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ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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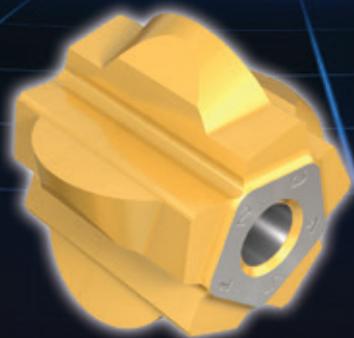
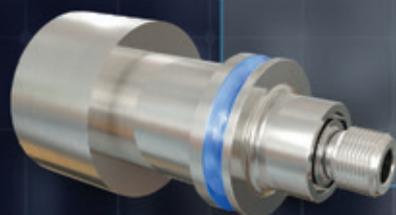
Preeti Bajaj, CEO & MD of Luminous Power Technologies, has defied norms in India's male-dominated energy industry. In a freewheeling interview, she discloses details about her company's culture, diversity, inclusivity, and equity.



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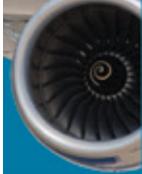
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## FINALLY, A STELLAR PERFORMANCE!

India's manufacturing sector ended the current fiscal year with a stellar performance. The HSBC India PMI® climbed to a 16-year high on the back of the strongest increases in output and new orders since October 2020, parallel to the second-sharpest upturn in input inventories in the history of the survey. Employment returned to positive territory and firms scaled up buying levels. There was a mild pick-up in cost pressures during March, but customer retention remained a priority for goods producers who raised their charges to the least extent in over a year.

The seasonally adjusted HSBC India Manufacturing Purchasing Managers' Index™ (PMI) climbed to a 16-year high of 59.1 in March, from 56.9 in February. The notable improvement in operating conditions was reflected in stronger growth of new orders, output and input stocks as well as renewed job creation. The growth of new orders accelerated to the quickest in nearly three-and-a-half years during March, amid reports of buoyant demand conditions.

Inflows of new work strengthened from both domestic and export markets, the latter reportedly reflecting better sales to Africa, Asia, Europe and the US. New export orders increased at the fastest pace since May 2022. Manufacturing output rose for the thirty-third month running in March and to the greatest extent since October 2020.

Growth quickened across the consumer, intermediate and investment goods sectors. As was the case for new orders, the steepest expansion in production was seen at investment goods makers. Quantities of purchases increased at the quickest rate since mid-2023, and one that was among the strongest in nearly 13 years, as companies sought to build up stocks in advance of expected improvements in sales. Subsequently, inventories of purchases increased to the second-greatest extent in the survey history (behind May 2023). Capital goods was the brightest area regarding both input buying and stockpiling.

After leaving payroll numbers broadly unchanged in the previous two months, manufacturers in India took on additional workers in March. The pace of job creation was mild, but the best since September 2023. Anecdotal evidence highlighted the recruitment of mid-level and full-time employees.

That said, the results for March provided a mixed picture regarding the outlook for the Indian manufacturing sector. Companies remained confident on average, with 28 per cent forecasting output growth in the year ahead and 1 per cent expecting a contraction. Planned marketing, new product enquiries and buoyant demand were all cited as reasons for optimism.

*R. Kamat*  
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# CONTENTS



**5G**  
Optimising 5G ROI for Long-term Sustainability of Enterprise Networks ..... **16**



**DRONES**  
Innovation and Technology Advancements: Shaping the Future of Drones in India ..... **22**



**BATTERY RECYCLING**  
Our Hybrid Hydrometallurgy Process Extracts Elemental Compounds with 1/10th the Carbon Footprint ---- **38**



**SIMULATION**  
Accelerating a Sustainable Future Through Simulation ..... **42**

**COVER STORY**  
"We Plan to Double our Growth in the Next Three Years" ..... **30**



**MSME & STARTUPS**  
The Synergistic Future of MSMEs and Startups in India's Manufacturing Sector ..... **45**

Editorial ..... 4

News ..... 8

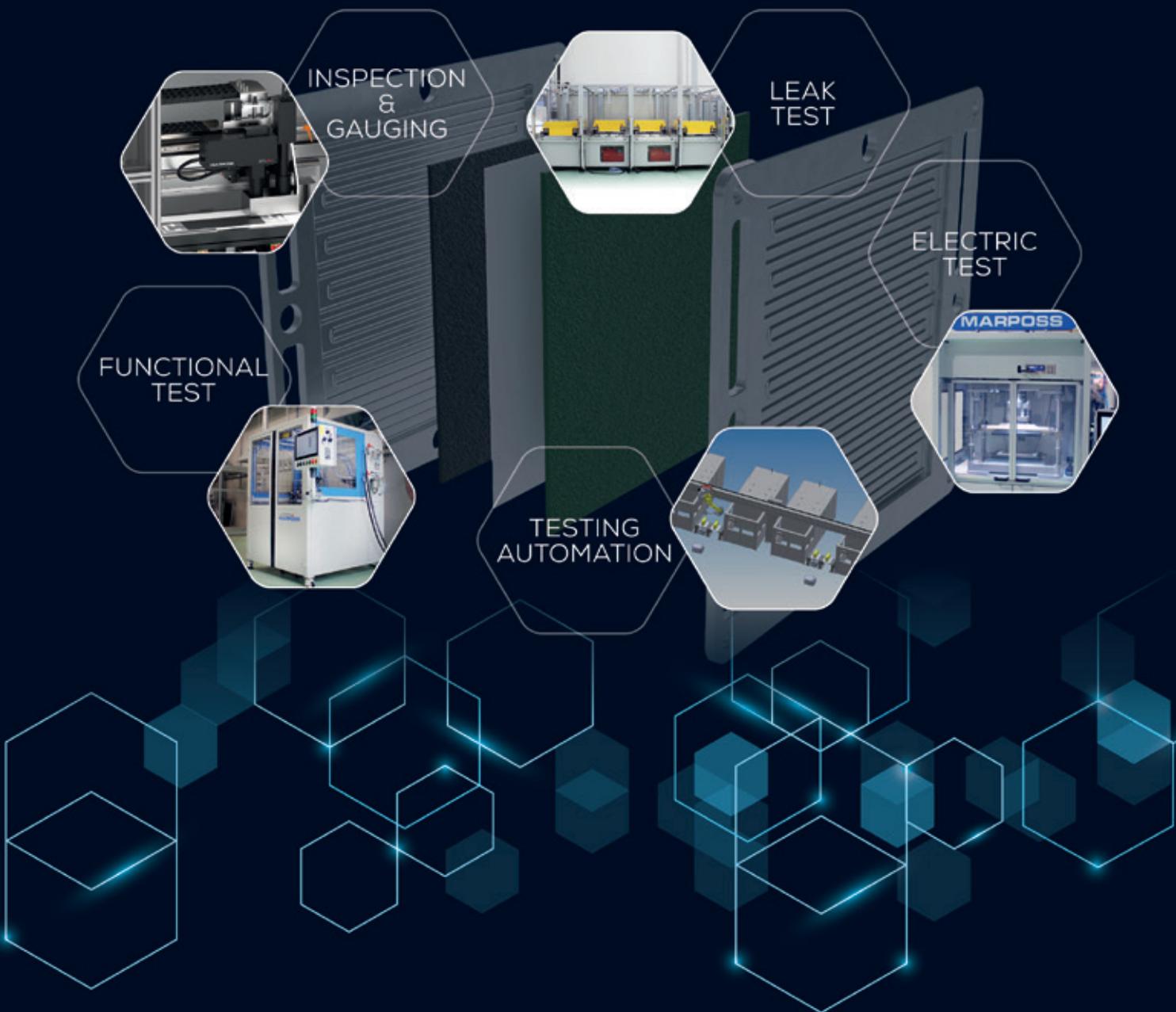
**Automated Guided Vehicles:**  
How Do We Examine The Safety Features Implemented in AGVs?.....26

**Quality Control:**  
Marposs' Unmatched Quality Control Solutions for Fuel Cells and Electrolysers.....36

Products ..... 48

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## Luminous Power Technologies inaugurates its state-of-the-art solar panel manufacturing factory

**TAKING A BIG LEAP** towards strengthening its sustainability and solar endeavours, Luminous Power Technologies, India's leading energy solutions company, inaugurated the solar panel factory in Rudrapur, Uttarakhand. Contributing to becoming a catalyst for positive change, the endeavour is aligned with the solar vision and sustainability objectives of the nation as outlined by the Hon'ble Prime Minister during the landmark launch of 'PM Suryodaya Yojana'.

Equipped with the latest advancements in solar panel manufacturing, the facility boasts of cutting-edge technology and infrastructure designed to ensure maximum efficiency and minimal environmental impact. The launch was graced by legendary cricketer and Luminous Brand Ambassador Sachin Tendulkar, accompanied by Preeti Bajaj, CEO & MD, Luminous Power Technologies, and Manish Pant, Chairman of Luminous Board & Executive VP – International Operations, Schneider Electric

The inauguration of the solar plant marks an important milestone for Luminous, with the company undertaking strategic business decisions to evolve from manufacturing a best-in-class product range in the solar, inverter, and battery categories to building an end-to-end solar energy management ecosystem. The Luminous solar solutions ecosystem will also have its flagship Connect X App integrated, offering customers insightful information on real-time energy consumption and monitoring, solar energy generation, and inverter performance.

Speaking at the momentous occasion, Preeti Bajaj, MD & CEO of Luminous Power Technologies, said, "The solar panel factory in Rudrapur is a step forward for Luminous towards playing a bigger role in India's road to net-zero. Our investment in this new manufacturing facility underscores our unwavering dedication to fostering sustainable practices and reducing the carbon footprint. Solar will be a significant part of our business, and we see it as a major growth enabler as we aim to double our growth in the next three years. We believe that solar is the future, and as the demand for clean energy sources continues to



rise, we are committed to being a leading company in this energy transformation journey."

Manish Pant, Chairman of Luminous Board & Executive VP – International Operations, Schneider Electric, said, "India has made remarkable progress in the development of solar power capacity in recent years. The Indian government has taken a lead role, particularly with the introduction of the game-changing 'Pradhan Mantri Suryodaya Yojana', which aims to provide solar roof-top to one crore households. The Luminous Solar PV Panel facility embodies our commitment to the vision of an Atmanirbhar Bharat. This factory is a significant step towards achieving the collective goal of Schneider and Luminous to promote net-zero practices and sustainable energy solutions. With this state-of-the-art facility, Luminous is well-positioned to further accelerate its solar business, given India's evolving renewable energy market."

Being the largest solar panel factory in Uttarakhand, the factory is spread over an area of 10 acres. It is fully automated and equipped with the latest and cutting-edge solar module manufacturing technologies. The plant boasts of being the first in the country to have future module technology, with fully robotic automation capabilities to manufacture high-quality modules. Launched with a capacity of 250 MW, the state-of-the-art

plant is expandable up to 1 GW.

During the occasion, Luminous wowed the attendees with the launch of the Luminous Experience Centre and an Experience on Wheels Bus. Providing an immersive ecosystem, the experience centre offered a virtual tour of the solar plant and the complete manufacturing process. The Experience on Wheels Bus extended an electrifying experience of being powered by the sun and living in a space equipped with luminous solar panels and products.

Luminous has forged a strategic partnership with The University of New South Wales, Australia, one of the world's largest renewable energy schools for solar panel projects on reliability, value engineering, and component qualification. This partnership has enabled Luminous to evaluate newer technologies well ahead of the curve and aids the company's technological prowess.

This plant can manufacture polycrystalline, monocrystalline, n-Type and Topcon panels both monofacial and bifacial with options to adapt from 5BB to 16BB. With these capabilities, Luminous becomes an expert in managing all forms of roof-top solar panel requirements for residential or commercial. This site will also host a state-of-the-art PV module performance efficiency and reliability evaluation lab which has the potential to get NABL accreditation in the future.

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The rapid global shift to new energy vehicles (NEV) poses a variety of quality assurance challenges, with metrology also greatly impacted by increasing demands relating to accuracy. As an international innovation leader, ZEISS eMobility Solutions provides advanced technologies to ensure the reliability, efficiency, and safety of NEVs.

Electric powertrains feature high-performance battery cells. These cells are characterized by detailed and evolving production processes. Particular attention must be paid to consistency, structural strength, and the elimination of hazards such as overhang beyond tolerance and debris contamination.

The dense battery cells and complex inspections exceed the capabilities of 2D X-ray technology. Operators must therefore deploy non-destructive industrial computed tomography (CT) to perform quality assurance with the necessary speed and precision. These QA processes include both component validation and root cause analysis for further upgrades.

#### **For more information**

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## Triveni Engineering & Industries Ltd. announces the upgrade of its long-term rating to AA+ (Stable) by ICRA

**TRIVENI ENGINEERING & INDUSTRIES LTD. (TEIL)**, one of the largest sugar and ethanol producers in the country, a leading player in engineered-to-order high speed gears & gearboxes and water and wastewater management business, announced the upgrade of its long-term rating to ICRA AA+ (Stable) from ICRA AA (Stable) and reaffirmed short-term rating of ICRA A1+ for the company's bank facilities of Rs 3,110.37 crore (enhanced from Rs 2,510.37 crore). This upgrade holds significant value and acknowledges the company's strong financial foundation.

The outlook on the long-term rating

is stable reflecting the credit rating agency's opinion that the company will continue to benefit from its healthy operational profile and comfortable credit metrics. Furthermore, ICRA has reaffirmed the rating at (ICRA)A1+ to the Rs 300 crore Commercial Paper Programme.

The improved ratings of TEIL acknowledge its extensive operations and high efficiency in sugar operations with a crushing capacity of 61,000 tonnes of Cane per Day (TCD). Additionally, the rating upgrade is driven by higher revenue diversification through distillation capacity of 660 KLPD which will be further enhanced to 860 KLPD. This

coupled with the profitable engineering businesses provides alternative revenue streams which lends more stability to cash flows.

Following the rating upgrade, Tarun Sawhney, Vice Chairman & Managing Director, Triveni Engineering & Industries Ltd said, "The rating upgrade is a recognition of our cost-efficiencies, healthy cash flows and fiscal discipline highlighting our robust financial performance and strong creditworthiness. The upgrade reaffirms our position as one of the leaders in the industry and underscores our dedication to delivering value to our stakeholders."

## Daimler India Commercial Vehicles achieves record sales and revenue performance in CY2023

**DAIMLER INDIA COMMERCIAL VEHICLES (DICV)**, the wholly owned subsidiary of Daimler Truck AG ("Daimler Truck") announced that in CY2023 it has achieved record sales and revenue performance. The company's CY2023 domestic truck and bus sales grew by 39 per cent and revenue grew by 21 per cent over 2022. DICV's bus volumes doubled in CY2023, growing 107 per cent over 2022. Its cumulative sales (including domestic and exports) from January to December 2023 grew by 13 per cent and its parts business grew by more than 21 per cent over CY2022.

In January 2023, DICV had transitioned its entire BharatBenz truck and bus portfolio to comply with OBD-II regulations, with a sharper focus on reducing total cost of ownership, increasing the productivity of its trucks, and offering industry-leading service intervals in India.

Commenting on the business performance, Satyakam Arya – Managing Director and CEO, Daimler India Commercial Vehicles said, "Our best-ever sales and financial growth, since inception, was spearheaded by excellent demand for our tipper and tractor trailer product lines which grew 53 per cent and 79 per cent respectively compared to CY2022. A slew of strategic initiatives that we undertook in 2023 also helped us take informed decisions on costs, tackle headwinds effectively and sharpen our focus on key areas of our business. We have started CY2024 with



great confidence, and with an ever-stronger product portfolio, engineered and packaged to drive business growth to new heights in 2024. Our aim was to challenge ourselves and up the game on total cost of ownership, uptime, and reliability, all of which our customers will benefit from with our new MY24 heavy-duty truck portfolio. These trucks reflect our highly evolved product development capabilities, which are being put to good use for creation of new products to help answer future mobility requirements."

The record business performance in 2023 was driven by multiple initiatives that DICV undertook holistically as an organisation. Last year, the company met its annual target of establishing 350 sales and service locations across India, expanding BharatBenz's presence across the country, in new markets. Manufacturing operations were streamlined and

made cost effective by introducing many digitalisation initiatives such as automated workforce planning and predictive maintenance using data, and many other initiatives that are in the phase of completion. On the sustainability front, nearly 85 per cent of DICV's manufacturing operations are run on renewable energy and nearly 90 per cent of its plant functions on upcycled water, reducing over 27,000 tonnes of carbon footprint.

On the heels of its record performance in 2023, the truck and bus manufacturer renowned for setting new benchmarks in the Indian commercial vehicles industry is ready to launch all its MY24 BharatBenz heavy-duty trucks in the coming months. The first to be launched will be the all-new BharatBenz Rigid range, followed by trucks with the newly introduced Automated Manual Transmission (AMT) and the all-new Construction and Mining truck heavy-duty range.

Commenting on the all-new MY24 BharatBenz range, Sreeram Venkateswaran, President and Chief Business Officer (domestic sales and customer service) said, "Having set new benchmarks in the industry, gained a large customer base in the construction and mining space and with a progressive tractor trailer portfolio in the last decade, we felt that we should go back to the drawing board to revamp everything that our heavy-duty trucks had under their skin and offer customers something new in 2024.

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## ETP Group launches next generation solutions in unified commerce retail management

**ETP GROUP**, Asia's leading retail software company, has announced the launch of two new and innovative platforms - Ordazzle and ETP Unify – to redefine the retail and e-commerce landscape in India. Built for both online only and online-offline retail businesses of all sizes, the two platforms offer top-of-the-line capabilities in streamlining multiple operations to ensure seamless and consistent customer experiences, thereby driving loyalty and business growth.

The enterprise-class, scalable, and secure platforms will target the US\$28 trillion global retail and e-commerce market<sup>1</sup>. The company plans to make Ordazzle and ETP Unify a key contributor to the US\$3.22 billion global retail and e-commerce software market<sup>2</sup>.

Naresh Ahuja, Chairman and CEO, ETP Group said, “Ordazzle and ETP Unify are being simultaneously launched in India. The cloud-native, AI-powered SAAS platforms are built for scale. The platforms offer unmatched scalability and a beautiful, intuitive user interface that ensures rapid adoption with minimal training time. With these platforms, retailers can effortlessly navigate the complexities of both physical retail and e-commerce, improve cash flow management and profitability, and deliver exceptional customer experiences that are consistent and channel-agnostic.”



The two platforms will offer retailers a multitude of benefits: amazing customer experiences for increased customer loyalty; real-time visibility of inventory for higher inventory turnaround; leveraging artificial intelligence for improved profitability; powerful order fulfillment for superior customer service; centralised information management for higher employee productivity and unprecedented scalability to support your growth.

ETP Unify is a pioneering cloud-native unified commerce retail software, designed with M.A.C.H. architecture for seamless integration of retail and e-commerce functionalities. Its user-friendly interface consolidates all data into one database, empowering merchants to serve customers across channels efficiently. With features like AI-driven order anomaly detection and dynamic product

recommendations, ETP Unify empowers retailers to optimise inventory operations and drive sales growth for improved ROI.

Additionally, it provides a comprehensive 360-degree view of customers, facilitating cross-channel loyalty initiatives. This unified system enhances the ability to cross-sell and upsell products across various channels, leverage advanced clientele techniques to maximise sales opportunities and create amazing customer experiences.

Ordazzle is a multi-channel e-commerce platform leveraging AI technology to streamline order management for online retail operations. It offers a range of features including order and product management, logistics, smart API, and seamless integration with marketplaces and webstores. This innovation eradicates the hassles and time lags associated with logging into numerous online seller portals individually to upload new products and modify attributes like price, stock, media, and promotional offers. With Ordazzle, retailers can easily upload and update product data across various channels with a single click. It also provides real-time detection of anomalous orders or breaches of service-level agreements. With scalability at its core, Ordazzle has been rigorously tested to handle an astounding 5 million orders per day per customer, providing retailers unparalleled efficiency and performance.

## Eaton's Mobile Tech Day, an exclusive roadshow unveils state-of-the-art solutions across 11 States

**INTELLIGENT POWER MANAGEMENT COMPANY**, Eaton recently showcased its Mobile Tech Day 2024 in Pondicherry. The roadshow aimed to exhibit Eaton's state-of-the-art solutions in electrical, mobility, and aerospace technologies that are set to revolutionise industries. The 40-foot advanced trailer traveled the length and breadth of India, connecting Eaton's industry experts with customers face-to-face.

This exciting journey began in April 2023, with a grand flag-off ceremony in Haryana. In Pondicherry, the trailer was stationed at Sedarpet, Thiruvandarkoil, Neyveli, Gothi Industrial Complex, and Nettappakkam Commune.

This unique initiative has already

made its mark—covering 11 states and extending its reach to over 60 cities within a few months in the northern region.

Commenting on Eaton's portfolio of Electrical solutions, Syed Sajjadh Ali, Managing Director, Electrical Sector, India, Eaton, said, “At Eaton, we recognise the enormous potential that India holds and are eager to explore opportunities to collaborate in the country's infrastructure and commercial growth. As a leader in electrical products, systems, and services for power quality, distribution, control, and wiring, our electrical business offers technology-driven solutions that address the critical needs of diverse markets such as industrial, utility, commercial, residential, and information technology.

This Mobile Tech Day campaign brings an exciting opportunity for Eaton to showcase our industry-leading technology solutions and product offerings to customers and end-users in the region.”

Commenting on Eaton's Mobility portfolio, Shailendra Shukla, Managing Director, Mobility Group, India, said, “Eaton's power management & e-mobility solutions position us as an ideal partner for leading players and vehicle OEMs in India's focused segments, enabling their growth and success. We are also the preferred choice for the aftermarket space, and we partner closely with our distributors, resellers, and users for our aftermarket products and solutions.”



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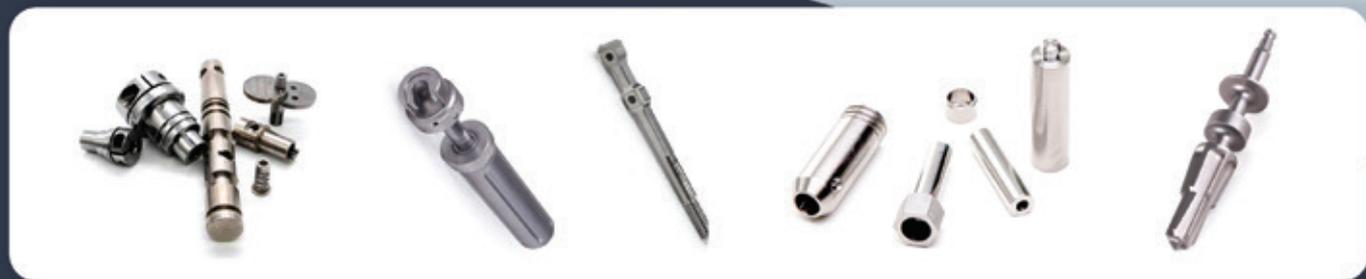


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## DP World launches dedicated service connecting ICD Sachana to Mundra Port

**DP WORLD**, a leading global provider of smart end-to-end supply chain solutions, started dedicated rail freight service seamlessly linking Sachana-Ahmedabad Inland Container Depot (ICD) to Mundra. Operating every Tuesday and Friday, the new service aims to support EXIM from Ahmedabad and surrounding regions by offering a specialised train service, thereby enhancing business efficiency for customers.

DP World's dedicated service offers numerous benefits for businesses in and around Ahmedabad, including cost efficient and sustainable cargo movement and value-added services. Precisely scheduled deliveries from ICD Sachana-Ahmedabad to Mundra will ensure an assured transit of 24 hours. DP World's



reliable service assures departures every Tuesday and Friday, providing businesses with a dependable transportation option. This initiative is expected to result in approximately a 65 per cent reduction in CO2 emissions. Additionally, cargo owners utilising DP World rail service will be presented with a sustainability certificate, acknowledging their effort and commitment towards minimising

their carbon footprint.

Commenting on the launch of the new service, Adhendru Jain, Vice President of Rail and Inland Terminals, Subcontinent, DP World said, "We are bridging commerce with efficiency and sustainability. Our new rail freight service from Sachana-Ahmedabad to Mundra port gives customers assured connectivity to the port and will help make the supply chain more predictable. This service is part of our ongoing efforts to deliver comprehensive logistics solutions that support the growth of business communities exploring newer export markets."

DP World will provide cargo owners with a sustainability profile that highlights the reduction of CO2 emissions achieved by each user of this new service.

## Hero Lectro introduces the H4 and H7+ e-cycles

**HERO LECTRO**, the e-cycle brand of Firefox Bikes Ltd., has unveiled its latest offerings: the H4 and H7+. Available at introductory prices of Rs 32,499 and Rs 33,499/- respectively, these models are crafted meticulously for the Indian market. The H4 is available in captivating Mystic Purple and vibrant Distance Red colour variants, while the Hero Lectro H7+ offers consumers the choice between Lava Red and Storm Yellow Grey.

Designed to revolutionise short-distance commutes, the H4 and H7+ come packed with numerous innovative features aimed at enhancing the riding experience. These include a detachable battery with a 7.8 Ah capacity, providing a remarkable range of up to 40 kilometres on a single charge and a swift charge time of 4.5 hours. For enhanced security,

the models feature a key ignition system, ensuring peace of mind for riders by adding a layer of security.

Sriram Sundresan, CEO of Firefox Bikes, expressing his enthusiasm for the launch, stated, "The unveiling of the Hero Lectro H4 and H7+ signifies our unwavering commitment to providing our customers with advanced, innovative, and sustainable mobility solutions that blend adventure and fun seamlessly. With these dynamic models, we are setting new standards in the e-cycle segment and inspiring greater adoption of electric mobility across India. We aim to infuse every ride with excitement, adventure, and eco-consciousness, ushering in a new era of short-distance commuting. Additionally, we aim to cater to short-distance commutes of under 20 kilometres in India by offering innovative and user-friendly products designed for last-mile mobility."

Of the two newly launched products, the H4 presents a compelling alternative for towns beyond major cities, providing a cost-effective solution compared to traditional internal combustion engines like

scooters and scooties. With the potential to save up to Rs 40,000 per year in ride costs, the H4 features a unisex frame suitable for all riders. On the other hand, the H7+ caters to urban commuters, positioning itself as the ultimate sustainable choice for city travel. Emitting zero pollution, the H7+ can reduce approximately 800 kg of CO2 emissions/year compared to ICE alternatives.

Additionally, the bikes come with a high torque 250W BLDC Motor, capable of propelling riders to a maximum speed of up to 25 kilometres per hour on throttle. With an IP67 rating, the H4 and H7+ ensure dust and water resistance, making them resilient against various weather conditions. Riders can indulge in additional comfort and safety features such as an LED display, cushioned seat, chain guard, disc brakes, 4-finger alloy brake lever, and anti-skid pedals with reflectors. Furthermore, the H7+ offers front suspension for multi-terrain rides, while MTB tyres provide enhanced grip on diverse surfaces.

Customers can avail of the Hero Lectro H4 and H7+ across the 500+ Firefox Bikes stores across India, including all major cities like Delhi, Mumbai, Bengaluru, Guwahati, Bhopal, Chennai, Jodhpur, Pune, and many more.





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By Manjunath DK, Associate Vice President and Global Delivery Head,  
Network Engineering and Services Portfolio, Infosys

## OPTIMISING 5G ROI FOR LONG-TERM SUSTAINABILITY OF ENTERPRISE NETWORKS

A look at how 5G can enhance network infrastructure by providing the connectivity, security, and agility needed to confront upcoming challenges.

**A**s hybrid cloud, AI, Gen AI, IoT, and edge computing advance, the need for low-latency data access grows. 5G provides high throughput and low latency, crucial for innovative services. A holistic 5G approach enhances network sustainability, drives innovation, and ensures long-term success in a digital world.

By 2025, the GSM Association projects 1.2 billion 5G connections worldwide. 5G-Advanced, the next 5G milestone, boosts the system foundation with new wireless tech for speed, coverage, mobility, and efficiency. This opens opportunities for enhanced enterprise functionality.

In this article, let's look at how 5G will be a game-changer that strengthens network infrastructure, offering agility, security, and connectivity to tackle future challenges.

### THE 5G INDIA STORY: THREATS AND OPPORTUNITIES

India has the swiftest 5G deployment worldwide, with 4 lakh base stations that cover 97 per cent of cities and over 80 per cent of the population. The announcement of 100 5G labs as a testing ground for innovators, students, and start-ups shows India's commitment to building a 5G-ready, and even 6G-ready, country.

However, for the 5G revolution to succeed, several challenges must be overcome. Cybersecurity vulnerabilities must be addressed, as complex network connections increase ransomware or malware attack risks. 5G networks will generate more data volume, making data security and privacy crucial concerns. It is also likely to widen the existing digital divide. Lastly, stakeholders will find it challenging to handle the regulatory complexities.

Despite challenges, the evolution of 5G networks brings exciting trends like edge computing, network slicing, IoT, AI, and cloud services. Edge computing reduces latencies and enhances efficiencies for real-time



applications like remote surgery and self-driven vehicles. Network slicing creates multiple virtualised networks on a physical network for added flexibility. Connected devices drive new IoT use cases in manufacturing, connected vehicles, retail, energy, and utilities.

Advanced capabilities of Gen AI and machine learning (ML) can help enterprises optimise 5G deployment. Gen AI can offer enhanced intelligence and adaptability to analyse complex

datasets and make informed decisions in real-time for proactive network optimisation. ML algorithms can be utilised to optimise network performance, predict maintenance needs, automate resource allocation, and enhance security measures in 5G networks.

Investing in high-speed networks as well as ensuring sufficient bandwidth to handle the increasing network traffic is crucial for organisations to stay competitive. These technologies enable faster data transmission, lower latency, and improved network efficiency, ultimately enhancing the overall user experience and supporting the growing demand for data-intensive applications and services. By prioritising investments in these areas, businesses can meet the evolving needs of their customers and adapt to the demands of a rapidly changing technological environment.

Leveraging 5G technology in enterprise networks can drive long-term sustainability and competitiveness. Enterprises can unlock various benefits aligning with their sustainability goals.

**Enhanced connectivity:** 5G offers faster data speeds, lower latency, and increased network capacity, enabling seamless connectivity for a wide range of devices and applications. This improved connectivity can enhance productivity, efficiency, and collaboration within the organisation.

**Innovation and differentiation:** 5G technology opens opportunities for innovation and the development of new services and products. Enterprises that embrace 5G can differentiate themselves in the market, attract



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new customers, and drive revenue growth.

**Cost savings:** While the initial investment in 5G infrastructure may be significant, the long-term cost savings from improved efficiency, reduced downtime, and optimised operations can result in a positive ROI over the time.

**Scalability and flexibility:** 5G networks are designed to be highly scalable and flexible, allowing enterprises to adapt to changing business needs and scale their network infrastructure as required. This scalability can support future growth and expansion initiatives.

**Sustainability and environmental impact:** By

enabling remote working, reducing the need for physical infrastructure, and optimising energy consumption, 5G technology can contribute to a more sustainable and environmentally friendly business operation.

Judicious investments in 5G infrastructure, combined with streamlined operations, pave the way for long-term network sustainability. Harnessing the power of AI/Gen AI and ML unlocks further potential for innovation, cost savings, and a competitive edge in the 5G landscape. By embracing 5G, enterprises can position themselves for prolonged success in a rapidly evolving digital world. 🌱

## GLIDA AND STATIQ FORGE PARTNERSHIP TO TRANSFORM INDIA'S ELECTRIC VEHICLE CHARGING SERVICES

GLIDA (formerly known as Fortum Charge & Drive India) and Statiq, the two leading players in India's electric vehicle (EV) charging service, have entered into a partnership, to accelerate the adoption of electric vehicles across the country. This seminal collaboration aims to redefine the landscape of EV charging infrastructure across India, promising enhanced convenience, accessibility, and empowerment for passenger electric vehicle (PEV) users nationwide.

Through the partnership all public chargers under GLIDA charging network can now be used through Statiq app as well, offering users visibility and accessibility to GLIDA's entire charging network, covering existing and upcoming chargers. Through this collaboration, EV users will benefit from seamless interoperability between Statiq and GLIDA charging stations enabling wide network access by omitting multi-app usage needs for charging and connectivity. GLIDA Chargers shall continue to be accessed through GLIDA app and Charge-Thru (app agnostic weblink solution designed for the ease of EV users).

Awadhesh Kumar Jha, Executive Director, GLIDA, said, "Our strategic partnership with Statiq emphasises our commitment to advancing the EV charging infrastructure in India. This unique collaboration opens newer avenues for users to seamlessly discover, access and conveniently experience charging on GLIDA's pan-India network facilitated through the Statiq app as well besides its own app and app agnostic Charge-Thru. This move allows us to leverage our expertise in green mobility solutions to build a robust & sustainable EV charging infrastructure aligned with the evolving customer needs. Together, we are paving the way for a cleaner and greener future, and thus making it 'All Lights Green' for our end users. We believe in the power of collaboration and co-creation to



offer high-value service proposition to the customers. This initiative further fortifies GLIDA's vision of electrifying mobility in India by investing in smart and innovative solutions today for a cleaner tomorrow."

This strategic collaboration marks a significant milestone in the journey towards a sustainable transportation ecosystem. With 850+ GLIDA charging points set to be accessible to an EV user through various ways including the Statiq app, this partnership marks a significant step forward in alleviating a major concern of users. Thus, it will help accelerate smoother adoption of EVs, emphasising on the importance of collaboration in advancing sustainable mobility solutions. As India embraces the transition to electric vehicles, partnerships like this will play a crucial role in building the infrastructure necessary to support widespread adoption and foster a cleaner, more sustainable transportation ecosystem.

Speaking on the collaboration, Raghav Arora, Co-founder & CTO of Statiq, said, "We are thrilled to partner with GLIDA to accelerate the transition to electric mobility in India. This partnership is a pivotal step in our mission to create an extensive and user-friendly EV charging ecosystem in the country. By integrating GLIDA's chargers into the Statiq app, we are enhancing convenience and affordability for EV users."



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How to select helical cutting edge inserts

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Application : semi-finishing to finishing



Magnified view of cutting edge

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Application : Finishing



Magnified view of cutting edge

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YOUR GLOBAL CRAFTSMAN STUDIO

By Bodhisattwa Sanghapriya, Founder and CEO of IG Drones

## INNOVATION AND TECHNOLOGY ADVANCEMENTS: SHAPING THE FUTURE OF DRONES IN INDIA

The article underscores the role of drones as significant disruptors for the future, offering a multitude of benefits across various sectors and presenting novel solutions to existing challenges.

The global drone market is poised for remarkable growth, with projections indicating a substantial evolution into a US\$ 51.4 billion industry by CY27 and potentially reaching around US\$ 91.3 billion by CY30. This expansion positions drones as significant disruptors for the future, offering a multitude of benefits across various sectors and presenting novel solutions to existing challenges.



### Wildlife Monitoring and Conservation Efforts

Drones play a crucial role in wildlife monitoring and conservation efforts in the country. By providing researchers with the ability to gather data without disturbing ecosystems, drones contribute to more effective conservation strategies. In disaster response and management, drones facilitate swift and efficient surveying of affected areas, enabling rapid and targeted relief efforts. Their

ability to minimise the need for human presence in hazardous environments enhances worker safety and enables more effective emergency response operations.

### Challenges Along the Way

The full potential of drones in India is hindered by several regulatory and technological challenges. These include issues related to airspace management, payload capacity, battery technology, reliability, durability, obstacle avoidance, sensor integration, remote identification, tracking, data security, and privacy. Addressing these challenges is crucial to unlocking the transformative power of drone technology in India and realising its vast array of potential applications.

### Emerging Solutions and Future Scenarios

Despite the challenges, innovative solutions are emerging to pave the way forward for the Indian drone ecosystem. Envisioning a future where drones play a pivotal role in everyday life, scenarios such as drone delivery of morning coffee, healthcare drones providing prescription medications to elderly parents, and drones transporting emergency supplies during natural disasters are becoming increasingly feasible. Integrated "droneports" in cities of the future are set to revolutionise logistics, agriculture, healthcare, and other industries, fostering enhanced connectivity, efficiency, and resilience within our societies.

India aims to lead Industry Revolution 4.0 by 2030, with drones playing a crucial role. This initiative is expected to enhance the country's GDP by 1-1.5 per cent and create over five lakh jobs. Drones are integral to the Industry 4.0 ecosystem, prompting calls for expanding the Production Linked Incentive (PLI) scheme introduced by the government in 2021.

Moreover, the allocation of Rs 57 crore for drone technology and components under the production-linked incentive (PLI) scheme in the interim budget 2024 is bound to give India the much-needed impetus to compete on the global stage. This marks drones as a sunrise sector in India shaping the future of the country in several areas through innovation and technology advancements.

Here is how the drone industry and its evolution in India will bring a lot of positive influence across sectors:

### Sustainability: A Priority

Drone technology holds immense promise for environmental conservation and sustainable practices in India. In agriculture, drones enable precision farming techniques, reducing the need for excessive pesticide and fertiliser use by delivering targeted applications. This not only enhances crop yield but also minimises environmental pollution, showcasing the potential for drones to revolutionise traditional farming practices.

## //

The full potential of drones in India is hindered by several regulatory and technological challenges. These include issues related to airspace management, payload capacity, battery technology, reliability, durability, obstacle avoidance, sensor integration, remote identification, tracking, data security, and privacy.

**The Impact of 5G Technology on Drones**

5G technology significantly enhances the capabilities of autonomous drones. Traditionally, drones rely on less dependable point-to-point links, which may lose signal intermittently during flight. However, when operating on a 5G network, drones experience ultra-high reliability and low-latency connectivity. Consequently, drones can promptly receive and execute commands from the ground control system or pilot. It also reduces

the time between sending, receiving, and acting upon commands and minimises the potential for errors during flight.

**The Future of Drones in India and Beyond**

In the fast-evolving landscape of drone technology, India stands as a burgeoning hub for enthusiasts and industry players alike. With a rich history of innovation and creativity in drone development, the Indian drone industry is poised to capitalise on emerging trends and technological advancements. From the early days of unmanned aerial vehicles inspired by visionary inventors to the present-day revolution in aerial systems, the Indian drone industry reflects a persistent quest for innovation and a commitment to shaping the future of aviation.

As we continue to witness the evolution of drone technology, fueled by advancements in artificial intelligence, robotics, and other cutting-edge fields, the possibilities for drones in India are endless. With the right regulatory frameworks, technological innovations, and strategic collaborations, drones have the potential to revolutionise industries, transform lives, and shape the future of aviation in India and beyond. 🚁

**KIA INDIA LAUNCHES 6-SEATER REFRESHED 2024 CARENS**

**K**ia, India's leading premium carmaker, has announced the launch of 2024 Refreshed Carens with a new 6-speed 1.5 Diesel manual transmission in U2 1.5 VGT engine variant. This new addition expands the trim lineup to an impressive 30 options, solidifying Carens' position as the segment leader in offering a diverse range of trims.

In this refreshed lineup, Kia has also introduced an enhanced X-Line model, elevating its exclusivity by integrating premium features such as a dashcam, all window auto up & down with voice commands, and expanded 7-seating options. Carens X-line was earlier launched in October 2023.

With the introduction of new trims, the Prestige +(O) variant in 7DCT and 6AT showcases the country's renowned feature, the 'Sunroof', along with LED map lamp and room lamp. Additionally, the Prestige (O) variant offers the choice of 6 or 7 seating capacity, a leatherette-wrapped gear knob, a smart key with push-button start, LED Rear Combination lamp, LED DRL, and positioning lamp.

Moreover, the Premium (O) trim enhances convenience with features such as keyless entry, an 8" D/Audio system, Shark Fin antenna, steering wheel-mounted remote control, burglar alarms, and bolstered safety features.

Emphasising customer-centricity, all models now come equipped with a 180W charger, representing an



upgrade from the previous 120W charger.

Furthermore, showcasing a sleek and stylish design, the Carens introduces a brand-new colour - Pewter Olive, available in all models except the X-Line. This addition provides customers with a choice of 8 monotone, 3 dual-tone options, and 1 exclusive colour for X-Line.

Myung-sik Sohn, Chief Sales and Business Officer, Kia India, commented, "We are excited to introduce the new trims of the Carens. Since its debut in 2022, the Carens has become a preferred personal mobility choice for over 1.5 lakh families, embodying comfort, reliability, and luxury. We saw a huge potential for a 6-seating option and decided to refresh Carens to reshape mobility preferences for more and more families seeking luxurious and comfortable rides."

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By Robinson Philipose, Co-Founder and CEO of ARAPL RaaS

## HOW DO WE EXAMINE THE SAFETY FEATURES IMPLEMENTED IN AGVS?

The article offers a thorough examination of the safety features and operational capabilities of automated guided vehicles (AGVs), exploring how each of them ensures a safe and secure working relationship between autonomous vehicles and human workers.

**A**utomated Guided Vehicles (AGVs), such as guiding carts, tow tractors, robotic forklifts, and unit load carriers, enable warehouses to enhance efficiency. However, ensuring safe collaboration between autonomous vehicles and human workers is imperative as facilities integrate AGVs. Core safety measures for all AGVs involve emergency stop responsiveness, anti-collision sensors, speed control, and exhaustive testing. The safety features are also warranted by safety certifications. However, the robust functionality of these measures varies among different types of AGVs. Broadly, there are three important considerations for safety features, namely the integration of vision perception cameras, integration feed from surveillance cameras, and emergency braking.

We will first consider various certifications required, evaluate the important integrations, and then discuss individual AGV specifics.

### IMPORTANT CERTIFICATIONS

Automated guided vehicles (AGVs) and their components require various safety certifications. For AGVs, key standards are ANSI/ITSDF B56.5-2019 (US) and EN ISO 3691-4:2023 (EU). Lidar sensors must comply with standards like IEC 60825-1 and certifications from ASPRS. Batteries need certifications to UL 3100 to ensure protection from electric shock and fire. Motors fall under overall AGV standards, with safety systems communicating speed/stop commands. Specific required certifications vary by region and application. It is important to consult with a professional to ensure these compliances are met.

### INTEGRATION OF VISION PERCEPTION CAMERAS

Vision perception cameras are critical for enhancing the



safety of Automated Guided Vehicles (AGVs). They identify potential threats by continuously monitoring static and moving objects. By expanding perception range and reducing blind spots, they decrease accidents caused by insufficient perception. Perception systems greatly increase vehicle safety and climate resilience. Dash cameras analyse and map scenes to provide specific road safety warnings. Engineers aim to develop sensors

and AI that outperform human senses fine-tuned by evolution. Running perception algorithms through labeled training data enables safe detection and reaction to diverse road conditions and objects.

### INTEGRATING LIVE DATA FROM SURVEILLANCE CAMERA FEEDS

Surveillance camera feeds are vital for enhancing Automated Guided Vehicle (AGV) safety. Ceiling-mounted cameras provide comprehensive environmental views to determine safe motion and avoid collisions. Cameras can swiftly detect and extinguish fires in industrial settings. Safety sensors prevent AGVs from hitting objects; camera feeds bolster this by enabling proactive risk avoidance. Surveillance helps governments uphold order, recognise dangers, and investigate crimes. So, for AGVs, surveillance bolsters operational safety and security. Overall, surveillance camera feeds are crucial for preventing accidents through extensive situation awareness, rapid-fire response, augmenting onboard safety systems, and strengthening industrial oversight. Their comprehensive real-time insights make AGVs safer.

### AUTOMATIC EMERGENCY BRAKING

Automatic Emergency Braking (AEB) is a vital safety feature in Automated Guided Vehicles (AGVs). By automatically initiating braking, AEB can prevent collisions or reduce impact severity. With a quicker



**Core safety measures for all AGVs involve emergency stop responsiveness, anti-collision sensors, speed control, and exhaustive testing. The safety features are also warranted by safety certifications.**

reaction time than humans, AEB saves lives through rapid response. As an advanced safety technology, AEB represents a huge leap in protecting against rear-end collisions. AEB typically activates after a forward collision warning alerts the driver of an imminent crash. Reverse AEB reduces low-speed parking damage. Avoiding over 85 per cent of rear-end crashes, AEB is highly effective at decreasing collision likelihood and speed when crashes remain unavoidable. Overall, AEB dramatically enhances vehicle safety.

Evaluating each safeguarding dimension proves critical to understanding capabilities and limitations when operating alongside humans. By deliberately investigating safety measures in pace with rapid AGV adoption, warehouses can securely benefit from vehicle autonomy while protecting on-floor staff.

We will now discuss the four most common types of AGVs:

#### **AUTOMATED GUIDED CARTS (AGCs)**

Automated Guided Carts (AGCs) are carts that autonomously transport materials by following predefined paths, using guidance systems like magnets or lasers. Key safety features include collision avoidance sensors to detect obstacles and emergency stop buttons to halt operation, if triggered. Assessments evaluate if proximity sensors maintain safe human-AGV distances and if alarms properly warn people. Navigation systems are tested for accuracy, while speed and trajectory adjustments are analysed. Emergency stops strategically halt and brake motors rapidly. Redundant sensors, often multiple laser/optical systems, ensure reliable navigation and system failover. Assessing if warning indicators, navigational stability, emergency responsiveness, and redundancy measures collectively enable safe autonomous transport alongside people is critical.

#### **AUTOMATED GUIDED TRACTORS**

Tow tractors haul multiple carts, requiring considerations around towing dynamics, intersection movements, and collision avoidance. Redundant sensors, including backup detection and navigation systems, enhance reliability. Examinations evaluate sensor coordination competencies to maintain safe operations during emergencies or malfunctions. Emergency stop buttons trigger braking to

halt tractors and loads. Assessments analyse dynamic path planning abilities, verifying real-time route optimisations and obstacle circumventions. Tests check alarm light placements and signal clarity. Advanced technologies like laser scanners facilitate navigation, while load monitoring prevents overloading. Further criteria involve fusion and communication across sensors to enable coordinated load manoeuvres. By investigating emergency responsiveness, alarm efficacy, navigational stability, obstacle avoidance, and load balancing, facilities can validate tow tractors offer innovations to safely operate alongside personnel.

#### **AUTOMATED GUIDED FORKLIFTS**

Robotic forklifts autonomously lift and organise pallets using arms and sensors. Key safety factors involve maintaining stability when stacking variable loads at height while detecting layout changes and obstacles in warehouses. Redundant cameras, lasers, and proximity sensors enhance spatial awareness and precise manoeuvring. Assessments analyse obstacle detection and avoidance abilities, verifying if forklifts can navigate around impediments. Examinations evaluate abilities to sense load sizes for tailored movements and detect human presence to trigger safety protocols preventing accidents. Alarm lights convey real-time status during loading, transitions, and duress. Emergency stops prominently halt all systems to freeze position. Further criteria investigate dynamic route optimisations based on environmental fluctuations and sudden obstacles. By scrutinising sensing capabilities, alarm integrations, emergency responsiveness, and redundant vision modalities, facilities can determine if forklifts safely collaborate with staff.

#### **AUTOMATED GUIDED UNITS**

Unit Load AGVs safely transfer defined load types like pallets using redundant vision systems and sensors to heighten load detection and navigation accuracy. Examinations verify adaptation competencies across varying conditions. Emergency stops rapidly halt motors to safely brake cargo. Assessments evaluate load-specific sensors to handle freight and collision prediction algorithms that model trajectories. Safety zones triggering deceleration are analysed. Alarm lights indicate status changes during transitions, loading/unloading, or obstacles. Additional evaluations examine load monitoring sensors maintaining cargo stability, environmental sensors enabling navigation adaptations, and communication systems for coordinated inter-AGV movements. Safety scanners detect obstacles and humans, slowing or stopping AGVs accordingly, enabling human-robot collaboration. By investigating emergency responsiveness, alarm integrations, redundant sensing, and load/environment monitoring, facilities can determine if AGVs provide layered innovations to operate safely around personnel. 

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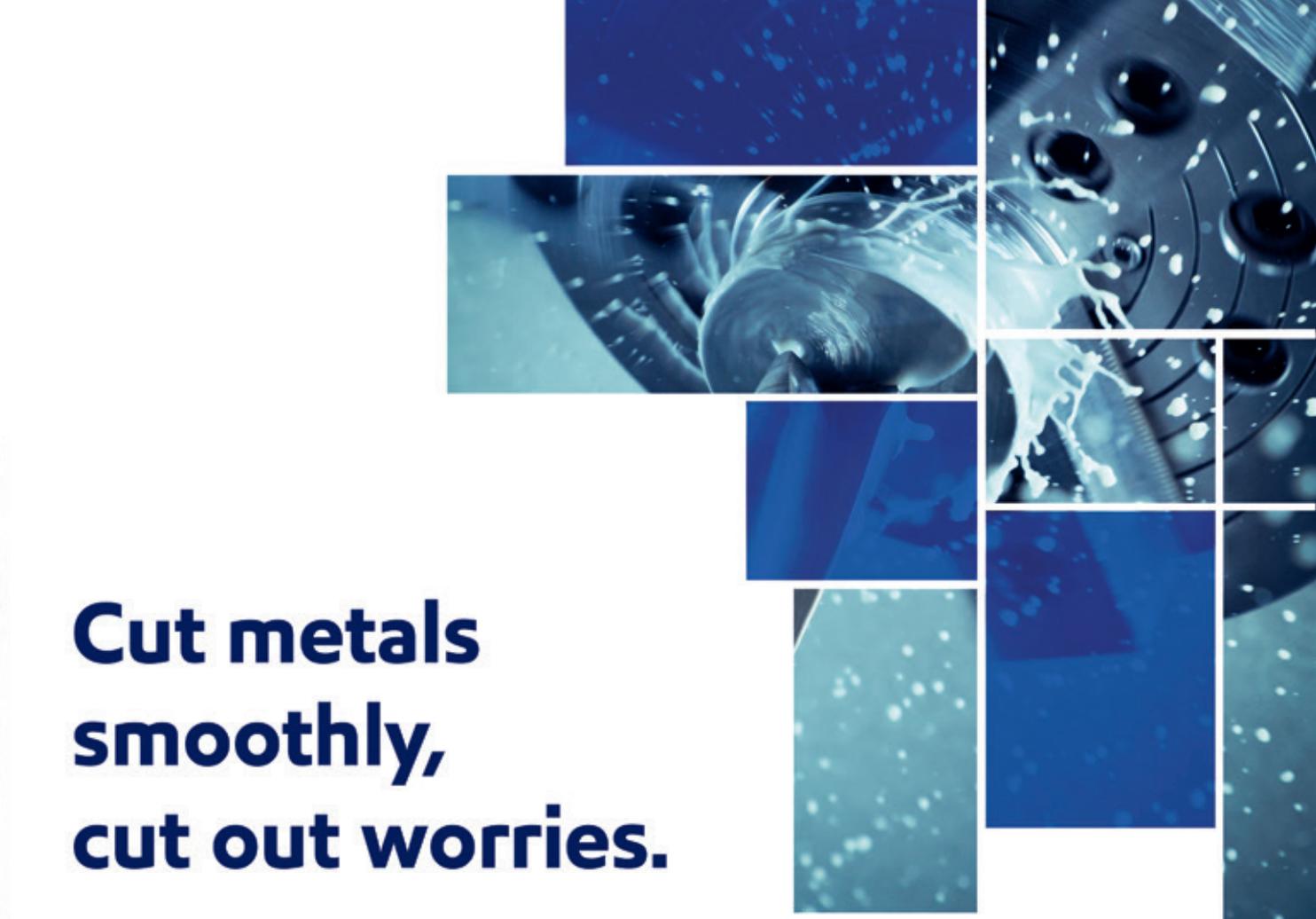


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## “WE PLAN TO DOUBLE OUR GROWTH IN THE NEXT THREE YEARS”

In a traditionally male-dominated sector like India's energy industry, the journey of **Preeti Bajaj**, CEO & MD of **Luminous Power Technologies**, stands out as a beacon of inspiration and empowerment. Amidst a landscape where women remain significantly underrepresented, with statistics from the International Energy Agency (IEA) indicating that they comprise less than 16 per cent of the workforce, Preeti Bajaj has defied norms and shattered barriers to establish her formidable presence.

As a trailblazer in a field where gender diversity is often overlooked, Preeti's leadership and achievements serve as a testament to the power of determination, resilience, and the unwavering pursuit of excellence. Through her remarkable journey, she not only challenges stereotypes but also paves the way for greater inclusivity and opportunities for women in the energy sector.

In this freewheeling interaction, Preeti Bajaj speaks about how the company has imbibed a culture of diversity, inclusivity, and equity.

### **What initiatives or changes do you believe are necessary to promote gender diversity and inclusion in the manufacturing industry?**

As a CEO in the manufacturing industry, I firmly believe that our greatest strength lies in the diversity of our workforce, the equity of our opportunities, and the inclusivity of our culture. Embracing diversity isn't just a moral imperative; it's a strategic advantage that fuels innovation, creativity, and resilience in the face of challenges. It's time for us to embrace gender diversity not just as a mere agenda to have equal representation of women in the workplace, but to make it a norm in our society to pass on this culture to our future generations. This can only be achieved by providing more opportunities for women to have a voice in leadership positions and boardrooms. Having women in leadership positions, especially in sectors like energy and manufacturing, will maximise our potential as a country and create a more inclusive and prosperous space for all.

### **What served as a stepping stone for you in the field of manufacturing? How do you reflect on this experience after holding significant positions for almost twenty years?**

One significant stepping stone in the field of

manufacturing has been the advent of automation and robotics. Automation technologies, including robotic arms, and automated assembly lines, have revolutionised the manufacturing process by improving efficiency, accuracy, and speed. These technologies have enabled manufacturers to streamline production, reduce costs, and increase output, leading to greater competitiveness and scalability.

Another crucial advancement has been the implementation of digital technologies such as the Internet of Things (IoT), big data analytics, and artificial intelligence (AI) in manufacturing. IoT sensors embedded in machinery and equipment collect real-time data on performance, productivity, and quality, allowing manufacturers to monitor and optimise operations remotely. Big data analytics enable predictive maintenance, supply chain optimisation, and demand forecasting, while AI algorithms optimise production schedules, identify process inefficiencies, and enhance product quality.

Reflecting on these advancements, one can appreciate the remarkable progress made in the field of manufacturing. The adoption of automation, digitalisation, and additive manufacturing has fundamentally transformed the way products are designed, produced, and distributed. These technologies



have driven innovation, efficiency, and agility in manufacturing operations, enabling companies to meet evolving customer demands, navigate market uncertainties, and achieve sustainable growth.

**What motivated or inspired you to pursue a leadership role within the manufacturing industry?**

Manufacturing presents complex challenges and opportunities for problem-solving. The opportunity to tackle these challenges head-on, leveraging their skills and expertise to develop creative solutions and drive organisational success is what motivates me. To be a leader in the manufacturing industry, one must be driven by a passion for innovation and technology and motivated to lead teams and organisations that

push the boundaries of what's possible, whether it's developing groundbreaking products, implementing cutting-edge manufacturing processes, or driving efficiency improvements through innovation.

**Tell us about the recently inaugurated Rudrapur solar panel facility? What sets this plant apart from others? Shed more light on its USP, cutting-edge technology, and its infrastructure.**

The Rudrapur plant is the industry's first fully automated plant with AI integration, it is enabled for flexible manufacturing and is the first plant in India with Autosorter. The plant has a capacity of 250 MW in the initial phase and is expandable up to 1GW. We have integrated the production of solar solutions and technologies to provide cost-effective value for customers. Our raw materials are indigenously sourced, making the Indian ecosystem grow. We want to go upstream, by investing in connected systems that will be monitoring the health of solar panels installed. The plant is located on an area of 10 acres and can manufacture polycrystalline, monocrystalline, n-Type and Topcon panels both monofacial and bifacial with options to adapt from 5BB to 16BB. With these capabilities, Luminous becomes an expert in managing all forms of roof-top solar panel requirements for residential or commercial and is India's only full-component manufacturer of solar solutions comprising solar panels, inverters, and batteries with connected solutions.

**Over the past few months, your company has been strongly propagating about building an end-to-end solar energy management ecosystem. What kind of steps are you taking in this direction?**

Luminous is engaged in manufacturing a best-in-class product range in the solar, inverter, and battery categories to build an end-to-end solar energy management ecosystem. The Luminous solar solutions ecosystem will also have its flagship Connect X App integrated, offering customers insightful information on real-time energy consumption and monitoring, solar energy generation, and inverter performance.

The factory also hosts the first-of-its-kind experience centre at Rudrapur. Bringing world-class experience in technology and innovation to create a solar ecosystem approach for sustainable energy management solutions under one roof while providing a holistic experience in an interactive space.

**According to what we have heard, Luminous plans to have 25 per cent of its revenue from overseas businesses over the next three years. Luminous is currently present in about 40 countries. So, what's your strategy for this revenue growth?**

While Luminous is the industry leader in India in the home inverter battery segment, it is also planning strategic expansion in international markets. Last year the company strengthened its operations in South Africa, Nigeria, Bangladesh, and Lebanon. With a growing market presence, Luminous plans to expand to new markets like Turkey and Eastern Europe. We also wish to further expand our presence in Africa.

To better meet the needs and preferences of international customers, Luminous is customising its product offerings to suit local market requirements. For instance, Luminous launched the first-ever Lithium battery pack - LITCORE for the South African market. It is compact, provides 3X fast charging, and higher power density for consistency.

Excellent customer support and after-sales service are crucial for maintaining customer satisfaction and loyalty and Luminous is investing in building a robust customer support infrastructure to ensure prompt and effective assistance for customers worldwide.

**What's your company's outlook for the next phase of growth in terms of exports, expansion, new business verticals, key investments, R&D etc.**

For the organisation, the growth engines to increase

market capitalisation include a stronger focus on solar products. Solar is important towards sustainable and profitable growth and the company aims to double its growth in the next 3 years. Additionally, new technologies and innovations in energy management solutions, along with reach and expansion, will be at the core of the company's growth strategy. While Luminous was the first company to launch lithium-ion in the inverter battery segment, it is investing in R&D to develop future-ready technologies and innovations. It is constantly undertaking product innovation in high-capacity inverters and alternate chemistries for new battery types, in addition to evolving eco-friendly and sustainable Li-ion battery solutions.

We continue to invest in digital capabilities, strengthen our presence in global markets, and expand our capacities in batteries and solar PV panels.

Last year the company strengthened its operations in South Africa, Nigeria, Bangladesh, and Lebanon. With a growing market presence, Luminous plans to expand to new markets like Turkey and Eastern Europe. We also wish to further expand our presence in Africa.

**Can you explain how your energy storage solutions optimise the utilisation of renewable energy, especially during periods of low demand?**

Luminous offers energy storage solutions, with battery backup, that allow users to store excess energy generated from renewable sources, such as solar panels. During periods of low energy demand, when renewable energy production

exceeds immediate consumption, the surplus energy is stored in batteries for later use. Energy storage systems enable load shifting, which involves storing excess renewable energy during times of high production and low demand and discharging it during periods of low production and high demand. By optimising the timing of energy consumption, consumers can reduce their reliance on grid power during peak hours, when electricity prices are typically higher.

We have Connect X App that empowers users with real-time monitoring and data on energy consumption, solar power generation, and inverter performance. It also helps the customer understand the impact on CO2 footprint.

**With the rapidly changing manufacturing landscape, skilling and upskilling of employees have become more important than ever. What steps are you taking in terms of boosting skill development within your company?**

Digital skilling is of critical importance in the context of making India a global manufacturing powerhouse, but it remains a challenge in the small cities of India.



The adoption of automation in manufacturing has become the need of the hour as the government encourages Made in India production. This is needed to push the domestic manufacturers towards encouraging employees with a skill set in data handling to experiment, implement and retrain themselves as the systems evolve.

**Culture-** The culture at Luminous focuses on embedding the values of diversity, equity, and inclusion through sensitisation and building an allyship. Our leaders and people managers are the real enablers. We are committed to excellence; we understand that diversity, equity, and inclusion are not only integral to our success but essential for staying at the forefront of a rapidly evolving ecosystem.

**Organisation Capability-** We practice structured developmental interventions through curated capability programs across the organisation. These programs are designed to address the day-to-day employee challenges while giving them the opportunity for growth and learning. Capacity building and skill enhancement are some of the critical requirements for an organisation and its employees. An employee tends to be more associated with an organisation when they feel their acumen and exposure are growing.

**India is still in the nascent stages when it comes to renewable energy adoption and energy storage solutions. If need be, would you be open to partnerships and collaborations with other organisations in the energy sector to further advance energy storage solutions?**

We are open to partnerships that help us significantly advance our goals of providing indigenous and reliable energy storage solutions to our customers.

In one of the recent collaborations, Luminous has forged a strategic partnership with one of the world's largest renewable energy schools The University of New South Wales, Australia, for Solar Panel projects on Reliability, Value engineering, and component qualification. This partnership has enabled Luminous to evaluate newer technologies well ahead of the curve and add value to the company's technological prowess.

**What do you see as the future direction of energy storage technology, and how is your company positioned to contribute to that future?**

We see a shift towards more sustainable and efficient solutions, driven by the increasing demand for renewable energy sources and the need to adopt environmentally conscious practices.

In consonance with this approach, Luminous Power Technologies is committed to being a pioneer in innovations related to energy storage. We recognise the market need for developing advanced battery technologies that can store energy more efficiently, reliably, and sustainably. Our focus is on enhancing the performance and longevity of energy storage systems, while also making them more affordable and accessible to a wider set of customers. We are investing in research and development to develop alternate chemistries leading to improved battery performance, while also bringing down the costs.

Furthermore, our company is actively engaged in the integration of energy storage solutions with renewable energy sources—solar. By combining energy storage with renewables, we can provide reliable and sustainable power solutions that reduce dependence on traditional fossil fuels and contribute to a cleaner environment. 

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## MARPOSS' UNMATCHED QUALITY CONTROL SOLUTIONS FOR FUEL CELLS AND ELECTROLYSERS

Exploring Marposs' quality control solutions for fuel cells and electrolyzers, which aid manufacturers in achieving high accuracy and quality in production processes.

In the fuel cell and electrolyser industry landscape, precision and reliability play a fundamental role in ensuring optimal performance and efficiency of these systems.

Thanks to its constant innovation in the supply of advanced solutions for in-workshop control, Marposs allows manufacturers of these devices to achieve unprecedented levels of accuracy and quality in their production processes.

The company, founded in 1952, is a primary supplier to major automotive manufacturers that it is supporting in the transition to electric mobility, as well as to the aerospace, semiconductor, consumer electronics, refrigeration, and biomedical sectors. The group today has over 3,500 employees worldwide and is present with over 80 of its own offices in 34 different countries.

Marposs' goal is to create quality control solutions for every stage of the production chain in both fuel cells and electrolyzers, from the single component (flow plate, bipolar plate, catalyst, membrane, gas diffusion layer) to the balance of plant, the stack and then the complete fuel cell or electrolyser system.

Defects in any of the above products, both during production and assembly, can result in reduced reliability, efficiency, and performance of the fuel cell or electrolyser, as well as a hazards during their operation.

The analysis, identification and detection of these defects is addressed by the Marposs proposal, which is divided into solutions for gauging & inspection, leak, functional and electric tests.

Gauging & inspection applications are used to detect the geometric dimensions of individual components as well as to determine manufacturing defects due to pinholes, cracks, and assembly inconsistencies. The techniques are based on touch systems with probes and contactless systems that use optical technologies such as laser scanners, cameras, and confocal sensors.

Leak applications detect manufacturing and assembly defects of individual components as well as



stacks and complete devices. They are based on the use of tracer gases such as He and forming gas (5 per cent H<sub>2</sub> and 95 per cent N<sub>2</sub>) for vacuum chamber or sniffer tests using a mass spectrometer, or on the use of gases such as air or N<sub>2</sub> for pressure drop and flow measurement tests.

A further alternative is the use of deionised water, especially in the field of electrolyzers, to carry out tests under operating conditions and without leaving contaminating residues in the product.

Functional applications are at the margins of the production process and are preparatory for other types of tests. These include solutions for filling and emptying the stack with deionised water as well as solutions for determining the clogging of the bipolar plates (BPs) channels with air as the process fluid.

The range is completed by the electric solutions used to determine the characteristic curves and performance of the stack (mainly PEM or SOFC) or the fuel cell/electrolyser system. In this area, we find applications for Interface Contact Resistance (ICR), Insulation Resistance (IR) and Dielectric Strength (DS) at high voltage, as well as applications for end-of-line (End of Line) controls such as open circuit voltage, control voltage pick-up, polarisation curve, Electrochemical Impedance Spectroscopy (EIS), performance, driving cycle and cyclic voltammetry tests. 

## EMPOWERING INDIA'S INFRASTRUCTURE: RAYCHEM RPG'S PIONEERING LEAP IN EHVCA

The article outlines Raychem RPG's groundbreaking leap in Extra High Voltage Cable Accessories (EHVCA) – a key milestone that promises to reshape the landscape of electricity distribution in India and beyond.



In a groundbreaking move that propels India closer to infrastructure self-reliance, Raychem RPG has heralded a new era in the country's electricity distribution projects. With its indomitable spirit and commitment to the 'Make in India' initiative, the company has achieved a significant milestone that promises to reshape the landscape of electricity distribution in India and beyond.

Founded in 1989 as a joint venture between TE Connectivity, U.S.A., and RPG Enterprises, India, Raychem RPG stands as a beacon of Indo-US cooperation, boasting nearly four decades of unparalleled success. Today, the company is proud to announce its latest triumph: the completion of the rigorous Pre-Qualification (PQ) test protocols for its 245KV Extra High Voltage Cable Accessories (EHVCA) at the Central Power Research Institute (CPRI), India.

This certification is not just a feather in Raychem RPG's cap; it's a monumental achievement that positions the company as the sole organisation in its field to successfully navigate the arduous year-long PQ testing process. The approval of Raychem RPG's 245KV EHVCA for use across India signifies the end of the country's dependence on long-lead imports from Europe for these critical components. It marks a giant leap towards fulfilling domestic de-

mands through home-grown solutions.

"Our dedication to the Make in India initiative is unwavering," says Vivek Venkatachalam, CEO of Raychem RPG. "We are committed to advancing our nation's progress and self-reliance." This sentiment is echoed by Sankara Raman, Sr. VP - Operations & Technology, who highlights the company's dedication to engineering excellence and innovation.

Raychem RPG's 245kV cable accessories, produced at their Halol plant in Gujarat using world-class material, are now set to receive widespread acceptance not only in India but also in SAARC countries, including Bangladesh, Nepal, and Sri Lanka. This development is expected to significantly aid in better project management and faster execution of infrastructure projects, thereby enhancing the quality of life in these regions.

Tamal Kanti Saha, Sr. VP and Head - Global Sales & Marketing, emphasises the company's commitment to supporting customers and large infrastructure projects with speed, affordability, and reliability. "We are determined to make the journey of self-reliance and the 'Make in India' initiative a resounding success," he states.

With operations facilities located in Halol, Vasai, Chakan, and Naigaon, Raychem RPG adheres to stringent

management systems across all locations, ensuring the highest standards of quality and efficiency.

As Raychem RPG continues to lead the way in the infrastructure segment, providing solutions across multiple industries, the company stands as a testament to the power of innovation, collaboration, and dedication to progress.

For those looking to be a part of India's infrastructure revolution with reliable, world-class EHVCA products, Raychem RPG offers not just products but a partnership in progress. 

**About Raychem RPG:** A Joint Venture between TE Connectivity, U.S.A. and RPG Enterprises, India, Raychem RPG has the distinction of being one of the longest, most successful joint venture in India for nearly four decades. Raychem RPG caters to the infrastructure segment of multiple industries. Its pioneering technologies provide solutions for various businesses in the domestic and global markets. The company caters to segments such as Cable Management & Connection Systems, Asset & Theft Protection Systems, Loss Reduction Systems, Electrical Safety Products, Energy Efficient Transformers, Gas Flow Metering and Manufacturing Processing Outsourcing.

**Raychem RPG Contact:** Anuneha Sinha, Global Lead- Communications, +91-8879114246, Email address: Anuneha\_Sinha@raychemrpg.com

## OUR HYBRID HYDROMETALLURGY PROCESS EXTRACTS ELEMENTAL COMPOUNDS WITH 1/10TH THE CARBON FOOTPRINT

MiniMines' Founding Director, **Anupam Kumar**, and CTO and Director, **Arvind Bhardwaj**, candidly discusses their shared passion for recycling batteries, inception of their dream venture, their patented eco-friendly process - Hybrid-Hydrometallurgy, upcoming initiatives, and expansion plans in an interview with **Nisha Shukla**.

**What motivated you to come up with your patented battery recycling mechanism- Hybrid-Hydrometallurgy. What sets this technology apart from other conventional methods?**

**Anupam Kumar:** Both me and Arvind are seasoned researchers in the realm of nanomaterials, chemical engineering, and energy storage devices, and we have traversed a remarkable journey in the field for over eight years. Arvind, with a wealth of experience in energy storage devices and chemical extraction, had earned his stripes working on different projects at CSIR-NCL Pune, US Navy-ONRG-Singapore. His tasks involved working on drug development, early detection of malaria, and developing anti-corrosive coatings for naval warships, showcasing his prowess in the intricate domain of materials science.

After the successful product development, Arvind assumed leadership of the R&D department for energy storage and subsequently held the position of AVP-R&D at Log9 Materials. During his tenure, he worked on metal-air batteries, supercapacitors, and lithium-ion batteries. This invaluable expertise came in handy for extracting materials, developing chemical processes, and formulating chemistry tailored for li-ion batteries.

Meanwhile, I embarked on my professional journey at the prestigious Bhabha Atomic Research Centre (BARC). There, I researched extensively on extracting uranium metal from the washing liquor of atomic reactors, a task that demanded precision and ingenuity. Eventually, I landed up at Log9 Materials, and contributed to the development of cleanup technology products and business development. Notably, my curiosity and constant urge to innovate led to the creation of a high-efficiency oil sorbent, crucially deployed in mitigating the Mauritius oil spill disaster by the coastguard.

United by our passion for advancing sustainable technologies, both me and Arvind found ourselves at a crossroads. Arvind's work involved making prototypes and discarding used prototype batteries after testing became the catalyst for our entrepreneurial venture. The concept of MiniMines took root when Arvind and I envisioned re-extracting elemental compounds from waste batteries and cells. Drawing upon my prior



**Anupam Kumar, Founding Director and Arvind Bhardwaj, CTO, Director, MiniMines**

experience in elemental recovery from nuclear wash liquor, we recognised the pressing need for addressing LIB waste in the energy storage industry.

Fuelled by our shared vision, I and Arvind made the bold decision to leave our well-established positions and set out on a new path. Together, we founded MiniMines, driven by the mission to create a platform for sustainable raw materials, indispensable to produce any energy storage device.

Our timing couldn't have been more auspicious. The escalating demand for lithium-ion batteries, driven by the surge in electric vehicles, portable electronics, and renewable energy storage systems, underscored the urgency of addressing the electronic waste dilemma. MiniMines aimed not just to recycle but to revolutionise the approach towards sustainable raw materials, becoming a beacon of environmental responsibility in the fast-evolving landscape of energy storage technologies.

When we started working on recycling the waste lithium-ion batteries, we started our work from already available technologies like pyrometallurgy, carbothermal and hydrometallurgy solvent extraction. These processes were having different efficiencies and viabilities but were not fulfilling the economic and environmental sustainability parameters. We decided to develop a completely new process, which can cater to the sustainability requirements of LIB recycling. After 2 years of work, we developed a completely new process called Hybrid Hydrometallurgy.

**The Li-ion battery recycling technology can be divided into two major technologies:**

1. *Pyrometallurgical Methods:* In this process, the batteries are treated at high temperature (1600-2000OC), resulting into the conversion of 30 wt per cent carbon in CO<sub>2</sub>. The resulting material is an amalgam of multiple metals which again requires treatment for the separation into different elemental compounds. This method creates high amount of carbon emissions and is highly unsustainable.
2. *Hydrometallurgical Method:* This process is one of the most used methods for recycling lithium-ion batteries. It involves the use of chemicals to dissolve metals from the battery electrodes and recover them. The major disadvantages of this method are high energy consumption, environmental impacts, safety risks, limited recovery rates and complexity of the process.

Our USP is our proprietary patented Hybrid Hydrometallurgical TM Method which uses water as a solvent and extract the elemental compounds with more than 96 per cent efficiency and above 99 per cent purity at 1/10th carbon footprint. The process is designed in such a way that it can process all types of

Li-ion batteries regardless of their chemistry or form factor. The process does not generate any type of liquid, solid or gaseous discharge during the process making it most sustainable method for recycling.

**Kindly elaborate on how this patented method helps in segregation of lithium and other toxic metals from the batteries?**

*Arvind Bhardwaj:* The complete recycling process is proprietary and can be divided into two sections:

The first part includes discharging, safely crushing the batteries, extracting Black Mass, and separating aluminium, copper, iron/steel, and plastic. In this part, our proprietary solution deep discharges the batteries for safe disposal. The mechanical crushing is also being done by proprietary machine design, which doesn't generate any PM<sub>2.5</sub> or PM<sub>10</sub> pollution in the environment.

The second part includes the processing of Black Mass using our patented Hybrid Hydrometallurgy<sup>TM</sup> Process. The Hybrid Hydrometallurgy<sup>TM</sup> Process is based on the principle of the solubility of metal ions in water at different pH, pressure, and temperatures of the solution. The technology comprises 3 segments involving leaching/extraction, elemental separation without using organic solvents, and beneficiation for purification.

**How do you ensure the safe handling and disposal of hazardous materials in batteries? What measures do you take to minimise environmental impact during the recycling process?**

*Anupam Kumar & Arvind Bhardwaj:* Our aim is to reduce the amount of greenhouse gas emissions associated with the recycling process, such as those produced by transportation, processing, and waste disposal. By using our proprietary Hybrid Hydrometallurgy process, we are extracting elemental compounds at 1/10th carbon footprint.

Additionally, we are targeting to increase the percentage of Lithium-ion batteries that are recycled, as opposed to being sent to landfills or incinerated. We are increasing our collection capacity every month by minimum of 10 per cent rate, with current collection capacity of 50 tons/month.

The absence of natural resources in India, such as minerals and metals for Lithium-ion batteries can be fulfilled by recovering these materials from waste Lithium-ion batteries. With the proposed capacity by next year, we will be able to cater 20 per cent of national Lithium and Cobalt demand.

**According to reports between now and 2030, 11 million metric tons of Li-ion batteries will be dumped into the landfills of which a minuscule fragment of less than 5-6 per cent only will be**

### recycled. How do you look at recovering the minuscule fragment?

**Anupam Kumar:** The technology is already developed and optimised at a pilot scale. We are currently building a commercial processing plant with a capacity of 3,000 tons/annum.

A product/technology roadmap for MiniMines aims to build a commercial 3000-ton/annum processing facility within the current year and set up three separate hubs at different geo-locations in India for battery collection and black mass extraction.

### Are there any benefits or incentives for businesses or individuals who recycle batteries through your program?

**Anupam Kumar & Arvind Bhardwaj:**

- *Employment creation:* Our aim is to create 2 jobs for every 5-ton processing capacity in the local community, particularly for individuals who are under-employed or facing employment barriers.
- *Reduction in environmental pollution:* Our aim is to reduce the amount of waste that goes to landfills and prevent hazardous chemicals from leaching into the soil and water. So far, we have processed more than 1,50,000 batteries and established 6250000 batteries/month processing plant.
- *Community engagement and education:* We have included more than 500 individuals through the awareness programs and seminars.
- *Reduction in greenhouse gas emissions:* By using our proprietary Hybrid Hydrometallurgy process, we are extracting elemental compounds at 1/10th carbon footprint.
- *Increase in recycling rate:* We are increasing our collection capacity every month by a minimum of 10 per cent rate, with a current collection capacity of 50 tons/month.
- *Conservation of natural resources:* The absence of natural resources in India, such as minerals and metals for Lithium-ion batteries can be fulfilled by recovering these materials from waste Lithium-ion batteries. With the proposed capacity by next year, we will be able to cater to 20 per cent of national Lithium and Cobalt demand.

### Are there any upcoming advancements or initiatives in your battery recycling program?

**Arvind Bhardwaj:** Based on current trends and advancements in technology, it's likely that waste lithium-ion battery recycling technology will continue to improve and become more efficient over the next 5-10 years.

Several factors are driving the need for better recycling technologies, including the growing demand for electric vehicles, which rely on lithium-ion batteries, and the need to reduce the environmental impact of

battery waste. Many companies and researchers are working on developing new methods and technologies to address these challenges.

One promising approach is the use of advanced chemical processes, such as hybrid hydrometallurgy and controlled pyrometallurgy, which can extract valuable materials from used batteries more effectively than traditional recycling methods. Other approaches we are working on is the use of biological systems, such as bacteria and fungi, to break down battery components and recover valuable metals.

Overall, it's likely that we will see significant advancements in waste lithium-ion battery recycling technology over the next decade, as companies and researchers continue to invest in this area and work towards more sustainable and efficient solutions.

### Are there any plans to improve your processes or expand your services in the future?

**Anupam Kumar & Arvind Bhardwaj:** MiniMines plans to build a 3000-ton processing facility within the current year and three collection hubs in India for battery and black mass extraction, which could be designed as follows:

*Research and Development:* The first step in the roadmap was to conduct thorough research and development for a sustainable recycling process. This helped us in the identification of the most efficient and cost-effective technology for recycling lithium-ion batteries. After optimising the process for extracting black mass and elemental extraction process development, which is a crucial step in the recycling process, now the R&D activities are focused on optimising scalability of the process, minimising waste, and reducing the overall environmental impact.

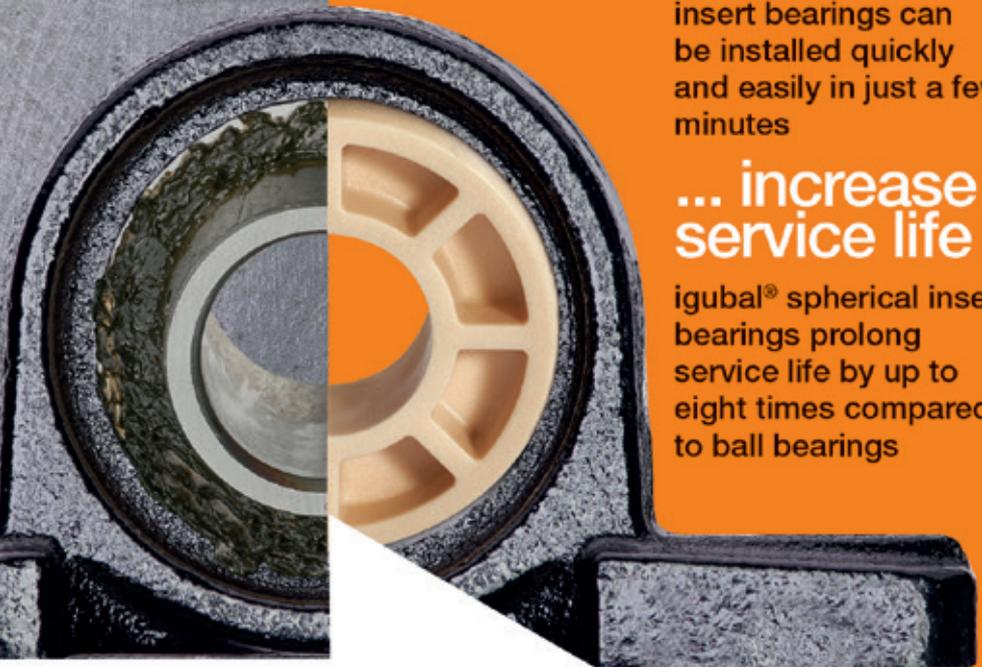
*Facility Design and Construction:* Currently we are designing and constructing the 3000 ton/annum commercial processing facility. The facility is designed to meet the specific requirements of the recycling process, and it is scalable up to 5000 ton/annum for future expansion. The facility is designed to comply with all relevant safety and environmental regulations.

*Battery Collection Hubs:* The next step in the roadmap is to set up three separate battery collection hubs. These hubs should be strategically located to ensure maximum coverage and convenience for customers. The hubs should be designed to receive, sort, and store batteries before transporting them to the processing facility.

*Black Mass Extraction Hubs:* The fourth step in the roadmap is to set up three separate black mass extraction hubs. These hubs will be strategically located to ensure maximum efficiency and convenience for the recycling process. The hubs should be designed to receive black mass from the processing facility and extract valuable metals and materials for reuse. 

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By Murali Pullela, Director Sales, India ANSYS Inc.

## ACCELERATING A SUSTAINABLE FUTURE THROUGH SIMULATION

The article demonstrates how simulation can help industries pave the way for a greener future while enabling them to adopt more efficient practices during the manufacturing, utilisation, and maintenance of products.

While discussing sustainability, several things come into our collective consciousness. Some may think about wind farms, green initiatives, recycling, electric vehicles, or even planting trees. However, sustainability goes beyond these separate concepts. It is the entirety of our efforts to meet current needs while ensuring that future generations can do the same. At its core, sustainability goes beyond mere conservation; it is also about safeguarding humanity.

In a product lifecycle, sustainability means realising the product with reduced and recyclable materials, reduced energy input, and reduced emissions during product manufacturing. Simulation plays a crucial role in sustainability throughout the entire product lifecycle. It expedites time-to-market, optimises resource utilisation, minimises product footprints, and cuts costs. Simulation accurately depicts product functionality and allows engineers to transition confidently from concept to reality. It helps industries align with the fast-paced competitive market demands of today. Simulation aids engineering teams in understanding resource conservation and emission reduction strategies during product enhancement. Beyond the design phase, simulation demonstrates how companies can adopt more efficient practices during manufacturing, utilisation, and maintenance of products.

Multiphysics simulation is like a sneak peek into the future. Engineers operate within short timeframes with limited resources. Simulation can accelerate sustainable concepts while optimising efficiency.

### SUSTAINABILITY STRATEGY

Breaking down sustainability into manageable components enables progress tracking. The need of the hour is a dual-focused strategy that covers



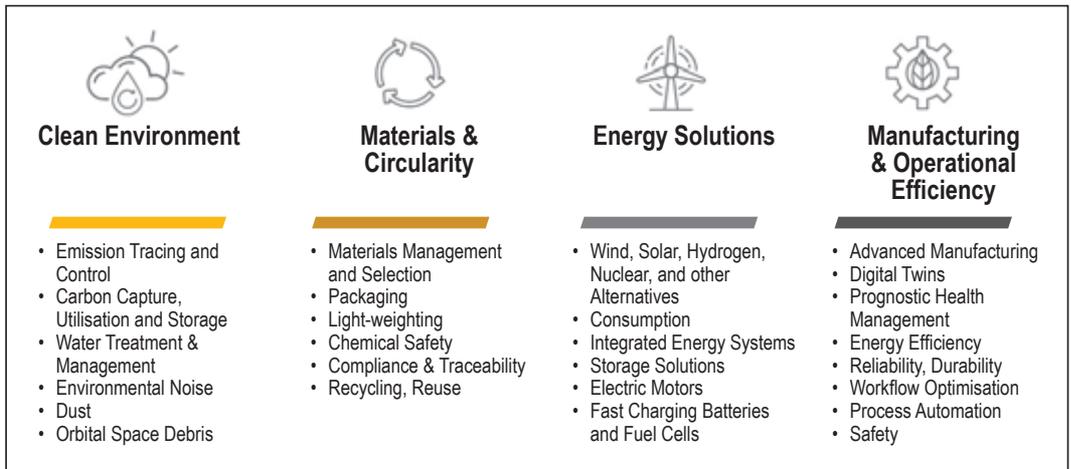
environmental, social, and governance (ESG) objectives and supports customers in achieving sustainability goals through simulation. Simulation tools accelerate the development of newer, more efficient, eco-friendly technologies and reduce waste and physical prototypes. By instilling ESG objectives into decision-making, long-term business value can be created, fostering a quicker transition towards a sustainable future.

Various industries can harness simulation as a facilitator for achieving their sustainability goals. Within the energy sector, companies are curbing greenhouse gas emissions, enhancing low-carbon energy alternatives, and streamlining operations through digital twins fuelled by simulation and artificial intelligence. Automakers are transitioning towards electric mobility while improving aerodynamics and reducing vehicle weight to extend range. In aerospace, endeavours involve exploring novel propulsion and fuel storage methods alongside advanced manufacturing and model-based system engineering. The high-tech sector leverages simulation to craft energy-efficient electronics embedded with material intelligence, fostering enhanced e-waste recovery. Furthermore, heavy industry, pivotal in crafting industrial machinery and materials, is shifting towards digital workflows reliant on the industrial Internet of Things (IIoT), optimising operations, conserving energy, and mitigating pollution.

Given the widespread integration of simulation into sustainability initiatives across industries, sustainability-focused solutions can be focused into four key pillars:

The first is a 'Clean Environment' that encompasses solutions that help customers filter pollutants from the environment, optimise energy usage, and extract carbon from the atmosphere.

The second is 'Materials and Circularity,'



which revolutionises product lifecycle management by facilitating product creation, manufacturing, distribution, recapture, sorting, and reuse, thereby minimising waste in the collective future.

The third is 'Energy Solutions,' which provides technical leverage to drive the decarbonisation of energy systems and aid customers in transitioning towards energy-efficient and renewable solutions.

Finally, 'Manufacturing and Operational Efficiency' equips manufacturers with solutions to streamline operations, optimise material usage, and enhance reliability, ultimately reducing power consumption and emissions.

#### OVERCOMING OBSTACLES WITH SIMULATION:

Proficiently using energy sources, including wind, solar, hydrogen, consumer waste, biofuel, etc., requires addressing complex, physics-based challenges. Baker Hughes and LG Electronics, among others, have already employed Ansys simulation techniques for sustainable manufacturing. Simulation catalyses sustainability across the product lifecycle, spanning conceptualisation and design to prototype testing, production, operations, and end-of-life considerations.

Simulation yields numerous sustainability benefits across various aspects. Materials Intelligence initiatives encompass lightweighting strategies, compliance with regulations, sourcing non-conflict materials, and increasing the utilisation of sustainable materials and processes. This can be enabled through the suitable materials information repository. With broad coverage of material types and property data, the Ansys materials database allows users to take simulation to the next level with instant access to consistent, validated, and ready-to-use data. This will ensure intelligent material selection, optimum material utilisation, traceability, and compliance throughout the product development lifecycle.

Multiphysics Solvers mean improved designs, fewer physical tests, and reduced waste. Utilising Autonomous Vehicle Simulation leads to decreased fuel consumption, lower insurance costs, and enhanced safety measures. Implementing Design Optimisation & Digital Twins facilitates streamlined production processes and predictive maintenance practices. Regulatory Approval simulations ensure compliance, authorise materials usage, adhere to noise limitations, and conduct comprehensive risk assessments. Simulation Process and Data Management practices enable sustainability tracing, enhance process predictability, and provide better control over data access and utilisation, preserving intellectual property and fostering sustainable talent development. Model-Based Systems Engineering initiatives minimise waste, optimise product designs, guarantee meeting requirements, and accelerate speed to market. Digital Mission Engineering endeavours focus on space debris removal, optimising missions, and pioneering novel mission approaches. Companies can achieve greater efficiency, reduce waste, and contribute to a more sustainable future through these comprehensive simulation-driven sustainability strategies.

#### MANUFACTURING AND OPERATIONAL EFFICIENCY:

Simulation lets manufacturers plan and optimise operations meticulously, leading to more efficient material usage and better reliability. This reduces power consumption, lowers emissions, and contributes to sustainability. With features like advanced manufacturing techniques, digital twins for predictive analysis, and prognostic health management, simulation empowers manufacturers to achieve superior energy efficiency, ensure product reliability and durability, and optimise workflow processes. For example, Ansys supported advanced air purification technology startup Praan for its clean-air mission by accelerating prototype development from four-and-a-half years to 45 days. On



Simulation tools accelerate the development of newer, more efficient, eco-friendly technologies and reduce waste and physical prototypes. By instilling ESG objectives into decision-making, long-term business value can be created, fostering a quicker transition towards a sustainable future.

the other hand, Atomberg, a leading high-efficiency fan and small appliance manufacturer, used Ansys simulation solutions to develop intelligent fans with 65 per cent less electricity consumption.

In sustainable digital manufacturing, particularly in sheet metal forming, the challenges of reducing energy consumption and shortening the design cycle

are effectively addressed through simulation-driven solutions. Rapid decisions can be made by simulating the end-to-end forming process and evaluating formability, leading to reduced wrinkling, and thinning of sheet metal while optimising the forming process and yield. The outcome is significant: a reduction in industrial waste stemming from failed components during forming, a minimised environmental impact from inefficient processes, and an elimination of energy costs associated with physical testing. This approach enhances sustainability and improves efficiency and cost-effectiveness in sheet metal forming operations.

Simulation enables companies to conserve resources and energy and reduce emissions before physically constructing products. It plays an essential role in augmenting the speed and cost-effectiveness of environmental innovation and accelerating the development, maturation, and deployment of new technologies. By providing predictive certainty, simulation is instrumental for a sustainable future. 

## LAPP UNVEILS 'ALIVE BY LAPP'

In today's dynamic industrial landscape, adaptability and innovation are crucial. LAPP stands as a beacon of transformation, unveiling its new brand identity and tagline, "Alive by LAPP". This initiative reflects the company's evolution over the last 65 years from a cable manufacturer to an integral industry partner dedicated to bringing industries to life, providing customised solutions that drive innovation and success for its customers.

The legacy of innovation, spearheaded by Oskar Lapp's invention of the first industrially manufactured colour coded wires under the brand name ÖLFLEX® in 1958, has propelled LAPP to become a pioneer in cable and connectivity technology. LAPP's commitment to delivering customised solutions remains resolute. Developed by experts for experts, the company consistently provides tailor-made connection systems for projects across different segments. Beyond cable supply, LAPP is dedicated to designing optimised end-to-end solutions and providing high-quality standard products, that actively contribute to bringing industries to life.

"At the heart of LAPP's mission is a powerful message: 'bringing industries to life.' This dedication positions LAPP as a global leader in connectivity technology, exemplified by its journey from a cable manufacturer to a preferred partner for connectivity solutions, a testament to the company's unwavering commitment to excellence and innovation."

Matthias Lapp, CEO of LAPP, emphasises, "It's all about our customers and their needs. They are the linchpin of everything we do. 'Alive by LAPP' is



more than just a tagline. It accompanies us in every customer conversation, in the online shop or in corporate communication. LAPP is everywhere: countless applications, machines, and industries around the world run thanks to our connection solutions. In a world that depends on connections, 'Alive by LAPP' is a promise."

Marc Jarrault, Managing Director, Lapp India adds, "The refreshed brand identity, with its vibrant blend of orange and purple reflects a deeper commitment to the future. The orange, the foundation of our heritage, continues to symbolise the energetic spirit of innovation that has always driven us. The additional dash of purple signifies our focus to be a more inclusive and accessible brand, communicating with a broader audience, young and old, and empowering future generations to shape a more connected world. This new identity also reflects our dedication to fostering diversity within LAPP. Ultimately, orange and purple together represent the dynamic energy and collaborative spirit that LAPP brings to creating solutions that keep industries alive."

By Rony Banerjee, Advisor World Association for Small and Medium enterprises (WASME);  
Mentor, Startup Innovation and Incubation Centre, IIT Kanpur & Advisor EY

## THE SYNERGISTIC FUTURE OF MSMEs AND STARTUPS IN INDIA'S MANUFACTURING SECTOR

The article delves into the immense possibilities that MSMEs and startup collaboration hold for transforming manufacturing practices, underscored by the supportive role of funding mechanisms and a conducive policy environment.

India's Micro, Small, and Medium Enterprises (MSMEs) in the manufacturing sector stand at a pivotal moment, ready to drive significant economic growth and innovation. With the burgeoning startup ecosystem offering fresh perspectives and technologies, the future holds immense possibilities for transforming manufacturing into a more efficient, sustainable, and globally competitive industry.

The MSMEs can harness the power of innovation and collaborate with startups to revolutionise manufacturing practices, underscored by the supportive role of funding mechanisms and a conducive policy environment.

The intersection of MSMEs and startups in India's manufacturing sector represents a fertile ground for innovation, sustainability, and growth. As these entities collaborate more closely, leveraging cutting-edge technologies and supported by conducive policies and funding mechanisms, the path to a more



efficient, sustainable, and competitive manufacturing landscape becomes clear. The future of manufacturing in India is not just about technological adoption but about creating a synergistic ecosystem where innovation thrives, sustainability is a priority, and global competitiveness is a natural outcome. As we envision the future of India's manufacturing sector, buoyed by the collaborative dynamism between MSMEs and startups, we

stand on the brink of a transformative era.

By integrating smart technologies, MSMEs can significantly reduce their environmental footprint while enhancing productivity and operational efficiency. Startups, with their agility and their expertise in developing cutting-edge solutions for smart grids, renewable energy, and energy-efficient practices can help MSMEs navigate the path towards sustainable manufacturing.

Startups specialising in smart grid technologies, EV charging infrastructures, and IoT solutions can offer MSMEs unparalleled advantages. These can be instrumental in revolutionising production processes and enhancing customer engagement. Erstwhile, a significant barrier to innovation for MSMEs and startups alike has been accessing to necessary funding and resources. Recognising this, initiatives like the "Kavachh Investment Scheme" represent a step forward, offering financial support and resources crucial for growth and innovation. Government and private investments are increasingly acknowledging the potential of startups and MSMEs in driving technological advancement within the manufacturing sector. Enhanced access to funding not only propels innovation but also ensures that MSMEs can scale their operations to meet both domestic and global demand.

Let's us take a closer look at some key sectors that are on the sunshine era in India and the role of the tech



The article's intentions to foster innovation, sustainability, and global competitiveness within India's MSME and startup ecosystem in the manufacturing sector are closely aligned with several key government schemes and initiatives. These initiatives not only aim to support the financial, technological, and infrastructural needs of MSMEs and startups, but also emphasise the importance of sustainability and innovation. Here are some significant schemes that directly support the article's intentions:

**1. Make in India:** Launched to encourage companies to manufacture their products in India and incentivise dedicated investments into manufacturing. The initiative aims at fostering innovation, protecting intellectual property, and enhancing skill development.

**2. Atmanirbhar Bharat Abhiyan (Self-reliant India):** This comprehensive package is aimed at making India self-reliant by bolstering various sectors, including MSMEs. It includes specific measures for financial support, equity infusion, and debt relief to help businesses, including startups, withstand the economic impact of the pandemic and thrive thereafter.

**3. Startup India:** A flagship initiative aimed at fostering innovation and creating a robust startup ecosystem in India. It provides startups with tax benefits, easier compliance, incubation opportunities, and financial incentives to encourage entrepreneurship and innovative ventures.

**4. MSME Samadhaan:** This scheme is designed to address the challenge of delayed payments to MSMEs by providing them with a platform to file their grievances regarding delayed payments.

**5. Digital MSME Scheme:** This initiative aims to make MSMEs digitally empowered and motivate them to adopt ICT tools and applications in their production and business processes, thereby improving their competitiveness in the national and international markets.

**6. Pradhan Mantri Mudra Yojana (PMMY):** Aimed at providing loans up to Rs 10 lakhs to the non-corporate, non-farm small/micro enterprises. The loans under this scheme are extended by various sectors including banks, NBFCs, and MFIs to encourage entrepreneurship.



**7. Scheme for Promotion of Innovation, Rural Industry & Entrepreneurship (ASPIRE):** This scheme promotes innovation and entrepreneurship in rural and agriculture-based industries. It supports startups and innovations that can contribute to the rural economy and enhance the competitiveness of MSMEs.

**8. Smart Cities Mission:** Although not directly targeted at MSMEs or startups/manufacturing units, this initiative aims at developing 100 smart cities across the country, making them citizen-friendly and sustainable. The mission opens avenues for startups in areas like IoT, smart energy solutions, and urban infrastructure.

**9. National Electric Mobility Mission Plan (NEMMP):** This initiative aims to promote electric mobility in the country. It supports the development of electric vehicle infrastructure and promotes innovation in electric mobility solutions, directly benefiting startups and MSMEs in the EV sector.

**10. Production Linked Incentive (PLI) Scheme:** Aimed at boosting the manufacturing sector's productivity by offering incentives on incremental sales from products manufactured in India. It supports various sectors, including those relevant for MSMEs and startups, such as electronics, pharmaceuticals, chemicals, and renewable energy.

startups in their ecosystem. The transition to electric power marks a cornerstone of modern manufacturing, emphasising cleaner production methods and energy

consumption. Startups, through their collaborative efforts, are set to redefine the energy landscape, integrating renewable sources and innovative storage



solutions to power the factories of the future. By adopting to innovations in LED technologies, manufacturing units can significantly reduce energy consumption and carbon footprint, aligning with global environmental goals while cutting operational costs.

From real-time monitoring of production lines to predictive maintenance, IoT solutions enable MSMEs to achieve unparalleled levels of efficiency and agility, fostering a responsive and adaptive manufacturing ecosystem. The backbone of the new electric era, electrical power equipment, evolves with the contributions of innovative startups. Advanced manufacturing techniques and materials are paving the way for more efficient, durable, and smarter power equipment, essential for the transition towards a fully electrified manufacturing sector. Energy Storage Systems (ESS) are revolutionising how we store and utilise energy, providing manufacturing units with the flexibility to harness renewable energy more effectively. The sector's growth, fuelled by MSME-startup collaborations, ensures a stable and sustainable

energy supply, critical for continuous and efficient manufacturing operations.

The exploration and adoption of new energy technologies, including hydrogen fuel cells and bioenergy, open new avenues for sustainable manufacturing. These technologies offer clean alternatives to fossil fuels, reducing the environmental impact of production processes and pushing the boundaries of what's possible in energy generation and utilisation. Innovations in power generation, driven by the need for sustainability and efficiency, are transforming power plants into models of green energy. The electric vehicle revolution is not complete without a robust EV charging infrastructure. The concept of the Smart Grid integrates communication technology and power infrastructure, leading to more efficient electricity distribution and usage. The manufacturing sector's embrace of electric vehicles extends beyond their production to their integration within logistics and transportation.

The journey towards a sustainable, efficient, and innovative manufacturing sector in India is both ambitious and necessary. Through the synergies between MSMEs and startups, underpinned by a commitment to leveraging the latest in electric power, LED lighting, smart IoT, and renewable energy, the sector is all set to lead India into a new era. An era where manufacturing not only drives economic growth but does so responsibly, sustainably, and inclusively, setting a global benchmark for what the future of industry can and should look like.

In the spirit of India's ambitious 'Atmanirbhar Bharat' mission, which aims to make the country self-reliant and a global manufacturing hub, the synergistic future of MSMEs and startups in India's manufacturing sector is not just an opportunity but a national imperative. This collaborative ecosystem, marked by innovation and sustainability, aligns perfectly with the government's vision, promising to propel India towards achieving unparalleled economic growth and technological self-sufficiency. 

## KFIL COMMISSIONS ITS PULVERISED COAL INJECTION PLANT AT KOPPAL

**K**irloskar Ferrous Industries Limited, one of the leading castings and pig iron manufacturers in India, announced the successful commissioning of its state-of-the-art Pulverised Coal Injection (PCI) Plant located in Koppal district, Karnataka.

R.V.Gumaste, Managing Director, KFIL, expressed his enthusiasm regarding the commissioning of the PCI Plant, stating, "The successful commissioning of our Pulverised Coal Injection Plant

marks a significant milestone in our journey towards sustainable manufacturing processes. This investment underscores our unwavering commitment to cost reduction, efficiency and cost competitiveness."

PCI Plant is equipped with advanced automation and control system. By utilising the pulverised coal as part of fuel for the mini blast furnaces, KFIL will reduce its coke consumption and achieve fuel cost savings thereby reducing the overall production cost.

## IGUS LAUNCHES NEW COMPACT LOW-COST ENERGY CHAIN FOR DRAWERS

For cable guidance in drawers and pull-outs of all kinds, igus is launching the draw e-chain.

Thanks to the minimalist design, the price of the compact energy chain is 30 per cent lower than the most cost-effective standard e-chains. This protects against expensive oversizing, especially if the application is only moved a little.

From drawers in camper vans to pull-outs in server racks in data centres: industrial energy chains for hundreds of thousands of cycles are oversized for guiding cables in applications where movement only occurs occasionally. Users would pay for features that they do not need. "We have therefore developed the draw e-chain, a new compact low-cost energy chain for cable guidance in drawers and pull-outs of all kinds," explains Jörg Ottersbach, Head of the e-chain Business Unit at igus. The new energy chain has a bend radius of 45mm, an external width of 45mm and an external height of just 22mm. "This makes it 13 per cent flatter than our flattest standard e-chain B17.1.048.0 to date."

### Minimalist design makes draw e-chain particularly cost-effective

The draw-e-chain is not only more compact than standard models, but it also costs less. The reason: there are no mechanically complex components. The injection-moulded e-chain does not need any chain links to fold. Instead, the segments are flexible enough to allow the required bending. Thanks to this absence of



chain links, the draw-e-chain consists of just six segments per metre, which can be connected via a simple connector system, which reduces effort and costs. "Due to this minimalist design, the draw e-chain costs 30 per cent less than our most cost-effective standard e-chain," says Ottersbach.

### Assembly completed in just a few minutes

The draw e-chain is designed so that users can assemble it by hand in a very short time.

The low-cost energy chain is designed for installation rotated by 90 degrees, for example on the inner side of a drawer. Connection elements are not necessary. The segments of the cable guidance have holes for screws. "Inserting cables is also done quickly," says Ottersbach. Unlike standard e-chains, there are no crossbars that users must open first. "You can simply push the cables through the bendable tabs of the energy chain from above. That takes just a few seconds."

## LVD LAUNCHES NEW EASY-CELL BENDING AUTOMATION

LVD Company nv launches Easy-Cell 80/25, the latest in its line of robotic bending cells for automated bending. Easy-Cell offers high flexibility to produce a wide range of parts with the precision of a built-in adaptive bending system which ensures bend angle accuracy from the first part. The robotic bending cell incorporates LVD's advanced software for fast, simple offline programming of both press brake and robot. Users benefit from the productivity of automated bending with high process reliability and low part cost.

**Flexible Scope:** Easy-Cell 80/25 combines an Easy-Form 80-ton press brake with Kuka industrial robot to handle parts from 100 x 100 mm up to 1600 x 1200 mm weighing up to 25 kg. The press brake features a 2500 mm bend length, five-axis back gauge, and 2500 mm crowning table,

providing the versatility to accommodate a broad scope of bending applications.

The cell features multiple robot grippers that can be easily changed to suit the job. The robot uses a unique swivel function to optimise

workpiece regripping. The swivel movement reduces the time it takes for regripping, improving overall cycle time.

**Precise Part Production:** Easy-Cell is equipped with LVD's Easy-Form® Laser for bend accuracy assured from the first part. Automation with built-in quality assurance provides a high degree of consistency in production, especially critical for automated operations.

Easy-Form laser uses adaptive, in-process control over the bend angle. The system compensates for material variations such as sheet thickness, strain hardening and grain direction. Scanners continuously measure the bend angle and transmit the information in real time to the



CNC control for immediate adjustment of the punch position to achieve the correct angle. The bending process is not interrupted and no production time is lost.

**Powerful Software:** Powered by LVD's CADMAN-SIM software, Easy-Cell accelerates "art to part" production with automatic generation of bending and robot program. The software defines all gripper positions and optimises the program for bending sequence,

collision-free operation, and other parameters. Programming is handled offline. No robot teaching is required.

**Automation Within Reach:** With Easy-Cell, LVD expands its portfolio of bending automation solutions to meet

the challenges of present-day manufacturing. Easy-Cell has the flexibility to handle a broad array of applications with built-in quality control to ensure repeatable accuracy in continuous, automated production.

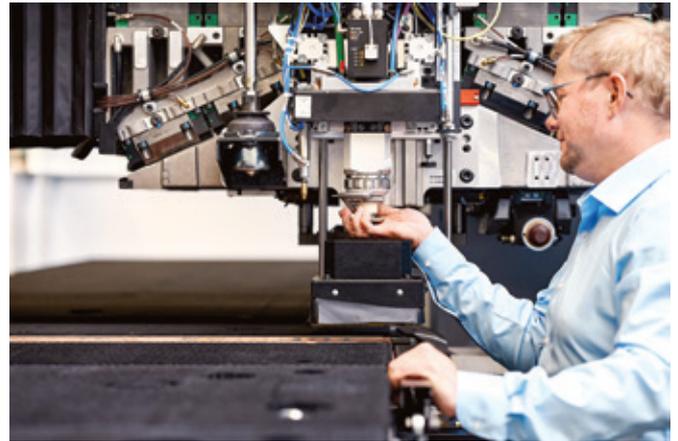
## AI-BASED RUN-IN ASSISTANT FROM TRUMPF SAVES TIME AND REDUCES COSTS

At this year's in-house INTECH exhibition, TRUMPF is presenting the "Runability Guide," an initial version of a new AI-based solution that helps production employees run in the high-performance TruMatic 5000 punch laser machine more quickly and more easily. At present, when using the machine to produce a new order with a new geometry or from new materials, users must individually test the machine program. This results in idle machine time that can quickly add up, especially with fully automated machines that produce many different parts. With TRUMPF's AI-supported software Runability Guide, users can avoid idle times of up to 20 minutes when running in the system. Based on various evaluation models, the new run-in assistant shows for each new job whether the TruMatic 5000 can produce parts directly or whether manual intervention will be required. "Our Runability Guide gives companies an advantage in productivity and competitiveness," explains Jonathan Eberle, Project Leader at TRUMPF's Development department. "This not only saves them time but also means they can then use employees' skills for other value-creating tasks or for training new personnel."

**Software recommends which parts are suitable for night-shift production:** When a machine produces parts automatically, problems can occur. For example, an automated machine may be unable to remove the part cleanly from the scrap skeleton. The result is machine downtime, until a production employee has manually removed the part from the machine interior and restarted the process.

Whether the part can be removed without interrupting the process depends, among other things, on its geometry and how the grippers are positioned on the workpiece. In this case, TRUMPF's Runability Guide will check, for example, how much the part will buckle because of gravitational force during removal and thereby possibly cause the process to jam. If a pre-defined limit value is exceeded, the software marks the corresponding area in red. This means that users can see immediately which parts of a job require attention. In addition to analysing possible problems, the software also recommends which jobs are suitable for the night shift.

"Normally, an expert would have to assess the geometry of the part along with the material, sheet



thickness and other factors," Eberle says. "But our solution uses AI to make this decision and also learns on the job for future problems."

**Evaluation in a matter of seconds:** TRUMPF's Runability Guide uses various models to determine a part's complexity. For this purpose, development engineers from TRUMPF continually upload knowledge from production experts into the cloud. In addition, the software uses physical simulations and AI to identify any possible problems in each of the process steps. Finally, the solution also works with genuine machine data from TruMatic 5000 users. This enables it to draw inferences about potential issues during processing. "Once all the models have been used to evaluate the job, the solution delivers its assessment," Eberle explains. "Depending on the part, this would take up to an hour with

classic physical simulation models. But by using AI, we can significantly accelerate this process, meaning that our customers can use it virtually in real time."

**Machine data from users required to further improve the software:** For companies purchasing the TruMatic 5000 from TRUMPF, the Runability Guide is included in the scope of delivery – provided they make their machine data available to TRUMPF. "Unlike conventional software, users start with only a small scope of functions," Eberle says. "Their production data then helps us to continually improve the solution, which in turn benefits our customers. This is the kind of new development approach we need to generate value from the use of data and AI in production." The TRUMPF in-house exhibition INTECH will take place from 9 to 12 April at the high-tech company in Ditzingen.

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