

# THE MACHINIST

RNI No 71129/98

Volume 17 Issue 3 • March 2022 • Rs 75

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THE MACHINIST  
SUPER SHOPFLOOR AWARDS 2022

A Times Group publication

ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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For more details:

**Rahul Kamat | +91 9892612075 | rahul.kamat@wmm.co.in**

**Shruti Nair | +91 9769621841 | shruti.nair@wmm.co.in**

For partnership opportunities:

(West & North)

**Ranjan Haldar**  
+91 9167267474  
ranjan.haldar@wmm.co.in

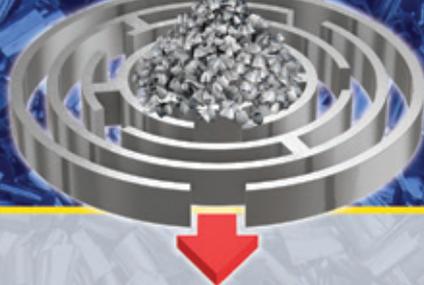
(South)

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

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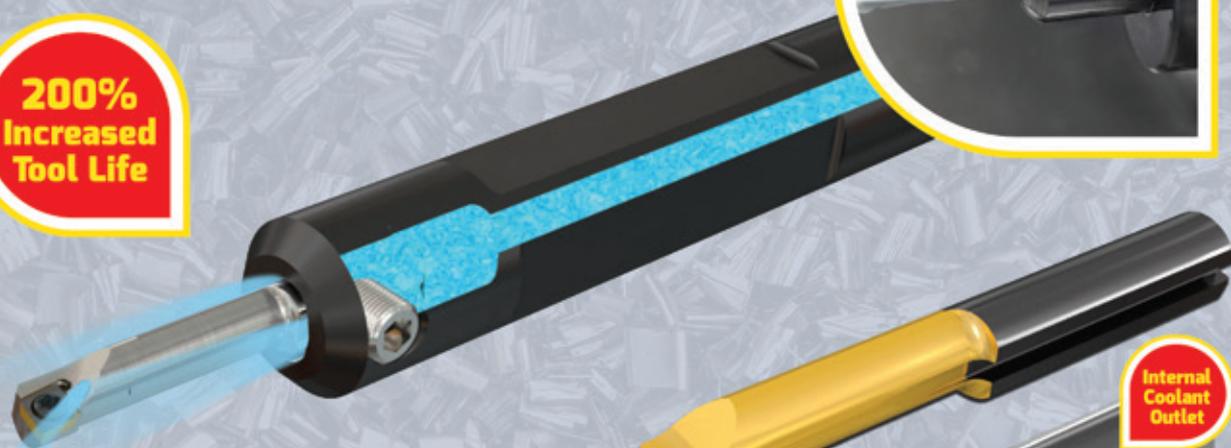
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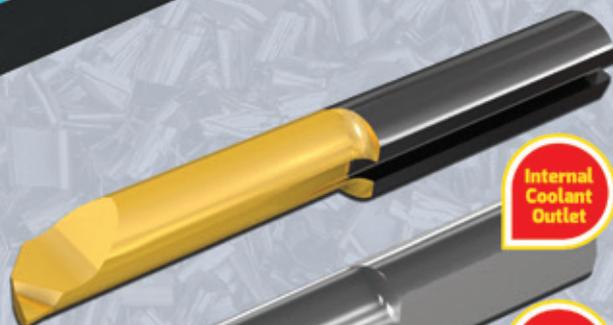
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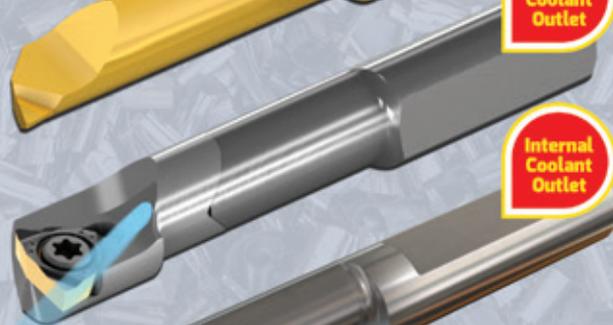


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## UP+YOGI= UPYOGI

**W**ith a thumping majority, for the second consecutive time, the Yogi Adityanath is back in power as the Chief Minister of Uttar Pradesh (UP). However, what does it mean for the manufacturing industry, especially investing in UP?

The UP government is targeting expanding its economy to \$1 trillion in the next five years. The GDP of the state was estimated at Rs 19.40 lakh crore in 2020-2021 and is projected to be Rs 21.74 lakh crore or about \$285 billion in 2021-2022. Therefore, the government is targeting a nearly fourfold increase by 2027, which is also when the next assembly election will be due. Meanwhile, the Yogi Adityanath government is already embarking on the completion of its ambitious Defence Corridor project for indigenous manufacturing of military goods and has started the process of development of four nodes for the plan.

A reasonable period for assessment of GDP growth between Yogi Adityanath and Akhilesh Yadav regimes would be the first three years as the last two financial years have been marred with lockdowns and economic restrictions due to pandemic. The Gross State Domestic Product or GSDP growth rate at constant prices during the Adityanath term is three basis points higher than Yadav's. As per Net State Domestic Product (NSDP) at constant prices, per capita income grew at 2.99 per cent vis-à-vis 2.62 per cent during the Akhilesh government.

According to the UP Directorate of Economics and Statistics, primary sector contribution reduced from 25.8 per cent in 2016-17 to 25.3 per cent in 2019-20, while the tertiary sector contribution rose from 46.3 to 49.7 per cent. According to the 15th Finance Commission report, the share of UP GSDP in 2018-19 rose to 9.7 per cent among the General States from 9.4 per cent in 2016-17.

At present, the MSME sector contributes 60 per cent of the state's annual industrial output and is the second biggest employer after agriculture. The UP government enacted a landmark MSME (Facilitation of Establishment and Operations) Act of 2020 strengthening the MSME Promotion Policy 2017 and MSME Procurement Policy 2020. Approval for the declaration of intent is given in 72 hours and units can obtain clearances within 1,000 days. Institutionalised inspector raj has become a thing of the past. The Yogi government inaugurated One District, One Product (ODOP) in 2018 with a vision to identify one product from each of the 75 districts and create a product-specific traditional industrial hub.

The policies and legislation are intended to shift the weight of the workforce from the primary sector and provide entrepreneurship, self-employment and employment opportunities to the young and skilled workforce. As a result, in the past 4.5 years, 92 lakh MSME units have got loans worth Rs 2.7 lakh crore under various schemes, nearly 90 lakh MSME units have brought in an investment of more than Rs 5 lakh crore, employing three crores.

A state's potential and effectiveness of its economic policies can be gauged by the investments, including FDI, it attracts. During the Yadav tenure, investment proposals worth \$10.2 billion were received and \$253 million FDI had flown in. In comparison, three years of Adityanath government received 7.5 times more investment proposals and 1.5 times more FDI, respectively.

That said, in this edition, we have featured Ms Sindhu Gangadharan, MD, SAP Labs India. In an exclusive interview, she talks about an inclusive workforce and creating the leaders of tomorrow.

That apart, this edition covers a range of topics from manufacturing infrastructure, advanced manufacturing to semiconductors. I hope you enjoy this reading this edition as much as we enjoyed putting it together.

Do share with us your opinions, comments and thoughts at [Rahul.kamat@wwm.co.in](mailto:Rahul.kamat@wwm.co.in)

*R Kamat*  
Editor



Chief Executive Officer **Deepak Lamba**  
Chief Financial Officer **Subramaniam S**  
Head Human Resource **Meghna Puthawala**  
Publisher, Print & Production Controller **Sunil Wuthoo**  
Brand Publisher **Rishi Sutrave**  
[rishi.sutrave@wwm.co.in](mailto:rishi.sutrave@wwm.co.in)  
+91 9820580009

Editor **Rahul Kamat**  
[rahul.kamat@wwm.co.in](mailto:rahul.kamat@wwm.co.in)  
+91 9892612075  
Assistant Editor **Anvita Pillai**  
[anvita.pillai@wwm.co.in](mailto:anvita.pillai@wwm.co.in)  
+91 9820137351  
Associate Art Director **Sanjay Dalvi**  
[sanjay.dalvi@wwm.co.in](mailto:sanjay.dalvi@wwm.co.in)  
Experiential Marketing **Aakash Mishra**  
[aakash.mishra@wwm.co.in](mailto:aakash.mishra@wwm.co.in)  
Executive Delegate Acquisition **Shruti Nair**  
[shruti.nair@wwm.co.in](mailto:shruti.nair@wwm.co.in)

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### CAREERS

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### SUBSCRIPTIONS

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Atlantic Lubricants & Specialities Pvt. Ltd.  
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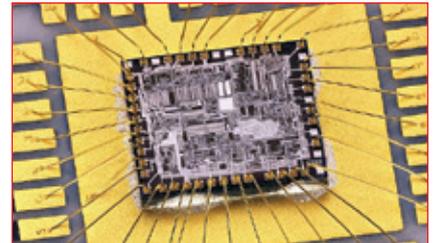
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## BMW To Invest \$200 Million In South Carolina Plant

**BMW** will invest more than \$200 million to construct a 219,000 square-foot press shop at its South Carolina plant. The investment will generate more than 200 new jobs. The announcement was made by BMW's Manufacturing President and CEO Dr Robert Engelhorn at the South Carolina Automotive Summit in Greenville, SC.

The new press shop, which will start production in the 2024 summer, will take raw coils of steel, cut them into blanks and stamp sheet metal parts for future BMW models. Those components include hang-on parts such as the vehicle's four doors, fenders, exterior body sides and liftgate.

"The BMW Group is known worldwide for the outstanding quality produced by its press shops. We are excited to add this new technology to Plant Spartanburg," said Dr Engelhorn. "This investment reinforces BMW's commitment in the United States and South Carolina. We continue to play a major role in the region's economic



strength as well as workforce development and job training."

### Highly skilled manufacturing jobs

A state-of-the-art press shop requires manufacturing jobs with advanced-level training. These jobs include tool and die technicians, electrical and mechanical maintenance for automated machinery and specialised line operators. More than 45 Plant Spartanburg associates are currently training at BMW Group press shops in Leipzig, Germany, and Swindon, England. These associates also train

with partners from the Schuler Group, a globally recognised company that manufactures automated servo press lines for all BMW Group plants.

"Inside our global production network, we share best practices and train associates to the highest BMW standards. The cross-functional collaboration is part of our BMW culture," said Karl Loessl, Vice President, Body Shop. "This world-class training will allow our

associates to work with advanced technologies and systems and support our production of future models."

### Inside the new high-tech press shop

The press shop marks the beginning of the automotive production process. Large steel coils arrive at the press shop, unloaded from trucks using 55-ton overhead cranes. The steel coils are then fed into the blanking line, where the steel is cut into individual 'blanks' (rectangular cut-offs or special shapes). These blanks are then ready to be fed into the press line.

## CHARGE+ZONE Completes 1,000 KM of National Highways Electrification

**CHARGE+ZONE**, a technology-driven EV Charging Network company, has announced that it has successfully electrified over, 1000 km of National Highways in India by setting up a network of twenty unmanned, app-driven EV charging points along the Gujarat-Maharashtra National highway. Designed for personal and public e-mobility, these charging stations have been installed as part of the company's larger goal of electrifying 10,000 km of national and state highways over the next three to five years. Through this, the company

has successfully cracked Dealer Owned Company Operated (DOCO) and Company Owned Company Operated (COCO) models for public charging networks on highways.

Deployed at convenient and strategic locations along the highway, CHARGE+ZONE's charging stations are rapid DC charging points with CCS2 as charging protocol, catering to electric four-wheelers. Depending on the battery size, these stations can provide up to 80 per cent charge in 45-60 minutes and a full charge in 90-120 minutes.

Commenting on the achievement, Kartikey Hariyani, Founder & CEO, CHARGE+ZONE, said, "We are immensely proud to have accomplished this milestone as part of our larger vision of building a robust network of one million EV charg-

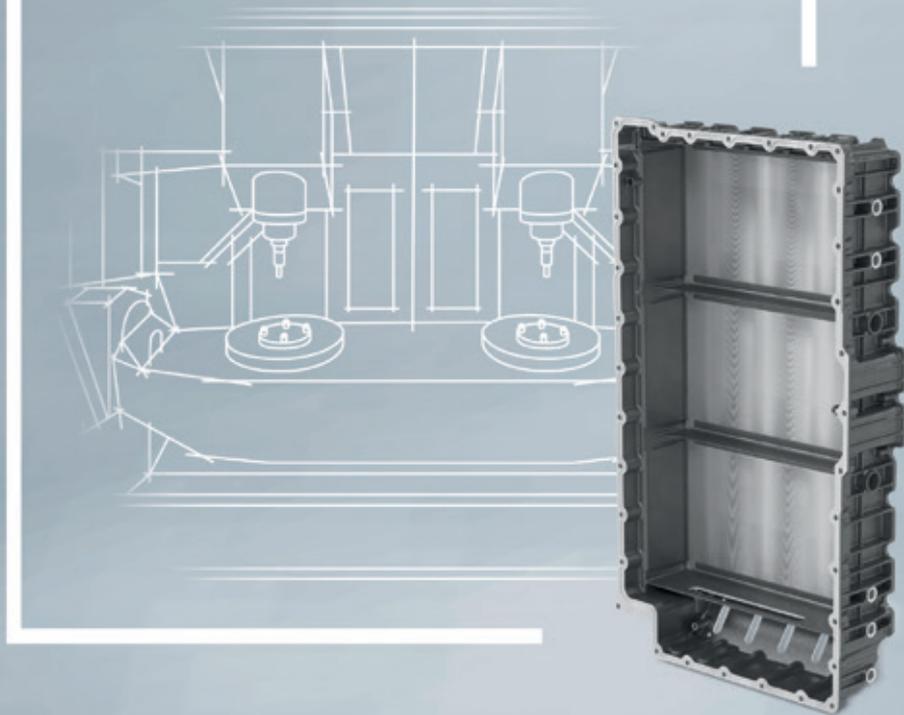
ing points by 2030. We also want to bring about a paradigm shift in the way people perceive EVs by addressing issues of range anxiety and the availability of energy for long hauls."

The charging stations have been installed at key locations on highways connecting Mumbai, Nashik, Ahmedabad, Surat, Navsari and Rajkot.

Since its inception, CHARGE+ZONE has created an active B2B and B2C network for EV charging stations for fleet and retail customers by setting up 1,250+ charging points across 650+ EV charging stations serving around 4,000 EVs daily. In December 2019, CHARGE+ZONE launched India's first fast-charging network for electric buses. In India, 125+ electric buses of Ashok Leyland are currently getting charged daily with its seven fast-charging hubs across three cities for intra-city public transportation. Earlier in December 2021, the company signed an MoU with the Government of Gujarat to install 10,000 charging stations along national and state highways.



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## Fortum Charge & Drive India Partners With BSES Yamuna Power To Launch Project On Load Balancing

**FORTUM CHARGE & DRIVE INDIA**, a leading Nordic Electric Vehicle (EV) charging service provider in agreement with BSES Yamuna Power Limited (BYPL), a leading power distribution company, has launched the pilot project on load balancing in New Delhi. The pilot project will focus on managing charging by balancing dynamic demand from EVs with static load input from BYPL in the smart chargers provided by Fortum Charge & Drive (Fortum C&D). The tenure of the pilot project is for one year. Over the next few months, Fortum will analyse the project capability under varying load & demand response scenarios through its proprietary back end and Fortum C&D India consumer Appi, enabling a smart & innovative model for operating EV charging infrastructure networks.

As part of the agreement, a total of three chargers (five charging points) will be deployed in Mayur Vihar Extension Phase I, New Delhi, built & operated by Fortum C&D India, offering complete system integration and software as a service (SaaS) for operating EV charging infrastructure networks and customer interfaces to other distribution utilities and charge point operators (CPOs). The carefully selected site is a gateway

to Noida and can be easily accessed by EV users and EV fleet operators.

More smart EV charging stations will be rolled out in South, West, East and Central Delhi, depending on the response. The capacity of the three deployed chargers will be 60kW DC (CCS), 30kW DC (DC001) (2X15kW guns) and 22kW (Type-II AC), respectively and will be transferred to BYPL at the end of the pilot project.

Speaking on the partnership, Awadhesh Jha, Executive Director, Fortum Charge & Drive India, said, "We are happy to collaborate with BSES Yamuna Power Limited on the country's first of its kind load balancing pilot project to shave the power demand during peak hours. Fortum Charge & Drive has been working closely with ecosystem partners across the country to facilitate EV charging infrastructure and create solutions to operate with minimal restrictions. This project will augment our efforts in laying a strong foundation to enable smooth functioning of EVs across the country by creating a widespread network of charging solutions



that the vehicle owners and operators can rely on."

The current Indian manufactured EV chargers do not have smart load balancing capability. Hence, identification of suitable charger and procurement was undertaken in the initial six months from signing the agreement. The new chargers have been integrated into Fortum's Charger Management System (CMS).

The smart charging station is truly smart and equipped with an 'analytic platform', which will help EV owners get a seamless digital experience. The EV chargers at the outlet are being integrated with a mobile application that enables end consumers to locate, pre-book an appointment and even pay at the EV charging station. It will be available on both Android & iOS platforms.

## TAGMA Announces The 12th Edition Of Die Mould India

**ORGANISED BY THE TOOL & GAUGE MANUFACTURERS ASSOCIATION OF INDIA (TAGMA India)**, India's most sought-after platform for the die mould industry is scheduled to take place from April 27 – 30, 2022, at Bombay Exhibition Centre, Mumbai. With the regular participation of leading brands who showcase their latest proven technologies and visitors like CEOs, Consultants, Decision Makers, DMI is today known to be a one-stop-shop for die mould professionals.

"With the ongoing pandemic still posing challenge, Indian manufacturers are taking a variety of approaches to radically transform their businesses and find new ways to differentiate themselves. Companies are continually looking for technologies to help them achieve



accuracy and reduce cycle time. The 2022 edition of Die Mould India will highlight the latest development in the field of tooling as companies gear up to showcase smart manufacturing solutions, newer tool geometries, the latest CNC machines, additive manufacturing solutions, integrated automation solutions, among others. With over 300 exhibitors

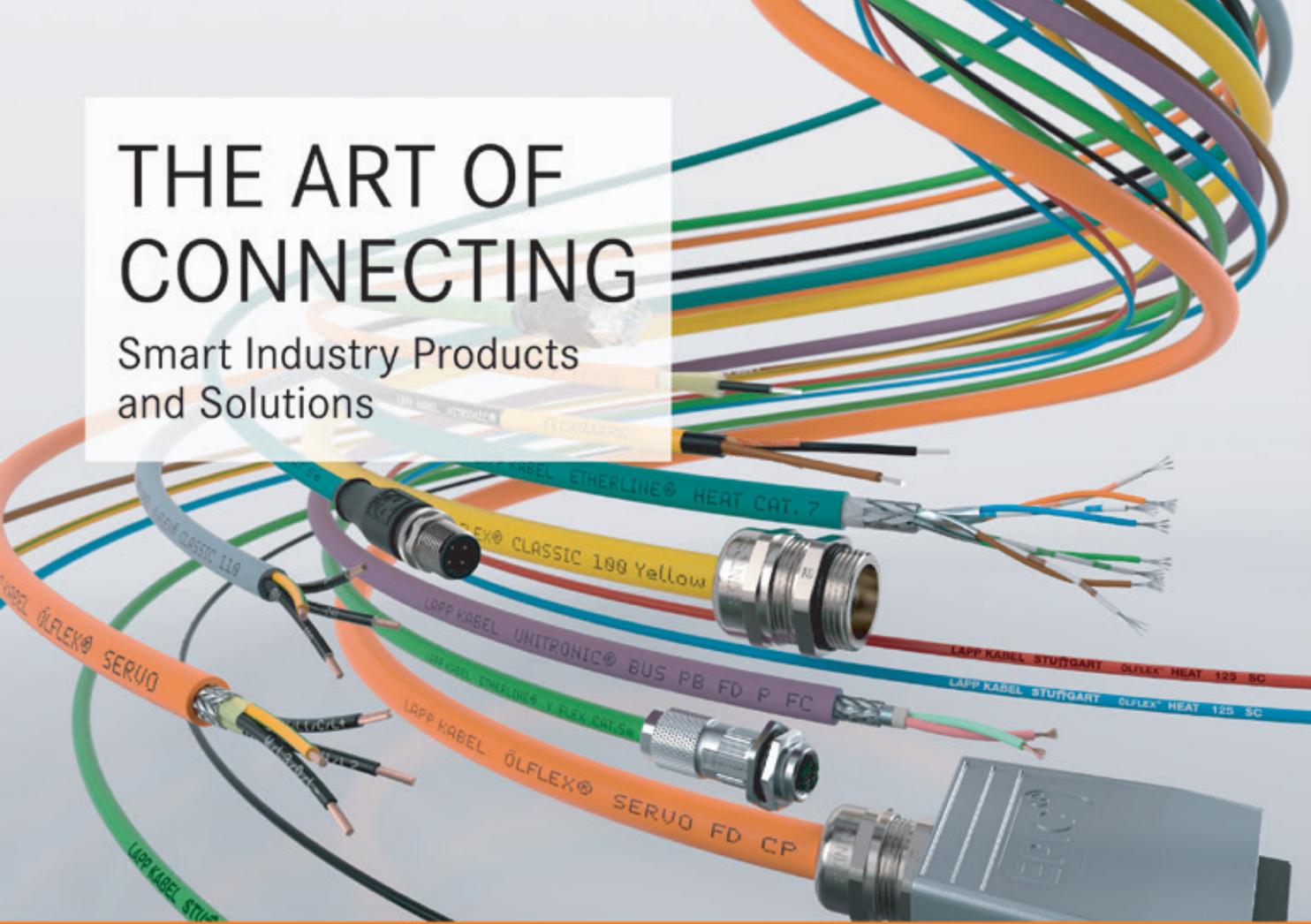
showcasing their technologies and solutions, we expect this edition to be a grand success," said DM Sheregar, President, TAGMA India.

Looking at the prevailing positive sentiment of the industry after two challenging years, the show, which will be held after a gap of four years, is likely to get a good response from various industry verticals.

The exhibit range of the show includes dies & moulds, press tools, mould base & standard parts of dies & moulds, hot runner system, tool steel, heat treatment, texturing, gauges, CAD/CAM system related to dies & moulds, die spotting, digitising, additive manufacturing/3D printing, rapid prototyping & modelling, machine tools for dies & moulds, CNC milling/machining centre, EDM, etc.

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## India's First FSRU Arrives At H-Energy's Jaigarh Terminal

**HÖEGH GIANT**, India's first Floating Storage and Re-gasification Unit (FSRU), has arrived at H-Energy's Jaigarh terminal in Maharashtra. According to H-Energy, this moment emphasises its commitment to be a significant contributor to the Indian LNG sector and its focus on sustainable and green energy solutions. With the berthing of the FSRU, it will now be gearing towards commissioning it in the coming weeks.



capable of reloading LNG onto other LNG vessels for LNG supply to other terminals and reloading onto small-scale LNG vessels for bunkering services. The facility will also deliver LNG through truck loading facilities for onshore retail distribution.

### Technical Specifications of the FSRU

The FSRU has a storage capacity of 170,000 cubic metres and has an installed re-gasification capacity of 750 million cubic feet per day (equivalent to six million tons annually). The Höegh Giant will deliver re-gasified LNG to the 56-km long Jaigarh-Dabhol natural gas pipeline, connecting the LNG terminal to the national gas grid.

Additionally, the facility will be

The Höegh Giant is equipped with an open-loop system using seawater as a heating medium and is paired with a propane closed-loop intermediate re-gasification system which is an environment friendly system and does not have any adverse effect on surrounding seawater. This system has proven to be more efficient, robust, and environment-friendly than traditional re-gasification methods.

## Honda India Power Products Reaches 5 Million Units Production Milestone in February 2022

**HONDA INDIA POWER PRODUCTS (HIPP)**, a leading manufacturer of power products in India, successfully crossed the 5 million units accumulated production milestone in February 2022. HIPP launched its first product, namely its portable generator model EM650, at its Rudrapur factory in 1988. Buoyed by strong demand from the customers, the company soon launched other well-differentiated generator models catering to the varying demands from a vast and well-diversified market. HIPP forayed

into the export markets in 1989, and its products were very well received in the competitive overseas markets.

Takahiro Ueda, Chairman & Managing Director, President & CEO, Honda India Power Products, said, "We were able to reach 5 million production units thanks to the support and cooperation of all the people in India and the local society. Our suppliers and partners stood by us and believed in our common vision – delivering continuously even in acute times such as the pandemic,

and I am grateful for their efforts all along. Our network of dealers channel partners played an excellent role as our extended arms in providing 3S - Sales, Service, and Spare Parts support, ensuring a delightful experience for our customers all along. HIPP will continue to contribute to India and its society as a company that is expected to exist".



## Vedanta Aluminium Launches India's First Low Carbon 'Green' Aluminium

**VEDANTA ALUMINIUM BUSINESS**, one of India's largest producers of aluminium and value-added products, launched 'Restora', a low carbon, 'green' aluminium brand. Under the brand, the company unveiled two product lines – Restora (low carbon aluminium) and Restora Ultra (ultra-low carbon aluminium). Vedanta Aluminium is the first major non-ferrous Indian metals producer to manufacture low carbon products (primary aluminium)



for customers worldwide, exhibiting a strong step towards its commitment to achieving net-zero carbon by 2050. Both products have been verified as low-carbon aluminium post-assessment by an independent, global verification assurance firm.

Vedanta's Restora is being manufactured at the company's aluminium smelter using renewable energy. It has a GHG emission intensity below four tonnes of CO2 equivalent (tCO2e) per tonne of aluminium manufactured – the global threshold for aluminium to be considered low carbon aluminium.

Restora Ultra has an even lower carbon footprint that is amongst the lowest globally. It is made from recovered aluminium through Vedanta's partnership with Runaya Refining. Under its Ultra product line, the company will offer aluminium recovered from dross (a by-product of the aluminium smelting process). Restora Ultra is also a testament to Vedanta's sharp focus on 'zero-waste' by enhancing its operational efficiencies.



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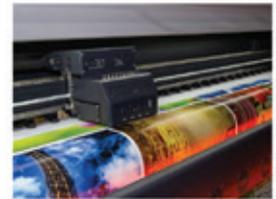
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## Solis Yanmar Launches Its Globally Acclaimed YM3 Series Tractors In India

### INTERNATIONAL TRACTORS

**LIMITED** has widened its footprint under the Solis Yanmar brand portfolio by launching its new YM3 tractor series. Also known as Global 4W Drive experts, Solis Yanmar has introduced two new tractors – YM 342A and YM 348A – fully tuned to deliver higher productivity and unmatched performance. Built with the 110-year-old diesel engine expertise of Yanmar, the new YM3 series is fully tailored as per Indian farmer requirements and is robustly designed for Indian conditions.

The YM3 tractor range offers fully sealed tractors with premium features, like Supernova engine, synchromesh gear, push-button operation (PTO), and carries optimum weight to address both farmings and special application needs



of farmers. It features an aerodynamic hornet design with an ergonomically designed four-way adjustable seat and power steering for farmer comfort. At the heart of the tractor lies the Japanese engine technology that has been refined to offer the best performance. The tractor powerhouse is a four-cylinder engine with Monoplunger FIP and feather touch 8F

+ 8R shuttle shift transmission, coupled with balancer shafts to eliminate noise and vibration for superior performance.

Sharing his vision during the new launch, Raman Mittal, Joint Managing Director, IITL, said, ‘Introducing premium technologies that steer farmers towards a prosperous future remains sacrosanct for us at Solis Yanmar. After the tremendous response to our Solis range of tractors since its launch in 2019, we are now launching the Yanmar tractor range with the YM3 tractor 4WD series, which is a clear reflection of advanced Japanese engineering.’

In collaboration with Yanmar, Solis has developed a wide tractor range that is optimised for significant productivity increase but reduces water consumption during agriculture.

## MG Motor India & PPG Asian Paints Launch Technology To Reduce CO2 By 1500 Tons/Annum

**MG MOTOR INDIA** recently became the world’s first automotive brand to use Ultrax Degreaser, a liquid alkaline degreasing cleaner developed by PPG Asian Paints. The degreasing pre-treatment chemical launch aligns with the brand’s focus on making sustainable mobility greener, leading to a CO2 reduction of 787 tons/annum.

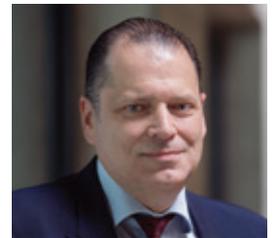
Apart from the Ultrax degreaser, MG Motor India conserves energy through low-temperature phosphate (Versabond) and high throw low cure cathodic electrocoating paint, leading to a CO2 reduction of 325 tons/annum and approximately 388 tons/annum, respectively. These new technologies will support the company to enable a cumulative CO2 reduction of 1500 tons/annum.

Ravi Mittal, Director – Manufacturing, MG Motor India, said, “MG Motor India is always on the lookout for ways to impact the environment positively. It recently partnered with CleanMax to use 4.85 MW of wind-solar power to conduct its operations in the Halol manufacturing hub, eliminating the use of two lakh MT of carbon dioxide in 15 years. The company has also announced its latest initiative (Enviro Wash) to promote dry car washing, encouraging people to save up to 14 lakh litres of water per month. For EVs, MG Motor has teamed up with Attero to reuse and recycle Li-ion batteries of electric vehicles in India. Its collaboration with TES-AMM also ensures environmentally sustainable and secured recycling of EV batteries in the country.”



## United Grinding And Francis Klein Combine Competencies For Indian Market

**FRANCIS KLEIN** has been firmly rooted in the Indian market with the distribution and manufacturing of high-precision machines for almost 70 years. The two companies have enjoyed a trusting partnership



for many years, providing their Indian customers with advice, sales and service of United Grinding Group precision machines for grinding, eroding, laser and measuring. The United Grinding Group’s commitment in India has a history: Since 2007, its own branch office in Bangalore has been represented by its own branch office. To intensify their market activities and provide even better support to their broad customer base, the two companies have founded a joint venture, United Grinding India LLP. The joint venture, based in Bangalore, is headed by C R Sudheendra, Former President of the United Grinding India Branch Office.

“Our goal is to make our customers even more successful. We are convinced that we will achieve this goal even better in the Indian market with the joint venture,” said Stephan Nell, CEO, United Grinding Group. “With Francis Klein, we have a strong partner at our side who shares our demand for quality and our understanding of service. Together, for the benefit of our clientele, we will bundle our competencies, be present even more powerfully in the market, intensify our sales and service activities, and be able to be on-site with our customers even faster.” Nell continued.

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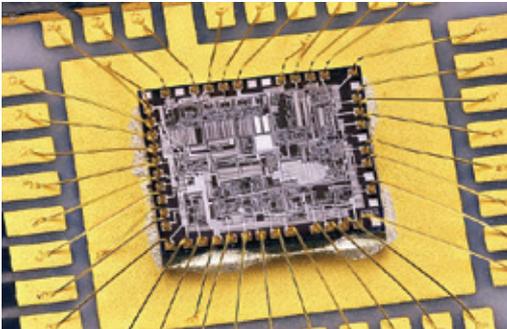
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 **WALTER**

By Yogesh Bhatarkar, Manager - Semiconductor EV Business, Mitsubishi Electric India

## POWER SEMICONDUCTORS: A KEY TO HEV/ EV ENERGY EFFICIENCY

Semiconductors play an important role in the growth of EV and HEV in India. The article elaborates on why it is essential to develop charging stations in India and develop power semiconductor modules to support EV/HEV growth.



Since technological innovation occurs with each passing day, the automotive industry has witnessed rapid transformations. Earlier, auto manufacturers used to try hard to install vehicles with advanced technology. But the level of tech-enabled services in today's models is such that the ecosystem is witnessing a realignment. This change has opened new avenues for the industry as smart technology is shifting towards battery-operated vehicles.

It is estimated that the automotive industry is undergoing a paradigm shift, attempting to make a quick transition to alternative energy sources. India, being part of the same league, has been making several attempts to move ahead with modern policies to deal with the accompanying growth in automobiles and shift to electric mobility after considering various factors such as the hassle of oil imports, global climate change issues, scarcity of natural resources, attainment of sustainability, pollution, and so on.

### INNOVATING FOR EV ADOPTION

Considering it a great move, the Government of India has proposed several changes to the Central Motor Vehicle Rules 1989 to encourage electric mobility in India. India aspires to become a major global vehicle market, with several automakers and start-ups working on relevant segments and tech-enabled gears.

In India, the growth of e-mobility requires the mandatory installation of EV charging stations. However,

the charging infrastructure is a critical factor determining the country's EV adoption possibilities. Since EVs run on batteries, the massive operation of the vehicle leads to the requirement of recharging of the batteries, which also depends on the size and capacity of the battery. As a result, charging stations are essential for the long-term operation of electric vehicles. According to the NITI Aayog, there is a possibility that India can have a high level of electric vehicle penetration by 2030.

While the transformational push for electric vehicles is a great initiative adopted worldwide, it brings with it a plethora of opportunities and challenges. There are a lot of global manufacturers who have already taken their first move to make the transition of EVs a reality on a large scale. These industry giants have expressed optimism about the growth of electric vehicles and charging stations in India. Based on recent developments, India is gradually catching up with the rest of the EV charging ecosystem.

### SEMICONDUCTORS DRIVING EV/HEV DEVELOPMENT

Considering the manufacturing part of the EV charging ecosystem and automotive components, which must meet stringent vehicle safety standards, has created a high demand for power semiconductor modules developed by power semiconductor manufacturers, which provides more reliability than industrial equipment modules.

In 1997, Mitsubishi Electric became the first company to mass-produce power semiconductor modules for hybrid vehicles. The company's power semiconductor devices are key devices for energy saving in power electronics equipment and hold the top position in the global market. Furthermore, their power semiconductor devices are utilised in inverters, boost converters, air-conditioners in EVs and HEVs. Mitsubishi Electric's series of power semiconductor modules feature compact packages with small footprints, low power loss and high reliability for use in the inverters of electric and hybrid vehicles.

The invention of power electronics technology has



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• E-mail : bakermum@bakergauges.com

• E-mail : bakerdlh@bakergauges.com

• 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

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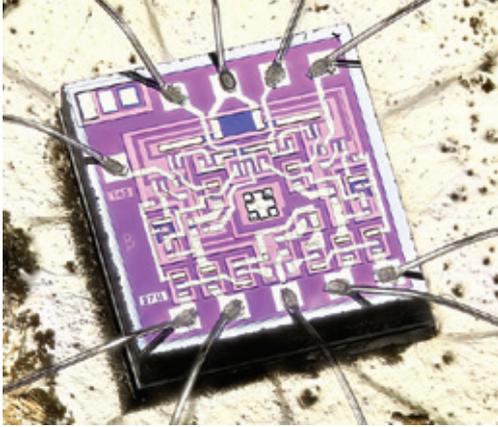
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made it possible to increase the driving mileage, thereby enhancing fuel economy and efficiency. These power semiconductors are undoubtedly a key to Hybrid Electric Vehicles (HEV)/EV's energy efficiency and fuel economy. HEV/EVs help in reducing emissions and efficient fuel consumption.

The development of power semiconductor devices has led to HEV/EVs development. HEV power system, drive, controls, or any luxury application heavily depends on high power switches. The cost, efficiency, comfort, and driving range improve with increased hy-

bridisation, which ultimately means more power electronic applications.

Common electric batteries rely on dated technology, limiting their performance. As a result, EVs can suffer from high costs and short life spans. But new semiconductor innovations offer the potential for longer and more efficient battery life. Semiconductor chemistries like Gallium Nitride (GaN) and Silicon Carbide (SiC) allow EV batteries to operate at higher voltages than traditional silicon wafers.

### PLAYING IN THE GROWING SEMICONDUCTOR MARKET

According to a report, the power semiconductor market for EVs is expected to take a steep jump, which will be three times increased as compared to the current usage and demand between 2020 and 2026, growing at a rate of 25.7 per cent CAGR to \$5.6 bn, driven by a significant technology battle between insulated-gate bipolar transistor (IGBT) and silicon carbide (SiC) modules.

Nowadays, many semiconductor players are targeting SiC modules for EV applications, due to which the SiC module market is expected to reach 32 per cent of the total EV/HEV semiconductor market by 2026. If such is the case, there's no denying that the power semiconductor market will soon have a stronghold on all major industries. 

## NASSCOM COE LAUNCHES 'SMART MANUFACTURING FORUM'

The NASSCOM Centre of Excellence (CoE), Gandhinagar, the digital India initiative of the Ministry of Electronics & Information Technology and Government of Gujarat, have launched the 'Smart Manufacturing Forum', an initiative to help MSMEs adopt Industry 4.0 solutions.

The Smart Manufacturing Forum will help manufacturing enterprises with an annual turnover of less than Rs 1000 crore to start, scale and sustain the adoption of Industry 4.0 solutions that can aid in optimising operations, maximising capacity utilisation and building a resilient supply chain. The forum will support three verticals: skill & capability building, handholding for the digital journey, and branding & market reach. The manufacturers will also get 24x7 access to a smart manufacturing competency centre, a virtual platform to help them improve efficiency, productivity and safety in plants by experiencing end-to-end smart manufacturing solutions.

"Disparity in tech adoption has increased as large enterprises have accelerated their pace while MSMEs still face the challenges of awareness, accessibility and affordability. The Smart Manufacturing Forum has been launched to enable MSMEs to kickstart their



digital journey and become future-ready. The forum will be a closed group of 100-150 forward-looking manufacturing enterprises working with us to build digital talent and implement low-cost and easy to deploy solutions from startups. Our focus will be on helping MSMEs enhance productivity, boost efficiency and become globally competitive," said Amit Saluja, Senior Director & Centre Head – NASSCOM CoE, Gandhinagar.

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By Fritz Studer AG

## UNMANNED CYLINDRICAL GRINDING PROCESSES FOR SMALL SERIES

The internationally operating MPS Micro Precision Systems AG (MPS) consistently uses grinding processes for demanding high-precision components in IT02 tolerance ranges. The case study highlights future projects and prototypes that can be brought to market more quickly thanks to a flexible production cell.

**M**PS, employing a staff of more than 400 employees, is a 'hidden champion' of a special kind. Back in 1969, RMB (Roulements Miniatures Biemme SA), from which MPS originated, developed components for the Apollo Mission. With 250 employees, Biel is the MPS Group's largest site and has more than 140 turning, milling, grinding, polishing and eroding machines.

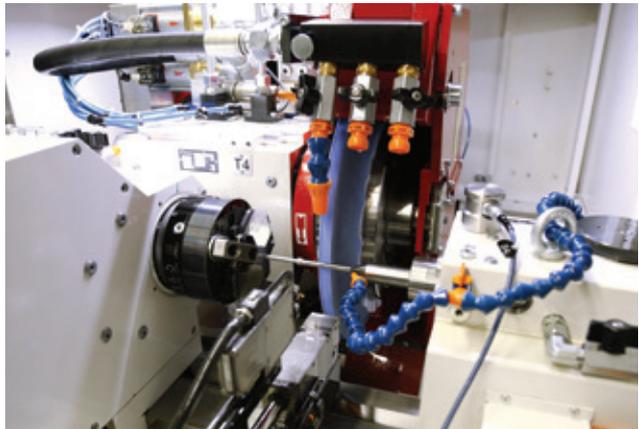
### CONSISTENT INVESTMENTS IN GRINDING MACHINES

Michael Bazzan, Production Manager, MPS, said, "With seven Studer grinding machines, we currently have a high grinding capacity for producing high-precision components. The grinding machines are matched to our varying lot size spectrum, which ranges from individual component production up to 25,000 pieces per year for some references."

In accordance with the lot size spectrum, three of the seven Studer machines are currently equipped with an automatic loading system. The following focuses on the Studer S33 for the production of recirculating ball screws and a Studer S21 in the area of a flexible production cell (Flex Cell).

### FLEXIBLE PRODUCTION CELL FOR PROTOTYPE MANUFACTURE

Didier Noirjean, the Manager at Flex Cell, mentioned, "The Flex Cell was recently integrated into cylindrical grinding production as a self-sufficient production unit, to set up grinding processes for prototypes and new developments without having to intervene in production. Thanks to this flexible production cell, our process from development through to the finished component is much quicker. The decisive factor with the Studer S21 was that it could be changed over very quickly, and



**View of the S33 with wheelhead, which has two external cylindrical grinding wheels here. An internal grinding spindle could also be integrated as a modular unit.**

it can be flexibly configured for different components. Eccentric grinding processes are also possible with the S21. In this regard, the Studer S21 is perfectly suited to our requirements."

While the Flex Cell primarily involves prototypes, series parts are machined on the other six Studer machines. These include recirculating ball screws with a high-precision design.

### CORE COMPETENCY RECIRCULATING BALL SCREWS

All components are developed and manufactured in-house by MPS, including the balls. The smallest recirculating ball screws have a ball diameter of 0.8mm. The larger series of screw spindles with gothic-arch thread are produced on a fully automated Studer S33.

### BALL-TYPE LINEAR DRIVES FOR HIGH-PRECISION APPLICATIONS

Manuel Nercide, Plant Manager, MPS, said, "We are involved in research and development with these precision screw spindles. The expertise developed by MPS



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Microsystems in the extremely gentle and precise positioning of lens groups enables the company to offer powerful alignment systems for optical components such as zoom and laser beam focusing systems.”

#### **SYSTEMS DESIGNED TO CUSTOMER REQUIREMENTS**

MPS microsystems miniature recirculating ball screws, or ball-type spindles, are made exclusively of stainless steel and are positioned with double nuts, which enable fine adjustment of the axial play. These often-customised spindles guarantee virtually smooth movement thanks to the high precision of their ground thread. With regard to customised production: There is a wide range of customised options available for recirculating ball screws.

#### **GOTHIC-ARCH THREAD: GRINDING FROM SOLID**

The gothic-arch thread form is ground directly from the solid hardened blanks. A macro was developed for these gothic-arch thread forms together with Studer. This macro can adapt the grinding parameters very quickly to the respective screw spindles.

U. Weyermann, Regional Sales Manager, Fritz Studer AG, said, “The Studer S33 used here is an external cylindrical grinding machine with a turret wheelhead. Specifically, the wheelhead used here has two external grinding wheels. One of the two wheels is used for the thread profiling, while the second wheel is generally used for external cylindrical grinding.”

#### **HANDLING SYSTEM FOR UNMANNED PRODUCTION**

In order to produce the medium-sized series cost-effectively, the Humard company developed a flexible handling system for automatic loading and unloading of workpieces in collaboration with MPS and Studer.

Bazzan mentioned, “A crucial factor in the design of the handling system is that it can be quickly adapted

to different workpiece geometries because our lot sizes are variable.”

#### **TYPICAL THREAD GRINDING PROCESS**

The Studer S33 requires less than a quarter of an hour to complete machining of a screw spindle 8 mm in diameter and 120 mm in length. The thread is roughed and finished with the same grinding wheel. The grinding wheel is dressed repeatedly in the micron range throughout the grinding process. More than 1000 screw spindles of this size can thus be ground with one grinding wheel.”

#### **THE DRESSING PROCESS WITH SEVERAL TASKS**

The grinding wheel dressing process performs an important function during grinding. On the one hand, the dimension and form of the grinding wheel are calibrated, and on the other hand, the cutting ability of the grinding wheel is defined.

Julien Grosjean, Screw Grinding Manager, Studer AG, mentioned, “In the case of screw spindles, we typically need to dress repeatedly during each production process. Both a diamond and a dressing roll are used for dressing. You can define the roughness of the grinding wheel relatively specifically with the dressing roll and thus control the grinding process and the surface quality. We have carried out many tests in this regard until finding the ideal dressing method for the roughing and finishing processes.”

Weyermann added, “If you consider the complexity of a grinding process and the dimensions of the machines – keyword thermal growth – then producing within IT02 tolerances in unmanned operation is hardly a matter of course. All seven Studer machines deliver exactly the precision and process reliability demanded by MPS daily. 24/7 production with the IT-02 tolerance ranges that we require ultimately only possible thanks to the extremely high repeatability precision of our Studer grinding machines.”

#### **INVESTMENTS REDUCE PRODUCTION COSTS**

Finally, Nercide takes a comparative look at the past, “Seven years ago we made between 2,000 and a maximum of 5,000 spindles, today we produce 50,000 spindles a year. We have continually reduced our production costs, not least thanks to investing in modern grinding machines. Seven years ago, our production was four times as expensive. From this perspective, investments in modern production equipment are crucial for ensuring long-term viability. Ultimately, our production must satisfy our product range’s qualitative and quantitative requirements. We are perfectly positioned in the cylindrical grinding segment in this regard, not least because of our continued investments. 

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By Ashok Patel, Founder and CEO, Max Ventilator

## THE RECENT EVOLUTION OF MANUFACTURING POLICIES FOR VENTILATORS

With the onset of covid-19, the GOI has streamlined the policies for medical device manufacturing. The article discusses the policy in action before covid-19, what it was updated to during covid and what more needs to be done.

Lately, the government of India has made earnest attempts to streamline policies and regulations to give that much needed thrust to the medical device sector. This was even before Covid-19 came as an unprecedented public health challenge. With ventilators constituting a critical weapon in the fight against Covid-19, the role of a policy framework guiding the manufacturing of ventilators became even more relevant. How has the policy landscape for manufacturing ventilators evolved in the country in recent years?

### CDSKO, THE REGULATORY AUTHORITY

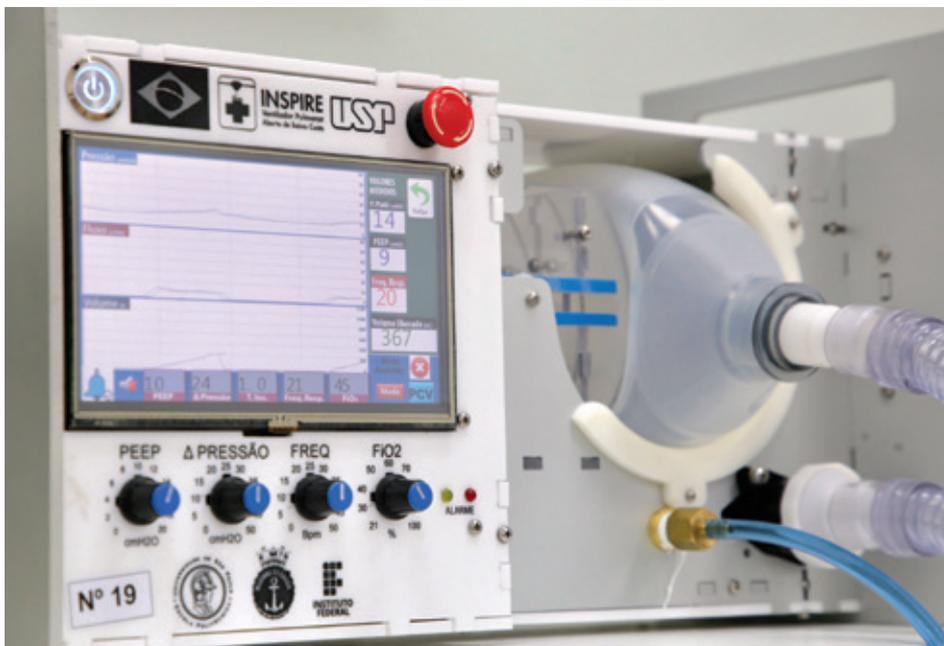
The Central Drug Standard Control Organisation (CDSKO) is the pivotal regulatory body for medical devices, including ventilators. The regulation is carried out either through the listing or registration of devices.

### MEDICAL DEVICE RULES 2017, THE GUIDING REGULATORY FRAMEWORK

With the introduction of The Medical Device Rules 2017, which came into effect in January 2018, the stage has been paved for simplifying and streamlining the regulatory framework set out rules and norms for obtaining registration and licenses by manufacturers and importers of medical devices. And this would also apply to ventilator manufacturers. Very importantly, the intent was to treat medical devices as distinguished from drugs for regulation for the first time since the Drugs and Cosmetics Act, 1940 came about.[1] Yet, as of today, practically speaking, medical devices, including ventilators, continue to be treated as drugs for regulatory purposes.

### A RISK-BASED CLASSIFICATION SYSTEM

The MDR 2017 also provided for a four-fold risk-



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based classification system for medical devices: Low (Class A), Low Moderate (Class B), Moderate-High (Class C), and High (Class D). And ventilators for all intent and purposes have been categorised as Class C medical devices.

**CHANGE IN DEFINITION OF MEDICAL DEVICES BY A NEW NOTIFICATION IN FEB 2020**  
MDR 2017 was followed by a notification on 11th February 2020, providing a new definition of medical devices. Under this, all medical devices conforming to this new definition were regulated by DCA and MDR with effect from April 2020. And ventilators do conform to this new definition.

#### **MEDICAL DEVICES (AMENDMENT) RULES 2020 MANDATING REGISTRATION ON ONLINE PORTAL**

On the same day in February 2020, the government also inserted Chapter III-A in the MDR, 2017, stipulating registration requirements for manufacturers and importers. According to this amendment, the manufacturers and importers of new medical devices are required to register their medical devices with a government-designated portal. While registering, the manufacturers have to submit an array of information, including the name & address of the company or firm manufacturing the medical device, along with the name and address of the manufacturing site. The manufacturer also has to furnish details of medical device such as generic name, model number, intended use, class of medical device, the material of construction, dimension, shelf life, whether sterile or non-sterile and brand name if registered under the Trademarks Act 1999. [2] Also, a certificate of compliance with respect to ISO 13485 standard accredited by National Accreditation Board for Certification Bodies or International Accreditation Forum is to be submitted. Similarly, importers have to upload information, such as the name of the importing company, details of medical device, certificate of compliance with respect to ISO 13485 standard accredited by National Accreditation Board for Certification Bodies or International Accreditation Forum, and free sale certificate from the country of origin.

#### **DIFFERENT TIMELINES FOR DIFFERENT CLASSES OF DEVICES**

Under the Medical Devices (Amendment) Rules 2020, after the initial voluntary registration period for the first 18 months starting April 2020, the government has mandated different timelines for different devices. And since ventilators fall under category C, ventilator manufacturers have been given 42 months from the time of notification, effectively until August 2023, to

obtain registration and license for their operations. Also importantly, from time to time, the government will carry out audits and verification of quality management systems (QMS) and documents to ensure the quality and safety of medical devices, including ventilators being sold and used in the country.

#### **IMPACT ON FOREIGN MANUFACTURERS**

From the standpoint of foreign manufacturers of ventilators, the requirement of obtaining registration certificate and import license separately was done away with, and they could henceforth apply for a single consolidated license. Foreign manufacturers would also have to appoint an Indian Authorized Agent (IAA) to market devices in India. In fact, foreign manufacturers may appoint their distributors or importers as the IAA.

#### **FEATURES OF VENTILATORS MANDATED DUE TO COVID-DRIVEN EXIGENCIES**

With the pressure to ramp up domestic manufacturing of ventilators in the face of unprecedented demand, the government had prescribed minimum essential technical features for covid purposes. These were as follows:

- The machine should be turbine/compressor based because the installation sites might not have central oxygen lines
- The machine should have invasive, non-invasive and CPAP features
- The machine should have 200-600 ML tidal volume
- The machine should have Lung Mechanics Display
- The machine should enable Monitoring of Plateau Pressure, PEEP, PS, oxygen concentration, lung mechanics/inverse ratio (I: E)
- The machine should have Pressure & volume control & PSV modes and should have the continuous working capability for 4-5 days

Therefore, the government has set in motion a train of regulations making manufacturing and importing medical devices, including ventilators, more streamlined while providing for a perpetual license and a single-window clearance platform, making it convenient from manufacturers' standpoint. From the end-user point of view, this will ensure quality and safe breathing devices in the country. Yet, the government needs to separate ventilators from drugs for regulatory ends legally. Also, we need to upgrade our internal quality management systems and develop indigenous certification systems at par with global standards. Given that ventilators are assembled devices with multiple components, the government should also give an impetus to domestic manufacturing of those components. More importantly, we need to go beyond Covid-specific ventilators and aim for upgrading our lifesaving breathing devices qualitatively. 



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By Rajaram Pai, Chief of Business – Industrial, Mahindra Lifespaces

## INDIA 2022: THE EPICENTRE OF SHIFT IN GLOBAL MANUFACTURING

India is known for its hospitality and diversity. This can be used to the country's advantage to improve its attractiveness as a location feasible for foreign manufacturing unit set-up. The article elaborates on how India can monetise its local manufacturing prowess and significantly enhance its value proposition.

“**A** *tithi devo bhava*” is an ancient saying in Indian culture that essentially encompasses our outlook towards our guests and the culture of hospitality in India. Foreigners visiting India have always vouched for our hospitality and welcoming nature. While this might sound like an interpersonal behavioural trait, this culture also bleeds into our businesses.

Due to its vibrant economy, infrastructure, and diverse talent pool, India can become the dominant driving force of the global manufacturing and production industry. With FDI equity inflow growing by 168 per cent in the first three months of FY'22, from \$6.56 billion to \$17.57 billion compared to the same corresponding period last year, we see India as a preferred destination, which is led by innovation, design and sustainability.

### LOCAL MANUFACTURING PROWESS

With the 'Make in India' initiative, India is emerging as a hub for high-tech manufacturing as global giants like GE, Siemens, HTC, Toshiba, and Boeing have established or are launching manufacturing facilities in India. We have overtaken the United States as the second most desirable manufacturing destination in the world according to Cushman & Wakefield's Global Occupational Risk Index 2021, reflecting the growing interest shown by manufacturers in India as the preferred manufacturing hub. A few factors contributing to the rise in ranking include the manufacturing resilience shown during the pandemic induced lockdowns, cost compet-



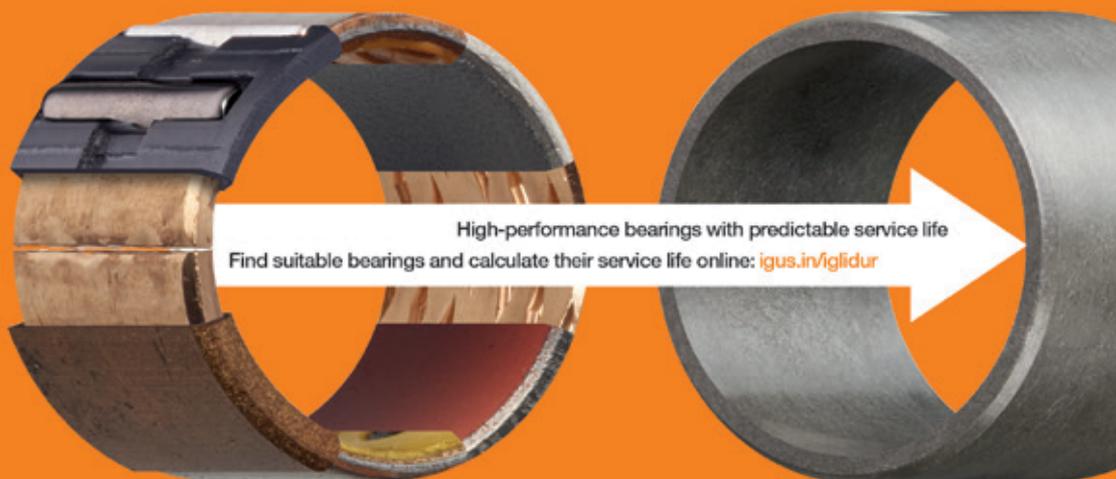
itiveness and operating ecosystem that ensure that we are efficient and productive.

The automobile industry has emerged as the top sector during the first three months of FY'22 with a 27 per cent share of the total FDI equity inflow. Due to the sector's manufacturing prowess and growth over the last decade, India has become one of the most attractive destinations for manufacturing investment. Today, some automobile manufacturers and OEM companies are exporting products to cater to the demand of several countries, including the European markets, through their manufacturing plants in India. Some major automobile manufacturing centres serving global demand are now present in Mumbai and Pune in Maharashtra, Gujarat, Tamil Nadu and West Bengal.

India has also attracted large-scale investment in labour-intensive manufacturing processes in the electronics assembly and textile industries. In this fast-paced environment, as global companies adjust their manu-

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facturing and supply chain strategies to increase flexibility, India has a unique opportunity to emerge as a base for semiconductors and electronics manufacturing.

### ACCELERATING CAPABILITIES

With improved ease of doing business in India, growth potential, subsidies and incentive schemes, sectoral policies and support infrastructure in SEZs and integrated industrial cities, global manufacturers are now seeing great value in adding India as a critical location for expansion. The availability of a skilled workforce and a strong macroeconomic framework have also boosted the growth of the Indian manufacturing sector.

With the government's intention of rebuilding India as an attractive manufacturing location, programs like 'Make in India', 'National Policy for Advanced Manufacturing', Industry 4.0 and Gati Shakti are being implemented to place India at the centre of the global manufacturing industry. India must leverage such schemes and provide the platform for global companies to accelerate their plans to shift manufacturing headquarters to India to increase the share of manufacturing to contribute 25 per cent of our GDP.

### VALUE PROPOSITION

We are sitting on enormous untapped potential. However, for decades, economic growth has been primarily driven by the growth of the services sector. The need, and indeed the scope for accelerating growth through manufacturing, is therefore immense. Almost all major industries within the manufacturing sector are going through pivotal changes. The automobile industry is transitioning to electric mobility; the semiconductor and electronics industry is seeing incredible demand due to the acceleration and adoption of AI and ML. The real estate and infrastructure industry, which supports the other manufacturing industries, is also growing and seeing a shift in demand across verticals.

India is not only emerging as a manufacturing hub due to this demand boost and trade policies, but we are also at the helm of the infrastructural development drive to support such ambitious plans. One example of this is the emergence of integrated cities; self-reliant ecosystems that provide manufacturing capabilities along with residential and social infrastructure for



quick turn-around times, enabling faster market entry for companies setting up manufacturing in India. With an increasing focus on bolstering the entire value chain, India is poised to emerge as an innovation-led manufacturing destination for global manufacturers.

Furthermore, with its stated intent to reduce dependence on fossil fuels, implement an accelerated GHG phase-out program, and meet ambitious renewable energy production targets with the ultimate goal of achieving net zero emissions, India provides the ideal platform for research and advancement in new technologies. The focus on sustainability will ensure that we do more with less.

### IN CONCLUSION

A rebalancing of the global value chain has been necessitated not only by the coronavirus pandemic induced bottlenecks across manufacturing and logistics but also due to a growing recognition of the need to diversify dependence on any location or a region.

India's economy needs strong manufacturing growth impetus as the country's dominant service industry struggles to return to normal after two deadly waves of the covid-19 pandemic. The rebalancing of the global value chain, caused by not only the coronavirus pandemic induced lockdowns but also by the realisation of the manufacturing potential of India against other countries, provides a unique opportunity for India to transform and accelerate the development of the manufacturing industry.

The inherent potential of India against other countries provides a unique opportunity to transform and accelerate the development of the manufacturing industry and benefit from any shift in the global landscape. 



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## “STAY AGILE, REINVENT AND ALWAYS PUT PEOPLE BEFORE BUSINESS”

The role of women is evolving across sectors, but there is still a long way to go and plenty to figure out. In conversation with the first woman to lead a German tech conglomerate, **Sindhu Gangadharan, the SVP & MD of SAP Labs India and Head of SAP User Enablement**, where she discusses everything right from her journey to becoming the first woman to lead SAP to the secret of building a culture and gender-inclusive workforce, enabling the upcoming workforce of tomorrow and the journey as a leader during pandemic and more. Excerpts...

By Anvita Pillai



**Let's start from the early days. What prompted you into the field of technology, especially in a time when technology was in its nascent stage in India?**

I guess a lot of it has to do with my upbringing in Bangalore. I was raised in Bangalore at a time when the city was on the cusp of a technology revolution in India. During my final years in school, we saw the charming neighbourhoods of Bangalore fast transform into the Silicon Valley of India. While these developments impacted how I saw my career shaping up, I was always more inclined towards technology and its incredible possibilities. As a child, I started reading more about technology and the immense potential to help society and the world in general.

I am very fortunate to have been raised by my strong working parents, who always encouraged me to pursue a highly rewarding career. I grew up with my two brothers. And I have to say, growing up, my parents had the same expectations from me as they had from my two brothers. We were treated alike – we were provided with equal opportunities, equal encouragement and an equal voice. I was never told “not to dream” or “not to have career ambitions”. My parents were working professionals who encouraged me to be fiercely independent and pursue a rewarding career. This further motivated me to take up software engineering and explore the opportunities in the industry.

When SAP Labs India set up its base in Bangalore, I was among the first few engineers to be hired here. Though the brand SAP was quite big worldwide, especially in Europe, it was still nascent in India. I'm



Effective intervention is needed on the part of the organisations, more than the individuals to foster a truly diverse & inclusive workspace, where women feel comfortable and empowered to come to work each day

very fortunate that I pretty much started off my career with SAP and continue to be a part of this glorious company 22 years later.

**Today, SAP solutions are largely used in labour-intensive sectors, such as manufacturing. Women in the labour-intensive field was a rather shied upon concept until recent times. Can you draw a comparison, based on your experience, on how the outlook toward women working in the manufacturing and technology sector has changed over the years?**

It is rather unfortunate that certain industries, like manufacturing and technology, have traditionally been considered ‘suitable’ for a particular gender. With focussed efforts, we are seeing a marked shift in this trend. Today, women constitute 36% (-1.6 million) of the Indian tech workforce. Women's participation in the tech workforce is 1.5x overall India Inc. We have come a long way in not just having more women in people-intensive industries, like tech and manufacturing, but also having them in leadership positions and driving



## We co-innovate with customers, build proof of concept solutions and handhold them in the innovation journey

change in their respective industries. For instance, the leadership team of the tech and trade industry body, NASSCOM, is led by Debjani Ghosh (President) and Rekha Menon (Chairperson). So, the message is loud and clear from an industry perspective. As organisations, it is now up to us how we take conscious efforts to change the narrative at scale and create more inclusive workplaces for women.

**Every company had a different journey and learning curve during the pandemic. Being in the leadership role, how difficult/easy was it for you to adapt to the challenges of covid? What were some of the changes put in place that, while it puts employees first, helped you grow as a leader?**

I think it's safe to say that no amount of training or experience prepares you enough to deal with the aftermath of a pandemic or a crisis of this magnitude. Just when we started to believe that the pandemic

was almost over, the second wave caught us all off guard in April 2021. As a leader, my top priority and concerns were the safety and well-being of our 12,000+ employees and their families. At SAP, we set the tone with our managers and LoB heads to prioritise our employees over the business. It was humbling to see the entire SAP family, beyond boundaries, stand up for each other and go beyond their capacity to mobilise resources and provide emergency relief for our affected colleagues and their loved ones.

Along with our Crisis Management Team (CMT), we worked 24/7 to offer emergency services and arrange essential supplies, including medical oxygen, ventilators, ICU beds, etc., for our colleagues and their families, irrespective of their locations. When I look back, empathy and compassion emerged as the most dominant traits during the pandemic. Our company was also among the country's first few organisations to run a dedicated vaccination drive for employees and their families across Indian locations. While a major section of us have loved remote working, it has not been so pleasant for many others. Being empathetic to the new working model and extending our commitment to helping promote better work-life, SAP Labs India recently announced 'No Meetings Fridays/Focus Fridays' to create a happier and healthier workforce. Inspired by the success in India, the initiative is now being adopted globally at SAP.

In a nutshell, my biggest learnings from the pandemic have been to stay agile and reinvent in the face of challenges and always put your people before your business.

**Customer expectation patterns have changed during covid. How has the customer preference style evolved in the last two years? How are you working on better serving the customer requirements?**

Yes, the pandemic has deeply influenced customer behaviour and expectation from the products and services. Our vision is to help the world run better and improve people's lives. With SAP technology, we are empowering half a million organisations worldwide to embark on a digital transformation journey to become intelligent, sustainable enterprises. The pandemic has accelerated the digital transformation journey of every single enterprise, large or small. Every CIO I interact with wants to accelerate their move to the cloud to fool-proof their business from ungoverned factors like the pandemic.

In order to deliver a seamless and efficient customer experience, we have come up with the One SAP framework, which is designed to work on strategic customer projects with a long-term objective of helping our customers in their digital transformation journey towards being intelligent enterprises. Through this program, we co-innovate with customers, build proof of concept solutions and handhold them in the innovation journey.



SAP Labs India Bangalore Office

**What have been some of the measures implemented to ensure more female inclusivity in SAP Labs? Given the disparity in the male-female pay scale gap, how has there been a conscious approach to ensuring remuneration fairness?**

Taking into consideration the demands of the different roles a woman is expected to play – be it that of a mother, daughter, wife, daughter-in-law, mentor, manager, etc. – I think it is important that we, as responsible and inclusive organisations, not put the onus on women to bring the best versions of themselves to work. Instead, we should take responsibility to create that right environment where they feel encouraged and motivated every day at work and receive the necessary guidance to deliver their best.

When we talk about creating the right environment, it consists of certain aspects, including – pay equity, flexible work options, equal opportunity, leadership development, mentoring, etc. Fortunately, SAP has made conscious and sustained efforts on these fronts with comprehensive policies and daily practices. For instance, we take pride in SAP being an equal pay and equal opportunity organisation. We have adopted the equal pay for equal work policy. Therefore, we proactively promote pay transparency, which further strengthens the trust between our female colleagues and the organisation, driving them to give their best.

So, long story short, effective intervention is needed on the part of the organisations, more than the individuals to foster a genuinely diverse & inclusive workspace,

where women feel comfortable and empowered to come to work each day, every day, and thereby contribute to the organisation's growth trajectory.

In fact, I am happy to share that SAP Labs India's pioneering D&I practices were recently adopted as a case study in Harvard Business Review's curriculum.

**A safe working environment is a key to having a healthy relationship with work. What steps has SAP established to ensure effective grievance addressal, especially for women?**

At SAP Labs India, we believe in creating a culture where everyone feels respected, included and can contribute to their full potential without any bias or threat to their safety and well-being.

We have created various channels for our employees to be heard through sounding boards, which can advise and guide them when they are in a dilemma or facing any difficult situation involving their career, work environment or even their personal lives. This ensures that even before a situation becomes a grievance, the employee has access to someone to seek advice confidentially without any fear of judgement or retribution.

We have launched an offering called Employee Experience, where any employee can reach out to a specialist if they seek advice on any personal matter at work. A specialist connects and speaks to the employee 1:1 confidentially and in a trusted environment and guides them on their situation, which may sometimes

also involve advising employees about the formal grievance redressal processes.

In addition, our conflict clarification service called Conflict Lounge is available to all employees for consulting under challenging situations. Employees can request a consultation with a trained coach who can provide an unbiased view to the employee and coach them for managing the situation.

We also have a strong training curriculum for managers and all employees to sensitise and create awareness about creating a respectful work environment.

When an employee faces a situation where only advice or sounding board is not enough, whether it is workplace harassment, career-related concerns or any situation that makes the employee uncomfortable, 'Respect at Work' or RAW is our formal grievance redressal mechanism. RAW is a forum where any employee can write to the internal committee, and their complaint is treated with the utmost confidentiality. The team has various experienced managers and experts from different teams, including the local employee relations partner. They have been trained specially to handle sensitive issues, ensuring confidentiality and maintaining respect and dignity of the complainant in the entire process. The team keeps the employee updated and apprised of the progress through the whole process, ensures timely closures and supports the employee during the entire resolution process, which can be a difficult and unsettling experience. In case formal counselling is required by the employee, we involve professionals from 'Sahayog' – our employee assistance program. We also ensure that we are not only supporting the employee during the process but even after the resolution of the concern by following a zero-tolerance policy and no retaliation. Our IC team has been trained to ensure this during the closure process for

any investigation. We have an official policy to support employees & their families against domestic violence. We established a strong support channel for anyone in distress, including seasoned EAP partners and an employee support group, so that, as an organisation, we stand united with our people to fight this violence.

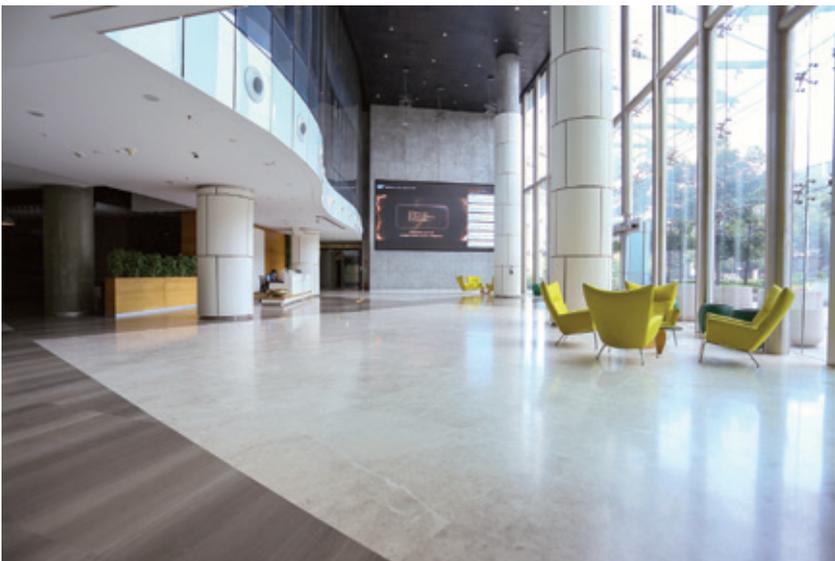
**There has been a persistent gap in the industry regarding aptly training today's students, especially girls, to turn into a capable workforce of tomorrow. How are you working on bridging this gap effectively and efficiently?**

SAP has targeted intervention amongst women youth towards building employable and future IT skills and workforce readiness. Women comprise almost half of India's population, but their representation and participation in the IT ecosystem is 24 per cent and even less, i.e., around 17 per cent in other industries. Our vision while building the enabling ecosystem for young women is to equip them with advanced career training in topics viz., data science, cloud computing, AI, Machine Learning and programming languages; provide them mentorship on how to build a career with IT industry and prepare them for future skills ready. We invest in building, strengthening and supporting every important milestone on career development & growth for women to ensure that they become a part of mainstream career opportunities.

In the last couple of years, we worked with & provided career opportunities to more than 5,000 young women. This effort was even more profound during the COVID-19 pandemic lockdown, wherein we provided virtual mentorship and training support under the guidance of SAP experts. To further extend our vision and scale up our efforts, SAP partners with companies like Microsoft and HP to replicate future IT skilling and coding skilling across different parts of India.

**You were the first woman to lead a German tech giant company. What is your key to success? What would your message be for young students, especially female students who look up to you as a role model?**

I would give them the same advice that I shared with my daughters: Neither your gender nor your backgrounds define you or what you do – it is you, what you achieve, what you want to do – whatever that may be – that defines you. Do not let anyone prescribe it for you, do not let anyone tell you, 'Okay, this is what you should do, this is what you shouldn't. Take that call for yourself and own it! 🇩🇪



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(Sunil Wuthoo)

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Signature of the Publisher

By Anvita Pillai

## “IN THE LAST SIX YEARS, WE’VE SPENT MORE THAN \$16 MILLION TO CORRECT THE GENDER PAY GAP”

The technology sector has grown and adapted to the evolving market. Today, creating an inclusive, balanced organisation that is gender and culture neutral is essential. **Michele Nyrop, Head – Employee Success, Salesforce India**, discusses the enigma of employee retention amid the wave of great resignation, creating an inclusive work environment, tipping the pay scales to ensure equal pay for equal jobs and more. Excerpts....

**There has been a wave of great resignation, especially evident in the technology sector. How can companies mitigate the challenge proposed by this movement? How can they work on retaining employees more effectively?**

A recent study by McKinsey found 51 per cent of employees who left their jobs reported a lack of a sense of belonging at work. Today, employees look forward to working for values-based companies that provide them with a rewarding work experience. They seek more flexibility in their work, a values-based environment, strong culture and more holistic benefit programs.



//

We have an opportunity to create an even better workplace — one that allows us to be more connected to each other, find more balance between work and home and advance equality — ultimately leading to increased innovation and better business outcomes

Companies that give employees what they most want — flexibility, autonomy and choice about where they work, when they work, and how they work -- will be the most effective at attracting and retaining top talent and are more likely to accelerate from the great resignation to the great retention. We believe that we have an opportunity to create an even better workplace — one that allows us to be more connected to each other, find more balance between work and home and advance equality — ultimately leading to increased innovation and better business outcomes.

**Being a woman leading a vital department of the company, how have you established a more gender and culture-inclusive workforce? Can you give examples of specific policies instated which help you with it?**

At Salesforce, equality has always been a core value, and we’re committed to building a more diverse and inclusive workforce that mirrors the communities where we live and work. Part of what makes Salesforce a great company is our belief that business is the most effective platform for change.

Our industry-leading parental leave policy helps address work-life conflicts, which are a reality for both



We need to begin by enhancing our skills in critical areas that analysts suggest are key to future success in the profession and likely to be widely practised. These include business strategy, analytics and, of course, people.

men and women after the birth of a baby. All our male employees are also entitled to paid parental leave as primary or secondary caregivers. Salesforce offers primary caregivers 26 weeks paid parental leave and secondary caregivers 12 weeks paid parental leave. We provide free daycare facilities for all employees.

We recently announced a new global Gender Inclusive Benefits that aims to provide transgender and non-binary employees with the critical financial and emotional support they deserve. After listening deeply to our LGBTQ+ community, we worked on a set of safe and accessible new benefits to support the unique needs of our global transgender and non-binary community.

We are constantly working towards eliminating bias throughout the employee journey, from the initial interview to onboarding and training, including the employee's departure.

**Equal pay has been the biggest topic of discussion for the longest time. How has Salesforce worked on bridging the gap of pay disparity within the organisation?**

One of the primary reasons for the low participation of women in the workforce is the gender pay gap. Despite the ground-breaking research and performance, women in STEM are known to be paid less for their work than men. Every year we conduct a pay audit, and we learn something new that helps us continue to improve upon our process. For example, as a high growth company, we continue to expand the business through new hires and acquisitions. When we bring on a new company, we inherit its talent, technology, culture, and pay scales. Since we started evaluating equal pay in 2015, we've iterated on our processes and broadened the scope of our assessment to address some of these factors.

Over the last six years, we've spent more than \$16 million to correct the gender pay gap. We are committed to equal pay for equal work. We evaluate pay on an annual basis to address any gaps among gender globally.

We realise just equal pay for equal work isn't enough. Hence, we're working to increase equality throughout the employee experience by introducing new and expanded programs, policies and benefits to ensure that all employees feel valued and empowered to succeed.

**In the technology sector, how big does HR play? What are the significant challenges associated with being a part of it? Additionally, what kind of opportunities do you come across?**

The IT sector is defined by constant innovation, which reverberates in HR functions. Today, HR professionals are becoming true strategic partners – using data and analytics to generate insights into organisational health and recommending strategies to support transformation growth. HR managers are becoming transformational leaders who are driving competitive advantages.

The days of traditional HR are long and truly gone. It is imperative to start adapting to the new reality even if the job titles or responsibilities are yet to change. We need to begin by enhancing our skills in critical areas that analysts suggest are key to future success in the profession and likely to be widely practised. These include business strategy, analytics and, of course, people.

**The IT sector is set for massive disruption in the coming two or three years. As prepared as the leaders are, employees need to be prepared for it, too. How can companies work on equipping employees for the incoming change?**

Technology is radically shaping the future. The technology sector in India has been resilient, riding on the back of increased tech spending, accelerated tech adoption and digital transformation. However, companies face a new challenge in a digital-first world as there aren't enough people with the right set of digital skills. The gap continues to widen primarily because emerging technologies such as artificial intelligence (AI) and machine learning (ML) are increasingly amplifying the need for digital skills. As the digital skills gap accelerates, reskilling of employees is a crucial priority across industries.

The World Economic Forum estimates that more than half (54 per cent) of all employees will require significant reskilling by 2022, but the problem is likely to be even more acute in some regions. What is needed is a holistic solution that prioritises new approaches to skills development within an existing workforce and in previously untapped talent pools.

**What is the focus set by Salesforce in 2022? What is the agenda set by you to ensure organisational efficiency and success?**

Salesforce has been growing swiftly across international markets. FY revenues were up more than 24 per cent in APAC. India is a critical market for Salesforce that has grown to be the largest centre outside its headquarters in San Francisco. Our priorities in India will focus on customer-centric innovation, talent and, lastly, skilling for inclusion. 



# THE OSCAR OF MANUFACTURING RETURNS!

WHEN THE *MACHIE* CALLS  
ONLY THE BEST ANSWER!



**THE MACHINIST**  
SUPER SHOPFLOOR AWARDS 2022

The manufacturing industry has surmounted the pandemic with vigour, innovation and one agenda – becoming the best in the industry. To recognise the best in the manufacturing sector and reward them with their much-deserved fame, India's first and only red-carpet ceremony for the discrete manufacturing industry, The Machinist Super Shopfloor Awards 2022 is back with its 8th edition and set to ring up the curtain on June 20, in Bengaluru, India.

#### NOMINATE TO WIN

Like every year, to ensure that the award winners are selected fair and square, The Super Shopfloor Awards is inviting nominations from shop floors of discrete and manufacturing sectors from March 22, 2022.

To create a levelled playing field, the nominations are divided into two segments

- i. Large companies: Organisations with an annual turnover of Rs 1,000 Crore and more
- ii. SMEs: Companies with an annual turnover of less than Rs 1,000 Cr

While nominating can seem like a daunting process, it is relatively simple and self-explanatory. However, to resolve any query regarding the nomination, The Super Shopfloor Awards website – <https://supershopfloorawards.wwindia.com/> – has a requisite FAQ section.

Based on a thorough evaluation, the nominations are assessed by a panel of eminent jury members, including Hemant Watve, CEO and MD, Wilo Mather and Platt Pumps; Dr Dhananjay Kumar, Emeritus Professor, College of Engineering Pune; Ramendra Kumar Sharma, Co-Founder & Managing Director, Daejung Motors; Breshwar Mitra, Former Executive Director, Sharda Motor Industries; S K Sinha, COO/ Senior Vice President, Setco; Rajeev

Mittal, Chief Information Officer (CIO), Endurance Technologies; Abhijit Janugade, Head - Production & Maintenance, Draexlmaier Manufacturing India; Madhu Ranjan, Emeritus Professor, College of Engineering Pune; and Rahul Kamat, Editor-B2B Division, Worldwide Media (The Times Of India Group).

The nominations for the award run across 11 different categories that measure key parameters of a manufacturing plant's performance.

#### The categories selected include:

- Safety
- Productivity
- Digital Manufacturing
- Innovation (Product/Process)
- Green Manufacturing
- Machining Excellence
- Quality
- Human Resources (HR)
- Corporate Social Responsibility (CSR)
- Supply Chain Management (SCM)
- Maintenance

#### Editorial Choice Categories:

- Outstanding Contribution to Manufacturing Industry Award
- CEO of the Year Award
- NextGen of the Year Award
- Sustainable Manufacturer of The Year Award
- Business Leader of The Year Award
- Lifetime Achievement of The Year Award

#### TAKING THE 'MACHIE'

Based on the jury selection, the winners will be felicitated at the Grand Award ceremony in Bangalore on June 20, 2022.

The 'Machie' Awards not only signify The Machinist Super Shopfloor Awards making its mark in the manufacturing sector it also highlights the innovations of the industry, motivating it to do more, do better and set a benchmark! 🏆

### Blast From The Past: Glimpses from The Super Shopfloor Awards 2021



By Guruprasad Bangle, Chief Technology Officer, Solutionbuggy

## ADVANCED MANUFACTURING: GROWING USE OF AUTOMATION IN MANUFACTURING

The manufacturing sector has travelled a long way from Industry 1.0, which used water and steam power to mechanise production, to Industry 4.0, which uses technology to streamline and mechanise production. The article elaborates on technology in advanced manufacturing and how it can help turn India into a global manufacturing hub.



**A**dvanced manufacturing is the process of leveraging the most advanced technology available at the current time to maximise the output and/or product quality of a manufacturing facility. In the context of manufacturing, automation is the use of equipment to automate systems or production processes. The end goal is to drive greater efficiency by either increasing production capacity or reducing costs, often both. Advanced manufacturing is changing the way products are being made.

### HOW IS THE USE OF AUTOMATION IN MANUFACTURING CHANGING?

When used correctly, automation can benefit the manufacturing industry significantly. These benefits can manifest in several ways, including:

- **Reduced production time:** Because machinery can operate more quickly and efficiently than hu-

man workers in many cases, it can help a production move faster

- **Higher-volume production:** Machinery can create products in less time and produce more of them within a given time frame
- **Less human error:** Human workers are susceptible to misjudgement and forgetfulness, but these are mistakes machines don't tend to make
- **Increased safety:** Because people don't have to be as involved with the production process, they can stay safer. If something goes wrong on the assembly line, the worst-case scenario may be a broken machine part rather than an injured worker.

Some technologies that support automation and their applications include the Industrial Internet of Things (IIoT) and artificial intelligence (AI), computer-aided design (CAD), computer-aided manufacturing (CAM), and computer-to-computer connection



## Manufacturing industries are going through a quantum change, with automation at the forefront

with robots on a manufacturing floor. Manufacturers can benefit from these advances in technology by increasing productivity, reducing costs and attracting talent interested in working in a high-tech environment.

Manufacturing industries are going through a quantum change, with automation at the forefront. Automation is one of the most intriguing growth areas on the horizon for manufacturing. It will completely change manufacturing processes and open up new opportunities due to adjusting production and improving quality. covid-19 has directed attention to advanced manufacturing as a key driver for business growth, which could play a vital role in reconstituting supply chains.

The first industrial revolution used water and steam power to mechanise production. The second used electric power to create mass production. The third used electronics and information technology to automate production. Now a fourth industrial revolution is building on the third, the digital revolution occurring since the middle of the last century. It is characterised by a fusion of technologies blurring the lines between the physical, digital, and biological spheres.

Advanced manufacturing is about developing new technologies, processes, and materials to create products. Automation through robots, computers and other devices is part of the equation as manufacturers search for ways to improve productivity, increase quality and reduce costs.

### TYPES OF AUTOMATION IN MANUFACTURING OPERATIONS

Automation can be thought of as the mechanisation of processes so that procedures can be followed and products can be created without human involvement.

There are several types of automation used on the factory floor. The type of automation utilised by a manufacturing operation will be implemented considering the products being produced, the machines required, and the resources available.

- **Fixed automation:** In this example, the application is usually simple and involves a process or assembly dictated by programmed commands. It is relatively difficult to accommodate changes in the product design in a fixed automation process, which is set up with one purpose or process per application in mind. E.g. automatic material handling
- **Programmable Automation:** Programmable au-

tomation is used most often when manufacturing products in batches. It allows for customisation and frequent changes throughout the manufacturing process. In this case, the operation is controlled by a program of instructions that the system reads and interprets. New programs can be prepared and entered into the hardware to produce new products at any time. E.g. PLC (Programmable Logical Controllers)

- **Flexible automation:** Utilising multiple tools linked by a material handling system. A flexible automation system can produce a variety of parts with virtually no time lost for changeovers from any one-part style to the next. The same is true when reprogramming the system or altering the physical setup. E.g., Robot arms can be programmed to assume multiple tasks, such as insert screws, drill holes, sand, weld, insert rivets and spray paint objects on an assembly line.

### POLICY INITIATIVES TO SHAPE INDIA INTO A GLOBAL MANUFACTURING HUB

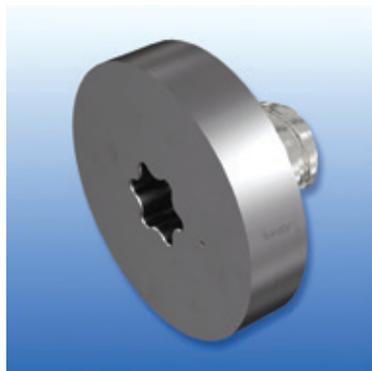
Disruption in the global supply chain has opened up opportunities for large-scale manufacturing in India, aided by significant policy initiatives, such as production-linked-incentive (PLI) schemes and low corporate tax rates for new manufacturing, among others.

The government has unveiled a \$27 billion worth of PLI scheme for 13 sectors to help integrate Indian companies into the global value chains and tap into the opportunity. The PM Gati Shakti - National Master Plan (NMP), which brings together 16 ministries to enable integrated planning and coordinated implementation of infrastructural connectivity, is expected to lower logistics costs significantly. The corporate tax rate for new manufacturing has been reduced to 15%.

The government's focus on manufacturing through programs, such as 'Make in India' and policies such as the 'National Policy for Advanced Manufacturing, Industry 4.0, could play a key role in boosting the manufacturing sector's share in the country's GDP to 25% by 2022 from the current 17%.

Manufacturing has emerged as one of the high growth sectors in India. PM Narendra Modi launched the 'Make in India' program to place India on the world map as a manufacturing hub and give global recognition to the Indian economy. The government aims to create 100 million new jobs by 2022. 

## SECURE THREADS WITH ISCAR'S MULTI-MASTER



Back in the early 2000s, the introduction of ISCAR's Multi-Master system of rotating tools with interchangeable carbide heads played a significant role in the development of cutting tools. Tool assemblies with exchangeable heads were known long before ISCAR's Multi-Master. This was a product that changed the traditional view of the design concept of such systems.

Within the MULTI-MASTER product line, heads are secured by using a thread connection. Cemented carbide is a very hard and wear-resistant material and has lower impact strength when compared to high-speed steel. In a threaded carbide part, the thread is a source of stress concentrators that is crucial for tool functioning, especially under cyclic loading. Rotating tools with exchangeable carbide heads are reasonable in a relatively small diameter range, typically 6-25 mm (.25"-1.00"), which limits appropriate thread diameters and the height of a thread profile.

Tools with threaded heads have significant advantages as they demonstrate impressive versatility, provide rational utilisation of cemented carbide and are user-friendly with simple head replacement. It has been frequently asked what the secrets are of the Multi-Master's success and what are the features that ensure the popularity and longevity of the product.

Aside from the benefits outlined above, which are crucial for tools with exchangeable threaded heads, the Multi-Master provides high dimensional repeatability with its face-contact design concept. This concept holds the "no setup" principle for replacing a worn head - no additional setup operations for adjustment are necessary and the head can be changed without removing the tool from the machine.

Another unique aspect of the Multi-Master is its very wide variety of heads that cover a broad spectrum of applications in milling, hole making, engraving, and gearing. In milling operations, these cover square shoulders, faces, 3D surfaces, chamfers, cavities and pockets, slots and grooves, threads, and machining by high-speed- and high-feed milling methods. And in holemaking operations, centre and spot drilling, countersinking, etc.

Combining two types of heads is a beneficial combination of two design approaches: fully ground heads from solid blanks and heads from pre-shaped sintered inserts. Together with a wide choice of shanks, adaptors, and reducers significantly simplifies the process of finding the best tool configuration for a variety of metal cutting operations. Apart from that, the line and its products are ideal for tailor-made products, which makes tool customisation much easier. All of this turns the robust Multi-Master line into a powerful tool for improving productivity and cutting production costs while ensuring longstanding customer commitment.

A new horizon of applications starts with ISCAR's new thread size T12, intended for end milling heads with a 32 mm (1.25") diameter. Even though solid carbide endmills in this diameter are not common due to their high cost, there are industrial sectors, such as aerospace, that need such tools.

Assemblies with exchangeable heads provide a much more cost-efficient solution and ISCAR is enthusiastic about its prospects of new developments. It's important to note that among the company introduced products, there are 5-flute endmill heads with a variable helix that were designed specifically for machining difficult-to-cut titanium alloys and high-temperature

materials (ISO S group of application). The heads have a corner radius of 4 and 5 mm (.120", .250", .375"), which are typical for aircraft part production.

In the aerospace industry, the line was enhanced with 6-flute endmill heads in diameters of 8-25 mm (.315"-1.00") for machining titanium, including hard-to-cut  $\beta$ - and near  $\beta$ -alloys, especially by the trochoidal milling method. The heads feature a combination of the different helix and variable angular pitch to improve chatter stability.

A typical aircraft countersunk screw requires a 100° countersink. The same angle is often needed for riveting. The Multi-Master provides an appropriate solution with its newly developed 2-flute countersink heads with 100°-point angle in diameters 9.525-19.05 mm (.375"-.750"). The heads are also suitable for chamfering and spot drilling.

An advantage of the Multi-Master is that the heads are excellent to produce special profiles. This line contains several threaded blanks from uncoated cemented carbides for tailor-made products. A short time ago the range of available blanks was expanded by dish-shaped semi-finished heads, which are successfully used for customised solutions in milling slots, grooves, threads, splines, and many more.

## METAL OUT, PLASTIC IN: IGUS PRESENTS NEW TRIBOLOGICAL PLAIN BEARINGS FOR MEDIUM LOAD RANGE

• igus extends its range of iglidur tribological plain bearings for applications with special loads. The materials iglidur M210 and M260 are new to the range. They enable a quick changeover from thick-walled metal bearings to plastic bearings without any structural modifications. The advantage of a change is that the bearing points no longer require lubrication and are almost maintenance-free. They offer a significant time and cost advantage, especially in harsh environments in the daily operation of construction, agricultural and municipal machines.

The new polymer plain bearings iglidur M210 and M260 offer wall thicknesses of up to 5mm and inner diameters of 20, 25, 30, 40, 50 and 60mm. They are particularly suitable for applications with pivoting movements in the medium load range from 20N/mm<sup>2</sup>, where a quick replacement of thick-walled metal bushings is required without structural modifications- for example in construction machines, agricultural machines and municipal vehicles that have to withstand harsh environmental conditions on a daily basis. The materials differ slightly but display their different strengths when in interaction with various shafts.

### Less maintenance more environmental protection

The switch from metal to polymer bearings means significant cost and time savings, especially for machines and vehicles with many bearing points as lubrication is no longer required. The tribological plain bearings M210 and M260 are self-lubricating. Solid lubricants ensure a



low friction and dry operation. This significantly reduces the cleaning effort. Another advantage: As no lubricants are entering the environment this allows users to contribute to environmental protection. Additionally, the energy consumption of machines and systems is reduced because the plastic bearings are lighter than metal bearings.

### Robust and lightweight at the same time

To guarantee sufficient robustness of the iglidur M210

and M260 plain bearings, the material experts at igus work with fibres and fillers. These components strengthen the materials so that they withstand high surface pressures of up to 40MPa and edge loads even under continuous loads - even at extreme temperatures between -100°C and +140°C. Tests in the in-house igus laboratory prove that the polymer bearings show limited visible wear in pivoting movements at medium loads, even after several thousand cycles.

## FREUDENBERG SUPPORTS INDIA'S FIRST ZERO-EMISSION BUS WITH FUEL CELL FILTERS

Freudenberg client Sentient Labs recently introduced the first zero-emission bus designed and built in India. The company relies on micronAir® filters to keep the fuel cells running despite tough weather conditions and exposure to pollutants such as ammonia. Thanks to hydrogen technology, the model bus can run for up to 600 kilometres before needing to refuel.

Hydrogen fuel cells have become a viable alternative to conventional combustion engines for vehicles that have to cover long distances before needing to be refuelled or recharged. That is why the Research and Development Engineering Lab Sentient Labs developed innovative hydrogen fuel cells in a new commercial bus model



intended to cover long distances across India. To ensure the complex technology's longevity, the company relies on high-tech fuel cell filters from Freudenberg Filtration Technologies.

Each bus will be equipped with closed "FC F-513-N" fuel

cell filters. They ensure that the buses keep running and reduce maintenance efforts.

### Protecting fuel cells from outside influences

Life on the road can be tough for a hydrogen fuel cell. To start the chemical reaction, a compressor takes in air from the outside. However, the air is often polluted, containing a mix of sulfur, hydrocarbons, and nitrogen oxides. These pollutants can affect the cell to varying degrees. Some might decrease performance temporarily. Others, such as fine dust, damage the cell permanently, rendering it less effective or decreasing its lifetime.

# BESPOKE FIRE RESISTANT POLYMERS



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## FEATURES

- Rigid structure
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# SLIDING HEADSTOCK AUTOMAT



**SHA 20 MAGNA**

### Integral Spindle Motor

For Main & Sub-Spindle

### Oil Cooled Headstock

### Spindle Speed

Up to 10,000 rpm (without RGB\*)

Up to 8,000 rpm (with RGB\*)

Continuously run with bar feeder  
with diameter ranging **3 to 20mm**



\* RGB - Rotary Guide Bush



### B-Axis for Complex Operations

Profile Generation, Cross Hole  
Drilling etc.

### Available with 5/6/7 Axes Capability

#### 5 AXES

X1, Y1, Z1 - Main spindle    X2, Z2 - Sub spindle

#### 6 AXES

X1, Y1, Z1 - Main spindle    X2, Y2, Z2 - Sub spindle

#### 7 AXES

X1, Y1, Z1, B - Main spindle    X2, Y2, Z2 - Sub spindle

With Simultaneous  
4 Axes Interpolation



### Deep Hole Drilling Option

## SPECIFICATION

Max. machining dia	20 mm	Turning tools on gang tool post	5
Max. machining length (with RGB)	205 mm	Cross rotary tools (7 Axes / 5,6 Axes)	3 / 4
Max. machining length (without RGB)	2 X D mm	Tools for front deep hole drilling	2
Spindle power (Main Spindle) (Continuous)	3.7 / 5.5 kW	Y2 Axis tools for sub spindle	4 (live) + 4 (stationery)
Spindle power (Main Spindle) (Continuous)	2.2 / 3.7 kW	B Axis live tool (plug-in)	3+3

