Where BDL is setting up its missile propulsion unit in the Jhansi node, BrahMos is setting up its Next Gen BrahMos missile manufacturing unit in the Lucknow node and Adani Defence Systems is going to set up a massive integrated ammunition manu-


facturing complex in the Kanpur node.

DPSUS ORDERBOOK

As of today, Mazgaon Dock Shipbuilders Ltd (MDL) the premier shipbuilding yard in the country, has submitted proposals for exports to various countries viz. Brazil, Peru, Argentina, Philippines, Hungary, Sierra Leone, Chile, Cameroon, etc. for construction & delivery of OPVs, FPGVs, FICs, Floating Docks, Flat Bottom Shallow Boats, FAC and Corvettes.

MDL has been selected as the preferred production partner to undertake major ship construction activities for SSK Zvezda Shipbuilding Complex, Russia which will open up a large-scale export business opportunity for India and specifically to MDL in future as the envisaged quantum of work is an enormous spanning for years.

Gliders India Limited, a Central entity has successfully and timely completed its first export order from Malaysia for brake parachutes of Sukhoi-30 Fighter Aircraft within just four months after receipt of the order. "In addition to this, GIL is in contact with various other countries like the USA, Kazakhstan, Malaysia, Kenya, Bangladesh, Uganda, Angola, Nepal, Indonesia etc., in addition to Malaysia for repeat orders," informed a person familiar with the development.

Armoured Vehicles Nigam Ltd, one of the seven new DPSUs created by the government have an outstanding orderbook of Rs 36,000 crore. Garden Reach Shipbuilders & Engineers Ltd is currently constructing 24 ships across seven projects of the Indian Navy, Indian Coast Guard, Government of West Bengal & foreign nations. "With a healthy order book of approx. Rs 24,000 crore and some in the pipeline, we are looking at high growth in turnover in next few years," said Cmde PR Hari, IN (Retd.) Chairman and Managing Director, GRSE. 

IGUS HYBRID CABLES SAVE INSTALLATION SPACE, WEIGHT AND CONSTRUCTION TIME

Reducing the complexity of automation solutions while saving money, time and installation space is a declared goal of engineers all over the world. This applies to cable planning as well. Here, so-called hybrid technology has become one of the major trends in recent years. While servo drive systems used to require several cables to transmit energy and data, hybrid cables simply combine the cores. "Hybrid technology is a pioneering development that we, as a cable specialist, are 100 per cent convinced is the way to go," says Markus Hüffel, Product Manager readychain and readycable at igus. "We are therefore continuously expanding our portfolio of ready-to-connect hybrid cables from the readycable series in order to offer our customers a fast, reliable, cost-effective solution for continuous use in energy chains."

The latest addition to the readycable series includes two models: a hybrid cable for motors from SEW-EURODRIVE, a German manufacturer, with the MOVILINK DDI interface, and a hybrid cable for Siemens servo drives suitable for SINAMICS S210. In addition to PUR, the outer jacket can be made of lower-cost polyvinyl chloride (PVC). "Lean industrial processes in harnessing, very short throughput times and a high degree of warehousing enable designers to quickly have



the new hybrid cables delivered directly from stock - at the desired length to the centimetre, without cutting charge, ready to connect and fit for immediate use," says Hüffel. To save even more project planning time, igus also provides direct links to the macros for the EPLAN Electric P8 planning software on their website. This allows the cables to be dragged and dropped into the digital cable plan as building blocks, reducing cable planning time by up to 50 per cent.

Like all cables in the read-

ycable series, the new hybrid cables have a strong outer jacket, a strain-relieved core, movement-optimised stranded wires, a stranded structure with a short pitch length and a gusset-filling extruded inner jacket. "This design and these high-quality materials make our new hybrid cables fail-safe in continuous use in energy chains, even in compact applications," says Hüffel. Materials with good electromagnetic compatibility prevent the energy and data transmission cores from having a negative influence on each other. All models have undergone several million test cycles in the 3,800 square meter igus test laboratory. Igus, therefore, offers an above-average chainflex cable guarantee of 36 months. They also provide an online tool, with which customers can calculate the expected service life of their specific application.

STUDER S100: PRECISE, FLEXIBLE, RELIABLE

"The S100 internal grinding entry-level machine perfectly complements our comprehensive internal grinding portfolio", explains CSO Sandro Bottazzo, when presenting the S100 at the BI-MU Exhibition for Machine Tools in Milan.

Like all Studer cylindrical grinding machines, the S100 also has a machine bed made of Granitan®. Its outstanding dampening, and thermal characteristics ensure consistently good grinding results and the renowned Studer precision. During the development, special attention was given to a simple and efficient design of the components, making operation and maintenance easier for the operator. However, the equipment of the S100 also makes it suitable for grinding a universal spectrum of parts comprising of geometrically defined basic forms and contours, which can be generated with interpolating axes.

The machine can be equipped with up to two internal grinding spindles or one internal and one external spindle. In addition to a fixed wheelhead, it can be equipped with a manual with a 2.5 degree Hirth and, in its optimum configuration, with an automatic wheelhead with 1 degree Hirth. A synchronous motor drives the grease-lubricated internal and external belt spindles. The machine is operated by the Fanuc Oi-TF PLUS

controller, together with the proven STUDER operating system.

A further advantage of the S100 is the automation option. On request, it can be equipped with a loading interface and an automatic sliding door, enabling automatic operation and the production of large series.

Typical workpieces for production on the S100 include collets for toolmaking, bearing rings, ball bearings and cylinders, as well as hydraulic control valves in small series. External and internal machining of flange parts or grinding of threads or non-circular forms is also possible.

The competent and reliable

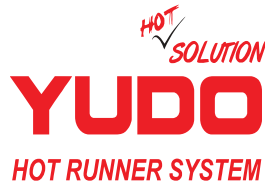


Studer customer care is naturally also on hand to provide advice and technical support for the S100. A total of more than 200 specialists worldwide ensure that the machine operates reliably and efficiently throughout its entire lifetime and fully satisfies all requirements. Customers can rely on the 110-year grinding tradition of the Swiss company, founded back in 1912.

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For Sponsorship, contact

Ranjan Halder | M: 9167267474 | ranjan.haldar@wwm.co.in

For Registration, contact

Shruti Nair | M: 9769621841 | shruti.nair@wwm.co.in

For Editorial and Panel Discussion Participation, contact

Anvita Pillai | M: 98201373510 | anvita.pillai@wwm.co.in

FACE MILLING FOR HIGH SURFACE FINISH

When considering an indexable milling cutter, the key factors that determine the quality of a generated surface are the cutter's geometry and accuracy. Both characteristics are mainly related to the inserts carried by the cutter.

An indexable face milling cutter is a multi-tooth tool. More teeth equals more productivity. This is the undeniable advantage of the cutter. But, in terms of surface texture, a large number of teeth may be a problem. A fine distinction in tooth protrusion leads to an irregular feed for the teeth and contributes to chatter, which will ultimately affect the surface finish.

It is perfectly clear that insert accuracy can be considerably increased by grinding. Moreover, grinding provides a sharp cutting edge that is very important in maintaining cutting action and preventing plastic deformation of metal in fine milling, which features shallow depths of cut. Ensuring a highly accurate cutting edge requires grinding both the top and side surfaces of an insert. This may cancel the advantages of powder metallurgy in generating complicated surfaces to provide the required rake and clearance angles along a cutting edge. To avoid such an adverse impact, tool engineers should be very resourceful when designing the inserts intended for fine grinding.

An important factor regarding teeth accuracy loss is that the insert pocket in a cutter has its own dimensional and form tolerances. As a result, even for ideally precise inserts, teeth protrusion will vary within acceptable limits, although it cannot ensure an extra-fine surface finish when compared to grinding. A way to overcome this problem is by using a fly cutter that carries only one insert. The fly cutter that is successfully used in various milling applications facilitates a smooth and clean cut, providing excellent surface texture parameters. But then again, productivity in this case is far below that of multi-tooth indexable face mills.

An integrated wiper flat with a specially shaped minor cutting edge is a classical element of various milling inserts. Its width should be greater than the feed per revolution. Despite being called flat, the minor edge sometimes has a complex geometry to compensate for a negative effect of wear development. When an insert is mounted on a cutter, the wiper flat sits parallel to the machined surface. Hence, the surface will be formed by the most protruding insert of the cutter. Introducing a wiper flat in an insert design is an effective way to improve surface finish. And even today, rough milling inserts may have an integrated wiper.

Iscar's DOVEIQMILL family face mill carries double-sided inserts with a wide wiper flat. These tools



are intended for rough and semi-rough milling with surface roughness that usually features semi-finish to finish passes. The DOVEIQMILL cutters have successfully delivered on the hopes of their designers, and the adoption of the cutters in various processes has resulted in cancelling finish milling operations. The cutters provide roughness Ra up to 0.4 μm (16 μin) when milling steel and cast iron.

Increasing the number of teeth in big-diameter face mills and fine pitch cutters determines the appropriate growth of the integrated wiper width, which has a natural bound due to design and dimensional limitations. In such cases, a high surface finish can be achieved with the use of a specially designed wiper insert (or two inserts for large-sized tools), whereby the wiper flat is significantly wider than the standard one. This insert is mounted in the same pocket but protrudes several tenths of a millimeter (hundredths of an inch) axially relative to the standard insert.

Very good results can be achieved by applying adjustable milling cutters that utilise different mechanisms to adjust the position of the insert cutting edge within very strict limits (only several microns). But the beneficial adjustability of cutting

tools also has a flip side; it is spider work, which takes time.

A desirable solution looks like a tool that, after mounting an insert, has no adjusting requirements needed to achieve high surface quality. As a result, improving accuracy and employing advanced geometries remain the norm when it comes to updating indexable cutters for finish face milling.

At the same time, cutting tool manufacturers offer unique solutions that attract attention with their originality. An example is Iscar's TANGFIN family of milling cutters with tangentially clamped inserts and wide integrated wiper flats. The inserts are positioned in a TANGFIN cutter with a gradual displacement in both radial and axial directions, and therefore, each insert cuts a small section of the machined material, providing an extra-fine surface finish with roughness Ra up to 0.1 μm (4 μin).

Iscar developed dedicated exchangeable solid carbide heads in a diameter range of 12-50 mm (.472-2.000 in) for its MULTI-MASTER and T-FACE families to ensure high surface quality when milling relatively small faces, primarily bounded by shoulders. The heads are fully ground and provide high precision, facilitate a sharp cutting edge, and enable a greater number of teeth when compared to mills with indexable inserts of the same diameter. In combination, these features guarantee high-performance finish milling.

A tendency to decrease machining allowances due to the active introduction of technologies for precise workpiece production and 3D printing makes the issue of obtaining a high surface finish by face milling particularly relevant. Can toolmakers find a prompt, simple, and effective answer to the new needs of manufacturing? The near future will tell.

LVD OFFERS COST-EFFICIENT LASER CUTTING MACHINE

LVD introduces Puma, a new cost-efficient fiber laser cutting machine designed to provide high-technology features and performance at a lower total cost of ownership. Offered with 3-, 6- or 12-kW laser in 3050 x 1525 mm, 4065 x 2035 mm, and 6160 x 2035 formats and automation ready, Puma provides the agility to handle a diversity of cutting applications.

LVD's newest laser cutting machine addresses a growing demand for versatile laser cutting equipment built to maximise the value of a user's investment and lower the cost per part.

Puma is designed to operate as economically as possible with high-end features that optimise cutting performance and robust construction to ensure reliable operation. The welded steel, mono-frame construction provides stability to achieve quality cutting at high feed rates.

The Puma cutting head uses the latest technology to deliver consistent quality and process stability. It



incorporates crash protection, motorised focus position adjustment, and capacitive height sensing, as well as automated functions for sheet referencing, cutting gas

selection, pressure control, and nozzle cleaning. High machine dynamics enables productive cutting across a wide range of material types and thicknesses.

Puma's shuttle table system allows one table to be loaded or unloaded while cutting on the other table, keeping throughput at its peak. Table changeover takes just 35 seconds.

To maximise laser cutting output and processing efficiency, Puma can be equipped or retrofitted with any MOVit modular automation system, including Compact Tower (CT-L) for loading, unloading and material/parts storage, Flexible Automation (FA-L) advanced load/unload system, Tower Automation System (TAS) single or double-tower storage, or Warehouse Automation System (WAS) customisable storage tower system.

ACP QUATTROCLEAN: CO2 SNOW-JET CLEANING FOR HIGH-PURITY APPLICATIONS

The scalable quattroClean snow jet technology from acp systems AG is a cleanroom-compatible and proven solution for such tasks. The cleaning process is dry and uses liquid, climate-neutral CO₂. The key to the reliable cleaning results is the design of the wear-free two-substance ring nozzle through which the carbon dioxide is fed. On exiting the nozzle, the CO₂ expands to form fine snow particles, which are then bundled by a separate jacket jet of compressed air and accelerated to supersonic speed. The jet is easy to focus on a specific area. On impacting on the surface to be cleaned, the four effects (thermal, mechanical,

solvent and sublimation) of the quattroClean snow-jet technology ensure that particles down to the sub-micron range and filmic contaminants are removed effectively and consistently.

Since the crystalline carbon dioxide sublimates completely during cleaning, the surfaces or parts are dry. At the same time, the process is so gentle on materials that it can even be used to clean delicate, sensitive and finely structured surfaces.

The process for full-surface or partial cleaning is tailored to requirements through tests in acp systems' technical center. All process parameters, such as the volume flows for compressed air and carbon dioxide, the number of nozzles, the area to be jet-cleaned and the jet time, are precisely tailored to the respective application on taking material properties, the type of

contamination and cleanliness specifications into account. These parameters can be filed as part-specific cleaning programs in the system control. During cleaning, end-to-end process monitoring and control guarantee that each part is cleaned using the validated process parameters.

The design and features of the modular cleaning systems are adapted to the respective cleanroom class. Therefore, they are made entirely of stainless steel and have smooth, homogeneous surfaces. The flow-optimised design of the process chamber ensures that the detached impurities and sublimated carbon dioxide are removed rapidly and effectively by the integrated extraction system. Media preparation equipment geared to the task at hand also guarantees that cross-contamination and re-contamination are prevented.



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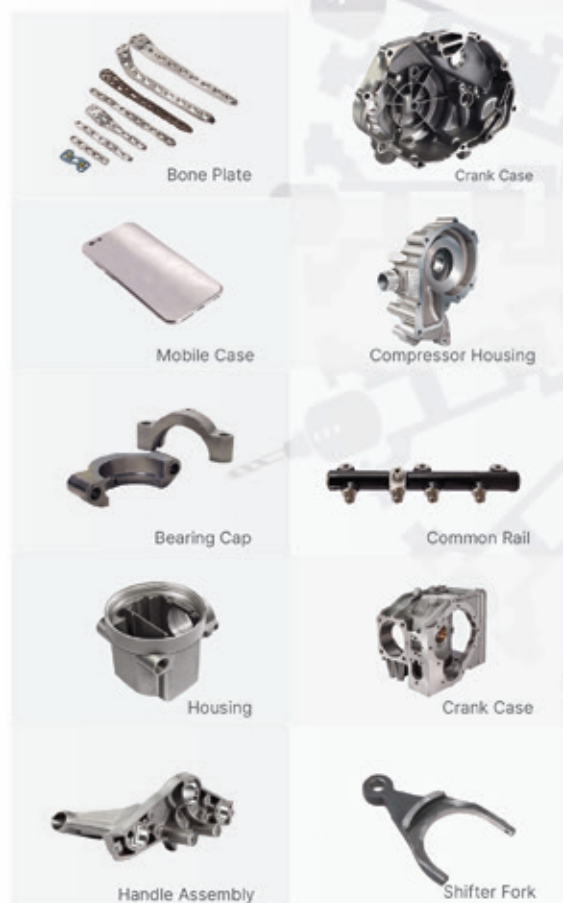
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