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**PRESCRIPTION FOR
SUCCESS**

The Indian pharma industry, accounting for 20% of global generic exports, aims to reach \$130 billion by 2030. Advanced manufacturing technologies like automation, AI, blockchain, etc can be enablers in this quest.

INSIDE

- Why AI is imperative for sustainability in industries 51
- Tips to additively make pressure vessel 65
- Interview: Benjamin Lin, President, Delta Electronics India 91
- How blockchain is revolutionising logistics sector 93
- Start-up Talk: EndureAir arming India with drone technology 104

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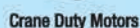




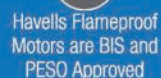
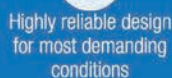
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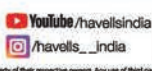
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“Despite several geopolitical challenges, India’s exports increased to \$35 billion in September 2024 compared to \$34 billion a year earlier. This uptick was supported by steady growth in engineering exports to Russia & Europe.

Chinese Checkers

The latest HSBC Flash India PMI indicates a slight revival in India’s economic growth activity for October 2024, primarily led by renewed strength in the manufacturing sector after a slowdown in September. The services PMI business activity index edged up from 57.7 in September to 57.9 in October, while the manufacturing PMI output index marked a more notable rise, increasing to 60.1 from the previous month’s 59.8. Accelerated new orders in both domestic and export markets signal a favourable outlook for industrial production throughout the remaining months of 2024. Part of the overall increase in new orders is attributed to improved international demand for Indian goods and services, according to the survey.

Despite several geopolitical challenges, India’s exports increased to \$35 billion in September 2024 compared to \$34 billion a year earlier. This uptick was supported by steady growth in engineering exports to Russia and Europe, where military spending has risen, alongside increased exports of tech products such as cell phones to the US. This export growth contributed to India’s goods trade deficit shrinking to a five-month low of \$21 billion in September, down from a ten-month high of \$30 billion in August.

According to the International Monetary Fund (IMF), there has been a significant global shift in manufacturing production towards emerging markets like India and China, as advanced economies lose competitiveness. This presents countries like India a big opportunity to become key players in the global manufacturing landscape. However, India must advance its manufacturing capacity to seize this opportunity.

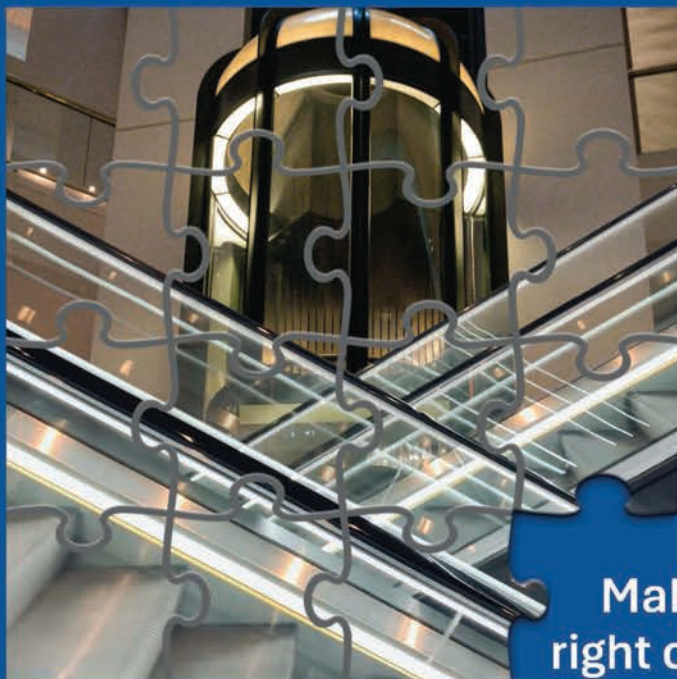
As per the recent study of Oxford Economics (a global economic think tank), India has not attracted a considerable share of manufacturing firms and foreign capital relocating from China in response to US-China trade tensions. Other Asian nations, particularly Vietnam, appear to have gained the most from this shift. Between 2017 and 2023, China’s share in US imports (excluding Hong Kong) fell by a striking eight per cent, dropping below 14 per cent from over 22 per cent. Meanwhile, India’s total share in US imports grew modestly by only 0.6 per cent, reaching 2.7 per cent of the US’s global imports in the same period. Vietnam, on the other hand, saw its share in overall US imports increase by 1.7 per cent to 3.7 per cent.

Earlier this year in July, the Chief Economic Adviser V Anantha Nageswaran, highlighted in his Economic Survey recommendations that India was faced with two strategic choices: integrating into China’s supply chain or promoting FDI from China. The report argued that focusing on FDI from China was more promising for boosting India’s exports to markets like the US, following the successful model of East Asian economies. Vietnam has successfully boosted its exports to the US by becoming the default destination for Chinese manufacturing. With strategic stance in diplomacy, India too could benefit both in terms of boosting manufacturing output, as a result of attracting Chinese FDI and then boosting exports to the US and European markets.

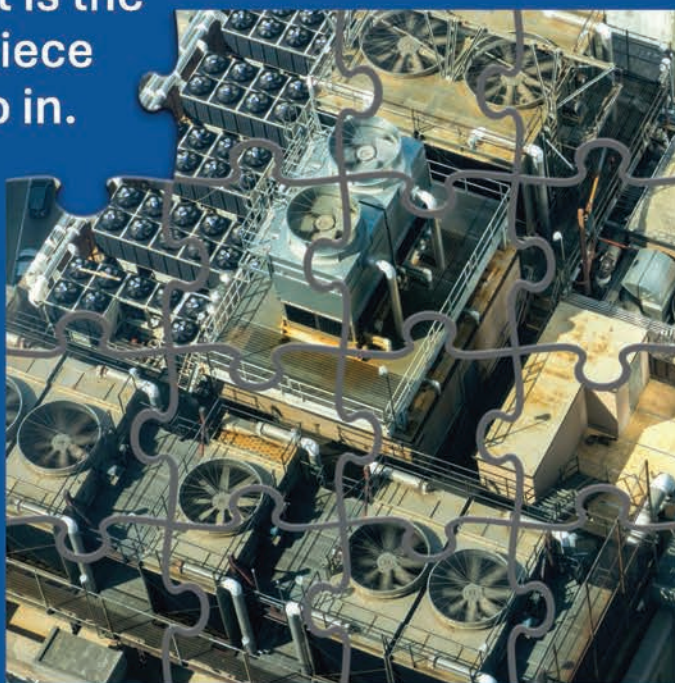
The Oxford Economics study points out that India’s export strengths remain focused on traditional industries, which face limited growth potential and intense competition. Therefore, to compete more effectively on a global scale, India will need to foster high-tech manufacturing too by promoting investment across the entire supply chain ecosystem.



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COVER STORY



44 Smarter Tech, Safer Medicines

In recent months, the Indian pharma industry, accounting for 20 per cent of global generic exports, has been facing problems related to quality from global & local regulators. By leveraging on AI and automation, the industry can not only overcome quality challenges, but can also help it reach the target of \$130 billion by 2030.

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By integrating AI into their strategic framework, businesses are positioned to drive and communicate their commitment to sustainability more effectively, writes Dr Heiko Claussen, SVP & Co-CTO, Aspen Technology, Inc.

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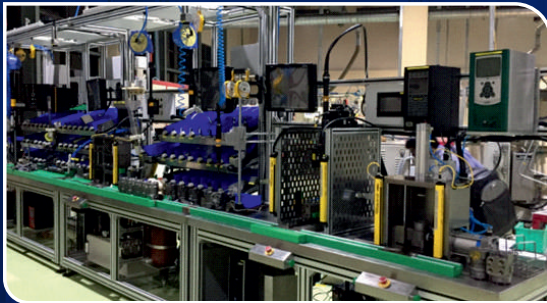
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CYLINDER HEAD & CYL. BLOCKS MACHINING

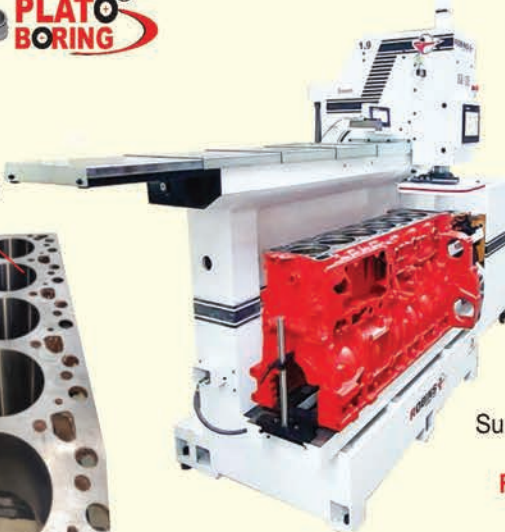
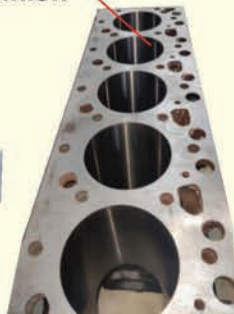
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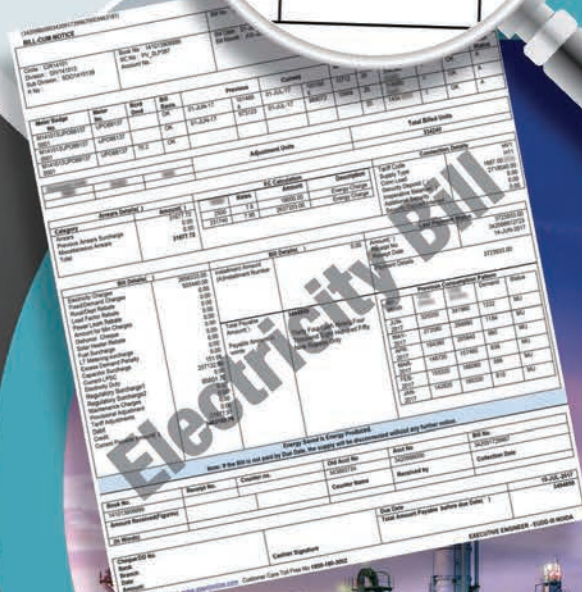
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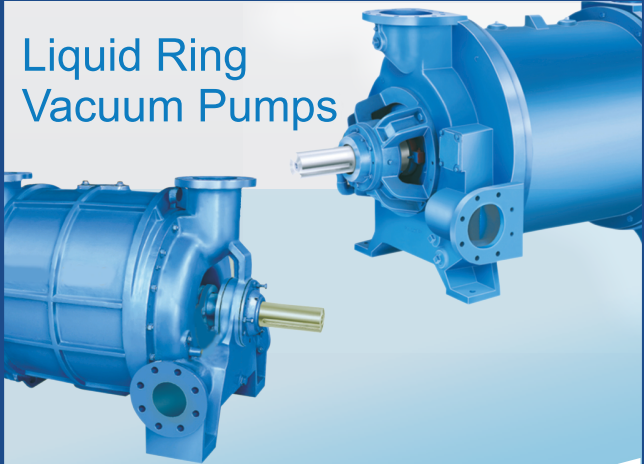


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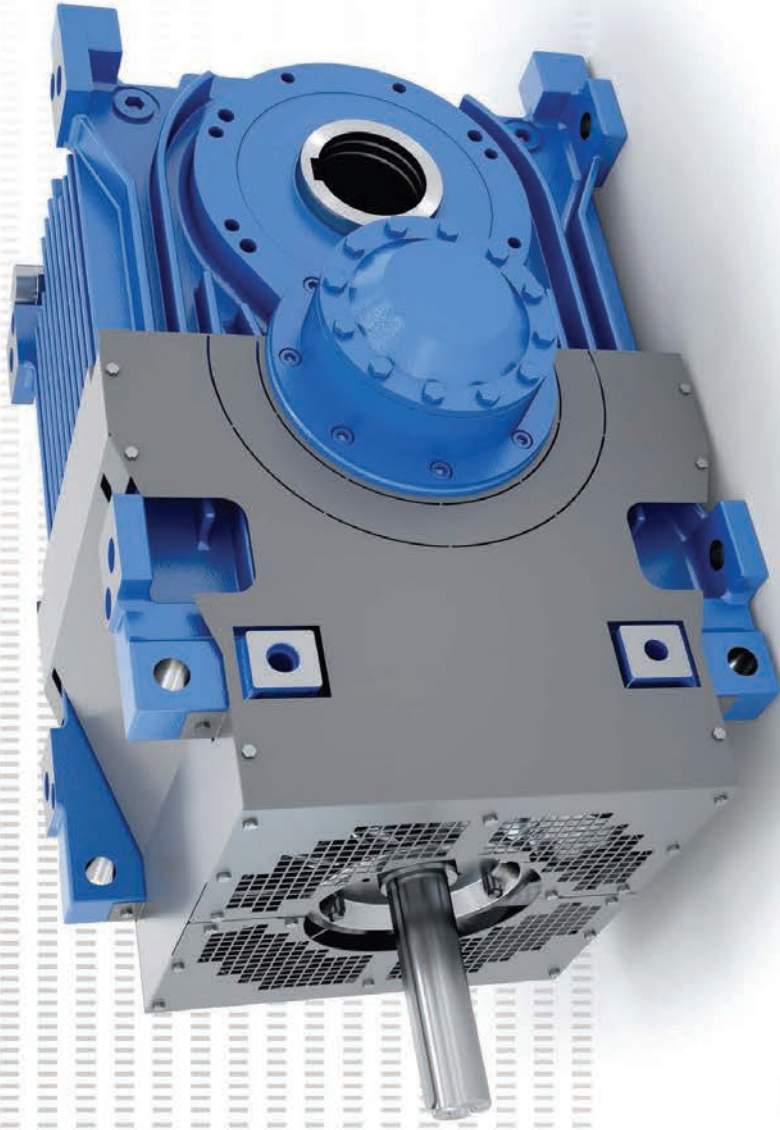
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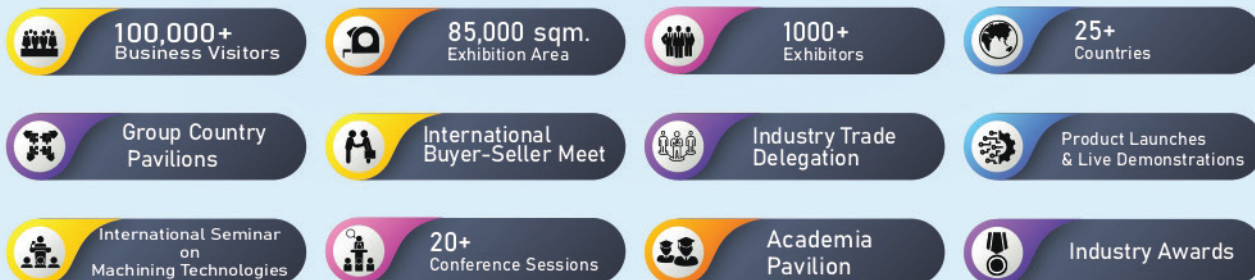
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Electrical and Electronics

Syrma SGS opens electronics facility

Syrma SGS Technology Ltd, one of the leading electronics systems design and manufacturing companies in India, has opened one of its largest state-of-the-art integrated electronics manufacturing facility in Ranjangaon near Pune. The new campus is spread across 26.5 acres of land and will have a manufacturing area of 1.20 million sq ft at its peak. This new campus will strengthen the company's Printed Circuit Board (PCB) assembly capabilities and will primarily serve the growing domestic demand for PCBAs, especially in the automotive and industrial sectors. The first phase of the facility commissioned on October 24, 2024, measuring over 60,000 sq ft, is expected to create approximately 1,000 direct employments.

With a clear vision, the company has positioned itself to quickly expand its capabilities and stay ahead of the curve in dynamic market trends. The new facility will complement company's existing manufacturing capacities by bringing operational efficiencies and positioning Syrma SGS as a key player in meeting the increasing demand for electronics manufacturing.

Industrial Automation

ABB and NAMTECH to set up School of Robotics in India

ABB Robotics and New Age Makers' Institute of Technology (NAMTECH) have signed a Memorandum of Understanding (MoU) to establish a School of Robotics, which will open in 2025 advancing robotics education and industry integration in India. This pioneering collaboration aims to close the education gap in automation, advancing robotics skills and industry integration in India. "With India's emphasis on education, upskilling, and youth employment, investing in high-quality engineering and technical education is vital for our future. ABB Robotics' collaboration with NAMTECH is pivotal to equip students with the skills necessary to succeed in the new era of automation. By integrating ABB's expertise in robotics and automation with NAMTECH's innovative educational approach, we will support the continued



growth of India's manufacturing sector," said Subrata Karmakar, President Robotics & Discrete Automation Division, ABB India.

NAMTECH aims to create a high-quality, world-class engineering workforce proficient in next-generation technologies, with a strong emphasis on

Industry 4.0, sustainability, and management principles. NAMTECH is structured around five schools and several competency centers – including the School of Manufacturing Technologies, the School of Manufacturing Design and AI, the School of Sustainability, the School of Robotics, and the School for Social Impact. Each institution is guided by a global academic partner and collaborates with major industry players. In 2023, India set a new record with the installation of 8,510 industrial robots.



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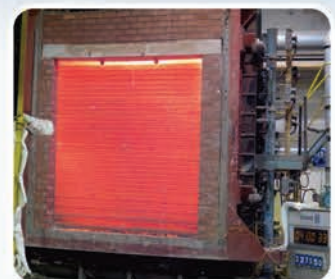
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Auto Components

Ratan Tata passes away: India mourns the loss of a titan

Ratan Tata, the former chairman of Tata Sons and an iconic figure in Indian industry, passed away at the age of 86, leaving a profound impact on the nation and the global business community. Tata, who led the conglomerate for over two decades from 1991 to 2012, died on the night of October 9, sending waves of grief through a nation that held him in the highest esteem.

Tata was admitted to Mumbai's Breach Candy Hospital on September 7 for a series of routine medical check-ups. Although he initially reassured the public that there was "no cause for concern" and that he remained "in good spirits," his condition worsened, culminating in a loss that will resonate deeply across India and beyond.

Born on December 28, 1937, Ratan Tata was a scion of the illustrious Tata family and the great-grandson of Jamsetji Tata, the founder of the Tata Group. After completing his early education in Mumbai, he went on to

earn a degree in Architecture from Cornell University in 1962 and later attended the Advanced Management Program at Harvard Business School in 1975.

Ratan Tata returned to India in 1962 and joined Tata Steel as a management trainee. His career saw a major shift in 1991 when he succeeded JRD Tata as chairman of Tata Sons, marking the beginning of a transformative era for the Tata Group. During his tenure, he led the group's expansion into global markets, acquiring several international companies and spearheading key projects.

One of his most celebrated achievements was the acquisition of Corus Steel in 2007, which positioned Tata Steel as a leading global player. Similarly, his strategic purchase of Jaguar Land Rover in 2008 elevated Tata Motors to the ranks of major luxury automobile manufacturers. He also introduced the world to the Tata Nano in 2008, showcasing his vision.

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Cleaning Systems

Germany's Kärcher bets big on India's cleaning market

Global cleaning equipment maker Alfred Kärcher SE & Co KG (Kärcher) has expanded its India market presence by launching advanced cleaning solutions for both professional and consumer segments. The company's new offerings for the professional segment include an autonomous scrubber-dryer (KIRA B 50), a high-performance autonomous cordless vacuum (KIRA CV 50), and a single-disc machine (BDS 43/165). Kärcher aims to enhance rental solutions for businesses, providing cost-effective access to their advanced cleaning equipment. In the consumer segment, they will launch a compact and advanced robotic vacuum cleaner (RCV2), following earlier introductions of RCV3 and RCV5 to tap into the home automation market. Highlighting the importance of India as a crucial market, Hartmut Jenner, CEO & Chairman, Alfred Kärcher SE & Co, stated, "Our consultative selling approach ensures we understand and address the specific needs of our clients, enabling us to maintain our market leadership, particularly in the professional sector. As we continue to



Hartmut Jenner (second from left), CEO & Chairman, Alfred Kärcher, with Jatinder Kaul (extreme left), MD, Kärcher India, and other team members

expand our customer base and enhance our product lines, including detergents, we will invest in infrastructure, training, and development to achieve consistent and sustainable growth."

The company will focus on its aftermarket and service division to maintain high levels of customer satisfaction, efficiency, and reliability across all customer care and service touchpoints through its subsidiary Kärcher India.

Management has also reiterated its commitment to empowering women

in the workforce and community. Several programs have been initiated to foster an inclusive work environment and promote gender diversity. Jatinder Kaul, MD, Kärcher India, noted, "As we deepen our presence in India, we remain focused on empowering communities and addressing local challenges, ensuring that our technology and solutions not only meet but exceed the expectations of our customers and society at large."

By Manish Pant

Industrial Automation

Bonfiglioli invests ₹3.2 billion in new industry and automation facility

Bonfiglioli Transmissions Pvt Ltd, the Indian subsidiary of Bonfiglioli Group, global leader in power transmission and drive solutions, celebrated a significant milestone with the foundation stone laying ceremony for its new industry and automation facility in Cheyyar, Tamil Nadu, and the inauguration of its Technology and Innovation Hub in Chennai.

The 25-acre Cheyyar plant, scheduled to commence operations by 2025, reinforces Bonfiglioli's commitment to the 'Make in India' initiative and solidifies its position as one of India's largest gearbox manufacturers. The facility will feature machinery, create 150-200 job opportunities, and cater to growing domestic demand for



heavy-duty industrial gearboxes. Bonfiglioli's latest investment is a strategic continuation of its previous year's investment in Pune, expanding its manufacturing capabilities for light and medium duty industrial gear boxes.

Bonfiglioli's new global competence centre, The Bonfiglioli Technology Space in Chennai, represents another milestone in the global Bonfiglioli innovation ecosystem, housing 180 engineers with diverse expertise. This cutting-edge facility will focus on research, development and technical support, integrating advanced technologies to create breakthrough solutions. The centre will also house testing laboratories that could be used to simulate real field working conditions.



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Corrosion Protection

Jasmino Corporation acquired German firms, HAW Lining and GBT Buecolit

Jasmino Corporation Pvt. Ltd., one of India's leading players in chemical process equipment engineering and corrosion protection, acquired two German companies, HAW Lining and GBT Buecolit. This move positions Jasmino as the world's 3rd largest provider of comprehensive heavy-duty industrial anti-corrosion lining solutions. Aligned with the company's vision to become a global leader and the preferred one-stop solution provider for critical equipment in chemical-based industries, this acquisition enhances Jasmino's reach to both domestic and international customers.

HAW Lining, a pioneer in rubber linings, has been instrumental in industrial corrosion protection for over 125 years, offering critical solutions to global industrial powerhouses. As the inventor of industrial rubber lining,



patented in 1920, HAW's technology has been fundamental in enabling the chemical industry revolution. With this acquisition, Jasmino now has access to the world's largest shop floor for anti-corrosive lining and one of Europe's largest equipment manufacturing facilities, spanning over 120,000 square meters. HAW's expertise and legacy in anti-corrosion solutions further strengthen Jasmino's position as a global leader in the field.

GBT Buecolit is one of Germany's leading companies in heavy-duty corrosion protection, specialising in coatings, plastic lining, and turnkey solutions. A renowned brand across Europe, GBT operates with subsidiaries in Poland and the Netherlands, and partners in Belgium, France, Switzerland, Luxembourg, and Jordan.

Chemical Processing

Johnson Matthey unveiled new engineering centre in Mumbai

Johnson Matthey (JM), a global leader in sustainable technologies, inaugurated its new Engineering Centre in Mumbai, further expanding its footprint in India. The facility will employ over 100 skilled professionals in the coming years and aligns with India's goal of achieving net-zero emissions by 2070.

This new centre reinforces JM's commitment to India as a hub for engineering and manufacturing excellence. It will leverage the country's engineering talent to support projects across JM's core licensing operations and emerging sectors like hydrogen, sustainable fuels, and specialty chemicals.

Maurits van Tol, Chief Executive-Catalyst Technologies, Johnson Matthey, said, "India is globally recognised for its engineering expertise, and expanding our team here is critical to meeting the demands of our customers and advancing low-carbon technologies. We are excited to deepen our presence in India and welcome more local talent into the JM family."

The centre will focus on developing solutions that reduce carbon emissions from fuels, power generation,

and hard-to-abate sectors. Key areas of interest include hydrogen, sustainable methanol, and green fuels, contributing to both JM's sustainability goals and India's clean energy transition.

The facility will be headed by Ramsundar Solaimalai, with its launch marked by a special event at the British High Commission in Mumbai. The reception was attended by key Indian policymakers and industry leaders.

Harjinder Kang, His Majesty's Trade Commissioner for South Asia and British Deputy High Commissioner for Western India, praised the initiative, saying, "Johnson Matthey's new engineering centre underscores the UK's commitment to clean growth. This venture will not only accelerate the adoption of low-carbon technologies but also exemplifies the importance of the UK-India partnership in driving sustainable development."

JM has been active in India for over 60 years, employing more than 1,000 people across eight sites in Uttar Pradesh, Gujarat, Maharashtra, and Haryana.



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Packaging

Omnia Technologies and Economy Process Solutions form joint venture in India

Omnia Technologies, a leading platform for processing automation and bottling technologies across the spirits, wine, beverage, dairy, and pharmaceutical industries, formed a strategic joint venture with Economy Process Solutions, India's leading provider of vacuum systems and process equipment. Headquartered in Pune, the joint venture aimed to become the top provider of processing and packaging equipment for Indian companies operating across the beverage and pharmaceutical value chains.

Omnia Technologies, headquartered in Treviso, Italy, reported a consolidated turnover of over €700 million, with 37 production sites, 24 commercial offices, and approximately 2,500 employees. The company was established in 2020 through the merger of renowned



brands, including Della Toffola, Bertolaso, TMCI Padovan, Frilli, ACMI, Comas, Tecnomaco, and several other strategic businesses.

Economy Process Solutions, based in Mumbai with manufacturing facilities in Chakan, Pune, had been a key partner of Omnia Technologies for nearly three decades. Since 1996, the company had promoted the Della

Toffola brand, starting with brewery filtration units and later expanding into winery and filtration markets, helping establish Della Toffola as a market leader.

The joint venture aimed for long-term growth by leveraging Omnia Technologies' technological leadership and Economy Process Solutions' engineering expertise and understanding of the Indian market. A Centre of Excellence was set to be established in Pune.

Renewable Energy

Navitas Solar declares new manufacturing facility at REI Expo 2024

Navitas Solar, a leading name in the solar module manufacturing industry, has made a significant announcement at the Renewable Energy India (REI) Expo 2024. The company announced its plans to establish a new, cutting-edge manufacturing facility, setting the stage for major growth in the solar energy sector.

The new factory will be situated on a vast 60-acre campus, featuring an impressive 400,000 square feet of construction space and an additional 600,000 square feet in construction.

This facility is designed to be a hub of innovation and efficiency, equipped with the latest technologies to enhance production processes. Initially, the new factory will have a manufacturing capacity of 1.5 GW per annum.

However, Navitas Solar has ambitious plans to expand this capacity to 10 GW per annum by 2025.

This expansion is a testament to the company's strategic vision and its dedication to scaling up operations to support the global transition to renewable energy.

In the next phase of development, Navitas Solar plans to add an additional 600,000 square feet to the facility. This expansion will further boost the company's production capabilities, ensuring it remain at the forefront of the solar module manufacturing industry.

With its modern manufacturing technologies that optimise production processes, the new facility will be a centre of technological innovation and efficiency.

A wide selection of superior solar goods is available from Navitas Solar, including as N-type TOPCon Bifacial Modules, Mono PERC Modules, and Polycrystalline Modules. These products are designed to meet the energy needs of both large-scale and domestic customers with exceptional durability, cost-effectiveness, and efficiency.

The plant is carefully designed with eco-friendly technologies to minimise their environmental impact, aligning with Navitas Solar's long-standing mission to promote renewable energy and reduce carbon footprint, propelling India onto higher levels and creating a strong position in the global market.



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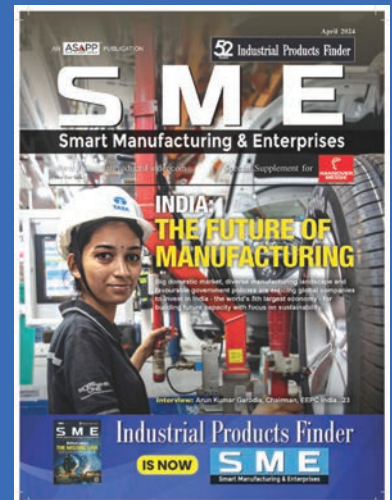
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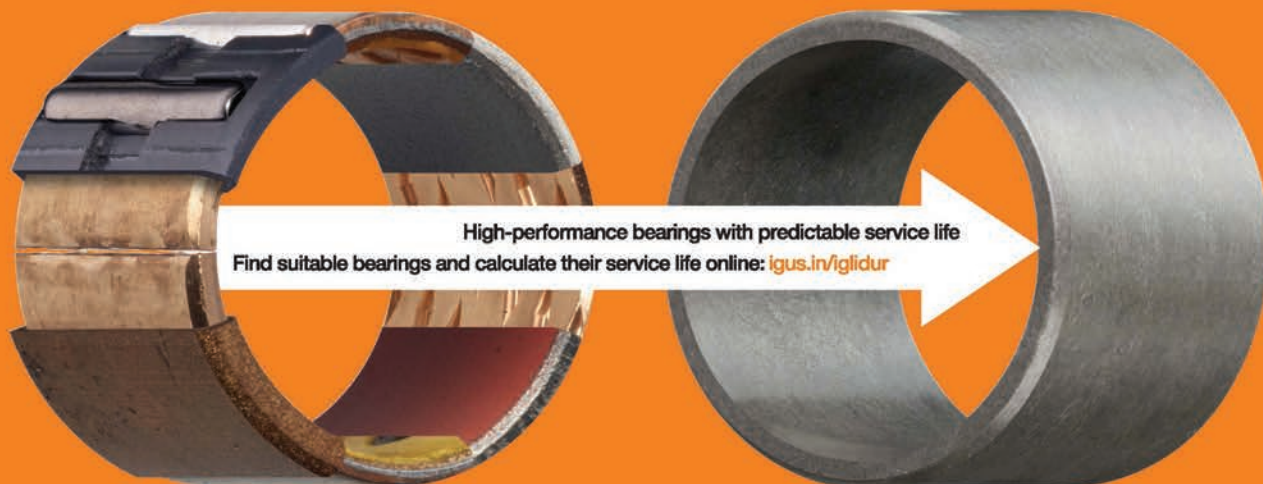
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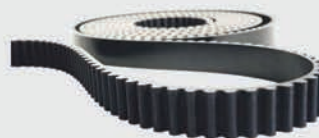


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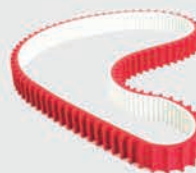
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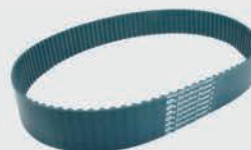
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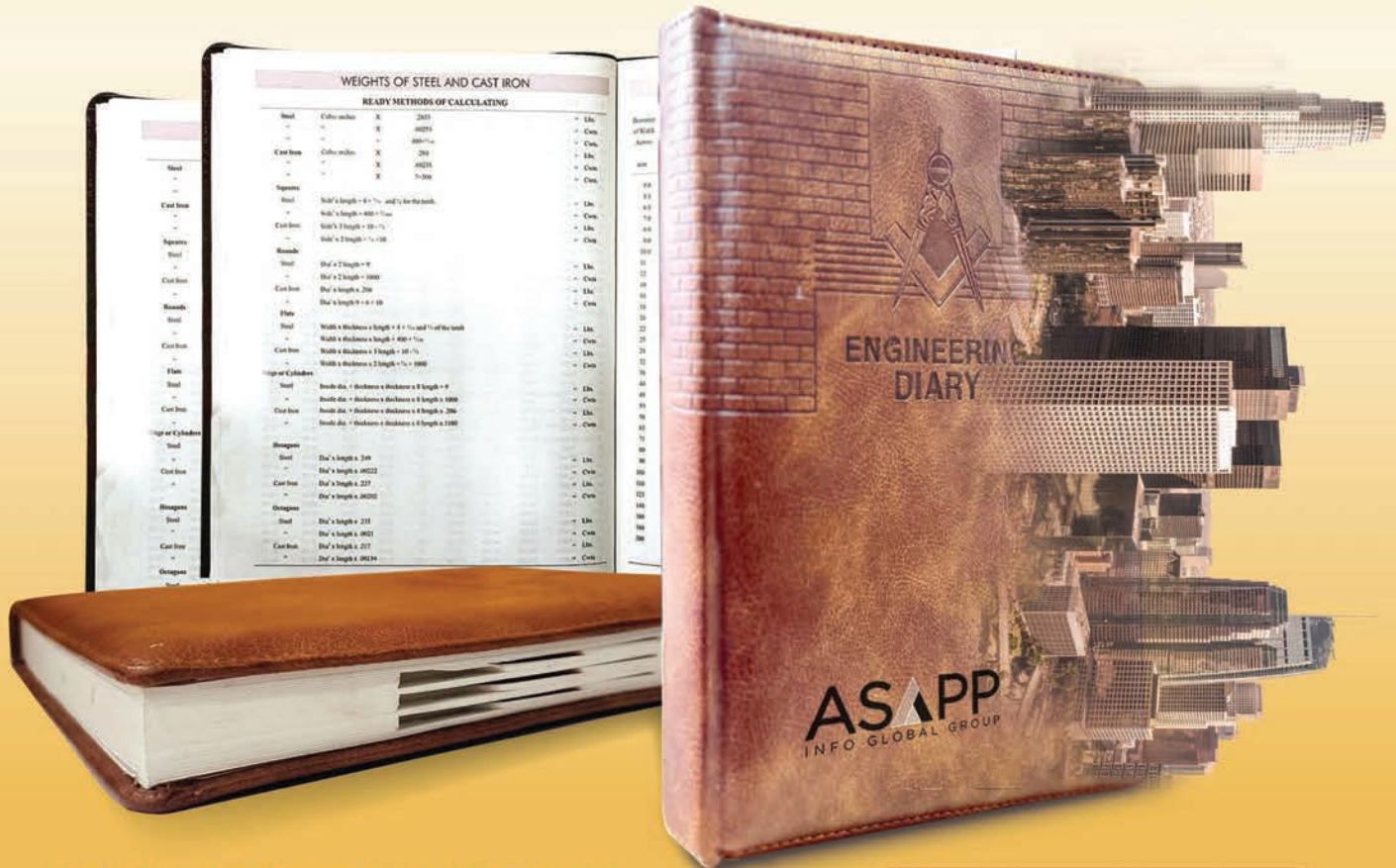
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Defence

Kalyani & AMG to build artillery platform

Kalyani Strategic Systems Ltd, a 100 per cent subsidiary of Bharat Forge Ltd, India, plans to enter into a multi-party agreement with leading United States defense companies, AM General and Mandus Group LLC, to explore the co-development and co-production of next-generation artillery gun platforms.

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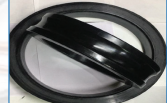
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Auto Components

Ashok Leyland & Nidec to build e-drive motors

Ashok Leyland, the Indian flagship of the Hinduja Group and the country's leading commercial vehicle manufacturer, signed a multipronged partnership agreement with Japan-based global electric motor drives manufacturer Nidec Motor Corporation (Nidec), a 100 per cent-owned subsidiary of Nidec Corporation. This will enable both Ashok Leyland and Nidec to develop novel e-drive motors and systems that will cater to the specific needs of India's commercial vehicle industry, ensuring advanced and efficient electric mobility solutions. Ashok Leyland and Nidec will work together to establish a Centre of Excellence (CoE) for Electric Drive Units (EDUs). This CoE will focus on developing cutting-edge motor technologies and power electronics systems for electric vehicles, along with innovations in gear-shifting mechanisms. Ashok Leyland will continue to source motors from Nidec for its existing electric vehicle line-up.



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Electrical and Electronics

Cyient DLM acquires US-based EMS manufacturer Altek Electronics

Cyient DLM, a leading integrated electronics manufacturing company, acquired Altek Electronics, a prominent EMS (Electronic Manufacturing Services) company based in the United States. This move marks a significant milestone in Cyient DLM's growth plan, expanding its presence in the North American market and strengthening its capabilities across key sectors.

Altek Electronics, with its strong footprint in the Medical & Healthcare and Industrial sectors, strengthens Cyient DLM's capability in these sectors and adds a diverse customer base to Cyient DLM. The acquisition adds a number of Fortune 500 clients to Cyient DLM's portfolio and strategic engagements with multiple other key clients. Additionally, Altek Electronics, with its ITAR



certification, positions Cyient DLM well to address the growing US Defense market. Through this acquisition Cyient DLM will also significantly expand its manufacturing capacity adding additional 80,000 sq ft of manufacturing area to cater to its clients globally.

This acquisition is in line with Cyient DLM's strategic roadmap to expand geographic footprint, add strategic clients and increase client proximity.

Krishna Bodanapu, Executive Chairman, Cyient DLM, commented, "This acquisition is a pivotal moment for Cyient DLM. It expands our global footprint, brings us closer to our strategic customers, and significantly strengthens our capabilities. This move sets the stage for Cyient DLM's next phase of growth, ensuring long-term.

Industrial Supplies

Alang-Gujarat's ship recycling industry eyes 10 per cent CAGR by CY28

India's ship-recycling industry is a crucial part of the global maritime sector. The top four countries including Bangladesh, India, Pakistan, and Turkey dominate the ship-recycling industry, dismantling over 90 per cent of the global ship recycling volume. India and Bangladesh consistently led the industry, while contributions from other countries were variable and generally lower.

From CY17 to CY23, the ship-recycling industry saw a decline in the number of ships recycled, with significant activity in CY21. The number of ships dismantled in CY22 and CY23 declined to 443 ships and 444 ships, respectively with above 600 ships in previous years. In terms of volume (GT) in CY22 and CY23, globally 7.17 and 7.47 million GT were dismantled as compared to 12 to 23 million GT in preceding five CYs. India's share in the global recycling industry remained 27 per cent in the past, before increasing to 33 per cent in CY22 and CY23, reflecting a rise in its contribution amidst global declines. In terms of volume, in CY22 and CY23, India dismantled 2.26 and 2.47 million GT, respectively.

Factors influencing ship recycling activity

India's ship-recycling industry is influenced by several factors including global ship recycling trends, balance between addition of shipping capacity and ship-recycling activity, fluctuations in Baltic Dry Index (BDI) and trends in Bhavnagar heavy melting scrap prices. Understanding these elements is essential for predicting future direction of ship-recycling industry.

Shipping capacity addition and ship-recycling activity

Decline in global ship-recycling activities combined with stable addition in shipping capacity in recent years highlights growing number of obsolete vessels still in operation. As newer, more efficient vessels are introduced, older ships become increasingly unviable for operation. This trend creates a rising need for ship recycling, as operators seek to retire aging vessels that are no longer economically feasible to maintain. The reason for the increasing proportion of ageing vessels in operational fleet includes post-pandemic higher freight prices (indicated by BDI) and volatility in heavy melting scrap prices with downward trajectory in the past two years.

Industrial Automation

Addverb and Mondial to change logistics

Addverb, a global leader in robotics and warehouse automation solutions, has announced a significant new partnership with Mondial Relay, one of Europe's largest parcel delivery networks based in France. This partnership marks another milestone in Addverb's journey to revolutionise global logistics through automation, as it introduces its cutting-edge "Zippy" sorting robots to Mondial Relay's distribution facility in La Roche-sur-Yon.

Designed to handle Mondial Relay's high volume of parcels for its delivery operations, these advanced robots streamline the sorting process. The parcel sorting system comprises four infeed stations, where operators load parcels onto the Zippy10 robots.

Each parcel undergoes scanning via a barcode scanner before the Zippy10 robot employs sophisticated algorithms to accurately sort parcels to predefined destinations.

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Industrial Automation

Ansys launches high-performance computing data center in Pune

Leading engineering simulation software company, Ansys Software Private Limited today announced the inauguration of its newest high-performance computing (HPC) data center, DC-3 at its Pune office by Shri Neeraj Mathur, President, and Shri Ulkesh Desai, Vice President, Space Society of Mechanical Engineers (SSME), SAC-ISRO. This facility is set to further bolster Ansys' computational capabilities, support cutting-edge technical simulations, and drive innovation, while also contributing to India's technological growth and progress. Ansys Pune now operates three on-premises data centres, with DC-2 and DC-3 equipped with advanced HPC cluster facilities.

While inaugurating the facility, Shri Neeraj Mathur, President, Space Society of Mechanical Engineers (SSME), SAC-ISRO, said, "HPC is at the core of present-day innovations, particularly in areas like aerospace and simulation-driven engineering. It is promising to see

Ansys' sustained investment in India's HPC infrastructure, and it will play an important role in empowering engineers and researchers of the country to solve today's increasingly complex engineering challenges. In addition, this will also enhance the country's technological advancement."

Shri Ulkesh Desai, Vice President, Space Society of Mechanical Engineers (SSME), SAC-ISRO, said, "Focused on GPU technology, DC-3 is poised to push innovation while staying ahead of emerging technology trends. It will play a significant role in both driving groundbreaking innovation and aligning with today's changing landscape of emerging technologies.. This launch by Ansys also emphasises how the company is creating a platform for future exploration and discovery.

DC-3 in addition to supporting Ansys' R&D teams, plays a key role in supporting the company's capability to serve customers across sectors.

Electrical and Electronics

IIT Bombay partners with ABB India to set up electrical machines and drives lab

The Indian Institute of Technology Bombay (IIT Bombay) has partnered with ABB India to establish a cutting-edge teaching laboratory for electrical machines and drives at the Department of Energy Science and Engineering on its campus. This partnership aims to provide undergraduate and postgraduate students with hands-on experience using modern industrial equipment and prepare undergraduate and post-graduate students for future roles in the fast-evolving energy and industrial sectors while promoting environmental sustainability.

The teaching lab will feature energy-efficient, mechanically coupled electrical machine sets, variable frequency drives (VFDs), and programmable logic controllers (PLCs), focusing on delivering practical training in electrical machines and drives. The laboratory will emulate various industrial applications, including those used in wind turbine generators and electric vehicle drivetrains, ensuring that students understand



modern energy systems comprehensively. With support from ABB India, the lab will help foster the next generation of engineers, equipped with the knowledge and skills needed to innovate once they join the industry in the future.

Electrical machines and drives are integral to a wide array of industrial applications. With advancements in power electronics and control strategies,

different kinds of electrical machines have emerged to meet application-specific performance needs. As industries increasingly adopt modern energy-efficient technologies, it is imperative for engineering students and research graduates to have a strong understanding of these innovations. Previously, IIT Roorkee had partnered with ABB India for technical cooperation to construct an operational smart electricity distribution network and management system (SDNMS) on its campus. The centre aims to support girls from economically disadvantaged families in becoming self-reliant.

Clean Energy

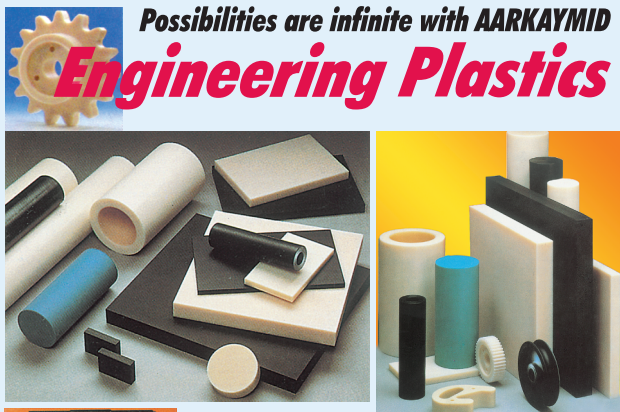
Adani and Google to collaborate in India

The Adani Group and Google announced a collaboration that will advance the companies' collective sustainability goals and add more clean energy to India's grid. Through this partnership Adani will supply clean energy from a new solar-wind hybrid project located in the world's largest renewable energy plant at Khavda, Gujarat. This new project is expected to start commercial operations in the third quarter of 2025.

With proven capabilities in delivering large scale wind, solar, hybrid and energy storage projects, Adani is well-positioned to provide customised renewable energy solutions to commercial and industrial (C&I) customers to meet their energy requirements and reduce their carbon footprint. Going forward, Adani plans to increase the focus on merchant and C&I segments to help decarbonise industries.

This collaboration will help advance Google's 24/7 carbon-free energy goal.

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Industrial Automation

TeamLease Digital highlights emerging trends in tech employment for FY25

TeamLease Digital, a leading tech staffing and solutions provider, has revealed its latest insights on hiring trends and the tech landscape for the upcoming fiscal year 2025. The analysis highlights the surge in demand across various experience levels, influential market factors, and the significance of skill development in the ever-evolving tech industry. The following are some of the key details gauged by TeamLease Digital.

With respect to hiring in the tech sector, there have been distinct patterns for freshers, mid-level professionals, and senior management. Global Capability Centers (GCCs) have emerged as significant employers of fresh talent, offering entry-level candidates salaries that are up to 30 per cent higher than the industry standard for in-demand skills. This surge is expected to continue, with GCCs projected to increase fresher hiring by 40 per cent compared to the previous year. The IT services sector, while cautiously optimistic, is also

anticipating a 20-25 per cent growth in the recruitment of freshers, underscoring the demand for skills in software development, data engineering, and cloud technologies.

Meanwhile, mid-level roles demonstrate stability, with consistent demand for project managers, data scientists, and cybersecurity experts. Salaries in these roles have seen an increase of 7.89 per cent to 10.2 per cent as compared to FY 2024, reflecting the market's need for professionals who can apply their hands-on experience to manage and optimise business operations effectively.

Senior management roles are experiencing a remarkable 21 per cent rise in demand since last year, attributed to the strategic importance of expertise in data engineering, product management, and DevOps, with salary increases ranging between 6.54 per cent and 10.8 per cent.

Mining & Construction Equipment

Sales of Indian MCE industry to fall by 5-7 per cent in FY2025: ICRA

ICRA expects the sales volume of the Indian mining and construction equipment (MCE) industry to fall by 5-7 per cent in FY2025 on a YoY basis, compared to its earlier estimate of 12-15 per cent. This revision follows better-than-expected domestic sales in the first half of FY2025, which grew by 2 per cent YoY despite disruptions caused by the General Elections and monsoons. The likely lower decline of MCE sales volume in the current fiscal also reflects customers' optimism about sustained policy focus on infrastructure development. However, ICRA remains cautious about the potential impact of slow project awarding and tightening in the financing environment, which could constrain demand in the second half of FY2025.

Road construction accounts for 35-45 per cent of MCE sales in India, followed by mining (20-30 per cent), real estate (10-20 per cent) and other sectors (railways, water supply, power etc.). In H1 FY2025, the growth in domestic sales was driven by the earthmoving and material processing equipment segments, which saw a 5 per cent and 1 per cent YoY growth, respectively. Road

construction (-9 per cent), material handling (-7 per cent) and concreting equipment (-4 per cent) segments reported a decline in volumes in H1 FY2025 on a YoY basis. The performance trend was mixed across the major sectors in H1 FY2025. In the road construction segment, data from MoRTH reported a decline in execution by 7 per cent and awarding by 34 per cent in 5M FY2025 on a YoY basis. In contrast, despite the impact of monsoon on the mining activities in Q2, coal production (up 5.8 per cent on a YoY basis in H1 FY2025, as per provisional data from the Ministry of Coal) and iron ore production (up 8.9 per cent on a YoY basis in 4M FY2025, as per data from the Ministry of Mines) reported growth, indicating healthy demand momentum in the user industries like energy, steel and cement. In addition, the ongoing real estate upcycle supported the overall MCE sales.

The aggregate revenues for ICRA's sample set of companies are likely to contract by 0-5 per cent in FY2025, partly supported by higher average realisations, better product mix and improving after-sales service revenues. ICRA maintains a stable outlook for the sector.

Electrical and Electronics

DE hosts Automation Solution Day

Delta Electronics, a global leader in power management and a provider of IoT-based smart green solutions, hosted Automation Solution Day, a unique event that provided esteemed customers and partners with an exclusive, hands-on experience of its latest innovations in industrial automation and smart manufacturing solutions.

These technologies were designed to enhance the operational efficiency and productivity of India's manufacturing sector. The event also served as an interactive platform where Delta's management shared their vision for the future of smart manufacturing in India, focusing on the implementation of robotics, Industrial IoT (IIoT), digitisation, and energy management across production lines and entire manufacturing sites.

During the event, Delta Electronics India showcased a wide range of automation solutions, giving visitors the opportunity to engage with cutting-edge technologies. The key solutions presented included:

Semi-automated lines: A blend of automation and manual workflows, offering manufacturers flexibility in increasing production capacity without full automation.

Machine loading and unloading systems: Automated solutions for material handling that improved speed and accuracy while reducing operational errors and minimising manual intervention.

Saline bottle automation: A solution tailored for the healthcare sector, automating the picking, placing, and capping of saline bottles, underscoring Delta's expertise in specialised automation applications.

Delta SCARA and servo press: Known for their precision and adaptability, these solutions enabled high-speed automation, ideal for manufacturing processes demanding both versatility and accuracy.

A major highlight of the event was the high-speed press automation solution, particularly useful for industries like stamping presses, laptop and mobile device manufacturing, and AC cabinet production.

This advanced system ensured faster production cycles, reduced downtime, and enhanced precision in complex stamping operations.

The event featured live shop floor demonstrations, allowing attendees to witness Delta's automation products in action. These demonstrations included:

- Saline bottle pick & place with capping station: An automated line that picked saline bottles from an infeed conveyor, placed them at the capping station.



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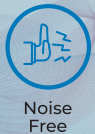
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Smarter The Tech, Safer The Medicines

In recent months, the Indian pharma industry, accounting for 20 per cent of the global generic exports, has been facing problems related to quality from global & local regulators. By leveraging AI and automation, the industry can not only overcome quality challenges, but can also help it reach the target of \$130 billion by 2030, says Sanskriti Ramachandran.



Source: FREEPIK

In an industry where quality can be the difference between life and liability, Indian pharmaceuticals are embracing Artificial Intelligence (AI) and automation to redefine standards. From predictive algorithms that anticipate production issues to robotic systems that eliminate human error, technology is reshaping the way medicines are made and monitored. As India's pharmaceutical exports surge, these solutions are ensuring compliance with global regulations, enhancing product safety, and building trust worldwide. The fusion of innovation and automation is not just improving quality—it is revolutionising the future of healthcare.

India: Pharmacy of the world

With over 20 per cent share in the global generics market, India has emerged as a significant player in the pharmaceutical domain. The Indian pharmaceutical industry is poised for substantial growth, with ambitions to

reach \$130 billion by 2030 and \$450 billion by 2047. However, with this anticipated growth come challenges—most notably, the need to maintain high standards of quality assurance (QA) to meet both domestic and international

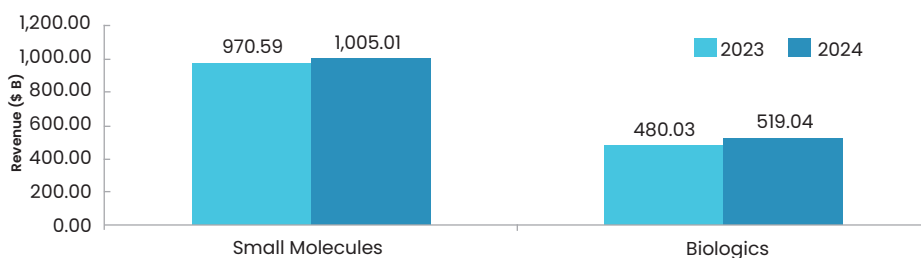


Figure 1: Pharmaceutical Industry: Revenue Forecast by Segment, Global, 2023 and 2024

Source: Global Pharmaceutical Industry Outlook, 2024, PFDE, Frost & Sullivan

regulatory requirements. The small-molecule market share accounts for 66.9 per cent of the total market; however, biologics, mainly monoclonal antibodies, recombinant proteins, and vaccines, will enable high growth in this industry.

Maintaining quality across such a vast industry can no longer be solely reliant on human oversight. Human errors, process inefficiencies, and counterfeit medicines remain significant risks, all of which can have dire consequences for patients and reputations. This is where AI and automation are stepping in as transformative technologies, revolutionising the ways in which quality is ensured in pharmaceutical production. As India seeks to become a global leader in both innovation and volume, AI and automation offer unparalleled solutions to the on-going challenges in quality assurance.

India is the third-largest pharmaceutical producer in the world by volume and ranks 14th in value. The country is responsible for around 10 per cent of global pharmaceutical production, which includes both domestic sales and exports to over 200 countries. Indian pharmaceuticals are heavily exported to regulated markets like the US, Europe, Japan, and Australia, making quality control not just an internal requirement but a global mandate.

The market value of the Indian pharmaceutical industry stood at approximately \$42 billion in 2021 and is expected to grow at a CAGR of 10.54 per cent, reaching around \$48.54 billion by 2033. However, this growth is not just quantitative; quality is the key differentiator as Indian companies compete with international players, especially in regulated markets that impose stringent quality checks and audits.

According to **Kinjal Shah**, Senior Vice President & Co-Group Head-Corporate Ratings, ICRA, “Revenues from the US market are expected to increase by 9-11 per cent during FY25,



Figure 2: The rising pharma exports from India

Source: PIB



Form 483 observations from the US FDA for quality lapses can jeopardise access to lucrative markets, which emphasises the need for robust quality assurance.

Kinjal Shah, Senior Vice President & Co-Group Head-Corporate Ratings

while European and domestic markets will grow by 7-9 per cent each. However, the industry faces continual pressure from regulatory agencies such as the US FDA, with inspections of Indian plants increasing. Form 483 observations from the US FDA for quality lapses can jeopardise access to lucrative markets, which emphasises the need for robust quality assurance.”

The US FDA’s Form 483, also known as a ‘Notice of Inspectional Observations’, lists any concerns or observations which may violate the Food, Drug, and Cosmetic (FD&C) Act.

Why does quality matter?

The importance of quality assurance in the pharmaceutical industry cannot be overstated. Drugs, unlike other consumer goods, directly affect human health. A minor quality lapse can lead to catastrophic outcomes, ranging from ineffective treatment to severe adverse effects and even fatalities.

Recent developments in the Indian pharmaceutical sector highlight the need for stronger quality assurance systems. Many pharmaceutical manufacturing facilities in India have received Form 483 observations from the USFDA after their routine inspection process. The observations may be procedural in nature, but it underlines the constant scrutiny that Indian pharmaceutical companies face in global markets.

India has the largest number of US FDA-approved plants (603) outside of the US (as of 2023). Over the last five years, the US FDA has carried out 672 drug quality assurance inspections in India and has identified data integrity issues (considered to be a very serious

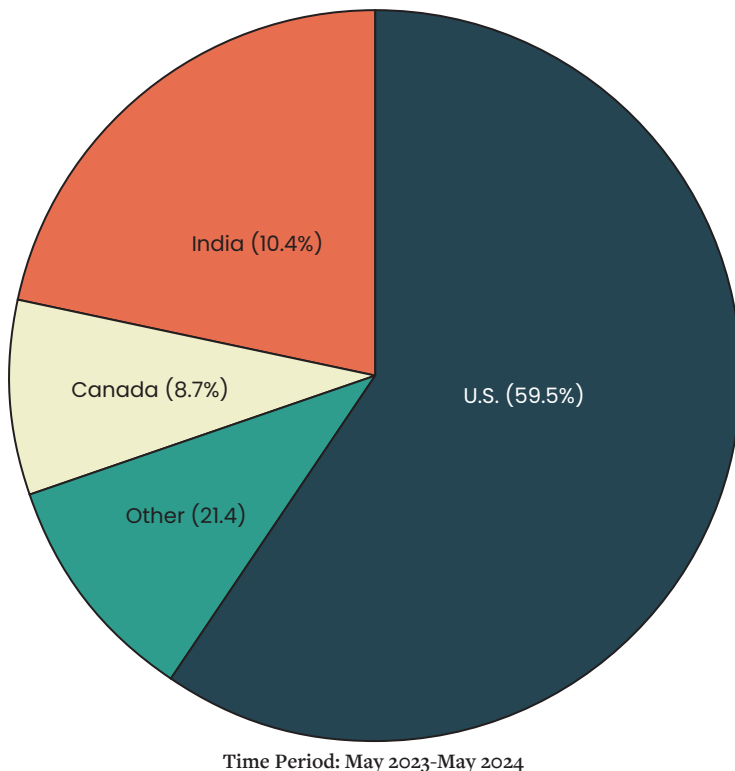


Figure 3: USFDA inspection 483s issued for finished formulation-sites

Source: Pharmaceutical Online

lapse) at various facilities. As the Indian pharmaceutical sector continues to expand its reach in regulated markets, companies cannot afford to overlook quality compliance.

Besides quality adherence issues, counterfeit drugs are also a grave cause of concern to the industry. Highlighting the importance of combating counterfeit drugs, **Manoj Kochar**, President, Authentication Solution Providers Association (ASPA), comments, "In the pharmaceutical industry, about 10-20

per cent of medicines are thought to be counterfeit, posing a serious health risk. The more unorganised a sector is, greater the chances of counterfeiting. The World Health Organization (WHO) has also highlighted the prevalence of falsified medical products in India, making it a critical issue." It also puts an enormous burden on pharmaceutical companies to ensure that their products meet stringent quality standards, especially as Indian drugs are exported to regulated markets where non-compliance can lead to import bans and costly recalls.

Navigating the regulatory maze with AI

The pharmaceutical industry is among the most heavily regulated industries in the world. Agencies such as the US FDA (United States Food and Drug Administration), EMA (European Medicines Agency), and CDSCO (Central Drugs Standard

Control Organization) in India set high standards for the safety, efficacy, and quality of drugs. In this context, AI and automation have the potential to both meet and exceed regulatory expectations by increasing transparency and accuracy in quality control processes.

AI can revolutionise the pharmaceutical industry by automating complex tasks and reducing human error. Quality control is one of the areas most impacted by AI, with predictive analytics and real-time monitoring providing unprecedented levels of oversight and precision.

Predictive analytics, powered by AI, can forecast potential quality issues before they occur. As **Bharat Shah**, Managing Director, S Kant Healthcare, explains, "AI and automation are revolutionising quality control and assurance processes within the pharmaceutical industry by enhancing efficiency, precision, and compliance.

Automation has already replaced many manual processes that were prone to human error, improving the consistency and reliability of QC procedures. AI takes this a step further by enabling real-time monitoring and predictive analytics. For instance, AI algorithms can detect anomalies during the production process, allowing for swift corrective actions that prevent the release of defective products. Automation systems handle tasks like

The more unorganised a sector is, greater the chances of counterfeiting.

Manoj Kochar, President, Authentication Solution Providers Association (ASPA)

Automation has already replaced many manual processes that were prone to human error, improving the consistency and reliability of QC procedures.



Bharat Shah, Managing Director, S Kant Healthcare

raw material sampling and in-process testing with a level of precision and speed that is impossible for human operators. Additionally, AI can analyse large datasets from the production floor to predict equipment failures or quality issues before they arise, thus minimising downtime and improving overall production efficiency. These technologies also streamline compliance reporting by automating the collection and analysis of data required for regulatory submissions, reducing the time and effort needed for audits.” This capability is especially important in a highly regulated industry like pharma, where even minor defects can result in recalls, regulatory action, and reputational damage.

According to a 2022 study by McKinsey & Company, companies that implement AI in quality control



Source: FREEPIK

experience a 15-20 per cent reduction in manufacturing costs due to decreased downtime and reduced waste.

Mudit Agarwal, Founder and CEO, Agrim Tech Services, notes, “AI

is playing a transformative role in drug discovery and development by significantly speeding up processes that traditionally took years or even decades. AI can analyse large biological datasets to identify and

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- Float Operated External Cage / Magnetic Level Switches
- Reed Level Switches
- Conductivity Level Switches
- Rotary Paddle Level Switches
- Cable and Float Level Switches
- Gear Box Oil Level Float Switches
- RF Capacitance Level Switches
- Vibrating Fork Level Switches

FLOW SWITCHES

- Globe / Vane Type Flow Switches
- Indicating Flow Relays
- Thermal Dispersion Flow Switches
- Sight Flow Indicators

FLOW METERS

- Paddlewheel Flow Meters
- Electromagnetic Flow Meters
- Ultrasonic Flow Meters
- Variable Area Flow meters

OPEN CHANNEL FLOW TOTALISERS / METERS

- Ultrasonic Open Channel Flow Totalisers
- Rate of Flow Transmitters
- Mechanical Open Channel Flow Meters

LOSS OF HEAD INDICATORS

- Capacitance type Loss of Head Indicators
- Float type Loss of Head Indicators

VALVES

- Blow Down Valves
- Cast Iron Valves
- Cast Steel Valves
- Forged Steel Valves



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validate potential drug targets faster. AI is also being used to design new drug molecules, optimise clinical trial designs, and predict patient responses to treatments.”

Another example is Cipla, which has deployed automation and AI tools in its manufacturing plants to improve consistency in drug production. Cipla’s automated

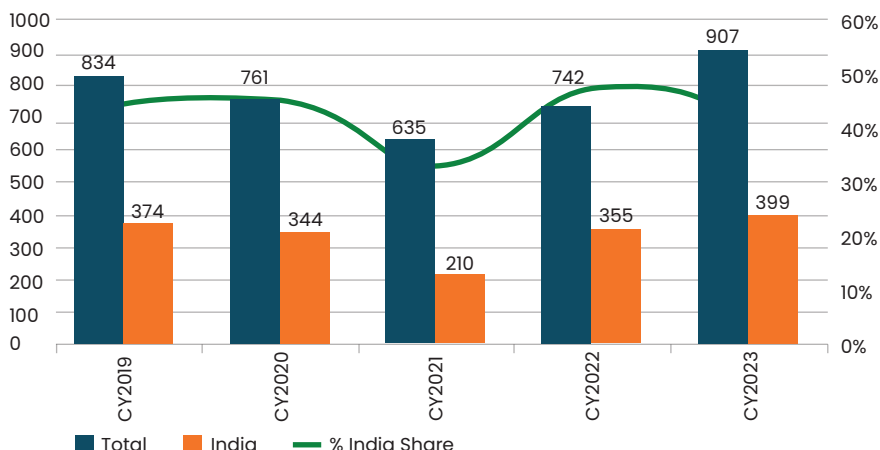


Figure 4: Trend in ANDA approvals and Indian pharma companies’ share

Source: ICRA Research

In the future, AI will increasingly be used to analyse real-world data collected from patients, including data from wearables, electronic health records (EHRs) and patient surveys. “This will lead to better understanding of treatment outcomes and help generate real-world evidence that supports drug development and regulatory approvals. AI can help pharmaceutical companies track drug safety in post-market environments by analysing real-world usage data, detecting potential side effects and enabling real-time pharmacovigilance,” adds Agarwal.

Several Indian pharmaceutical companies have begun implementing AI and automation in their quality control processes with remarkable results. For instance, Dr Reddy’s Laboratories has integrated AI into its quality management system to monitor and predict deviations in its production lines. By doing so, the company has significantly reduced its error rates and increased the efficiency of its manufacturing processes.

systems handle tasks like raw material sampling, in-process testing, and final product inspection, ensuring that each product meets rigorous quality standards.

Vandana Iyer, Research Director, TechVision, Frost & Sullivan shares, “One notable trend is the rising use of data-centric approaches to tackle challenges across the entire pharma value chain. By leveraging data more effectively, companies can enhance efficiency and decision-making processes in various stages of drug development and manufacturing. Additionally, there is a growing emphasis on platform-based automation tools rather than traditional product-based solutions.

Another significant trend is the increasing collaboration between technology and biotechnology sectors. These tech-bio partnerships are becoming essential for advancing both diagnostic and precision medicine applications.

Personalisation of wellness and healthcare solutions is gaining momentum; complemented by the

rising individualisation of treatment design, driven by advanced AI tools that tailor approaches to patients.”

These real-world implementations show that AI and automation are not just theoretical solutions but practical tools that can deliver tangible results. By reducing human error, improving consistency, and providing real-time insights, these technologies are transforming how quality control is managed in Indian pharma.

Making supply chain robust

Counterfeit drugs are another issue making headlines. Despite being a leading producer of legitimate drugs, India struggles with a significant counterfeit drug problem. As noted in a report by the Office of the United States Trade Representative (USTR), approximately 20 per cent of all pharmaceutical goods sold in India are counterfeit. This problem is not only a regulatory challenge but also a massive public health concern.



AI can analyse large biological datasets to identify and validate potential drug targets faster.

Mudit Agarwal, Founder and CEO, Agrim Tech Services

AI and automation, particularly in track-and-trace systems, can help resolve the problem of counterfeit drugs by ensuring that drugs are authentic and safe before they reach patients. These technologies enable pharma companies to track every step of the production and distribution process, ensuring transparency and quality control at all stages.

“AI is set to transform quality control and supply chain management by leveraging data to



Source: FREEPIK

predict and prevent failures in production, minimising errors and reducing rejections. AI also optimises supply chains by accurately forecasting demand, enabling Just-in-Time (JIT) inventory, reducing costs, and improving customer service. Beyond manufacturing, AI enhances marketing, sales forecasting, and operational planning, aligning production with market needs to improve satisfaction and ensure high-quality products.

Future advancements include AI in predictive data management, which helps pre-empt quality issues and non-compliances, allowing companies to address issues proactively. AI will further streamline supply chains, enabling JIT inventory management for optimal financial and operational efficiency. However, regulatory compliance remains essential, with a strong focus on ethical data management and transparency. By embracing AI responsibly, companies can build

more sustainable and compliant operations, positioning themselves as future leaders in the pharmaceutical industry,” opines **Sanjeev Dharwadkar**, Current CEO, Pharma Tech Consulting LLP and Former Director, Sanofi.

Maximising AI potential

Ensuring automation systems comply with regulatory standards throughout manufacturing is a primary challenge, as regulators require proof that automated



“**Regulatory challenges in AI and automation within the pharmaceutical industry primarily revolve around compliance, data security, transparency, and ethical considerations.**”

Sudipta Ghosh, Partner, PwC

processes are risk-free and transparently reflect production data. “This scrutiny demands that all data be real-time and accurate. Another challenge lies in choosing automation tools that not only enhance efficiency but also meet these regulatory demands. Companies must develop in-house expertise to validate these tools, ensuring consistent quality and efficiency; without it, automation adoption can become resource-intensive,” adds Dharwadkar.

One of the primary regulatory challenges involves ensuring that AI systems are both explainable and transparent. **Sudipta Ghosh**, Partner, PwC, highlights this challenge, “Regulatory challenges in AI and automation within the pharmaceutical industry primarily revolve around compliance, data security, transparency, and ethical considerations. This highly regulated sector requires adherence to strict standards from agencies like the US FDA, EMA (Europe), and others to ensure patient safety, data integrity,

and validation processes. Integrating AI and automation into this framework introduces several complexities.”

First, data privacy and security are major concerns, as AI systems rely on vast datasets that often contain sensitive patient information. Ensuring compliance with regulations like GDPR (Europe) or HIPAA (USA) is crucial. AI algorithms must handle this data securely, adhering to anonymisation and encryption protocols to protect patient confidentiality.

Another challenge is validation and explainability. Regulatory bodies demand transparency in AI decision-making, requiring the technology to be explainable and interpretable. Black-box AI models, whose processes are opaque, are unsuitable for pharma because their decisions cannot easily be justified. There is a need for robust validation methodologies to ensure the accuracy and reliability of AI systems.



Future advancements include AI in predictive data management, which helps pre-empt quality issues and non-compliances, allowing companies to address issues proactively.

Sanjeev Dharwadkar, Current CEO, Pharma Tech Consulting LLP and Former Director, Sanofi

Ethical considerations, such as avoiding bias, are also essential. AI algorithms must be designed to prevent discriminatory decisions, especially in areas like clinical trials and patient treatment recommendations. Regulatory guidelines are increasingly pushing for frameworks that minimise bias,

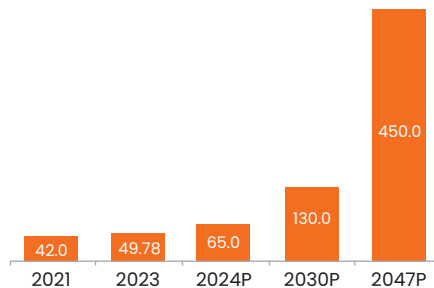


Figure 5: Indian pharmaceutical industry's growth projection

Source: EY Report

ensuring fair and equitable treatment for all patient groups.

Compliance with evolving standards is another hurdle. AI technology evolves rapidly, often outpacing the development of regulatory standards. This creates uncertainty for pharmaceutical companies on how to implement AI innovations while staying compliant. Constant engagement with regulators to shape policies that accommodate these technological advances is crucial to closing this gap.

Government funding can play a pivotal role in overcoming these challenges and advancing AI and automation in the pharmaceutical industry. Investment in this area can lead to breakthroughs in drug discovery, manufacturing efficiency, and healthcare accessibility. Government-backed grants and funding initiatives can support collaborative research and development (R&D) projects between academia, AI tech firms, and pharma companies. This would accelerate AI-driven drug discovery and personalised medicine, reducing the time and cost involved in bringing new drugs to market.

“Regulatory agencies such as the US FDA are already drafting guidelines such as ‘Using Artificial Intelligence & Machine Learning in the Development of Drug and Biological Products’ to ensure structured regulatory standards

which helps improve compliance. Continuous monitoring of quality standards, partnering with vendors that have the necessary regulatory compliance, such as the 21 CFR Part 11 for US FDA helps improve outcomes for automated processes. Ensuring and implementing GAMP5 (Good Automated Manufacturing Practice) guidelines and following ALCOA+ principles (Attributable, Legible, Contemporaneous, Original, Accurate, plus Complete, Consistent, Enduring, and Available) help improve regulatory compliance for automation. Conducting regular audits, securing virtual data repositories, documentation and periodic risk-based validation are also some practices that can be adopted to improve regulatory compliance”, adds Iyer.



Continuous monitoring of quality standards, partnering with vendors that have the necessary regulatory compliance, such as the 21 CFR Part 11 for US FDA helps improve outcomes for automated processes.

Vandana Iyer, Research Director, TechVision, Frost & Sullivan

The AI-amplified growth

The integration of AI and automation in India's pharmaceutical sector is proving to be a decisive step towards enhanced quality assurance and global competitiveness. AI-driven predictive analytics and automated processes are minimising human error, improving consistency, and optimising efficiency across the supply chain. By investing in infrastructure, talent, and public-private partnerships, India's pharmaceutical industry can continue to leverage AI innovations responsibly.

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Deploying Industrial AI With Sustainability

Industrial AI stems from combining AI with models, based on engineering fundamentals with crucial domain-expertise driven guardrails around AI applications. Results follow the scientific laws i.e., of chemistry, physics, electricity, and geoscience, ensuring that outcomes are safe. Industrial AI works around the premises of agility, guidance and automation – in particular, as an expert co-pilot and advisor to help workers make better, more strategic decisions, faster, says **Dr Heiko Claussen**, SVP & Co-CTO, Aspen Technology Inc.



Image source: Freepik

“AI is in a ‘golden age’ and solving problems that were once in the realm of sci-fi.” (Jeff Bezos)

Yet, views around AI are polarising. Jim Covello from the Goldman Sachs Group called out examples with dot-com companies in the late 1990s and more recently, with cryptocurrencies. He added that it will likely happen with AI at some point. However, Joseph Briggs from the same firm estimates that AI will automate a quarter of work tasks and boost economic growth.

Whether you are a proponent or opponent of AI as the next big thing, it is key to note the near-term investment themes cited by Dong Chen, Pictet Wealth Management. Of the three trends cited, two trends allude to the promise of AI and the industrial sector – linked to drivers, such as electrification, decarbonisation and digitalisation.

Gaining momentum with Industrial AI

Industrial AI is the key to energy transition, as it propels companies towards operational excellence.

With built-in guardrails to ensure plant operations run safely, AI models can also help companies drive efficiencies, track equipment health and optimise sustainability.

In the man versus machine debate, Industrial AI is not aiming to replace workers in a complex and safety-conscious world of process manufacturing sites. AI can solve some, but not all the problems. A key opportunity for asset-intensive industries is that AI provides realistic and correct recommendations. Operators and engineers remain in charge by ensuring the validity of the output of AI, relying on that the technology remains

transparent and accountable.

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In the next two decades, sustainability will be top of mind for asset-intensive industries, as companies work through the energy transition.

Journey towards sustainability

To optimally capitalise on Industrial AI, companies should factor in the following considerations to build a supportive culture.

First, organisations must conduct a comprehensive assessment of their operations to identify areas with the

highest potential for improvement. For example, companies can start by analysing energy-intensive processes and pinpointing inefficiencies. Industrial AI can impact predictive maintenance, where it anticipates equipment failures and optimises operational schedules to reduce downtime and energy use. In supply chain optimisation, industrial AI can help lower emissions and costs across asset-intensive processes. All of which leverage AI capabilities in data analysis and process optimisation to achieve significant sustainability gains.

By using predictive analytics, business can forecast energy demand and optimise usage. AI can also monitor emissions in real-time, identifying excessive sources and suggesting corrective actions. Machine learning models can analyse production processes to improve efficiency and reduce wastage. AI-driven simulations can explore operational scenarios, enabling companies to adopt strategies that minimise their environmental impact. By continuously learning and adapting, AI systems help businesses stay on top of their sustainability goals and dynamically adjust their operations for better environmental performance. Regular audits and updates to AI models ensure that the latest data and trends are incorporated.

Second, companies should be aware of potential challenges in deploying Industrial AI solutions. For example, there can be complexity in integrating AI into existing operations and ensuring compatibility with legacy systems. Data quality and availability can also present issues. While in the case of AspenTech, it is possible to look beyond hard to come by big data from the field, as available first principles models can generate simulation data on-demand, this is not the norm. Other exceptions include AI methods, such as reinforcement learning that do not need historic data but continuously learn during operation. That said, AI systems often benefit from significant amounts of high-quality data, which may not be always readily accessible in a ready-to-use format. Companies also need to mitigate data privacy and security, particularly when handling sensitive operational data. Careful planning, investment in training and a commitment to continuous improvement are required.

Third, Industrial AI can revolutionise key areas of business operations, delivering significant impact through enhanced agility, guidance, and automation. As such, AI-driven agility allows organisations to swiftly adapt to changing business conditions, optimising value creation. In an industrial setting, model sustainment reduces the gap between simulations and reality, improving efficiency and minimising waste. This ensures that businesses can respond rapidly to market demands and operational changes. AI also levels up the workforce to guide them daily and make complex decisions faster.

Industrial AI-led software can assist new employees in understanding system optimisations and support experienced staff in managing complex processes. Such systems not only accelerate decision-making, but also improve accuracy in daily and complex scenarios via a systematic approach.

AI-powered automation frees engineers from routine tasks, allowing them to focus on higher-value activities. One practical application is the automatic segmentation and interpretation of subsurface image volumes. This enables businesses to efficiently identify optimal locations for CO₂ storage, driving sustainability efforts. In fact, the ability of Industrial AI to enhance agility, provide insightful guidance, and automate routine tasks significantly boosts operational efficiency and strategic decision-making, positioning businesses to achieve greater success and sustainability.

Fourth but not least, AI plays a crucial role in embedding industrial sustainability into a corporate strategy by providing data-driven insights that inform decision-making. AI-powered tools can evaluate the environmental impact of various business activities, allowing companies to make informed choices that align with their sustainability goals. To support decision-making processes, Industrial AI can help prioritise initiatives that offer the greatest sustainability benefits, balancing environmental, social, and economic considerations. For stakeholder engagement, AI can enhance transparency and communication by providing real-time data on sustainability metrics and progress towards environmental, social and governance (ESG) targets. AI can also facilitate the identification and management of risks related to environmental and social factors, ensuring that companies can proactively address these issues.

By integrating AI into their strategic framework, businesses are positioned to drive and communicate their commitment to sustainability more effectively. Finally, AI can also help to track regulatory changes and ensure compliance, further embedding sustainability into the company's core operations.

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About the author:

Heiko Claussen is the Senior Vice President & Co-Chief Technology Officer at Aspen Technology, leading the company's artificial intelligence research & technology strategy. Prior to Aspen Technology, he was Head of Autonomous Machines and Principal Key Expert of AI at Siemens. During his 15-year

tenure at Siemens, he worked in many areas related to AI and digitisation, including remote monitoring, machine learning, robotics, pattern recognition and statistical signal processing. Heiko has been named Inventor of the Year twice at Siemens – in 2016 for the development of a virtual sensor to monitor the flame status of gas turbines, and in 2019 for the development of a neural net accelerator for industrial control systems.



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“Effective Regulation Is The Key To Fight Counterfeiting.”

Counterfeiting is widespread, but certain industries are particularly vulnerable. FMCG and pharmaceuticals are among the hardest hit. According to a report of ASPA (Authentication Solution Providers Association) and CRISIL, 20–30 per cent of FMCG products in India are estimated to be counterfeit, causing massive losses for legitimate businesses. Similarly, in the pharmaceutical industry, about 10–20 per cent of medicines are thought to be counterfeit; posing a serious health risk, says **Manoj Kochar**, President, ASPA, during this free-wheeling interview with Rakesh Rao.

What role does ASPA play in the industry?

Authentication Solution Providers Association was officially formed in 2014 to represent companies offering authentication and anti-counterfeiting solutions. However, its roots go back to the Hologram Manufacturers Association of India (HOMAI), which was established in 1998. HOMAI was initially created to regulate the hologram industry's growth and promote innovation in technology.

But over time as the industry evolved, it was clear that focusing solely on hologram technology was limiting. New technologies (such as RFID, QR codes, and digital authentication tools) emerged offering enhanced capabilities for fighting counterfeiting. To reflect the expanding scope of solutions and incorporate these new advancements, the association decided to rebrand and expand HOMAI's role to become ASPA in 2014, covering a broader spectrum of authentication technologies.

When ASPA was first established, it had around 20 members. Today, it has grown to over 80 members, covering diverse authentication and security technologies. ASPA includes material suppliers, technology developers, and equipment providers, creating a comprehensive ecosystem. This growth reflects the association's efforts to unite the industry and provide an integrated approach to tackling counterfeiting.

ASPA is highly proactive in engaging with brands, regulators, government bodies, and industry associations. One of its major focuses is raising awareness about the perils of counterfeiting and



providing platforms for knowledge sharing.

What is the significance of ASPA's 2022 report on counterfeiting in India?

ASPA's "State of Counterfeiting in India 2022" report, developed in partnership with CRISIL, provides detailed insights into the scale and impact of counterfeiting in India. It highlights key sectors affected, consumer behaviour towards counterfeit products, and estimated losses. One striking finding was that approximately 42 per cent of consumers knowingly purchased

counterfeit FMCG products due to lower prices or availability issues. This report serves as a benchmark for understanding the current landscape and developing industry-specific solutions.

How does counterfeiting affect industries and consumers?

Counterfeiting is not a victimless crime. It affects consumers, brands, and governments. Consumers are often misled into purchasing substandard products that pose health and safety risks. Brands suffer reputational damage and revenue loss as counterfeit products diminish their market value. For governments, counterfeiting results in significant tax losses, as counterfeiters do not pay GST, excise duties, or income taxes. According to estimates, counterfeiting accounts for around 0.5 per cent of global trade, equating to roughly \$400 billion — a value higher than the GDP of several countries.

Which industries are most affected by

counterfeiting in India?

Counterfeiting is widespread, but certain industries are particularly vulnerable. FMCG and pharmaceuticals are among the hardest hit. ASPA's report found that 20-30 per cent of FMCG products in India are estimated to be counterfeit, causing massive losses for legitimate businesses. Similarly, in the pharmaceutical industry, about 10-20 per cent of medicines are thought to be counterfeit, posing a serious health risk. The more unorganised a sector is, greater the chances of counterfeiting. The World Health Organization (WHO) has also highlighted the prevalence of falsified medical products in India, making it a critical issue.

What is the role of regulation in combating counterfeiting?

Effective regulation is key to fight counterfeiting, but its implementation varies across sectors. For example, the pharmaceutical industry in India has seen more stringent regulations due to the high stakes involved. Recently, the Indian government mandated that the top 300 pharmaceutical brands implement QR codes for better traceability. However, sectors like automotive parts, where safety and quality are also crucial, do not yet see the same level of vigilance. Strengthening regulatory frameworks and enforcing them uniformly is essential to curb counterfeiting across all industries.

What measures can companies take to protect their brands from counterfeiting?

Companies can adopt a combination of physical and digital authentication technologies. Physical options include holograms, security printing, and specialised inks, while digital solutions cover QR codes, blockchain traceability, RFID, and NFC (near-field communication) technologies. An effective anti-counterfeiting strategy often integrates multiple layers of security to deter counterfeiters. For instance, a company could combine physical holographic labels with a digital traceability system, ensuring that the product is not only tamper-proof but also traceable throughout the supply chain.

What standards should companies follow when implementing authentication solutions?

One crucial standard is ISO 22383, which provides guidelines on implementing an effective authentication solution and measuring its impact. This standard helps companies craft comprehensive strategies that combine both physical and digital technologies, ensuring robust brand protection. Adhering to recognised standards like ISO 22383 can significantly enhance a company's ability to safeguard its products and maintain its reputation.

How does consumer awareness play a role in combating counterfeiting?

Educating consumers is one of the most effective ways to combat counterfeiting. When consumers are aware of the risks and know what to look for in genuine products, they become a crucial line of defence. Government campaigns like 'Jago Grahak Jago' have been successful in raising consumer awareness about their rights, and a similar initiative could be instrumental in sensitising people to the dangers of counterfeit products. Social media and proactive communication from brands can further amplify this awareness.

What more can the government do to combat counterfeiting?

The government can strengthen enforcement by tightening laws and increasing penalties for counterfeiters. The economic offenses wing, which deals with such cases, often lacks the resources and time to tackle counterfeit incidents effectively. More stringent penalties and better coordination between law enforcement agencies could deter counterfeiters. Additionally, the government could support industry efforts by launching nationwide awareness campaigns, encouraging the adoption of authentication standards, and fostering a collaborative approach with industry associations like ASPA.

What are the latest technological trends in anti-counterfeiting?

The anti-counterfeiting industry is increasingly adopting hybrid solutions that combine physical and digital technologies. For example, holographic labels with embedded QR codes that link to a blockchain-based traceability system offer robust protection. NFC-enabled tags that allow consumers to verify product authenticity using their smartphones are also gaining traction. These advancements not only make counterfeiting more difficult but also enable real-time tracking and consumer engagement, making it easier to detect and report counterfeit products.

How should companies choose the right authentication technology?

Companies should consider factors such as the nature of the product, its distribution channels, and the level of counterfeiting risk. A multi-layered approach is often the best, combining different technologies to create a solution that is both secure and cost-effective. It's also crucial to work with experienced solution providers who understand the complexities of the industry and can tailor solutions to specific needs.

SME

(With inputs from Sanskriti Ramachandran)



“Jasmino Corp Has Robust Global Expansion Plans.”

With over 40 years of industrial leadership in equipment engineering and corrosion protection, Jasmino Corporation Pvt Ltd serves a diverse range of industries, including petrochemical, chemical, thermal, pharmaceutical, etc. Recently, the company acquired two German companies, HAW Lining and GBT Buecolit, positioning Jasmino as the world's third largest provider of comprehensive heavy-duty industrial anti-corrosion lining solutions. In this interview with Rakesh Rao, Adheesh Ramani, CEO, Jasmino Corporation Pvt Ltd, explains criticality of rubber lining for process industries and its role in protecting capital equipment and reducing downtime.

How is Jasmino Corporation helping its customers to protect their capital equipment and reduce downtime?

Industrial linings play a crucial role in protecting capital equipment and minimising downtime across various industries.

Jasmino's expertise lies in understanding the entire industrial process and recommending the right anti-corrosion linings that protect equipment from harsh environments, enhance durability, and improve efficiency, leading to significant operational benefits.

These linings provide a protective barrier that shields both the internal and external surfaces of industrial equipment from corrosive and abrasive materials, preventing wear and tear. This protection ensures equipment integrity, reduces the likelihood of breakdowns and costly repairs, and extends the life of capital assets. Additionally, high-quality industrial linings mitigate risks associated with equipment failures, such as chemical spills or explosions. For example, rubber linings not only protect machinery but also safeguard employees from potential injuries caused by equipment malfunctions.

Minimising production stoppages is crucial for industrial plants, as unexpected downtime can lead to significant losses. Industrial linings help reduce maintenance needs, extending equipment life to 15-20 years. Our predictive maintenance programs and regular inspections detect issues early. This proactive approach ensures that equipment remains in optimal condition, allowing for scheduled maintenance rather than unexpected breakdowns. By keeping equipment running



efficiently, downtime is minimised, and productivity is maximised.

Lastly, our integrated approach simplifies the procurement process for customers. Our comprehensive portfolio of services and solutions cater to multiple aspects and requirements of our clients. By placing just one purchase order with Jasmino, clients reduce the time, effort, and resources spent on managing multiple vendors. This streamlined process accelerates project timelines and simplifies project coordination, minimising delays that could lead to downtime.

Why are rubber lining so critical for process industries like chemical, petroleum, power/energy, etc.?

All industrial linings provide corrosion and abrasion protection, and rubber lining is one of the most effective. They act as a protective barrier against chemicals, corrosive materials, and high temperatures, making them ideal for harsh environments, including exposure to high-concentration acids and alkalis. Rubber linings possess unique properties that make them especially suitable for industries like pharmaceuticals, chemical processing, thermal power, and agri-chemicals.

In the chemical processing industry, rubber linings protect equipment such as the interiors of chemical storage tanks, reactors, and pipelines from the corrosive nature of the chemicals being processed.

High-quality rubber linings prevent wear and tear, reducing the need for frequent replacements, which saves resources, reduces waste, and lowers costs—

benefiting both the environment and operational budgets. They also serve as durable barriers that prevent leaks, ensuring safety and operational efficiency. Rubber's properties—such as resistance to corrosion and abrasion, elasticity, impact absorption, thermal insulation, temperature resistance, versatility, and ease of installation—make it an excellent choice for protecting equipment in demanding industrial settings. These features not only extend the lifespan of machinery but also enhance workplace safety and boost operational efficiency, making them a critical component in maintaining the reliability and efficiency of essential equipment.

With installation of FGD units being made mandatory in thermal power plants in India, what kinds of opportunities it presents to Jasmino Corporation?

Power generation from fossil fuels, a major component of India's energy sector, has long been associated with environmental hazards, particularly the emission of harmful gases such as sulfur dioxide. In response, the Indian government introduced stringent regulations, and the Supreme Court mandated that thermal power plants must ensure their emissions are clean. This created a valuable opportunity for Jasmino Corporation.

With around 260 thermal power plants in India, each with two or more generating units, all are now required to install Flue Gas Desulfurization (FGD) units to clean emissions before release. This represents a market potential of approximately Rs 60 billion over the next few years. Jasmino Corporation, with its indigenised technology for corrosion protection in FGD scrubbers, is well-positioned to capture a significant share of this market. Even after accounting for existing competitors and completed work, there remains a substantial untapped market worth an estimated Rs 45 billion—offering immense growth potential for Jasmino Corporation.

In India, we are recognised as the sole qualified vendor by the National Thermal Power Corporation (NTPC) for rubber lining solutions for FGD units. This positions us to meet a critical market demand and support national environmental objectives. With our solid track record, robust client relationships, and unique FGD expertise, we are well-equipped for future growth.

What are your growth plans for Jasmino Corporation in the next 3-4 years?

We have a robust international expansion strategy set to unfold over the next 3-4 years, with Europe, the Middle East, and other key regions offering significant



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opportunities. In Europe, the shortage of skilled labor and high manufacturing costs has created a favourable environment for us to step in as a reliable and cost-effective supplier. The acquisition of HAW and GBT marks a major milestone in this expansion, enhancing our ability to provide comprehensive turnkey solutions. This has strengthened our position as a respected international brand, positioning us for growth and a larger market share in our core verticals.

In Saudi Arabia, substantial investments are being made across sectors beyond oil and gas, including petrochemicals, mining, fertilizers, water treatment, and desalination. Our partnership with the Al-Suhaimi Group, backed by significant capital investment in an operational facility, will ease our entry into this market and open opportunities in Jordan, Kuwait, and Bahrain. With established credibility and strong regional acceptance, Jasmino Corporation is well-positioned to partner on large-scale industrial projects, providing significant growth opportunities.

Additionally, we plan to establish an office in Australia to focus on the mining sector, and we are exploring expansion into Southeast Asia, particularly in Vietnam and Thailand, to tap into emerging industrial markets. This strategic diversification will support long-term global success.

SME



“AI Can Detect Anomalies During Production.”

Automation has already replaced many manual processes that were prone to human error, improving the consistency and reliability of QC procedures. AI takes this a step further by enabling real-time monitoring and predictive analytics, says **Bharat Shah**, MD, SK Healthcare.

What is the importance of quality control in pharma?

Quality control (QC) is a critical aspect of the pharmaceutical industry because it ensures that drugs are safe, effective, and meet stringent regulatory standards. Every drug that reaches the consumer must go through rigorous testing to guarantee it is free from contamination, properly formulated, and stable. Without QC, there is a significant risk of substandard or harmful products reaching patients, which can lead to severe health consequences. The role of QC extends to compliance with regulatory requirements from agencies like the FDA, EMA, or CDSCO. These agencies set benchmarks that ensure manufacturing processes meet Good Manufacturing Practices (GMP) to maintain consistency in drug production. QC also plays an essential role in protecting the reputation of pharmaceutical companies. A robust QC system assures patients, healthcare professionals, and regulators that a company's products can be trusted, reducing the likelihood of recalls or legal liabilities, which can be financially and reputationally damaging.



Additionally, AI can analyse large datasets from the production floor to predict equipment failures or quality issues before they arise, thus minimising downtime and improving overall production efficiency. These technologies also streamline compliance reporting by automating the collection and analysis of data required for regulatory submissions, reducing the time and effort needed for audits.

How is your company ensuring quality control in your production?

Our company has integrated a sophisticated blend of traditional QC techniques and advanced technologies to maintain the highest level of product quality throughout the production lifecycle. We use fully automated systems to oversee critical stages of manufacturing, from dosing to packaging, ensuring precision and consistency in every batch we produce. In addition to automation, we have implemented AI-driven tools to monitor production processes in real-time, allowing us to detect and address any deviations or potential quality issues instantly. This approach not only ensures compliance with regulatory standards but also minimises the risk of errors that could compromise product quality. We also employ a digital Quality Management System (QMS), powered by AI that centralises all quality-related data. This system enhances traceability and ensures that all processes are fully documented, making audits by regulatory bodies more efficient. Furthermore, by using predictive analytics, we can anticipate potential risks in production and implement corrective measures proactively, which not only safeguards product quality but also enhances operational efficiency by reducing wastage and preventing downtime. This combination of automation, AI, and traditional QC practices ensures that our products consistently meet the highest industry standards.

What role do you see AI/automation playing in quality control and assurance?

AI and automation are revolutionising quality control and assurance processes within the pharmaceutical industry by enhancing efficiency, precision, and compliance. Automation has already replaced many manual processes that were prone to human error, improving the consistency and reliability of QC procedures. AI takes this a step further by enabling real-time monitoring and predictive analytics. For instance, AI algorithms can detect anomalies during the production process, allowing for swift corrective actions that prevent the release of defective products. Automation systems handle tasks like raw material sampling and in-process testing with a level of precision and speed that is impossible for human operators.



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“Automation Ensures ‘Right-First-Time’ Output.”

The goal of automation is to improve both product quality and productivity while minimising human intervention, which helps maintain a competitive product cost. Building automation increases the confidence of regulatory authorities & in turn establishes higher quality standards and customer expectations, says **Sanjeev Dharwadkar**, CEO, Pharma Tech Consulting LLP and Former Director, Sanofi.

How are pharma firms integrating automation into their production process?

In the pharmaceutical manufacturing processes, automation plays a crucial role in minimising human intervention & errors arising out of it. The objective of building automation is to ensure the products meet high-quality standards. Specifically, in pharmaceutical manufacturing, automation ensures ‘Right-First-Time’ production output, meaning the product is manufactured correctly on the first attempt. This is essential because small errors causes interruptions and increase the costs because of corrective measures, such as reprocessing and discarding defective products. These errors also lead to higher rejection rates.

The goal of automation is to improve both product quality and productivity while minimising human intervention, which helps maintain a competitive product cost. Building automation increases the confidence of regulatory authorities & in turn establishes higher quality standards and customer expectations. Every time we adopt automation, we keep in mind that minimising manual involvement will not only, reduce risks but also enhance operational efficiency, allowing us to deliver high-quality products to patients.

What challenges firms face while adopting these technologies?

Although automation is not new to the pharmaceutical industry, its implementation is becoming increasingly essential over the years. Regulatory authorities are driving this shift. These authorities are keen to see how automation helps to minimise human intervention, improves product quality, and ensures compliance with the highest standards. Automation tools have become a key focus for regulators, who closely



examine how manufacturers use technology to enhance quality and build data transparency.

One of the primary challenges is ensuring that the automation systems comply with regulatory standards at every step of the manufacturing process. Regulatory bodies require evidence that automated processes are free from risks such as data falsification or manipulation of production records. This means that all data generated by automated systems must be available in real-time and accurately reflect the production process. Regulators

are highly vigilant in scrutinising these systems to ensure they function reliably and transparently.

Another challenge lies in selecting the right automation tools that not only improve efficiency but also meet regulatory requirements. Companies need to develop in-house expertise to validate these automated systems, proving their reliability and compliance to regulators. This validation process is essential to demonstrate that the automation tools consistently deliver the expected benefits, such as higher product quality and greater efficiency. Without this expertise, the adoption of automation can become a complex and resource-intensive task.

How does AI play a role in quality control?

AI is set to become a transformative force in the pharmaceutical industry, particularly in quality control and supply chain management. AI leverages historical data to predict potential failures in production processes or quality control measures. By identifying these risks early, manufacturers can address them proactively, preventing the production of substandard products. This predictive capability ensures that errors are minimised, reducing the likelihood of product rejections and improving overall cost efficiency.

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"Govt Plays A Key Role In Catalysing AI In Pharma."

The ideal scenario involves a collaborative approach where the industry works closely with regulators to co-create policies that balance innovation with compliance, ensuring that AI and automation drive positive health outcomes without compromising ethical standards, says **Sudipta Ghosh**, Partner, PwC India.

What regulatory challenges do you see in the adoption of AI and automation in the pharma industry?

Regulatory challenges in AI and automation within the pharma industry primarily revolve around compliance, data security, transparency, and ethical considerations. The industry is heavily regulated, with agencies like the FDA (U.S.), EMA (Europe), and others requiring strict adherence to standards for patient safety, data integrity, and validation processes. Integrating AI and automation into this framework poses several challenges:

- **Data privacy and security:** Given that AI systems rely on vast datasets, often containing sensitive patient information, ensuring data privacy and compliance with regulations like GDPR (Europe) or HIPAA (U.S.) is crucial. AI algorithms need to handle this data securely while adhering to data anonymisation and encryption protocols.
- **Validation and explainability:** Regulatory bodies demand transparency in the decision-making process of AI algorithms, which requires the technology to be explainable and interpretable. Black-box AI models are often unsuitable for pharma because their decision-making processes can't easily be justified. There is a need for robust validation methodologies to ensure these systems' accuracy and reliability.
- **Ethical AI and bias:** AI algorithms must be designed to avoid bias, ensuring that they do not make decisions that could adversely affect specific patient groups. Regulatory guidelines are now pushing for frameworks that minimise bias in AI models, especially in clinical trials and patient treatment recommendations.
- **Compliance with evolving standards:** AI technology evolves rapidly, outpacing the development of regulatory standards.



What role do you think government funding should play in advancing AI and automation in pharmaceuticals?

Government funding plays a pivotal role in catalysing AI and automation within the pharmaceutical sector. Investments in this area can lead to breakthroughs in drug discovery, manufacturing efficiencies, and healthcare accessibility. Key areas where government funding could have the most impact include:

- **Research and Development (R&D):** Government-backed grants and funding initiatives can support collaborative R&D projects between academia, AI tech firms, and pharma companies. This would accelerate innovations in AI-driven drug discovery and personalised medicine, reducing the time and cost involved in bringing new drugs to market.
- **Infrastructure development:** The adoption of AI and automation requires significant investment in digital infrastructure, data centers, and high-performance computing. Government funding in this area can lower the entry barriers for smaller companies and startups in the pharmaceutical ecosystem.
- **Training and upskilling:** To address the growing need for AI and data science talent in pharma, government-sponsored training programs and AI research centers can play a vital role. This would not only prepare the workforce for future challenges but also ensure the industry is equipped with professionals who understand both pharma and AI.
- **Public-Private Partnerships (PPP):** Governments should encourage PPPs where tech companies and pharmaceutical firms collaborate on AI and automation projects. These collaborations can de-risk investments for private players while ensuring public health interests are safeguarded.



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“AI Simulates Trials to Predict Outcomes.”

AI will continue to streamline the drug discovery process by identifying novel drug candidates faster and more efficiently. Generative AI models and deep learning algorithms will increasingly be used to design molecules with desired properties. AI will also help in optimising clinical trial design, patient recruitment and monitoring, says **Mudit Agarwal**, Founder and CEO, Agrim Tech Services.

How can one ensure the ethical use of AI in pharmaceutical applications?

Ensuring the ethical use of AI in pharmaceutical applications, particularly in terms of privacy and security, requires a multi-layered approach that balances innovation with legal and ethical responsibility.

Pharma industry, more often than not, deals with sensitive data, which must be handled in compliance with regulations like the General Data Protection Regulation (GDPR) in Europe, the Health Insurance Portability and Accountability Act (HIPAA) in the U.S. or Digital Personal Data Protection (DPDP) Act in India. Organisations should implement data anonymisation or pseudonymisation during AI processing. AI systems must adhere to the principle of data minimisation, collecting only the data necessary for a specific purpose and ensuring compliance with regional and global privacy laws. Robust data encryption protocols must be in place for data storage and transmission to prevent unauthorised access or data breaches.

The vast datasets required by AI for training may come from clinical trials or patient records. It is essential to ensure that participants provide informed consent for the use of their data, especially when AI models are being trained on this data. Pharma companies should clearly communicate how AI will use data, and participants must have the option to opt-in or opt-out. Additionally, transparent data usage policies must be established to ensure patients are aware of how their data is used, stored and shared.

Similar to other organisations and systems, AI in pharma is vulnerable to cyberattacks, including data theft, model tampering, or manipulation of AI algorithms. Given the sensitive nature of data, securing these systems is paramount. Implementing advanced



cybersecurity measures, such as multi-factor authentication (MFA), intrusion detection systems and regular security audits is essential. Additionally, ensuring AI systems undergo robust testing to detect vulnerabilities before deployment helps reduce risks.

What future trends do you anticipate for AI in the pharma industry?

The future of AI in the pharmaceutical industry is poised for significant advancement with several key trends expected to shape how AI will impact drug discovery, development and healthcare delivery. AI will continue to streamline the drug discovery process by identifying novel drug candidates faster and more efficiently. Generative AI models and deep learning algorithms will increasingly be used to design molecules with desired properties. AI will also help in optimising clinical trial design, patient recruitment and monitoring. This will enable virtual clinical trials, where AI models simulate trials to predict outcomes and reduce the need for costly and time-consuming traditional methods. Use of AI will accelerate the identification of existing drugs that can be repurposed for new therapeutic areas.

The combination of AI with genomic data will drive advancements in precision medicine, where treatments are tailored to individual patients based on their genetic makeup can be a reality in future. It will analyse vast amounts of data from patients to help identify the most effective personalised treatments. AI will increasingly be used to analyse real-world data collected from patients, including data from wearables, electronic health records (EHRs) and patient surveys.

This will lead to better understanding of treatment outcomes and help generate real-world evidence that supports drug development.

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“AI Models Could Be Biased In Algorithm Design.”

AI-models tend to be variable and complex and are often associated with lack of transparency in the algorithms that are deployed. This impacts the reproducibility of results and prediction, leading to lack of consistency, says **Vandana Iyer**, Research Director–TechVision, Frost & Sullivan.

What specific automation technologies are being developed for the pharmaceutical industry?

There are a wide range of automation technologies that are being developed for the pharmaceutical industry. These technologies can be classified into:

- Use of AI & automation for drug discovery: AI is being increasingly used for drug discovery and clinical development of small molecule and biological therapies. Recursion, US, uses ML algorithms to accelerate drug discovery and currently has a lead candidate in phase 2/3 clinical studies for Neurofibromatosis treatment. Automated high throughput screening is widely used for screening large drug libraries for discovery of new therapies. Companies such as Thermo Fisher Scientific, US, already offer advanced HTS platforms for drug screening applications.
- Use of AI & automation across clinical development: AI and automation can help improve clinical trial design and outcomes, apart from enabling improved patient recruitment for clinical trials. Use of Robotic Process Automation (RPA) can help automated data entry and compliance reporting during clinical trials or other pharma processes.



- Complexity of biological systems: AI’s efficacy is limited by the human understanding of complex biological systems. Factors such as genetic variation, environmental conditions, demographic variability and other factors may influence individual responses to drugs, which is difficult to incorporate in AI algorithms. Small molecule drug interactions with biological components cannot be completely simulated in a virtual environment using docking algorithms and scoring functions, as they are very complex, which may lead to identification of inactive molecules.

What trends do you foresee in automation technology specifically for pharma?

Some of the key automation trends in pharma:

- Rising use of data-centric approach to address challenges across the pharma value chain
- Growing focus on platform-based automation tools for the pharma industries as opposed to product-based solutions for driving new drug discovery and development

How do you address the need for scalability in your offerings for manufacturers?

Scalability in automation can be achieved by:

- Modular & flexible manufacturing design: Modular plug-n-play manufacturing models can be easily scaled up or down to suit production needs and workflows. Use of single-use reactors and continuous manufacturing protocols can help scale production needs in an agile manner.
- AI for scaling: Use of AI and digital twin systems can help understand the impact of scaling in virtual environment and help minimise operational risks during implementation in real world scenarios.

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FLAME PROOF FLOOR SCRUBBER CYCLON - FP-240

Soma Specialities Pvt Ltd, the pioneer in introducing floor cleaning machines has introduced its latest model of flame-proof floor cleaning machine, the CYCLON FP-240.

Features:

- The FP-240 is the only flame-proof floor cleaning machine of its kind available in India.
- This model is fitted with a 3-phase 1 HP flame proof motor.
- All electrical fittings are also compliant to the requirements of flame proof area for Zone 21/22 applications.
- The brush speed of 240 RPM is just ideal for all kinds of floor cleaning & maintenance operations such as scrubbing, stripping, waxing, buffing, spray buffing, scouring, scarifying etc.
- With use of proper chemicals and accessories, this machine makes it extremely easy to maintain all types of floor in a very clean and hygienic condition. Tremendous savings in labour cost and highest standards of cleanliness can be achieved with reduced efforts.
- This machine is very easy to operate, maneuver, and to transport.
- It provides almost noise free operation but does the job very effectively and efficiently.
- It is equally effective for all types of floors like Marble, Granite, Mosaic, Kotha Stone, Vinyl, Epoxy, Ceramic, Cement Floors.
- This machine is ideal for floor cleaning applications in any industry in flame proof areas such as in paint industries and paint shops, chemical industries, pharmaceutical plants, oil refineries etc.
- This is a rugged performance machine and yet it is available at a fraction of the cost of imported machines with a one-year warranty and assured availability of spares and prompt servicing..

About the Company: Soma Specialities Pvt Ltd, the pioneer in introducing cleaning machines in India since 1992 has added yet another innovative floor cleaning machine to its range. Excellent products, economical pricing & low maintenance along with a dedicated network of sales and service team across the country have been the hallmark of the company's success in rugged Indian conditions. They have developed a wide range of products in-house that includes auto scrubber dryers,

vacuum cleaners, power sweepers, mopping machines etc.

Contact:

Soma Specialities Pvt Ltd, Mumbai
Tel: 022-25786895 Mobile: 09594988533
Email: info@somaspecialities.com



WALK BEHIND SCRUBBER DRYER CYCLON PRO-510

Soma Specialities Pvt Ltd offers wide range of walk behind scrubber dryer Cyclon PRO-510.

Features:

- Floor cleaning is one of the most necessary cleaning operation for any premises that needs to be frequently and round the clock at times. But with the CYCLON PRO-510 Walk Behind Scrubber Dryer, this task can be done effectively and efficiently with minimum effort. THE CYCLON PRO-510 is a heavy duty scrubber dryer meant for cleaning the floors in all kinds of medium to large premises.
- This machine has one scrubbing brush attached to the brush motor and two large capacity tanks; solution tank of 50 Ltrs and Recovery Tank of 60 Ltrs. While the solution tank dispenses the cleaning chemical on the floor, the scrubbing brush moves in a rotary direction and cleans the floors due to the agitation of the scrubbing brush and cleaning chemical releasing the dirt from the floor.
- As the operator walks past the scrubbed floor area, the rubber squeegee wiper collects the residual dirty water that was generated on the floor and transfers it to the recovery tank using vacuum suction process.
- The CYCLON PRO-510 is a more hygienic alternative to traditional cleaning methods such as a mop and bucket.
- This machine has the power to remove grime, grease, and dirt from the floors that are traditionally very difficult to remove.
- Therefore, since the CYCLON PRO-510 scrubs and sucks the water simultaneously, it eliminates the risk of people slipping as the floor is completely dry.
- The CYCLON PRO-510 is ideal for use in Indian conditions and has achieved great success in terms of performance & sales all across India.
- This is a heavy duty and indigenously made machine guaranteed for years of trouble free service.
- Motors for both the versions are heavy duty for long hours of usage and fitted with helical gearbox so that the machine can operate in rough conditions with durability with minimal noise.
- The batteries used in battery version are Lithium Ion batteries which can provide trouble free performance for a long period.

About the Company: Soma Specialities Pvt Ltd, the pioneer in introducing cleaning machines in India since 1992 has added yet another innovative floor cleaning machine to its range.

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Big Gains Of Additive Engineering

Arc-based metal 3D printing can be more flexible and economical than machining or forming processes, especially in case of complex geometries. There are compelling reasons to use them to additively manufacture pressure vessel.



Arc-based metal 3D printing is well on the way to radically changing metal component manufacturing. The near-net-shape additive manufacturing process with welding wire shapes three-dimensional objects by applying welding beads layer by layer. Examples can be found in the fields of plant engineering, aircraft construction, and toolmaking or lightweight construction. This is particularly advantageous for complex geometries with a high proportion of machining. Here the process is more flexible and often more economical than machining or forming processes. There are also benefits in the spare parts business, prototype construction, and small series production. Standards for metal 3D printing are now available in North America, and are in progress for additively manufactured, unfired pressure vessels in Europe. Linde Engineering, MIGAL.CO, TÜV SÜD Industrie Service GmbH, and Fronius International GmbH are taking the lead with the intention of helping the wire-based manufacturing method make its final breakthrough.

Tailor-made and just-in-time components

Classic manufacturing techniques such as casting are

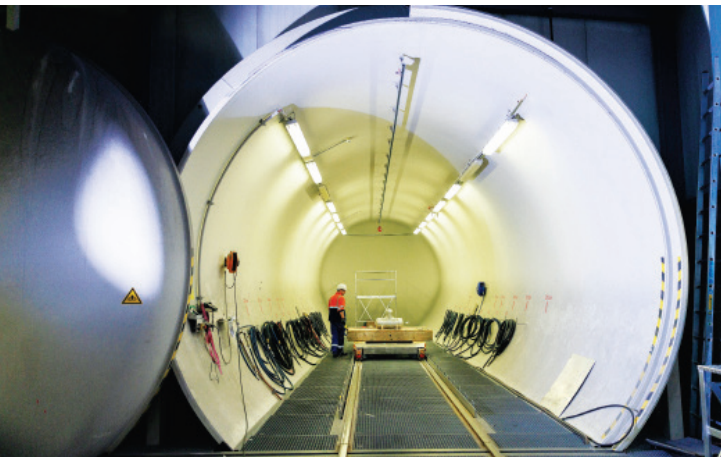
often associated with the construction of complex moulds and tools. There are also lead times and development costs to consider. Companies that adopt metal 3D printing can significantly shorten their production cycles. Additive manufacturing processes not only drive the rapid production of sample parts (rapid prototyping), but also just-in-time manufacturing. As such, they help to avoid risky single source situations—in other words, dependence on individual suppliers, and the associated high storage costs. When various components are needed, the correct “recipes” are selected in the software and “printed” as required. There are hardly any limits for component geometries. By contrast, topology and flow-optimised designs feature prominently in everyday production in additive manufacturing—even for large components.

CMT welding process ideal for metal 3D printing

3D printing works with various processes. Wire-based processes such as “Fronius Additive” melt the welding wire, building up the workpiece layer by layer. To stop too much heat flowing into the workpiece, they must be designed to apply as little energy as possible. The MIG-based Cold Metal Transfer welding process (CMT) from Fronius is especially suitable for metal 3D printing of aluminum components. CMT is a “cooldip” transfer arc process that minimises the heat input, despite its high deposition rate. This process is therefore ideal for additive welding, where the cyclical build-up of beads causes a high heat input.

CMT supports functions that are perfect for metal 3D printing. “Power correction” is a typical example. This function allows the electrical power to be precisely adjusted to the respective process phase while the deposition rate remains constant.

“With our CMT Additive Pro functions, specifically developed for additive manufacturing, such as power correction, or the Deposition Stabilizer that keeps the deposition rate constant, we can precisely control the power input and thus the height and width of the weld,” explained Leonhard Reiter from Fronius R&D.



The pressure vessel joint working group of the German Institute for Standardization (DIN) is looking to increase the acceptance of additive manufacturing in plant and container construction.

Developing standards for additively manufactured pressure equipment

As a member of the “Joint working group for additively manufactured components under the Pressure Equipment Directive of the German Institute for Standardization (DIN),” Fronius participated in the model qualification of an additively manufactured component in collaboration with MIGAL.CO, Linde Engineering, and TÜV SÜD. The working group assessed the applicability of the draft standard prEN 13445-14 to the components of unfired pressure vessels.

Drawing on their particular areas of expertise, the participating partners carried out material qualification, design review, process qualification, additive manufacturing, component and pressure testing, as well as full documentation of the process chain, at their respective locations, and a binding additive manufacturing procedure specification (AMPS) was subsequently created.

“The entire value chain, including all the monitoring details, is considered in the draft standard for prEN 13445-14, and in the previously published DIN/TS 17026. This ensures that the fundamental safety requirements defined in Pressure Equipment Directive 2014/68/EU can be met,” said Dr Kati Schatz, Linde Engineering, outlining what is in the forthcoming standard. “All the details are included. This applies in particular to the material requirements, design, qualification of the additive process, manufacturing and testing, as well as acceptance and documentation. There is hardly any difference between this procedure and that for conventionally manufactured pressure vessels. Even though it has yet to provide the “presumption of conformity” of the intended harmonised standard, and there will still be revisions, the specification can

nevertheless serve as a guide for all those involved in the additive manufacturing process of pressure equipment.”

Design, material, and filler material

The entire process chain was checked using a pressure vessel in the form of a pipe branch. As per the design template, the branch (additively applied area up to the stub) was formed on a conventionally manufactured base pipe with a cut-out provided for this purpose. This is known as a hybrid component, because the substrate material to be welded on will become an integral part of the pressure vessel.

“We decided to use aluminum as the material. We use the naturally-hardened wrought alloy in plant construction because of its excellent low-temperature toughness down to minus 273°C. Welding the material is challenging, however. It’s not just the choice of process and the process parameters that are crucial to the result, but also the choice of filler material,” explained Martin Lohr, Linde Engineering.

The filler material plays a key role in metal 3D printing, as tight tolerances apply both to the diameter and to the chemical composition, with the aim being to include as little hydrogen as possible. Furthermore, the wire must be free of inclusions and neatly wound onto a spool to ensure that the manufacturing process runs smoothly.

“The carbon footprint of the welding wire is an important environmental aspect, because it’s relevant in terms of the climate impact,” pointed out engineer Robert Lahnsteiner, CEO of MIGAL.CO, adding: “Ours is 3,8 kg CO₂ per kilogram of aluminum, which amounts to less than a quarter of the international average.”

Designing the component and selecting the process

The aim was to optimise the transition from the base pipe of the pressure vessel to the stub in terms of both flow and topology. The design resulted in the following wall thicknesses: 8 mm for the base pipe, 14 mm for the transition from base pipe to branch, and 5 mm for the branch.

Selecting the direct energy deposition process

The essential requirements for the DED (Direct Energy Deposition) process, also known as the wire arc additive manufacturing process, were as follows for the model qualification of the pressure vessel:

- The highest possible deposition rate
- A reduced-heat process to avoid or minimise the cooling requirement and distortion
- No lack of fusion in the connection to the base material

- Insensitive to changes in the distance between welding torch and component
- Absolute reproducibility of the high material quality required within the qualified limitations of the deposition process
- Suitability for large components

Based on the requirements, the MIG-based CMT process was chosen for the additive build-up of the weld layers—specifically, CMT mix for the first layers and CMT Additive Pro for the subsequent wall build-up, where the use of power correction significantly influenced the heat input.

Qualifying the process

Due to the different wall thicknesses of the transition from the base pipe to the branch, the scope of application of prEN 13445-14 required three separate process qualifications (DPQR). The resultant deposition procedure specifications (DPS) are binding for the additive welding process. The final “recipe” for metal 3D printing, the so-called additive manufacturing procedure specification (AMPS), thus comprises three deposition procedure specifications, instructions for the welding sequence, and notes on material certificates and operator qualifications.

“In addition to welding guidelines, material certificates and operator qualifications are what ensures a consistent standard of product quality for additively manufactured components,” explained Manfred Schörghuber of Fronius R&D.

The individual test pieces were subjected to non-destructive and destructive testing as per the requirements of prEN 13445-14. Visual and dimensional tests (VT), volume tests (RT-D), and surface tests (PT) were used as non-destructive testing processes to provide evidence that the pieces were free from faults both externally and internally.

“We demonstrated that the mechanical and technological requirements for the additively manufactured material and the hybrid connection were met by checking the chemical composition and by conducting tensile and bending tests perpendicular to the direction of the deposition layer. We then performed metallographic analyses at the start and end points, and at the hybrid connection,” explained Martin Boche from TÜV SÜD.

Planning and simulating the robot path

The path for the robotic welding task was planned using a three-dimensionally modeled pipe branch in the CAM software (computer-aided manufacturing software) developed at Fronius.

“We calculated the proposed additive build-up—the actual welding program—by entering the layer height,



Additive manufacturing processes not only drive the rapid production of sample parts (rapid prototyping), but also just-in-time manufacturing.

position, speed, and build-up strategy. The welding path was visualised in a robotic welding cell that we modeled in our software,” added Leonhard Reiter of Fronius R&D.

Position sensing and sensor travel

The component was scanned using Fronius WireSense so that it could be perfectly positioned and corrective action taken with regard to the manufacturing tolerances. This innovative sensor technology uses the wire electrode as a tactile sensor and scans the welding contour point-by-point. If the electrode extension touches the surface, a short circuit occurs, which triggers a distance signal and transfers it to the welding robot. The system’s software compares the target value programmed offline with the actual value of the WireSense travel, and corrects the welding path for additive manufacturing as necessary. The wire then immediately moves backward and—while the robot continues moving the welding torch—forward again to the next point, where a further short circuit is triggered, a distance signal is generated, and the welding path is modified again, if necessary. This minimises geometric deviations.

Producing the component

The various wall thicknesses in the transition to the branch were implemented via different oscillation amplitudes. A constant heat balance was required to ensure the necessary optimal weld toe from bead to bead, and the uniform weld seam flow. Layer-specific welding jobs with specific parameters were used for this.

A water supply and return were provided for the component during the welding process. The water level

this produced had to be far enough away from the welding point to maintain the interpass temperature in the qualified area. This allowed continuous welding without cooling breaks. Cooling of the component minimised component distortion and increased the deposition rate.

“To observe the build-up of the layers, we used a camera that was triggered in synchronisation with the process. This allowed us to analyse the process deviations more accurately afterwards,” added Reiter of Fronius R&D.

Monitoring parameters and documentation

The WeldCube welding data management software monitored the parameter limits stated in the AMPS (additive manufacturing procedure specification) and issued a warning as soon as the preset limits were exceeded. The sum of all the parameters yielded the “fingerprint” of the additive build-up and facilitated analyses in the event of possible discontinuities.

Final component testing and looking ahead

The final testing, including confirmation of CE conformity, was performed by notified body 0036 of TÜV SÜD Industrie Service GmbH. In the present case, a starting material with mechanical data in a future, harmonised European standard (“harmonised” design) and a component of design class DC1, the result was a component inspection scope in accordance with the Table 1.

“In parallel with these tests, we developed metallographic analyses covering especially those areas



The MIG-based Cold Metal Transfer welding process supports functions that are perfect for metal 3D printing.

where imperfections had been detected. Also affected were the transition areas between the classic material and the additive welding deposition, the hybrid area. The main purpose of the metallographic analyses was to verify the data collected from parameter monitoring and from mechanical, technical, and non-destructive testing. In this case, samples were taken to gain a clear idea of the extent to which the material and the applied manufacturing process were flawless,” explained Boche.

Now that the conformity assessment procedure has been completed according to Module G of the European Pressure Equipment Directive 2014/68/EU, in the form of a “model qualification” of an additively manufactured pressure vessel with subsequent CE label to confirm compliance with the requirements of this EU directive, the pressure vessel joint working group of the German Institute for Standardization (DIN), represented by Linde Engineering, TÜV-SÜD Industrie Service GmbH, MIGAL.CO and Fronius, is looking to increase the acceptance of additive manufacturing in general, and in plant and container construction in particular.

“In conclusion, we can definitely say that decades of experience with arc-based welding processes—combined with stable and innovative processes such as Fronius CMT Additive Pro—offer compelling reasons to increase the use of metal 3D printing in plant and container construction. This creates a competitive edge, especially in view of the associated advantages such as topology optimisation, just-in-time manufacturing, and supplier independence,” summed up Schörghuber.

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Table 1: Results of the test

Type of test	Testing processes	Scope of testing
Non-destructive testing	- Volume testing (RT or UT) - Surface testing (VT and PT)	Per component, 100% of the relevant areas of the design (or 20% if using a suitable grid to fully cover the area)
Destructive testing	- Chemical analysis - Tensile test to determine strength and elongation - Bending test	1x in the additively manufactured area 2x in the unfavorable direction, and also in the hybrid area 2x in the unfavourable direction, and also in the hybrid area
Final testing	Water pressure test	Bursting test (optional)

Article Courtesy: Fronius International GmbH



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“Indian Railways Is Driving Demand For Stainless Steel.”

The usage of stainless steel in the railways has particularly increased owing to its versatile properties such as corrosion resistant, high strength to weight ratio, crash & fire resistant, lightweight, lower life cycle cost, least carbon footprint, and durability. Indian Railways has specified usage of high strength stainless steel for development of high speed trains (250 kmph) and Vande Bharat trainsets, says **Tarun Kumar Khulbe**, CEO, Jindal Stainless.

How is Jindal Stainless serving the railway sector in India? What trends do you foresee in railways sector in the next 4-5 years?

Jindal Stainless has been a vital partner of Indian Railways since the 1990s, consistently contributing to the development of rolling stock and railway infrastructure. We are fully aligned with the government’s vision of transforming India’s railway network into one of the safest and most sustainable in the world. This year, the Union Budget has earmarked a record capital expenditure of approximately ₹2.6 trillion for railways, and we are upbeat about the sector’s growth prospects.

Stainless steel, recognised for its recyclability and safety, aligns seamlessly with the government’s commitment of creating a sustainable railway network. We take pride in our ability to develop cost-effective, customised stainless steel solutions that meet international standards. In the coming years, we anticipate a significant increase in the use of stainless steel across freight wagons, coaches, and rail infrastructure.

Our efforts also support the Prime Minister’s Make in India initiative, as we leverage cutting-edge research and development to deliver world-class stainless steel products. Given the government’s focus on reducing its carbon footprint, stainless steel will play a pivotal role in achieving these sustainability goals. We are committed to partnering with the government to realise this vision, contributing to a greener and more efficient railway system for the nation.

Are you seeing an increase in the usage of stainless steel in railways in India?

Definitely, the usage of stainless steel has diversified, not just in the railways sector but in other sectors as



well. To give you an example, majority of stainless steel in the 90s was only used in the kitchenware segment. This has drastically changed. Now, stainless steel finds its applications in the automobile, railways, transport (ART); architecture, building, construction (ABC); processing industry and consumer durables.

The usage of stainless steel in the railways has particularly increased owing to its versatile properties such as corrosion resistant, high strength to weight ratio, crash & fire resistant, lightweight, lower life cycle cost, least carbon footprint, and durability. Indian Railways has specified usage of high strength stainless steel for development of high speed trains (250 kmph) and Vande Bharat trainsets. All freight wagons used today, for transportation of coal and ore, are made out of stainless steel. All passenger trains, including metro cars are constructed with stainless steel. Apart from coaches and wagons, stainless steel is also being used in making footover bridges at railway stations now. India inaugurated its first stainless steel footover bridge at Naupada railway station in Andhra Pradesh in 2022 followed by Srikakulam railway station. Redevelopment of railway stations under the Amrit Bharat Station scheme and the Railway Station Redevelopment program have many modern amenities being designed in stainless steel. This has ushered in an era of sustainable infrastructure in the railways segment.

As the usage of stainless steel is expected to reach 20 million tonnes by 2047 from 4.5 million tonnes in FY24, railways sector will play a crucial role in its demand.

What kinds of new opportunities are arising for Jindal Stainless in the railways space?

As I mentioned, stainless steel is a versatile and

sustainable material, making it an ideal choice as the government aims to reduce carbon emissions and enhance railway safety. Indian Railways significantly drives the domestic demand for stainless steel, particularly for railway wagons, coaches, infrastructure like foot-over-bridges, station modernisation, and dedicated freight corridors. Additionally, metro projects across India increasingly utilise stainless steel for various applications. Upcoming initiatives, including the Logistics Policy, National Rail Plan, PM Gati Shakti National Master Plan, and multimodal connectivity projects, are expected to further enhance rail freight in the country.

To mention some recent prestigious projects, we supplied stainless steel for Vande Bharat sleeper coaches, Vande Metro, Kolkata's underwater metro, India's inaugural Regional Rapid Transit System (RRTS), and the Mumbai & Bangalore metro projects.

Is Jindal Stainless involved in the development of Vande Bharat trains? Also, what kinds of R&D/innovations were required for Vande Bharat?

Jindal Stainless has been partnering with Indian

Railways for development of light-weight and long-lasting rolling stock. Towards this endeavour, we have supplied tempered 201LN grade of high-strength austenitic stainless steel for the Vande Metro project, a shorter-distance version of the Vande Bharat Express. By using this grade, we've reduced the thickness of the external panels of coaches from 3 mm to 2 mm. This change has resulted in lighter, more energy-efficient, and cost-effective trains. 201LN grade of stainless steel is highly corrosion-resistant, offers greater strength and durability, and has improved crash resistance, ensuring top-notch safety for passengers.

Another potential area for light-weighting and addressing corrosion related issues is the bogie-frame of coaches. Under the present conditions, these carbon steel made bogie frames undergo heavy corrosion necessitating replacement after every 8-9 years interval. Utilisation of high strength stainless steel could open up the possibility of having a light-weight & durable structure lasting the entire codal life of the coach.

We take immense pride in partnering with Indian Railways and shall continue to innovate and offer the best-in-class stainless steel solutions to them in the future as well.

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“RHI Magnesita Is Leading The Industry 4.0 Adaption.”

With 8 production facilities across India, RHI Magnesita India Ltd (RHIM) has emerged as one of the leading global manufacturers of high-grade refractory products, systems and solutions. The company plans to invest about €400 million (₹36 billion) to expand and upgrade its production capacity in India. In this interview with Rakesh Rao, **Parmod Sagar**, MD & CEO, RHI Magnesita India, explains the importance of refractories for the growth of India's economy and manufacturing sector.

Kindly provide us an overview of RHI Magnesita India business.

RHI Magnesita India Ltd (RHIM) is the leading global manufacturer and supplier of high-grade refractory products, systems and solutions which are critical for high-temperature processes exceeding 1,200°C in a wide range of industries, including steel, cement, non-ferrous metals and glass. We operate 8 state-of-the-art production facilities across India at Bhiwadi (Rajasthan), Visakhapatnam (Andhra Pradesh), Rajgangpur (Odisha), Khambhalia (Gujarat), Dalmiapuram (Tamil Nadu), Jamshedpur (Jharkhand), Katni (Madhya Pradesh), and Cuttack (Odisha).

RHIM's products and services are divided into two operational divisions, each catering to specific customer industries. The first division focuses on supplying products and services to the steel industry, known as the “Steel Division”. The second division serves industries such as cement and lime, non-ferrous metals, chemicals, energy, glass, and others, referred to as the “Industrial Division”.

In recent years, our growth trajectory has been strong, driven by the synergies created through the integration of the three Indian subsidiaries and our continued investment in R&D, infrastructure, and customer-centric solutions. We also have robust export capabilities, serving markets across Asia, the Middle East, and other regions.

In the year ended 31 March 2024, revenue grew 38 per cent year-on-year with consolidated income of Rs 37.92 billion, while adjusted EBITDA before one time and exceptional item stood at Rs 5.78 billion at 15.3 per cent.

Why are refractories important for the



growth of India's economy and manufacturing sector?

Refractories are the backbone of high-temperature industrial processes, which are essential for the manufacturing sector, particularly in steel, cement, non-ferrous metals, and glass. These industries are the driving forces behind India's infrastructural development, and ‘Make in India’ initiative. As India moves towards becoming a global manufacturing hub, the role of refractories becomes even more critical in ensuring the efficiency, safety, and sustainability of these high-temperature operations.

For instance, steel is a key sector in India's economy and refractories are vital to almost every aspect of steel production, from reduction furnaces to reheating furnaces. Without reliable refractory solutions, these industries would face significant downtime and operational inefficiencies, affecting productivity and economic growth.

What is the size of the Indian refractory market? Which end-users are driving the demand?

India's aggressive domestic manufacturing and infrastructure development targets have catalysed the growth of the refractory industry, driven by increasing global demand for Indian steel. The emphasis in India on manufacturing and infrastructure is propelling the refractory sector forward. The Asia-Pacific region, with a refractories market size of \$ 20.26 billion in 2023, is projected to reach \$ 43.56 billion by 2033, registering a CAGR of 8 per cent from 2024 to 2033.

India is a major market for refractories, with a forecast of 6-9 per cent CAGR. RHI Magnesita India Ltd

is well-positioned to leverage on this opportunity for a sustainable and profitable growth in the coming years.

The Government of India's target, including reaching a \$7 trillion economy by fiscal year 2030 and achieving 300 million tonnes of steel production by 2030, coupled with initiatives like Atmanirbhar Bharat, provide a strong foundation for economic growth. These factors create a conducive environment for increased demand for refractory products.

What kinds of opportunities the market presents to refractory makers?

The Indian refractory market offers immense opportunities, both domestically and internationally. The government's focus on infrastructure development, industrial expansion, and the 'Make in India' initiative is fuelling demand for refractory products across sectors. This coupled with the growth of industries like steel and cement, creates a positive outlook for refractory markets.

On the global front, exports offer significant opportunities. Indian manufacturers have a competitive edge in terms of cost-efficiency and technological expertise. RHI Magnesita India, with its strong production base and high-quality offerings, is well-positioned to capture export markets in Asia, the Middle East, and beyond. The company enjoys the status of "Three Star Export House" for a period of 1 October 2023 to 31 March 2028. Exports are at 10.20 per cent of total turnover of standalone entity in FY23-24.

Moreover, innovation in refractories such as products that offer higher efficiency, durability, and sustainability, presents growth prospects in emerging industries like renewable energy and waste-to-energy plants.

What are your growth plans for RHI Magnesita in the next 4-5 years?

Looking ahead, RHIM plans to capitalise on its strong global presence, diversified product portfolio, localisation of imported products, and favorable domestic industry growth. Anticipated synergies from inorganic expansion, coupled with strategic partnerships and investments, position RHIM for sustained growth and profitability in the Indian refractory industry.

Leveraging synergies from recent acquisitions, RHI Magnesita India aims to increase its market share to 40 per cent within the next four years. This growth will be driven by our strategic focus on expanding production capacities, developing new business verticals, and enhancing our service offerings.

We also intend to invest more in R&D and innovation to develop advanced refractory solutions that cater to the evolving needs of industries,

particularly in the steel, cement, and non-ferrous sectors. We look forward to expanding the export markets by utilising cost-effective production capabilities and a global network.

RHIM India is spearheading adaption of Industry 4.0 through 'Robotics Technology' offering for steel industry and lining Evaluation Scan for Cement Industry. Collectively, these advancements not only ensure operational efficiency and reliability but also set new industry standards. By embracing Industry 4.0 principles, we at RHI Magnesita India are committed to driving innovations and improving performance across the refractories sector which further solidifies our position as the market leader in delivering high-quality solutions.

RHIM India has also set up a new business vertical to service the iron-making industry. The new business vertical will support the industry through strategic partnerships to jointly address key challenges faced by the industry such as domestic refractory supply reliability and, productivity and performance improvement of the iron making plants. The new vertical will enhance the company's growth journey by leveraging synergies from acquisitions and, entering targeted areas where we are still underrepresented, such as iron making, DRI, pellets, and more. This vertical provides the company with a wider product offering across all segments and enables cross-selling opportunities.

We will also increase sustainability initiatives, focusing on reducing our carbon footprints, improving energy efficiency, and developing eco-friendly products. As a responsible manufacturing company, we are committed to the circular economy and our recycling rate of raw materials is at 14 per cent. We continue to leverage Group R&D and investments in sustainable technologies, such as proprietary technology to utilise recycled refractory material which significantly reduces emissions, and we are confident that this will increase further underlining our efforts.

RHI Magnesita has spent about Euro 300 million in the last 2 years in India for enhancing local production footprint through mergers & acquisitions. The company has committed Euro 400 million of phased investment by FY 2026 to strengthen its production capacity in India. Post acquisitions and integrations, it now has more than 500,000 tonnes of local refractory production capacity in India.

Looking ahead, as a market leader and an enabler of infrastructure growth, RHIM India, is well positioned to seize all the growth opportunities in sync with the end user industries and continue contributing to the economic growth. The company remains steadfast in its conviction that GDP growth will require the refractory industry to serve as a catalyst to support the vision of Viksit Bharat.

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Transforming Manufacturing With Gen 4 Technologies

Salvagnini's Generation 4 lineup was engineered to eliminate low-value-added activities, reduce lead times, and optimise production flows, ultimately lowering product costs while enhancing business competitiveness. By focusing on user-friendly technologies, Salvagnini empowered manufacturers to meet and exceed market demands effectively.



Salvagnini, a leader in sheet metal working technology, made a significant impact at EuroBLECH 2024, setting a new milestone in the industry. The event was held from October 22–25, 2024. With a steadfast commitment to innovation, the company unveiled its Generation 4 (G4) technologies, designed to revolutionise manufacturing processes. This new generation aimed to address the pressing challenges faced by the industry, including labour shortages, and delivered highly efficient solutions that maximised productivity, ensured exceptional product quality, and minimised errors and consumption.

At the heart of Salvagnini's mission was the introduction of innovative solutions that streamlined operations and enhanced job repeatability. The Generation 4 lineup was engineered to eliminate low-value-added activities, reduce lead times, and optimise production flows, ultimately lowering product costs while enhancing business competitiveness. By focusing on user-friendly technologies, Salvagnini empowered manufacturers to meet and exceed market demands effectively.

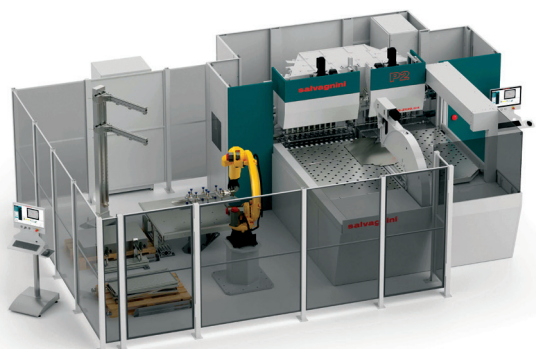
During EuroBLECH 2024, Salvagnini showcased an extensive range of cutting-edge solutions, including machinery, automation systems, software, and

comprehensive services. These systems operated with varying production strategies, providing both standalone processing and collaborative technology integration when necessary.

Multi-level automation

Salvagnini's multi-level automation solutions were integral to eliminating low-value-added activities and bottlenecks throughout the production process. Key highlights of these innovations included:

- **Punching-shearing centre:** Equipped with a multi-press head featuring always-available tools, this system eliminated setups while delivering high-quality machining and reduced cycle times.
- **Panel bender:** Featuring universal bending tools that automatically adjusted to the size and shape of the parts being produced, this machine operated without re-tooling and processed a wide range of machinable thicknesses and materials.
- **Laser technology:** A single-optic cutting head capable of handling all workable thicknesses and materials, this laser required no adjustments, speeding up production changeovers.
- **P-Robot:** Enhanced with an artificial vision system, this robot maximised cell autonomy without compromising flexibility.



At EuroBLECH, P-Robot, which combines a P2-2120.G4 panel bender and a 6-axis robot, showcased the new RVS artificial vision system.

- Press brakes: With devices such as the ATA, ATA.L, MVM, and AU-TO, these systems adapted automatically during re-tooling and managed tools based on production requirements, enhancing flexibility and autonomy.

In environments characterised by low volumes and rapid production changeovers, the integration of automatic loading and unloading devices became crucial to maintaining efficiency. Given the speed of lasers, punching machines, and panel benders, Salvagnini's wide and modular range of automation evolved to configure systems based on specific production needs, including:

- Automatic loading/unloading and sorting devices: These devices reduced idle times for sourcing sheet metal while minimising the risk of material damage during stacking.
- Robotised unloading devices: These systems ensured immediate machine availability for subsequent jobs, even at non-Salvagnini stations.
- Intermediate automation devices: Transfers and turnover units balanced material transfer times between stations.
- User-friendly software solutions: Designed to streamline the production process, these solutions significantly reduced errors and operator intervention times.



The new S4.G4 punching-shearing machine was presented in Hannover for the very first time.

Introducing FSL S4+P4

At EuroBLECH 2024, attendees witnessed the debut of the FSL S4+P4 line. This innovative system integrated smart technology to automatically produce different parts in sequence and adopted various production strategies tailored to specific goals. This groundbreaking line, which combined the S4 punching-shearing machine and the P4 panel bender, symbolised a new era in flexible production systems.

The FSL operated within a unified ecosystem that connected physical realities—machines and people—with virtual realities, leveraging big data to enhance production flows. By analysing and interpreting data, the

FSL optimised operations, reduced waste, and ensured environmentally friendly practices.

The FSL S4+P4 featured an exceptionally compact layout. The MD single-sheet store-tower fed the S4 punching-shearing machine, while an MC Cartesian manipulator positioned between the S4 and P4 managed part unloading, stacking, and system balancing, acting as a buffer when necessary. This seamless integration ensured rapid part transfer between workstations, minimising downtime and optimising overall efficiency.

Measuring sustainability and efficiency with Impacts

All Salvagnini systems are designed for lean operation, with energy absorption tailored precisely to meet job requirements. However, in a world increasingly focused on sustainability, it is essential to quantify energy efficiency through precise data. At EuroBLECH, they introduced Impacts, which measures the energy consumption of all systems at the Salvagnini booth, including a ground-breaking feature that tracks the consumption of individual machine programs.

Impacts assess the electricity, compressed air, and assist gas usage in Salvagnini systems. This marks the first step toward calculating the CO₂ equivalent emissions for each manufactured component. The way Impacts aggregates data varies depending on the services utilised, including FACE, the comprehensive HMI interface for the entire product range, LINKS, the IoT solution for monitoring system performance, or an OPC UA interface. True to Salvagnini's innovative spirit, Impacts is a flexible product that can customise data collection based on specific requirements.

- Impacts enable users to monitor and understand their energy consumption, facilitating optimisation and reduction efforts. This ultimately enhances profitability, as lower consumption translates to reduced operating costs.
- By assisting in the optimisation and reduction of energy usage, Impacts promotes greater environmental sustainability and strengthens corporate social responsibility.
- Impacts aid in compliance with the latest environmental standards.
- It also helps companies access financial and tax



P2-1620.G4 increases the range of compact panel benders.

incentives available for investments in high energy-efficiency machinery, often linked to updates in national regulatory frameworks.

P2-1620 panel bender

Salvagnini also presented the new P2-1620 panel bender, which embodied the hallmark features of the Generation 4 series. Capable of bending 3.2 mm thick sheet metal up to 1000 mm long, and 2.5 mm for lengths between 1000 mm and 1600 mm, this machine combined productivity with flexibility. With a bending speed averaging 17 bends per minute, the P2-1620 featured universal tools that eliminated re-tooling, ensuring continuous production without downtime.

The ABA automatic blankholder further enhanced efficiency by adapting tool lengths in-cycle based on the size of the produced parts, enabling zero-waste production. Its advanced sensors measured the thickness and dimensions of the sheet metal, compensating for any deformations due to temperature variations. The MAC3.0 system allowed real-time measurement of tensile strength, enabling automatic adjustments to maintain optimal production parameters without affecting cycle times.

L3.G4 with full automation and neural networks

A new architecture that combines high accessibility with high rigidity, an 8kW high power density that reduces consumption and achieves the typical performance of 10kW sources: these are just two of the key features of L3.G4, the new Salvagnini fiber laser cutting system, presented for the very first time at EuroBLECH. In the proposed configuration, L3.G4 is fed by an LTWS 10-tray store-tower, equipped with automated loading/unloading. The MCU automatic sorting device completes the layout and is used to easily stack parts of different shapes, sizes and weights. But the cutting system offered by Salvagnini also features a wide range of advanced process control and efficiency solutions, which further improve the performance and make it a highly productive and versatile laser, with reduced power consumption and competitive running costs. Cutting has never been easier.

L3.G4 changes the architectural paradigm of Salvagnini laser systems with an innovative high-accessibility gantry solution. This solution offers unique and innovative design features guaranteeing full accessibility to the working range, high rigidity and precision machining, all



The new L3.G4 laser with fully automated configuration, with LTWS store-tower, MCU sorting device and belt transfer.

to the advantage of performance on medium and thin thicknesses, 15 per cent higher than in the past.

ACT, PLAN, GROW

Salvagnini showcased a modular range of services at EuroBLECH 2024 designed to meet diverse customer needs throughout their system's lifecycle. The three service levels—ACT, PLAN, and GROW—facilitated a collaborative relationship focused on mutual development and customer success.

- ACT: Provided immediate solutions for daily operational challenges.
- PLAN: Focused on proactive problem prevention and strategic planning to optimise system efficiency.
- GROW: Aimed to maximise process value and enhance in-house skills through continuous training, empowering customers to achieve new heights.

Celebrating innovation and sustainability

Salvagnini's exhibition at EuroBLECH 2024 marked a pivotal moment in the sheet metal working market. By showcasing innovative technologies and solutions, the company underscored its commitment to helping manufacturers navigate the complexities of modern production while promoting sustainability and efficiency. The event allowed attendees to experience firsthand how Salvagnini's Generation 4 technologies could transform their manufacturing processes, enhance productivity, and drive competitiveness in an evolving industry landscape.

The focus on sustainability and efficiency resonated strongly with attendees, who recognised the importance of adapting to the changing demands of the market. With labour shortages and increasing operational costs, the innovations presented by Salvagnini provided valuable insights into how manufacturers could optimise their processes and ensure long-term success.



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Machine Diagnostics For Boosting Productivity

With machine diagnostics, TRUMPF detects abnormalities in the machine before they can cause a breakdown.

Fix a problem with the machine before it affects production – with TRUMPF machine diagnostics, this is possible. To do this, TRUMPF service experts remotely monitor the machine's condition (condition monitoring). “With the new machine diagnostics, we can capture more in-depth machine measurement data, such as motor currents or sensor signals, that previously could not be measured. Simply put, we could previously take a machine's temperature, but now we can get a complete blood count,” explained **Martin Schober**, Head Developer- Machine Diagnostics, TRUMPF. With the digital service condition monitoring, service technicians were already able to view machine status data, such as the level of lubricating fluids. With the addition of machine diagnostics, TRUMPF can analyse the machine's status even more reliably and, above all, remotely.

A deep look inside the machine

During the machine diagnostics, the machine independently and regularly performs measurements. Service experts from TRUMPF check this data for special error patterns that indicate unusual machine behavior. To do this, they use automatic search algorithms to compare the data with defined indicators and limit values. “If, for example, components on the machine's axes wear out due to dirt or stress, this will have a long-run negative impact on production,” explained **Stefanie Rieker**, Product Manager, TRUMPF. “With machine diagnostics, we are now able to avoid such cases because we can now collect the relevant data and, above all, interpret it. If we detect any irregularities, we react immediately and contact the customer with the appropriate recommendations for action,” added Rieker.

Increased productivity with lower service costs

The advantage for the customer: they always know the condition of their machine and are informed in advance of any potential problems. This allows them to check the settings or plan the replacement of a component in good time. As a result, they can prevent



consequential damage or machine failures, avoid unforeseen service visits and reduce costs. At the same time, the continuous availability of the machine increases production productivity.

Fast troubleshooting – even without a service visit

Over 80 per cent of all service cases can be predicted and planned using digital condition monitoring. Thanks to the significantly more precise error diagnostics that this enables, the service engineer can also inform the customer about possible action steps remotely. In most cases, the problem can be solved without a service visit, which saves time and money. TRUMPF has already reached the point where the customer can solve the problem independently in three out of four cases, for example, with step-by-step instructions, so-called Technical Guides, or in remote contact with a TRUMPF service engineer.

The prerequisite for this is that the machine is connected online to the TRUMPF network, for which the company places a high value on maximum information security and data protection. This is how TRUMPF ensures that no unauthorised access to the data takes place.

SME



Radiant Thermal Engineers: The Complete Solution Provider

Based in Indore (Madhya Pradesh), Radiant Thermal Engineers is a renowned manufacturer and service provider of a comprehensive range of boilers, boiler accessories, heat exchangers, etc. The company, established in 2000 with an aim to cater to various needs of steam solutions services, has garnered a huge clientele by working with utmost sincerity to gain total client satisfaction. In addition to this, Radiant Thermal Engineers is an IBR (Indian Boiler Regulation) approved firm by the Directorate of Boilers, Indore, MP, under the Ministry of Industries and Commerce for fabrication of industrial boilers with working pressure up to 100 kg/sq cm.

Radiant Thermal has grown by leaps and bounds under the guidance of the mentors, Kamlesh Rathore and Sanjay Sharma. It offers products like boiler; heat recovery unit/heat exchanger – water pre

heater, air preheater; chimney; pressure reducing station; bag filter; multicone/simple cyclone dust collector; and air receiver/ammonia receiver. It offers services like IBR approval, boiler and thermic fluid heater erection and commissioning; steam pipeline and high temperature thermic oil pipeline designing, drawing and site fabrication; and boiler and thermic fluid heater repair and maintenance. It also offers consultancy service for boiler/thermic fluid heater selection, steam/heat requirement assessment, plant layout and efficient boiler/thermic fluid heater operation.

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For details about Radiant Thermal Engineers, contact Kamlesh Rathore (Mob: +91 94240 18370) or Sanjay Sharma (Mob: +91 93021 01122) or send an email on radtherm@rediffmail.com.

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TOOLING SOLUTIONS

Delta Small Tools & Engineering offers a wide range of customised tooling solutions. The range includes chill vents, 2D/3D core pins, sleeves, sliders for die casting dies/moulds, precision punches, and die inserts for cold forging applications.



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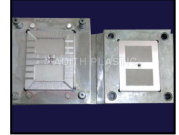


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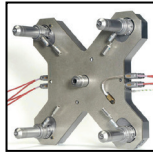
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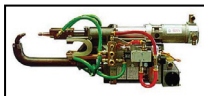
settings for electrode spacing and upsetting pressure are calibrated directly for the different wire size to be welded.

Contact:

Parmo Welding Machines (P) Ltd, Rajkot
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Shreeji Weld Industries offers a qualitative range of spot servo pneumatic welding guns. Automatic detection of variable sheet combinations; automatic change in welding parameters with forces as per sheet combination detected. No operator dependency for welding parameter change free programmable mid position.



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Contact:

Shreeji Weld Industries, Mumbai
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Email: shreejiweld@gmail.com

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Sturdy RAM for high speed operation; safety cut off switch for water flow in transformer.

Contact:

Arm Welders Pvt Ltd, Pune
Tel: 020-27120063 Mobile: 09822039805
Email: sales@armwelders.com

DC TIG WELDING MACHINE

Welding Aids offers DC TIG (inverter base) MOSFET base welding machine. Its soft switch technology offers high efficiency, low power consumption, automatic protection from over current, over heat and over/under voltage. It offers TIG welding and MMA welding.



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Contact:

Welding Aids, Delhi
Tel: 011-23214114 Mobile: 09811062635
Email: weldingaids@gmail.com

PROFILE WELDING MACHINE

Eewa Engineering Co offers an array of profile welding machine. To ensure the quality and flawlessness of the machine, this range is stringently monitored on various quality parameters.



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Contact:

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Mobile: 09879538559
Email: contact@eewaengineering.com

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Azamin Enterprise offers a wide range of gas metal arc welding wires (GMAW). GMAW, sometimes referred to by its subtypes metal insert gas (MIG) welding or metal active gas (MAG) welding, is a semiautomatic or automatic arc welding process in which a continuous and consumable wire.



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Contact:

Azamin Enterprise Pvt Ltd, Mumbai
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Email: azaminpl@vsnl.net

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Invent Weld Automation is offering a wide series of tack welding machine. Assembling machine is specially designed to form H/T beams from loose plates; during the assembly operation, the web and flange is centralised and synchronised clamping by hydraulic.



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Contact:

Invent Weld Automation (P) Ltd, Chennai
Mobile: 07358386573, 07358386572
Email: baboogv@gmail.com

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Modi Arc Electrodes Company offers a wide range of welding wires - MIG wire carbon steel, Excel MAG 1. This is double deoxidised copper coated Mn-Si wire suited for gas metal arc welding in all positions for mild and fine grained steels.



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Contact:

Modi Arc Electrodes Company, New Delhi
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Email: infodelhi.modiarc@groupmkm.in

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Mansoori Weldarc India manufactures, exports and supplies a high quality range of Mig Mag welding machines. This machine is manufactured using optimum quality material and sophisticated technology in tune with industry standards.



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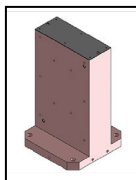


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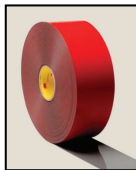
ventured into the manufacturing of bopp packing tapes, aluminum foil tapes, cloth duct tapes.

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Pioneer Corporation offers a wide range of acrylic foam tapes. Various grades of acrylic foam tapes & PE foam tapes & their die-cuts are available in various thickness. Its features include: mounted trims, emblems & body side moldings are fixed with high performance adhesive tapes & die-cut.



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Contact:

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“Smart Features Let Users Control Pumps Remotely.”

These smart pumps can fine-tune their performance based on real-time requirements, such as adjusting RPMs or reversing direction if clogged. They can communicate with neighbouring pumps, allowing for seamless operational handovers if one pump encounters an issue. The integration of artificial intelligence (AI) and machine learning into our pumps enhances their capabilities, **Hemant Watve**, CMD, Wilo Mather and Platts Pumps.

What range of pumps do Wilo Mather and Platts Pumps offer for industrial applications? What sectors do you cater to?

Wilo India offers a comprehensive range of pumps tailored for various industrial applications, spanning from 0.5 kilowatts to 4200-4500 kilowatts. This extensive range allows us to cater to a wide array of needs across different industries.

In industrial applications, we focus particularly on raw water intake, which may involve sourcing water from rivers, lakes, or even seawater, depending on the industry requirements. Once the water is sourced, it must be treated, and we also supply pumps for water treatment plants.

Our pumps are essential for numerous processes, including cooling water, cooling towers, condensate extraction, HVAC systems, and fire fighting applications. Each of these uses necessitates reliable pumping solutions.

After the water has been utilised, it is crucial to recycle and reclaim it. We provide pumping systems designed for water reclamation from wastewater, allowing it to be reused in processes or for purposes such as gardening and flushing. This occurs before any water is discharged to external treatment facilities. Our pumps serve a variety of sectors, including chemical, pharmaceutical, sugar, steel, aluminium, coal power, nuclear power plants, and oil refineries. This broad range of applications underscores our capability to meet diverse industrial needs.

How does your technology enhance operational efficiency and energy savings?

At Wilo, we emphasise continuous improvement in our pump technology. While pump technology is not



new, it is evolving, and we learn every day about new requirements and traits. Each pump is designed to handle specific fluid types and generate a particular head.

The application demands often differ from standard pumps, necessitating an evolution in technology to meet these requirements. We focus on customising our pumps to ensure high efficiency and substantial energy savings. For instance, consider a one-megawatt pump running continuously for 24 hours.

Even a 2-3 per cent energy saving can result in significant reductions in energy consumption. Globally, pumps account for about 15-20 per cent of energy generation, so improving energy efficiency in this area translates to substantial indirect energy savings that can be redirected to other applications.

How do you make your pumps smart?

Six to seven years ago, Wilo pioneered the concept of the “smart pump,” capable of understanding its operational environment. These pumps can fine-tune their performance based on real-time requirements, such as adjusting RPMs or reversing direction if clogged. They can communicate with neighbouring pumps, allowing for seamless operational handovers if one pump encounters an issue.

Additionally, smart features allow users to control pumps remotely via smartphones, enabling modulation of flow rates and operational settings. The integration of artificial intelligence (AI) and machine learning into our pumps enhances their capabilities.

For instance, in data centre applications, our technology can sense data flow, energy consumption, and heat dissipation, allowing HVAC systems to adjust based on real-time processing needs. Technological

advancements enable the creation of 3D surfaces during pump manufacturing and design, improving precision and efficiency. Analytics tools, including CMT and CEE simulations, allow us to measure vibrations, temperature, and noise levels, helping us estimate and mitigate losses. Our journey toward enhancing pump efficiency is accelerating rapidly, reflecting industry trends.

What are current trends and how are the markets fairing (global and Indian)?

Globally, market trends are mixed. In Europe, recent wars have led to market sluggishness. However, North America, South America, Africa, the Middle East, India, and China show varied growth rates. While China's market is currently slower, its growth potential remains substantial compared to Europe. The most buoyant markets are Southeast Asia, India or Middle East or even North America. They are growing very rapidly in terms of Indian market.

The Indian market this year will definitely grow double digit. This what our forecast shows, and this is what the market trends are showing. Forecasts indicate that India's growth story will continue for the next five

to six years, driven by infrastructure projects. The increasing focus on food security, desalination, and river-linking projects highlights the importance of conserving resources.

These initiatives create significant demand for pumps and pumping systems. Looking ahead, we plan to expand into metallic volute pumps, which are gaining popularity due to the rise of solar energy generation in households. This energy often goes unused at certain times, prompting the need for systems that can store water using this excess energy for later use. Additionally, the trend toward smart pumps will continue to shape our future developments.

What are your future plans?

As far as our market growth is concerned, for last 10-12, years, we have been growing double digits and we will continue to do so.

Currently, approximately 20 per cent of our turnover comes from exports, and we intend to increase this to over 25 per cent in the near future.

This expansion will not only diversify our market presence but also showcase India's capabilities to a global audience.

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www.ringgaskets.co.in
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- Pump Sleeves
- Plug Gasket
- Valve Seat Ring
- Seat Retainer Ring
- Valve Components
- Rolled / Forged Ring
- Machined Ring Forgings
- Machined Investment Castings
- Machined Centrifugal Castings
- Centrifugal Castings
- PTAW / GTAW Welded
- Components / Overlay Welding
- Stellite 6 / Stellite 21
- CNC / VMC Machined Components
- Ring Joint Gasket
- Serrated Gasket
- Bonnet Ring / Seal Ring
- Valve Stems
- Bush / Yoke / Gland





Electrified Future Of Actuators

The focus on the trade-offs of electrical actuators is only a topic of discussion because the transition from hydraulic systems is picking up pace. In following the trend, professionals may forget to consider the drawbacks, writes **Emily Newton**.



Electric actuators have started to replace hydraulic and pneumatic systems. While they promise various operational and financial improvements, the change may not be for the better — at least not entirely. What trade-offs should business leaders expect from making the switch? Are the benefits worth the compromises?

Why electrical actuators are replacing hydraulics

Hydraulic actuators have been considered the industry standard for years. Why make the switch to electric? Perceived value has been one of the top drivers. Experts estimate the market for electrical linear actuators will increase from \$20.5 billion in 2022 to \$34.3 billion in 2032, achieving a compound annual growth rate of 5.3 per cent.

Increasingly tightening regulations are also driving change. As federal and state governments eye clean energy, high tariffs on crude imports and laws limiting emissions become real possibilities. In an effort to proactively comply with foreseeable changes — and appeal to socially conscious consumers — construction and manufacturing firms are switching to electric.

Still, relatively few real-world examples of all-electric machinery exist to date. Multiple firms have created proof-of-concept models, but they are far from becoming industry standard. Is it because original equipment

manufacturers hesitate to break into an unproven field? Or is transitioning to batteries and electrical actuators more challenging than they assumed?

How electric, pneumatic and hydraulic compare

Realistically, decision-makers should expect to compromise on speed, precision or strength regardless of the actuator type they select. The focus on the trade-offs of electrical actuators is only a topic of discussion because the transition from hydraulic systems is picking up pace. In following the trend, professionals may forget to consider the drawbacks.

Hydraulic actuators are purpose-built for power. An industrial-grade version has a one to eight-inch bore size at 2,000 to 3,000 pounds per square inch (PSI) and can exert anywhere from 1,700 to 110,000 pounds of force. These systems have undergone decades of fine-tuning and optimisation.

Those purpose-built for specialised applications are capable of even more strength. While typical hydraulic actuator pressure ranges from 1,000 to 5,000 PSI, large systems can reach upwards of 10,000 PSI. They undoubtedly provide the greatest force and power density out of any actuator design.

Electrical actuators, on the other hand, are comparatively weak. They have the equivalent of a one to five-inch bore size and can exert up to 50,000 pounds of force — just half that of a comparable hydraulic system. Achieving a similar power level when generating mechanical power from electrical input may not be impossible, but it is technologically impractical.

The trade-offs of switching to electrical actuators

Since hydraulic systems rely on compressed fluid and have been the industry standard for years, their design simplicity is unparalleled. They are often significantly cheaper to deploy than alternatives. The total cost of acquisition for electric is comparatively high — even pneumatic actuators are more affordable upfront.

Another trade-off of electrical systems is the lack of

power. Many real-world machines achieve under 50 kilowatts — the equivalent of 75 mechanical horsepower. This is because it only makes sense to deploy them in applications with one or two actuators. The larger and more complex machinery becomes, the more difficult it is to justify the upfront cost.

Some original equipment manufacturers are attempting to build all-electric heavy-duty machinery. Their power is even lower. For instance, Caterpillar's battery-powered 793 electric mining truck runs on a 256-kilowatt-hour battery and has an eight-hour charging cycle, meaning it has the equivalent of a 42-horsepower motor.

The problem with electrical actuators is that they require a large amount of space. While they technically take up less room than other systems, they are relatively bulky. A hydraulic system may contain numerous valves, hoses and components, but optimisation has made it compact.

Moreover, making these components comparatively strong means even more space is needed. In other words, retrofitting machinery for an electric system may be complex and costly. Professionals will realise as much once they use the load, duty cycle and stroke length to determine the size needed for their application.

What makes these actuators worth the investment?

Despite the potential drawbacks, business leaders can still make the switch to electrical actuators worth the investment. These components may not possess their counterparts' force or power density, but they are highly precise, efficient and cost-effective. Since they are directly driven and rely on electricity, their power source is continuous.

Efficiency-wise, electric systems come out on top. While they can achieve up to 80 per cent efficiency, hydraulic actuators reach roughly 40 per cent on average. This incredible disparity is primarily due to oil's messy, inconsistent nature. Pneumatic systems range from 10 per cent to 25 per cent, readily experiencing decreases as seals degrade and leaks develop in supply hoses.

In addition to being more efficient, electric actuators are also more sustainable and easier to maintain. Unlike alternatives, it does not leak fluids or gasses. There is no messy buildup that requires cleanup or could damage adjacent parts. Having little to no maintenance expenses throughout the machine's life cycle lowers the total cost of ownership.

Moreover, unlike hydraulic and pneumatic, electric systems do not need to constantly run to keep lines charged. They do not waste energy when idle, saving resource usage and lowering companies' carbon footprints.



Another benefit is greater motion control. Pairing electrical actuators with a motor system and servo drive enables real-time visibility into the component's position, speed and acceleration, among other variables. Professionals can customise the speed, stroke length and applied force. A similar setup for a hydraulic system would be expensive and technologically complex.

The bottom line on adopting electrical systems

Companies have several options for optimising electric actuators to compensate for the various power density and force trade-offs. Maximising the space in the envelope by making designs more compact is the best way to simplify retrofitting. Customising motion control factors is another way to increase efficiency and speed.

Will machine operators be able to tell the difference? From their perspective, the change is mostly undetectable. Their equipment will be more precise, quiet and responsive. The main difference will be noticed during refueling and maintenance, as charging a battery and fixing electrical shorts are much different than refilling oil or cleaning a fluid leak.

SME

About the author:

Emily Newton is a tech and industrial journalist and the Editor-in-Chief of Revolutionized magazine.



Manufacturers Are Driving Down Rising Energy Bills With Acoustic Imaging

Acoustic imaging is helping energy-intensive industries to keep the lights on by driving down operating costs and slashing maintenance expenses, writes **Federico de Lucia**, FLIR Team Lead of Condition Monitoring Specialist.



FLIR Si2-LD Industrial Acoustic Imaging Camera for Pressurised Leak Detection and Mechanical Fault Detection

Businesses are struggling to cope with compounding costs and rising energy bills—that much is clear. In the face of surging costs and in the absence of certainty, businesses across the globe are looking to reduce consumption and cut costs wherever possible. In this new (increasingly costly) reality, acoustic imaging is offering manufacturers a crucial lifeline; it is helping energy-intensive industries to keep the lights on by driving down operating costs and slashing maintenance expenses.

You've heard of 'lossless sound'. Well, acoustic imaging takes that quite literally.

Detecting previously undiscovered air leaks can plug a costly problem

For the UK and much of the EU, the cost of energy has almost doubled from this time in 2021, with prices now at 34.0p/kWh (versus just 18.9p/kWh in 2021). That's 179 per cent higher. In fact, gas prices have increased in 23 of the 24 EU Member States for which data are available, with the biggest jumps after the UK being seen in Estonia (+154 per cent), Lithuania

(+110 per cent) and Bulgaria (+108 per cent).

This begs the question, "how can energy-intensive industries survive in this climate?" With large-scale industrial processes driven largely by compressors and vacuum pumps to operate machines and transport assets, that's a critical question.

The answer is of course to look at your outgoings and real, tangible ways to cut expenditure on the factory floor. One way that is rapidly picking up traction among manufacturers across the breadth of the EU is acoustic imaging.

No piece of equipment is immune to the issue of machine failures and wear, however high-tech they are. Machines that aren't operating optimally are costing you money in very real terms. This is where acoustic imaging comes in; on the frontline of condition monitoring, it promises to yield savings by picking up air leaks in real time.

While isolated incidents may seem minimal, the costs of wasted energy can quickly snowball



The FLIR Si2-LD detects two sources of potential compressed air leaks, distinguished from background noise.



Industrial compressed air leak, as seen by the FLIR Si2-LD.

from a minor inconvenience to an acute concern. Consider that with the average compressor system, approximately 80 per cent of energy is lost through heat dissipation, meaning only 20 per cent makes the transition into a usable output on the factory floor. From this, up to a third of this usable energy is lost to leaks. Energy that you're paying more and more to use.

The value of acoustic imaging for leak detection

It's a proactive stance against leaks:

Compressed air may be cheap but the power needed to run faulty systems is not. By catching leaks through detection systems and sensors early, facilities crews have the opportunity to prevent further energy waste and can schedule repairs.

It pays for itself: Leak detection with an acoustic imager leads to improved energy efficiency and reduced costs, not only from repairs to compressed air and vacuum systems but also related to any expensive specialty gases that could be leaking during your production process.

It finds leaks more accurately than traditional methods: Acoustic imagers actually see the leak and display it on a screen, allowing technicians to pinpoint leak locations almost instantly.



Easy-to-view color LCD screen.

Why are air leaks so expensive?

Let's put a measurable scale on a problem that can vary substantially by application. To do this, operators must first explore exactly how much a leak can impact production costs.

Take, for example, a compressed air leak from a small hole of just 1.5 millimetres on a network of compressed air at seven bars of pressure. Two years ago, with a price of €0.07 per kilowatt hour, that alone would have cost a company roughly €1500 (£1300) if

you assume an operating time of 6000 hours per year.

Of course, now the energy situation is worsening, which means that costs may be three, four, even five times higher in some cases—which could be a cost of up to £7500 a year for failing to identify a single small hole in a vital production component.

When you consider the scale of industrial manufacturing and the scope for leaks to crop up unnoticed, it is staggering that such a comparatively small hole can compound into such a large problem.

Driving down energy bills with the FLIR Si-Series

Newer acoustic imaging camera models such as the FLIR Si2-LD use a number of high-spec audible and ultrasound microphones to detect air leaks as they appear and boast an optimal bandwidth range of 2–130 kHz. This range yields unmatched detection accuracy and identification down to even the smallest breach.



FLIR Si-Series acoustic imaging cameras include features such as dual-mode LED worklights and a 12 MP camera with 8x digital zoom.

Why choose a FLIR Acoustic Imager?

- **Effortless one-hand operation:** Improves operator safety and reduces potential neck strain.
- **Superior sound detection with 124 microphones:** Optimised dynamic range helps balance frequency capabilities with how far sound travels (you want your detectors to use the lowest frequencies possible to get the farthest distance).
- **Enterprise scalability:** Fleet management, cloud data integration, and OTA software updates ensures optimal use in large-scale industrial settings.
- **Machine learning capabilities:** Allows Si-Series cameras to distinguish sound patterns created by leaks from background noise.



The technology also gives handlers the ability to identify, photograph or video the location of an air leak up to ten times faster, meaning minimal downtime for the facility and a prompt repair or replacement of the defective component. In addition to this, it also detects partial discharge, floating discharge and corona, helping to curb potentially life-threatening events, as well as general maintenance issues.

Operators benefit from the much quicker identification of problem parts and even have the capability to see the detected leak(s) as they appear. This is because the sound is superimposed by functional AIs to render a visual depiction of where the leak is as well as gauging its severity, including recommended actions to resolve.

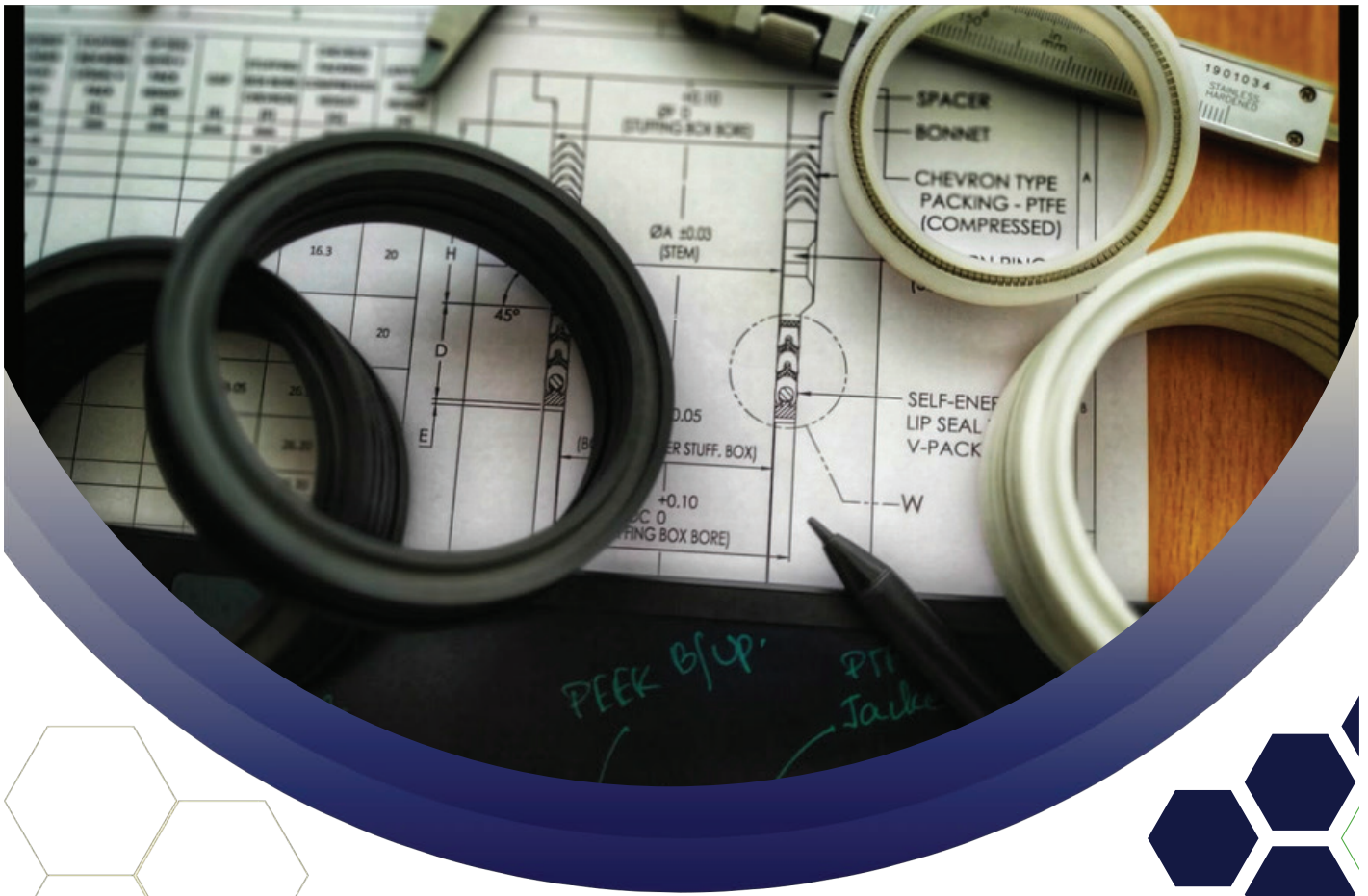
In the case of FLIR Si-Series acoustic imagers, projective algorithms even estimate how much the leak will cost by evaluating the air lost in real-time, calculating the spend per kWh and displaying an expecting saving per year (or on a specified timeframe), ensuring that inspectors have clear evidence needed to solve problems and justify any incurred repair costs across the production line.

If you're a manufacturer struggling with the rising cost of energy, explore the new Si2 range now to radically improve inspections in your facility.

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For details, contact FLIR India on Tel: +91 11 4560 3555; or Email: flirindia@flir.com.hk

(Communication provided by the management of the company)



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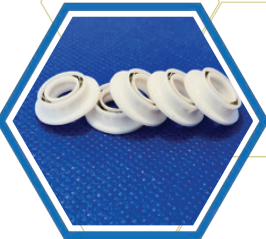
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VAG AW DISK CHECK VALVE

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GATE VALVES

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material, precision and durable service.

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pneumatic override safeguards the system. Remote operation available to re-circulate full flow.

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SOLAR WATER PUMP

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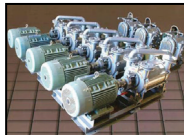
design for simple and cost-effective servicing and repair.

Contact:

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LEADERSPEAK: BENJAMIN LIN 

“Regulations Are Pushing Funds In Sustainable Technology.”

Delta Electronics is witnessing increasing demand for its solutions that facilitate electric vehicle (EV) charging infrastructure. As the EV market expands, our energy management products provide essential support for developing charging networks, with an emphasis on energy efficiency and sustainability in transportation, says **Benjamin Lin**, President, Delta Electronics India Pvt Ltd, in this interview with Rakesh Rao.



How do you view Delta’s journey in India over the years?

Delta Electronics India has experienced a remarkable journey over the years, supported by steady growth and expansion across diverse business units. Since establishing a presence in India in 2003, we have developed a strong manufacturing footprint, supported by 3 state-of-the-art manufacturing facilities in India. These facilities are designed to meet the needs of our end-user industries, including telecom, data centres, EV charging infrastructure, renewable energy, industrial automation, and more.

Our growth has been driven by a combination of local market demand and our focus on exports, particularly to neighbouring regions. We continue to invest in R&D and innovations, with a focus on energy-efficient solutions, sustainability, and digital transformation. Our recent investments in new global R&D centres further demonstrate our commitment to developing cutting-edge technologies that address global challenges and contribute to the digital and green energy revolution.

Delta remains dedicated to driving value for our customers and partners in India and beyond.

What is the significance of the global R&D centre that Delta opened in Bengaluru?

The global R&D centre that we opened in Bengaluru on September 9, 2024, is a major milestone. This centre will play a key role in developing new technologies and solutions that support our mission of providing energy-efficient and sustainable products. It will focus on innovations in areas like power electronics, EV charging, renewable energy, and industrial automation. With advanced labs for high-voltage testing and a focus on IoT and AI applications, we anticipate that this facility will play a pivotal role in driving local innovation and enhancing our global capabilities. It reflects our commitment to investing in India’s technological landscape and aligns with our ‘India for India’ initiative.

Which end-user industries are the key demand drivers for Delta Electronics’ products and solutions in India?

At Delta Electronics, we recognise that various sectors are driving demand for our products and solutions. In the telecommunications industry, our telecom power solutions play a crucial role in supporting operators as they upgrade and expand their infrastructure. Our solar power systems enable telecommunication operators to integrate renewable energy, demonstrating their commitment to environmental responsibility. Additionally, our site controllers facilitate intelligent site management, which optimises energy use. By effectively coordinating cooling

and power solutions, we help our customers achieve reliable and stable service quality.

In industrial automation, Delta provides a wide range of products designed for high performance and reliability. Our offerings include drives, motion control systems, industrial control and communication technologies, power quality improvement solutions, human-machine interfaces, sensors, meters, and robotic systems. These solutions contribute to enhancing operational efficiency across various manufacturing processes. We also offer information monitoring and management systems, such as SCADA and Industrial EMS which support comprehensive smart manufacturing initiatives. These systems enable businesses to monitor real-time performance and make informed decisions to optimise their operations.

In the automotive sector, we are witnessing increasing demand for our solutions that facilitate electric vehicle (EV) charging infrastructure. As the EV market expands, our energy management products provide essential support for developing charging networks, with an emphasis on energy efficiency and sustainability in transportation. Integrating renewable energy sources, such as solar and wind, into EV charging stations is part of our commitment to reducing the overall carbon footprint of electric vehicles. Our solutions ensure seamless connectivity and interoperability across various charging platforms, simplifying access to charging stations.

As industries pursue decarbonization strategies for growth, how is DE supporting its customers in this transition?

Delta Electronics is committed to supporting its customers in their decarbonization strategies by providing high-efficiency products that significantly reduce energy consumption. From 2010 to 2023, our innovative solutions have enabled customers to save an estimated 45.5 billion kWh of electricity. This substantial energy savings is equivalent to a reduction of nearly 23.84 million tons of carbon emissions, contributing to a healthier planet. Our collaboration with organisations like the UN Global Compact emphasises our alignment with global sustainability goals, including supporting India's target of having 30 per cent EVs on the road by 2030 through our EV charging infrastructure.

Have you observed the impact of the various government initiatives under the AatmaNirbhar Bharat scheme, including Production Linked Incentives?

We have observed a substantial positive impact from government initiatives like AatmaNirbhar Bharat and the

Production Linked Incentive (PLI) schemes. These policies have led to a significant increase in local sourcing and have facilitated the establishment of partnerships with local suppliers.

What does the future of manufacturing look like to you, and what trends do you foresee?

The future of manufacturing is set for transformation, driven by trends such as Industry 4.0, artificial intelligence, and sustainability. By 2025, it's estimated that 70 per cent of manufacturing firms in India will adopt smart technologies, leading to a market size of \$50 billion. Sustainability regulations are also pushing investments in energy-efficient technologies, and the adoption of digital twin technology could enhance productivity by 25 per cent.

What challenges and opportunities do you see for India in becoming the 'factory of the world'?

India's ambition to become the 'factory of the world' presents both challenges and opportunities. Infrastructure bottlenecks and regulatory hurdles remain significant, but with the government planning to invest \$1.5 trillion in infrastructure by 2025, we can expect substantial improvements. Additionally, the Skill India initiative aims to train 400 million people, which will enhance manufacturing capabilities. By embracing innovation and enhancing skill development, India can leverage its demographic dividend to attract foreign investments and strengthen its global position.

What are your growth plans for Delta Electronics over the next five years?

Over the next five years, Delta Electronics India is focused on driving growth through strategic capacity expansion, product innovation, and market diversification. We plan to enhance our manufacturing infrastructure, including expanding existing facilities and establishing new ones, such as our R&D centre and headquarters in Bengaluru, to meet increasing demand across sectors like energy management, industrial automation, and telecommunications. Our product portfolio will see further diversification with the launch of energy-efficient solutions, EV charging infrastructure, renewable energy systems, and smart manufacturing technologies. Additionally, we are investing in IoT and AI-based solutions to drive digital transformation. Delta is also exploring new applications in emerging sectors like electric mobility, renewable energy, and smart cities, aiming to develop solutions that support sustainability and carbon reduction. On the export front, India will continue to serve as a key manufacturing hub.



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Revolutionising Logistics Industry With Blockchain

The promise of blockchain technology and the Internet of Things points to a bright future for logistics. By addressing enduring issues, these solutions hope to improve operational effectiveness and promote a more open, cooperative, and transparent workplace. Standardised protocols will make integrations easier to implement and enhance stakeholder data sharing, which will lead to more seamless operations and greater confidence, says **Vishal Agarwal**, Group CEO, Interem Relocations.

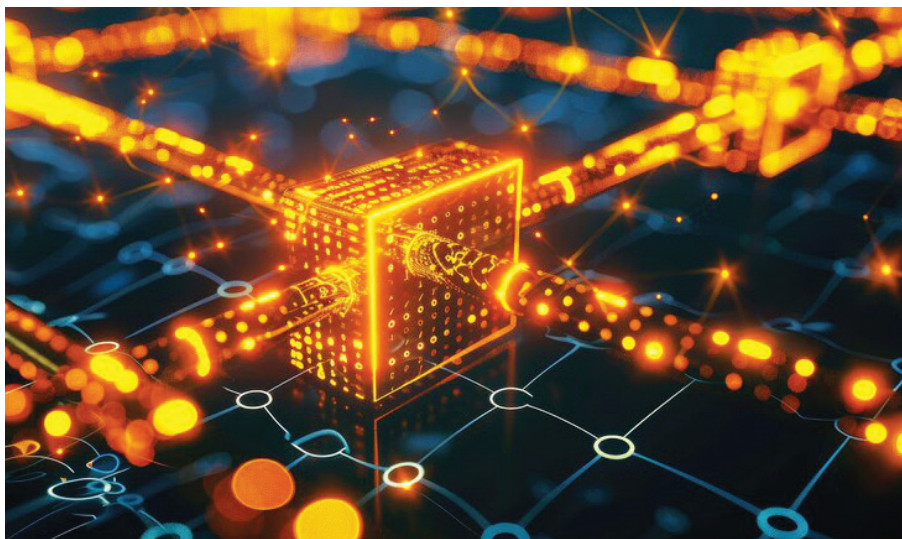


Image source: Freepik

The logistics industry is a backbone of global trade which is experiencing a significant transformation driven by the integration of blockchain and the Internet of Things (IoT) the two innovative technologies. These advancements help in improving operational efficiency while also fostering transparency, enhancing security, and enabling real-time decision-making.

Blockchain is a decentralised, distributed ledger technology that allows multiple parties to securely record, verify, and share information in real-time. Each transaction is added to a "block," which connects to prior blocks, forming an unchangeable chain of records. Due to its inherent transparency and security, this technology is especially well-suited for industries where a high degree of assurance is required among stakeholders.

The Internet of Things (IoT) refers to a network of physical devices equipped with sensors, software, and other technologies that help them to connect and communicate data over the Internet. In the logistics

sector, IoT devices can monitor the location, condition, and status of goods throughout the supply chain, offering real-time insights and improves decision-making.

The integration of blockchain and IoT holds significant promise for overcoming challenges like inefficiencies, lack of transparency, security concerns, and complex supply chains.

IoT devices enable real-time tracking of shipments, allowing companies to monitor their products from the point of origin to their final destination. When this tracking data is integrated with blockchain, it can be securely recorded and shared among all

stakeholders. Each IoT device can generate a digital "twin" of the physical object, facilitating continuous monitoring and providing immediate updates on location, temperature, humidity, and other pertinent factors.

Blockchain's decentralised structure offers a high level of security. Once a transaction is recorded on the ledger, it cannot be altered or deleted which ensures a permanent and verifiable record. This aspect is necessary in logistics, where trust among two parties is important. By leveraging blockchain, logistics companies can confirm the authenticity of products and transactions, which is particularly critical in sectors vulnerable to counterfeiting, such as pharmaceuticals and luxury goods.

The logistics industry often involves paperwork and lengthy processes. Blockchain can automate many of these functions through smart contracts—self-executing contracts with the terms directly written into code.

When predetermined conditions are the contract executes automatically, triggering payments or updates in the supply chain. IoT devices can further enhance this automation by providing real-time data that feeds into smart contracts. For instance, when a shipment arrives at its destination, IoT sensors can confirm the delivery, prompting automatic payment to the carrier.

The synergy between blockchain and IoT generates a comprehensive data ecosystem that can be analysed for valuable insights. With access to real-time, immutable data, logistics companies can identify inefficiencies, monitor performance metrics, and optimise their operations effectively.

This data-driven approach allows companies to make informed decisions about inventory management, route optimisation, and resource allocation. Predictive analytics can be employed to forecast demand, reducing excess inventory and associated costs.

The logistics industry is on the brink of a major transformation, driven by the continuous evolution of blockchain and Internet of Things (IoT) technologies. As these innovations gain traction, they are set to reshape the industry in profound ways. Here are some of the key changes we can anticipate in the future of logistics:

1. Increased standardization: Standardized protocols that enable smooth integration across multiple systems and stakeholders are likely to develop as blockchain technology gains popularity. Processes may be made simpler, friction can be decreased, and platform compatibility can be improved by standardization. For example, if every logistics company uses the same blockchain foundation, parties can share data instantly and easily without requiring intricate interfaces. In addition to speeding up transactions, this would reduce operational silos and promote collaboration by establishing a more integrated ecosystem with open flow of information.

2. Enhanced collaboration: Blockchain technology's defining characteristics of greater trust and transparency will make it possible for logistics partners to work together more successfully. There can be a significant reduction in conflicts about delays or discrepancies when all parties have access to the same immutable data. For instance, real-time collaboration among manufacturers, suppliers, and retailers can fix problems as they emerge, improving the supply chain's agility and responsiveness. As a result of this collaborative atmosphere, the supply chain will probably operate better overall and be more resilient to shocks from the weather or changes in the economy.

3. Sustainability: Sustainability is becoming an increasingly crucial factor for logistics companies as they face increased demand from consumers and regulators to decrease their environmental effect. IoT devices are

essential to this endeavour because they offer real-time data on variables like carbon emissions, vehicle efficiency, and fuel usage. Businesses can adjust scheduling and routing to reduce fuel use and increase delivery efficiency by studying this data. For example, a logistics provider can save idle time and fuel usage by utilising IoT sensors to modify routes based on weather or traffic conditions. Moreover, IoT and blockchain might improve sustainability initiatives by facilitating open reporting of environmental parameters, which enables businesses to show their dedication to sustainable practices.

4. Regulatory compliance: The intrinsic security characteristics of blockchain technology will increase in value as data privacy and security rules tighten. The decentralised and unchangeable characteristics of blockchain technology guarantee the integrity of data, making it crucial for adhering to many regulatory mandates. Blockchain technology can be used by logistics companies to safely exchange and store sensitive data, guaranteeing that only authorised parties can access it. In addition to assisting in meeting legal requirements, this feature fosters customer trust, as consumers become more apprehensive about the handling of personal data.

The promise of blockchain technology and the Internet of Things points to a bright future for logistics. By addressing enduring issues, these solutions hope to improve operational effectiveness and promote a more open, cooperative, and transparent workplace. Standardised protocols will make integrations easier to implement and enhance stakeholder data sharing, which will lead to more seamless operations and greater confidence. Organisations that emphasise the implementation of IoT and blockchain will not only improve their operational skills but also establish themselves as leaders in a competitive field as the logistics industry adopts these technologies. The logistics industry can anticipate a more effective, transparent, and sustainable future by fully utilising these technologies, which will eventually benefit all parties involved—from manufacturers and suppliers to customers.

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About the author:

Vishal Agarwal of Interem Relocations began as Country Manager - India, followed by his appointment as CEO - India in 2023 and subsequently as Group CEO in 2024. With an experience spanning over 18 years, Vishal has held various leadership roles at organisations like Honeywell, Al-Futtaim

Engineering, and Santa Fe Relocations. His expertise lies in strategic planning, business development, sales leadership, and people management, with a proven track record of driving sustainable growth and profitability.



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World's First Laser-Based Neutron Source

The main innovation of the new test method is the neutron source driven by a high-power laser. Instead of using conventional accelerator technology, ions are accelerated by the laser and directed to a converter to generate neutrons via particle reactions.

A joint project led by Focused Energy is developing the world's first laser-driven neutron source for industrial use. The so-called LDRS process (Laser-Driven Radiation Sources) can non-destructively not only see through thick steel or concrete walls, but also into them. The Fraunhofer Institute for Laser Technology ILT in Aachen, the Helmholtz-Zentrum Dresden Rossendorf (HZDR), Photonis Germany, TRUMPF and TU Darmstadt are involved in the joint research project. RWE is providing premises at the Biblis site for this purpose. The Federal Ministry of Education and Research is funding the project with €20 million.

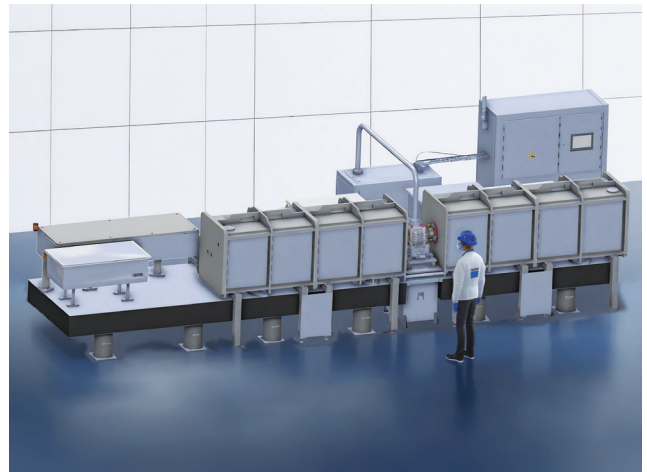
The aim of the joint project called PLANET is to develop a laser neutron source from the individual components developed by the project partners and thus demonstrate that it can be used for the non-destructive examination of nuclear waste containers.

The LDRS technology developed by Focused Energy is the first non-destructive technology that can be used to characterise large components such as bridges or shipping containers as well as tightly closed containers from the outside. In the past, the inspection method used relied on huge particle accelerators to generate the necessary neutron beams. This was not practical for many applications. LDRS thus not only offers a much more cost-effective and compact alternative, but also a kind of non-destructive X-ray vision into the finest structures and complex material compositions.

Laser-based process promises solution

The main innovation of the new test method is the neutron source driven by a high-power laser. Instead of using conventional accelerator technology, ions are accelerated by the laser and directed to a converter to generate neutrons via particle reactions.

The PLANET project comprises various sub-projects that build on each other and involve different partners. The high-power laser, which is being built by TRUMPF, Fraunhofer ILT and Focused Energy, fires up to 100 times per second at a self-renewing target developed by Focused Energy together with TU Darmstadt. The laser



Source: TRUMPF

accelerates the particles over a distance of a few millimeters. In conventional particle accelerators, this requires several hundred meters. Focused Energy is working with the HZDR to generate these particle beams in a stable and reproducible manner. The particles are then converted into directed neutrons and X-rays in order to illuminate the inside of components and containers. Photonis Germany is developing a large-area, highly sensitive detector for imaging. This detects the incoming neutron and X-ray radiation in order to generate high-resolution image information from it, as in conventional radiological procedures.

Focused Energy acts as a system integrator and uses its patented LDRS process to draw conclusions about the composition and condition of the containers from the data recorded in this way. With the laser-driven source, a locally usable neutron source with high power can be realised for the first time.

Pilot facility in Biblis

RWE is providing a building on the site of the former nuclear power plant in Biblis, which will be converted by Focused Energy into a research laboratory and the first pilot facility for the use of this technology.

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Reducing Welding Fume Emissions

Welding fumes pose significant health risks, making it essential to adopt measures that minimise welders' exposure. Process parameters have a significant effect on the emission rate: The wire speed, arc length and correction parameters significantly influence the level of harmful substances generated. A collaborative study by Fronius International GmbH and the Aachen Society for Research and Joining Technology (FEF) delved into these parameters to identify optimal settings for reducing emissions.



As is evident from the FEF final report of the welding fume studies dated October 13, 2021, the pulsed arc was the process that caused the most advantageous material transfer and the lowest fume emission rate (FER) compared to the Low Spatter Control (LSC) arc

and the standard arc – all from Fronius. A further series of tests determined how different welding torch positions, wire speeds and arc length corrections affect the emission rate. Welding was carried out with a PMC pulsed arc and the TPS 500i from Fronius.

The following conditions were defined:

GMAW welding parameters	
Filler material: copper-plated wire electrode	EN ISO 14341-A: G 3SiI, Ø 1.2 mm
Base material: unalloyed structural steel	S235JR, t = 8 mm
Wire speed	5 m/min, 8 m/min and 11 m/min
Shielding gas CORGON®	DIN EN ISO 14175: M21-ArC-18, 12 l/min
Process variants	PMC pulse
Voltage correction and dynamic	Voltage correction 0, dynamic 0
Welding position	Surfacing beads PA, fillet welds PB
Welding torch position	Neutral, 10° push, 10° pull
Contact tip spacing	15 mm
Welding speed	37 cm/min
Degree of mechanisation	Fully mechanised with linear trolley

Welding surfacing beads

In principle, it can be stated that welding fume emissions are lowest at 5 m/min wire speed and in the neutral welding torch position, where it is apparent that emissions are lower at a wire speed of 11 m/min than at 8 m/min. With the pull torch guidance technique, the emissions are very slightly lower at all wire speeds than with the push technique.

If welders optimise the arc using arc length correction (with a neutral torch position in the test), the welding fume emissions can be significantly reduced at all wire speeds. In contrast to non-optimised arcs, welding fume emissions are slightly lower at 8 m/min with 0.9 mg/s than at 11 m/min with 1.1 mg/s (refer Figure 1).

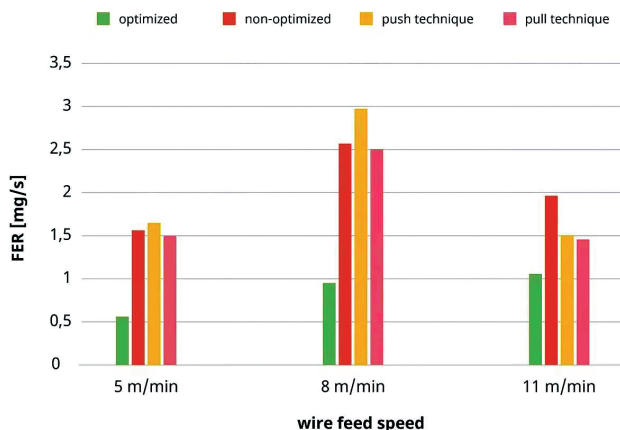


Figure 1: Fume emission rate when welding surfacing beads

Comparison of voltage curves with a wire speed of 5 m/min

Clearly, the welding fume emission rate correlates with the number of short circuits. A high number leads to a significantly higher FER. The study considers this to be due to material transfer. Short-circuit phenomena cause process disruptions that result in metal vapor and metal spatter. If you want to keep emissions to a minimum, it is advisable to use a process setting that brings arc length and short-circuit reduction down to a common denominator – that is, does not keep the arc too long or too short. With a slightly increased medium voltage, both short-circuit phenomena and emissions are reduced (refer Figure 2).

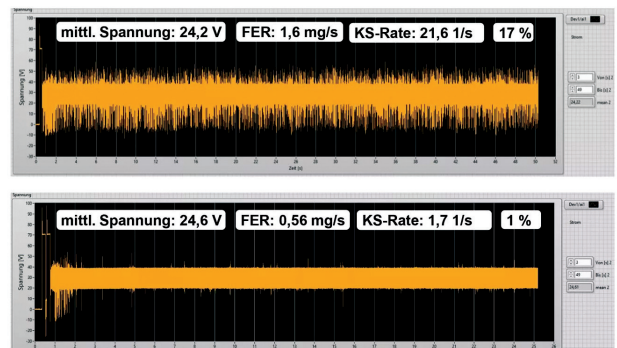


Figure 2: Comparison of the voltage curves with a wire speed

The welding processes at 8 and 11 m/min behave in the same way as the process at 5 m/min in terms of the interplay between medium voltage, short-circuit phenomena and welding fume emissions.



If welders optimise the arc using arc length correction (with a neutral torch position in the test), the welding fume emissions can be significantly reduced at all wire speeds.

High-performance and precise extraction

Fume extraction torches prevent the welding fumes from dispersing at the point where they are generated – at the weld pool itself. They not only protect welding specialists when they are welding, but also anyone else who is in the vicinity of the workpiece.

Since it is important welders are not adversely affected by a complex design in terms of their health and productivity, Fronius has paid particular attention to

ergonomics when developing its fume extraction torches. They sit perfectly in your hand when welding, while an LED lamp facilitates welding in dark environments and supports quality control.

Exento fume extraction torches meet the requirements of standard DIN EN ISO 21904-1 Health and safety in welding and allied processes.

FER when welding fillet welds

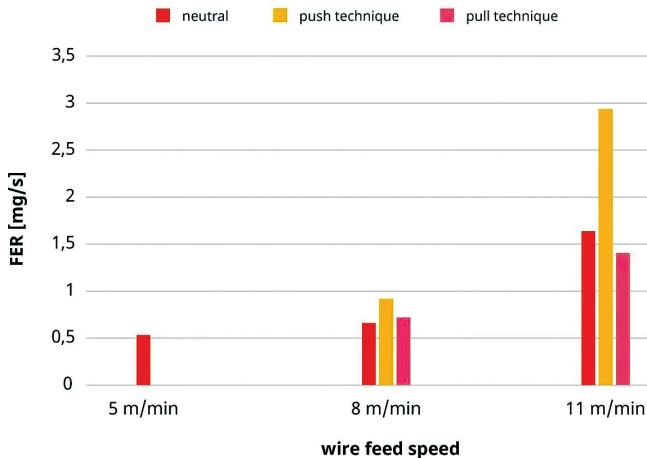


Figure 3 - Pull torch guidance technique also leads to lower emissions

Pulse welding with wire speeds of 5 m/min and 8 m/min results in significantly lower emission rates, 0.55 mg/s and 0.7 mg/s respectively, than with a wire speed of 11 m/s. Here, the emissions amount to 1.7 mg/s, more than three times that generated at a wire speed of 5 m/min. Similar to the surfacing beads, the reason for this is the lower number of short-circuit phenomena; here too the pull torch guidance technique also leads to lower emissions – with a considerably lower emission rate with a wire speed of 11 m/min (refer Figure 3). In this case, the emissions are even lower than with a neutral welding torch position.

Overall, the welding fume emissions are at a lower level than with the surfacing beads. The lowest value of each of the wire speeds is comparable to the emissions of the optimised processes (see Figure 1, green bars) with which the surfacing beads were welded.

At a wire speed of 8 m/min, the welding fume emission rates for the push and pull welding torch position are very similar in absolute values – as was also the case with the surfacing beads. By contrast, the push welding process at 11 m/min reveals a significantly higher FER at around 2.8 mg/s.

Comparison of voltage curves at wire speed of 11 m/min

In the FEF test, the relationship between emission

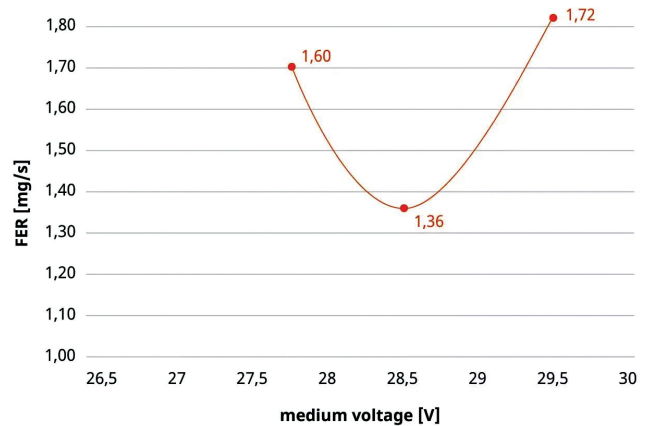


Figure 4 - Comparison of the voltage curves at a wire speed

rate and medium voltage at 11 m/min wire speed was studied more closely: With three measured values, there was a minimum at 1.36 mg/s (optimised with arc length correction -1.5 V). This is the operating point at which short-circuit phenomena occur sporadically, but the arc is not unnecessarily long. The process without arc length correction generates more emissions (1.72 mg/s) due to the longer arc and higher process performance. As the number of short-circuit phenomena increases with decreasing medium voltage (arc length correction -2.5 V), the welding fume emissions (1.6 mg/s) also increase (refer Figure 4).



Welding fume production can be significantly reduced through the targeted selection of welding process, wire speed, and arc length.

Conclusion

Welders can take matters into their own hands. Welding fume production can be significantly reduced through the targeted selection of welding process, wire speed, and arc length.

Essentially, the welding fume emission rate depends on the deposition rate or process performance, with the material transfer being decisive. If the welding process is optimised using arc length correction and a fume extraction torch, such as the Fronius MTW 500i Exento in combination with a Fronius Exento HighVac extraction system, then up to 99% of welding fumes can be extracted.

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Article Courtesy: Fronius International GmbH



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Igus Adds Accessories for Hoses to E-Chain Series E4Q

The new hose clamp and with special side sections to ensure quick and easy installation of corrugated tubes and hoses.



With the help of the special outer links and the new hose clamp from igus, it is now possible to safely guide both PMA hoses and corrugated tubes parallel to the energy chain.

The safe and efficient guidance of hoses, corrugated tubes and cables in energy chains is a major challenge in various industrial applications. To counter this problem, igus now offers new accessories for their E4Q series: a special outer link for parallel guidance of hoses and a new hose clamp. These additions allow for simple and safe installation of corrugated tubes and hoses. The links with guide channels make it easier to retrofit PMA clips while the hose clamp makes sure that hoses are securely fastened.

The E4Q from igus is the chain of choice when it comes to safe cable guidance in unsupported and long travels. The bionically inspired design of the series saves weight while a crossbar with locking clips makes the tool-free installation of the energy supply as easy as winking. To allow for parallel guidance of PMA hoses and energy chains, igus has now added special outer links for hoses to the E4Q energy chain series. The links have already been tried and tested in the E4.1 standard series

and can now also be used in the E4Q energy chains. They have a guide channel into which the PMA clips can be conveniently inserted. This ensures quick and easy installation of PMA corrugated tubes. Thanks to the different sizes from 17 to 48mm, the so-called TUB links can accommodate a wide range of hose diameters.

In addition, igus presents the new SHM.60 hose clamp. Just like the PMA clip, it is attached to the outer link. With the clamp, you can guide corrugated tubes or hoses with a diameter of up to 60mm, e.g. for extraction systems in woodworking. The hoses can be easily fitted with a hook-and-loop strip or one to two cable tie wraps. "Our new hose clamp complements the different options of the E4Q series and ensures that all additional cables, tubes or hoses are perfectly supported and protected," explains Phillip Hagedorn, Product Manager e-chains, igus GmbH. "However, we are working on further developments for the E4Q, such as a new extension link."

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Freudenberg Expands With €42 Million Plant In Punjab

The facilities will cater to key sectors such as automotive and industrial manufacturing, ensuring the company remains competitive by optimising material flows and leveraging modernised equipment.



Germany-based global technology conglomerate, Freudenberg Group, has officially inaugurated two advanced manufacturing facilities in Morinda, covering a total built-up area of 40,700 sq. m. These plants are operated by Freudenberg-NOK India Pvt. Ltd. (FNI) and Vibracoustic India. The move consolidates the company's operations from its existing plants in Basma and Mohali, aimed at enhancing production efficiency and supporting Freudenberg's long-term growth plans in India.

Freudenberg's investment of over €42 million in the Morinda facility marks the company's largest financial commitment in India to date. The new plants are equipped to serve both domestic and international markets, reinforcing Freudenberg's dedication to India's

'Make in India' initiative. The facilities will cater to key sectors such as automotive and industrial manufacturing, ensuring the company remains competitive by optimising material flows and leveraging modernised equipment.

Speaking at the inauguration, **Dr Mohsen Sohi**, CEO, Freudenberg Group remarked, "Our investment in the new facilities in Morinda reflects Freudenberg's strong commitment to the Indian market and the 'Make in India' vision. This expansion not only aligns with our global growth strategy but also boosts our ability to serve customers with greater efficiency, innovation, and quality. As we celebrate 175 years of Freudenberg's legacy of excellence, we are proud to further strengthen our presence in India."

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The Rise of India's CE Industry

Driven by increased government spending, rapid urbanization, technological advancements, and the 'Make in India' initiative, the RAHSTA (road) ahead for the construction equipment (CE) industry is bright with full of possibilities and opportunities.



Over the past decade, India's road network has expanded by 59 per cent, making it the world's second largest. National highway construction in India grew at a compound annual growth rate (CAGR) of 9.3 per cent between FY16 and FY24. As India's economic momentum accelerates, this expansion is fueling growth across various core and allied sectors. Among the key beneficiaries is the construction equipment (CE) industry, which saw remarkable growth in FY24 with a 26 per cent increase.

Ranjan Sharma, Senior Director – Large Corporate Ratings, CareEdge Ratings, states, "There has been a significant focus of the Union government on infrastructure development in the country, as a result almost all segments like roads, ports, bridges, etc are doing well. If one looks at performance of the top 18-20 listed EPC companies, their order books have been consistently growing Y-o-Y basis. Road construction pace in India in FY24 was one of the highest (i.e. 34 km per day compared to 28 km per day in the previous year), as large number of projects were awarded in the preceding two years. In FY24, the construction equipment industry, which plays pivotal in infrastructure development, grew by 25 per cent (in terms of unit sold)

led by earthmoving, material handling, as well as road construction equipment."

But, in the current fiscal year (in the first 5 months), there has been some slowdown in project awards. As a result, experts expect the road construction pace to moderate in FY25 to about 31 km per day from 34 km per day. Even this speed is one of world's fastest in the road construction segment.



In FY24, the construction equipment industry, which plays pivotal in infrastructure development, grew by 25% (in terms of unit sold) led by earthmoving, material handling, as well as road construction equipment.

Ranjan Sharma,
Senior Director – Large Corporate Ratings, CareEdge Ratings

Growth multiplier

Explaining the driving force behind construction equipment industry, **Sandeep Singh, Managing Director, Tata Hitachi Construction Machinery Company Pvt Ltd**, says, "Road construction, mining, housing, and the Har Ghar Jal Yojana are the main growth drivers. However, this year, heavy rains and elections led to stagnation in growth. Mining is growing as it has been privatised. Overall, we are looking at an average growth rate of 10-15 per cent over the next five years."



Road construction, mining, housing, and the Har Ghar Jal Yojana are the main growth drivers. Mining is growing as it has been privatised. Overall, we are looking at an average growth rate of 10-15% over the next five years.

Sandeep Singh,
MD, TATA Hitachi

Today, everybody across the world is eagerly watching India's unfolding growth story. Driven by solid automotive sales, Indian auto component industry is eyeing to grow from the current \$ 20 billion to \$ 100 billion in the next 6 years. Similarly, Indian Construction Equipment Manufacturers' Association (ICEMA) has set an ambitious target of \$ 25 billion by 2030 (from the current \$ 9.5 billion) for the Indian construction equipment industry.



“The industry should raise the ambition bar higher, be obsessed with total quality, build scale, focus on R&D, strengthen the domestic supply chain, adopt Industry 4.0, and invest in people to propel the industry's growth forward.”

Vipin Sondhi,
Chairman, RAHSTA Expo Committee

According to **Vipin Sondhi, Chairman, RAHSTA Expo Committee**, CE manufacturers in India should work on seven-point agenda for building a strong industry. “The industry should raise the ambition bar higher (think global and build big brands), be obsessed with total quality, build scale, focus on R&D and innovations, strengthen the domestic supply chain, adopt Industry 4.0 and digitalisation, and invest in people to propel the industry's growth forward,” he says.

India spends 0.5 per cent of GDP on R&D, while developed countries on an average spend 2.5 per cent of the GDP. Hence, to maintain market dominance and strengthen exports, CE makers will have to focus on innovation. Attracting young talent will also be crucial for CE manufacturing to propel growth. “If younger generation understands that technology is the driving force in manufacturing, and then they will be attracted to the sector,” says Sondhi, who is also the former MD & CEO of Ashok Leyland.



“Exports have doubled in the last two years. This growth is happening both in construction equipment as well as components market. The global CE market is about 1.2 million machines across all product types, so the export opportunity is high.”

Dimitrov Krishnan,
MD, Volvo CE India Pvt Ltd



Global CE makers are using domestic arm to not just serve India but also the global market. ICEMA has set the target of \$ 3 billion CE exports by 2030, which can be easily achieved considering the fact that India exported CE worth \$ 0.5 billion in FY24. **Dimitrov Krishnan, MD, Volvo CE India Pvt Ltd**, adds, “Exports have doubled in the last two years. This growth is happening both in construction equipment as well as components market, particularly in the fabrication industry. I think it's only positive. The fact that we are the third-largest market in the world, and poised to become the second-largest, will definitely attract the scale required for construction equipment. Globally, the construction equipment market is about 1.2 million machines across all product types, so the export opportunity is high. Every brand is looking forward to investing in India, and more than 30 countries are receiving machines from India today.”

Aiding sustainability

With environmental concerns growing, construction equipment are also gearing up to help construction companies (or project developers) minimise their carbon footprint. Sustainability will get further push with the implementation of stage 5 emission standards for



“The Indian construction equipment industry is moving towards the one of the most stringent emission norms (Stage 5) in the world. To enable adherence to upcoming emission standards, supply chain also needs to be geared up.”

Shalabh Chaturvedi,
MD for India & SAARC region, CASE Construction Equipment



“**The shift from fossil to alternate fuels is bound to happen requiring changes in CE design, components and their materials. For example, the bearing industry is already working on alternate materials to meeting the emerging needs of CE makers.**”

Sanjay Koul,
President – India and SE Asia, The Timken Company

construction equipment vehicles (CEVs) in India, which will take effect on January 1, 2025. **Shalabh Chaturvedi, MD for India & SAARC region, CASE Construction Equipment** (a wholly owned subsidiary of CNH Industrial N.V), says, “The Indian construction equipment industry is moving towards the one of the most stringent emission norms (Stage 5) in the world. To enable adherence to upcoming emission standards, supply chain also needs to be geared up. Many CE OEMs are extending sustainability targets to their suppliers as well.”

As emission standards become stringent, the construction equipment would require high quality components to fulfil the requirements of this emission norm. “If you want to manufacture CE that will lead to savings and sustainability, then component players have to play a major role,” opines **Sanjay Koul, President – India and SE Asia and MD – India, The Timken Company.**

Talking about the trends, Koul says, “The shift from conventional (fossil) to alternate fuels is bound to happen requiring changes in CE design, components and their materials. For example, the bearing industry is already working on alternate materials to meeting the emerging needs of CE makers. Smart batteries, smart hydraulic systems—all this will come. We need to keep an eye on developed countries to track technological shifts and catch up later.”

Rising income levels is propelling the need for better



“**We can become the second-largest construction equipment manufacturer in the world. We are also excelling in the components manufacturing industry, with 60% of our business coming from outside India.**”

Sitaram Ganeshan,
President, Wipro Hydraulics

infrastructure, which is expected to keep up the pace of demand for construction equipment. As the CE makers increase their manufacturing foot print in India, they are also aiming to increase sourcing of components and machinery (required for CE production) from domestic producers. Expressing optimism for the construction equipment manufacturing industry, **Sitaram Ganeshan, President, Wipro Hydraulics**, states, “We can become the second-largest construction equipment manufacturer in the world. We are also excelling in the components manufacturing industry, with 60 per cent of our business coming from outside India.”

The emphasis on higher quality standards is leading to greater mechanisation, especially in larger projects; thus, aiding the industry’s growth. Giving the user industry’s perspective on the construction equipment, **S P Rajan, VP and Head Plant & Machinery, L&T Construction**, says, “Construction equipment manufacturers should be fully geared up to fulfil the future requirements. I would like to see more use of biofuels in the near future. When it comes to electric equipment, we should develop systems that don’t require charging at all. Companies should create self-charging technologies, like solar batteries, where heat is converted into energy. We should also focus on improving the ease of operation for operators.”



“**Construction equipment manufacturers should be fully geared up to fulfil the future requirements. They should focus on improving the ease of operation for operators. I would like to see more use of biofuels in the near future.**”

S P Rajan,
VP and Head Plant & Machinery, L&T Construction

The demand for construction equipment is anticipated to witness substantial growth in the coming years, driven by increased government spending, rapid urbanisation, technological advancements, and the ‘Make in India’ initiative. As a result, the industry players are reportedly gearing up to invest about \$4.5 billion over the next 5-7 years to fulfil the rising demand. Thus, RAHSTA (road) ahead for the construction equipment industry is full of bright prospect laying a foundation for a strong, better India. SME

*(This article is based on the construction equipment industry Panel Discussion that took place during **RAHSTA Expo 2024** on Oct 10, 2024 at Jio World Convention Center, Mumbai)*



“Indian Drone Industry Is Witnessing Rapid Expansion”

As can be seen in the ongoing conflicts in the Middle East and Russia-Ukraine war, drones are increasingly becoming a potent tool in warfare today. In India, EndureAir Systems, incubated in the corridors of IIT Kanpur in 2019, is gearing up to provide world-class drone technology for the Indian Armed forces. In this exclusive interview with Rakesh Rao, **Rama Krishna**, Co-founder & CEO, EndureAir Systems (which was recently honoured with the NASSCOM Emerge50 Award in the Space & Satellite, Defence category), elaborates on the evolution of drone technology and their utilities in modern-day wars and other applications.

Kindly take us through the evolution of EndureAir.

EndureAir Systems was founded in 2018 with the goal of advancing unmanned aircraft technology by utilising our extensive R&D experience from IIT Kanpur. I, alongside, Chirag Jain (CTO & Co-founder) and Dr Abhishek, a professor at IIT Kanpur and Director at EndureAir, set out to build a business that could revolutionise the way Unmanned Aerial Vehicles (UAVs) benefit governments, corporations, and the Indian Army. We are building the concept of indigenous Heli Drones that are fully autonomous UAVs, with the aim of meeting the industry requirements.

For heavy-lift logistics operations, we designed and developed our product line, Sabal, a cargo delivery drone. The multipurpose logistics and surveillance drone, Vibhram was created for dual purpose, carrying cargo and surveillance. Alakh, a UAV for nano surveillance, is made to offer better monitoring capabilities in urgent situations.

We began with a small yet committed team that put forth endless effort to realise our ideas. Today, EndureAir employs more than 150 skilled engineers, researchers, and designers. We have obtained eight patents and published over fifty journals and conference papers over the years.

In 2019, we launched the G-Vibhram drones for the Indian Army and were honored to win the prestigious “Unmanned Aerial Systems Flight and Payload Challenge” by NIST in the USA. By 2022, we were recognised as one of Forbes DGEMS Top 200 Companies and achieved a milestone in Telangana’s Medicine



Delivery from Sky Project, where we set a record with a 42 km range. We’ve also deployed our technology in critical situations like the Uttarkashi Silkyara Tunnel rescue and the Turkey Earthquake rescue operations. Recently, Chirag and I were recognised in the prestigious Forbes India’s and Asia’s 30 Under 30.

Looking ahead, the future holds even greater promise. EndureAir has joined forces with five DPSUs as a technical partner in the Defence Testing Infrastructure Scheme (DTIS), a pivotal role that will shape the defence landscape.

Our recent move to a new R&D facility in Noida is part of our ongoing efforts to develop advanced UAVs with high-altitude and heavy payload capabilities. And, with the recognition of Best Drone Tech Startup of the Year 2024 by Entrepreneur 2024 (India edition), we are more motivated than ever to continue our mission of creating groundbreaking aerial solutions that address the evolving needs of tomorrow.

How has the Indian drones industry grown in the last few years?

The Indian drone industry has witnessed a rapid expansion in the past few years supported by progressive growth in indigenous components of drone technology and its localised manufacturing. Key factors include government measures such as the Production-Linked Incentive (PLI) scheme which promotes the manufacturing of locally made goods and the relaxation of some regulations. The progressive push towards manufacturing more competent UAVs, the implementation of AI and autonomy, and the

development of their endurance and payload capabilities have further advanced the industry in providing world-class drone technology to the Indian Army.

As per Markets and Markets report, the Indian drone industry is expected to grow from \$ 654 million in 2024 to \$ 1437 million in 2029 at a CAGR of 17 per cent. Some of the major hurdles faced by drone producers include reliance on the availability of imported parts, lack of appropriate facilities for testing and manufacturing drones and staying compliant with changing laws. Still, the market potential is huge, especially in defence, logistics, agriculture, infrastructure, and solutions to natural disasters. Similarly, as there is growth in the demand for UAVs in these fields, the companies that position themselves in R&D and innovate will be able to acquire both local and international markets.

How developed is the supply chain ecosystem for drones in India?

The supply chain ecosystem for drones in India is still developing, with many drone makers relying on imported components like high-end sensors, cameras, and avionics. However, with growing government support for indigenous production, we, at EndureAir, are increasingly focusing on localising critical components. The push for "Atmanirbhar Bharat" (Self-reliant India) is gradually reducing this dependence, but it will take some time to fully establish a robust supply chain.

Are the regulations in India conducive for industry's growth?

India's drone policies have been drafted constructively over the past few years since the pandemic. The introduction of the Drone Rules in 2021 first simplified the procedure for the industry players to obtain licenses, clearances, and permissions. The government's Digital Sky platform works as another enabler to drone operations, and programs including Drone Shakti have encouraged drone startups and manufacturing.

While it is true that the regulatory framework is more compliant now than ever, it cannot be denied that there remains room for improvement in certain areas especially those regarding the operation of large-scale drone platforms and the certification of high payloads and high-altitude operational drones.

How are new technologies like AI, VTOL, Swarm, etc shaping the future of the drone industry?

New technologies in the drone industry such as artificial intelligence (AI), vertical takeoff and landing (VTOL) as well as swarm capabilities are reshaping the industry. Drones equipped with AI can operate

unattended for long periods and perform complex operations such as understanding the environment, avoiding obstacles, recognizing objects, performing object inspections, conducting surveillance, and analysing complex operational scenarios. While VTOL enables drones to fly in harsh conditions where standard landing strips do not exist. The ability to fly several drones at once and conduct the same missions can be revolutionary in military tactics, search rescue operations, and natural disaster management. We, at EndureAir, is incorporating these technologies into our UAV, enabling us to expand our capabilities in the evolving drone manufacturing environment.



As there is growth in the demand for UAVs in these fields, the companies that position themselves in R&D and innovate will be able to acquire both local and international markets.

How are drones changing the way modern-day wars are fought?

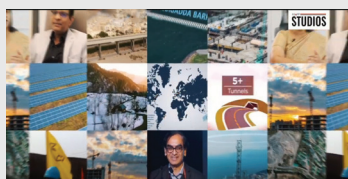
Warfare like any other sphere has not remained unchanged, drones have contributed to achieving military objectives via empowering the army with reconnaissance, targeted assaults, and logistics delivery. They are also capable of delivering real-time intelligence that can be used for situational awareness and command on the battlefield. In the Middle East or the Russia-Ukraine clashes, targets are being achieved through drone strikes, reducing reliance on troops on-ground lowering the risk of collateral damage. Drones are also improving warfare logistics by bringing in the much-needed supplies to remote locations. Today, drones have made warfighting low risk while being highly effective, extensively redefining War.

What kinds of opportunities is EndureAir looking to tap in the defence space?

EndureAir is actively pursuing opportunities in defence logistics, surveillance, and tactical UAVs. Our high-endurance and high-payload drones, such as the Sabal series, are well-suited for defence applications, cargo delivery, border patrol, and disaster response. Additionally, we are focusing on developing UAVs equipped with advanced autonomy and AI-driven capabilities, enabling enhanced situational awareness

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START-UP TALK

and decision-making in complex environments. EndureAir is also exploring opportunities in counter-drone technologies, which are becoming increasingly critical in modern defence strategies. Our commitment to providing all-weather, fault-tolerant systems ensures that our drones can perform reliably in the most challenging conditions, making them ideal for military operations.

What kinds of trends are you seeing in the drone industry?

Some of the trends driving the industry are:

- One of the market's major shifts is the autonomous functions of the drone and AI integration which enables drones to make real-time decisions, navigate complex environments, and perform tasks like surveillance and logistics delivery.
- Also, VTOL and hybrid drones are gaining popularity since they can operate in restricted areas and possess greater operational range.
- Furthermore, swarm technology, which operationally organizes a group of drones to co-function, is expected to be an emerging trend in the military strategy and wide data-gathering industries.
- In addition to this, drones capable of long-endurance operations in all-weather are also increasing particularly in the domains of defence, disaster management, and other industries.
- Improvements in regulatory frameworks are opening doors to future growth when drones are incorporated into sectors like agriculture, logistics, or healthcare.

How is EndureAir collaborating with five defence PSUs to establish advanced testing facilities?

EndureAir is set to play a pivotal role as a technical partner. Establishing these testing facilities will drive technological advancements and

provide essential infrastructure to test and refine niche defence technologies, particularly in unmanned aerial systems. This facility would house the latest testing equipment and setups which are currently not available anywhere in the country and would be the first facility to support comprehensive testing of drones.

It would offer unique facilities such as a gust wall facility to test the wind handling capability of drones.

EndureAir is the sole private firm involved alongside the five defence PSUs (namely HAL, BEL, GIL, YIL, and BEML), IIT Kanpur, and UP Defence Corridor. Setting this testing facility will enable technological evolution and will also provide the basic infrastructure to evaluate and perfect specialised defence technologies, particularly unmanned aerial systems. The facility would include unique testing equipment and setups that are currently unavailable in the country. This would be the very first facility catering to complete drone testing. It would have a gust wall facility, which is a uniquely built for wind-handling capability of drones.

What are your growth plans for EndureAir?

Our vision is to become the market leader in the defence UAVs logistics sector, with plans to eventually expand into civilian applications both domestically and internationally. We are working towards the development of an enhanced version of Sabal with a higher-payload drone designed for high-altitude operations. Following this, our focus will shift to getting certified for global markets and starting the development of Helicopter Drones with the high-payload capacity. Beyond UAVs developments, we are investing in technologies such as advanced autonomy and the vertical integration of critical hardware and software. We also aim to focus on all-weather operational drones with redundant fault-tolerant systems to reduce the risk of system failures. 



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RAHSTA Expo 2024 Concludes To A Grand Success

Smart Manufacturing & Enterprises (SME) and Equipment India (EI) host construction equipment (CE) industry leaders to discuss the future of CE industry. The 10th India Construction Festival (ICF) 2024 awards over 75 companies from infrastructure industry.



Sanjay Bhatia (Upa-Lokayukta, Government of Maharashtra) inaugurating the RAHSTA Expo along with Vipin Sondhi (Chairman of RAHSTA Expo Committee) and Pratap Padode (Founder, FIRST Construction Council)

The 10th Edition of India Construction Festival (2024) - comprising 14th RAHSTA Expo, 14th India RAHSTA (Roads) Conference, 12th Equipment India Awards and 22nd Construction World Global Awards - received a big thumbs up from industry leaders of the construction and infrastructure industry for recognising the industry's contribution to the nation building by awarding & celebrating its success.

Held on October 9-10, 2024, at Jio World Convention Centre, BKC, Mumbai and hosted by infrastructure think-tank FIRST Construction Council in partnership with Construction World (CW) and Equipment India (EI) magazines, India Construction Festival 2024 honoured over 75 companies in the infrastructure and construction equipment sectors with awards under various categories.

The 14th RAHSTA Expo - India's first indoor trade fair for the construction equipment technology - provided a platform to more than 100 companies for showcasing their latest technologies, products and solutions that are crucial for the development of a strong infrastructure. The RAHSTA Expo and conference united all stakeholders in the infrastructure sector, including policymakers, industry professionals, and supporting industries such as financial institutions and technology

providers. This gathering aimed to showcase integrated solutions for challenges within the construction industry and establish best practices for efficiency.

Sanjay Bhatia, Upa-Lokayukta, Government of Maharashtra along with Vipin Sondhi, Chairman, RAHSTA Expo Committee, inaugurated the RAHSTA Expo. Speaking at the inaugural session, Sanjay Bhatia, who has been instrumental in projects like Atal Setu, NAINA region, Mumbai East Coast Marina, Sagarmala during his stints leading CIDCO, Mumbai Port Trust etc., expressed his delight at the huge display of construction technology at the expo, "The RAHSTA expo has put the construction industry on an international standard. India is experiencing nation building at a robust pace and I am truly impressed with the work being now done by our youth with their start-ups many of which are showcasing their innovation here at this expo."

Launching his book 'Tarmac to Towers - India's infrastructure story', **Pratap Padode, Founder, FIRST Construction Council** stated, "RAHSTA Expo is a paradigm shift in exhibition presentation for the construction industry. It has drawn 4000 quality business visitors who have had fruitful discussions with material manufacturers and OEMs of equipment and technology. The RAHSTA Expo has brought together road contractors, developers, financiers, material manufacturers, equipment OEMs, government authorities and engineering firms on the same platform to share from each other."

Speaking at the inauguration, **Pam McFarland, Senior Editor, Engineering News - Record (ENR)**, said, "India and the USA deals with a lot of similar issues such as flooding, hurricane, etc. Billions of dollars are being poured into construction, roads, and variety of transportation which has climate and environmental resilience focus. In India, pace of road construction has increased manifold. I am looking forward to learn more about what's going on in India and particularly resilient materials in roads and bridge construction."

Vipin Sondhi, Chairman, RAHSTA Committee, and

former MD & CEO, Ashok Leyland & JCB, said, “This occasion is not just a gathering but reflects our collective strides in shaping the future of India’s highway sector. This sector is not only critical for economic growth but is the backbone of physical connectivity that binds our nation together. The union budget reflected the priority of the sector and allocated Rs 2.7 trillion for Ministry of road transport and highways (MoRTH). India’s road network is the second largest and it moves not only goods, people but drives opportunities of inclusivity and development. National highway construction has seen a remarkable upward trajectory, growing at 9 per cent CAGR from FY2016 to FY2024.”

The 14th India RAHSTA Conference (IRC) convened policymakers, industry leaders, and experts to explore innovative technologies, sustainable practices, and funding opportunities aimed at transforming the road construction landscape in India.

Padode stated, “India has the distinction of the second largest road network in the world. In the last 10 years, the speed of road development has increased manifold, and today we are building roads at the rate of 30-37 km per day. But, we need to build roads and bridges of the best quality that can last for 100 plus years. With rising environment and climate change concerns, India need to promote climate and disaster resilience in the infrastructure development process. RASHTA conference provides an ideal forum to discuss, debate and form strategies for building more sustainable, resilient infrastructure projects.”

During the conference Ashish Kumar Singh, Chief General Manager - Finance, National Highway Authority of India (NHAI) has asked FIRST Construction Council to submit policy recommendations based on deliberations and discussions at the RAHSTA conference and expo.

The two days of RAHSTA Conference paved the way for fruitful engagement and informed participants about novel technologies, strategies and processes required to build a resilient infrastructure.

With over 50 speakers, participants gained valuable insights through engaging panel discussions, thought-provoking keynotes, and displays of cutting-edge innovations at IRC 2024. The event enhanced understanding of industry trends and facilitated important partnerships, contributing significantly to the development of safer, greener, and more efficient road networks.

On the occasion, seven RASHTA Awards were presented in various categories such as Award for best in Road Engineering & Construction, Bridge Engineering, Road Financier, technology in road building, project management, project execution, etc.

Leaders discuss the future roadmap of CE industry



Panelists of CE industry panel discussion L-R: Ranjan Sharma, Sr Director, CareEdge Ratings; Sitaram Ganeshan, President, Wipro Hydraulics; Sanjay Koul, President - India and SE Asia, The Timken Company; S P Rajan, VP and Head Plant & Machinery, L&T Construction; Sandeep Singh, MD, Tata Hitachi; Dimitrov Krishnan, MD, Volvo CE India; and Shalabh Chaturvedi, MD for India & SAARC region, CASE Construction Equipment

India’s road network has grown 59 per cent to become the second largest in the world in the last ten years. National highway construction in India increased at 9.3 per cent CAGR between FY16-FY24. With the government’s continued focus on infra-led growth, construction equipment (CE) are also witnessing robust demand. In fact, in FY24, the industry witnessed about 26 per cent growth compared to previous year.

Against this background, *Equipment India* (EI) and *Smart Manufacturing & Enterprises* (SME) also hosted a Panel Discussion - titled “RAHSTA (Road) Ahead for CE Industry” - to deliberate on opportunities and future trends in the construction equipment (CE) industry. Panelists of the panel discussion - moderated by Ranjan Sharma, Senior Director – Large Corporate Ratings, CareEdge Ratings - included Dimitrov Krishnan, MD, Volvo CE India Pvt Ltd; Sandeep Singh, MD, Tata Hitachi Construction Machinery Company Pvt Ltd; Shalabh Chaturvedi, MD for India & SAARC region, CASE Construction Equipment; SP Rajan, VP and Head Plant & Machinery, L&T Construction; Sanjay Koul, President - India and SE Asia and MD - India, The Timken Company; and Sitaram Ganeshan, President, Wipro Hydraulics.

Later, the eagerly awaited 12th Equipment India Awards 2024, presented by BKT, brought together industry leaders, top construction equipment manufacturers, and components & accessory suppliers to recognise and celebrate excellence and innovation in the construction equipment sector. Some of winning companies included Schwing Stetter India, Sany Heavy Industry India, Ammann India, Schwing Stetter India,



A M Naik (left), Chairman Emeritus of Larsen & Toubro (L&T), being presented with CW Lifetime Achievement Awards by Pratap Padode, Founder, FIRST Construction Council



Mofatraj Munot (first from right), Group Founder, Promoter and Chairman of Kalpataru Group, received the CW Lifetime Achievement Award

Caterpillar India, JCB India, Tata Hitachi Construction Machinery, Action Construction Equipment (ACE); BEML Limited, Doosan Bobcat India, LiuGong India, AJAX Engineering, Case Construction India, etc.

A key highlight of the evening was the announcement of the Equipment India Person of the Year 2024, awarded to Jaideep Shekhar, MD of Terex India. The jury recognised Terex India's impressive growth under Shekhar's strong leadership.

Jaideep Shekhar said, "I'm deeply grateful to the Jury and Equipment India for this remarkable honour. This award reflects not only my contributions but also the dedication and hard work of my team. I have been associated with the industry for more than 25 years, and this award motivates me to keep pushing boundaries and to lead the growth with integrity."

CWAG awards presented to 50 construction industry leaders

The 22nd Construction World Global Awards brought together top construction industry leaders, experts and policymakers. CW Global Awards were presented to 50 companies such as Berger Paints, Century Plyboards India, GMMCO, H&R Johnson, Komatsu India, Larsen & Toubro, Afcons Infrastructure, APCO Infratech, Ashoka Buildcon, DRAIPL, H G Infra Engineering, IRB Infrastructure Developers, ITD Cementation India, J Kumar Infraprojects, NCC, Patel Engineering, PNC Infratech, Ramky Infrastructure; Welspun Enterprises; Shapoorji and Pallonji, Tata Consulting Engineers, KEC International, and Kalpataru Projects International, among others in different categories. The CW Global Awards and ENR Awards offered a platform to acknowledge and celebrate the innovation, dedication, and outstanding accomplishments of individuals and companies in the construction industry, raising the standard for future endeavours.

A M Naik, Chairman Emeritus of Larsen & Toubro (L&T), and Mofatraj Munot, Group Founder, Promoter and Chairman of Kalpataru Group, were bestowed with CW Lifetime Achievement Awards, for their incredible contribution to the growth of not just their companies, but also of the industry.

A M Naik commented, "I would like to extend my gratitude to the jury of the 22nd Construction World Global Awards and to the entire team at First Construction Council and Construction World magazine for this honour. To be recognised in this way, for contributing to a sector that has been a passion of mine for decades is a moment of great pride. Not just for me but for all those who have been a part of this journey. I have been fortunate to work with some of the brightest minds and most committed professionals, and I share this award with them. It is through their dedication and innovation that we have been able to achieve so much and propel both our company and the industry forward. Over the years, we have seen immense transformation in



Dineshchandra Agrawal (first from left), CMD, Dineshchandra R Agrawal Infracon Pvt Ltd, being presented with the CW Person of the Year (Private Sector) Award



El Person of the Year 2024 being awarded to Jaideep Shekhar (second from left), MD of Terex India, in presence of Vipin Sondhi, Chairman of RAHSTA Expo Committee, Sandeep Singh, MD of Tata Hitachi, and Dimitrov Krishnan, MD of Volvo CE India Pvt Ltd

technology processes and practices, and it is heartening to witness how this industry continues adapting to new challenges while always looking to build better and smarter. This recognition from Construction World serves as a powerful reminder that our efforts to drive progress, innovation, and sustainability have been noticed.”

While accepting the award, Mofatraj Munot said, “A project can progress successfully only with the support of right equipment. Timely and quality completion depends on having reliable machinery at the site. I vividly remember, back in 1980s, I used to visit Bauma in Germany to see the latest machines because, at that time, India lacked a platform to showcase innovative equipment. Today, thanks to efforts like those of Construction World, we have access to all these machines right here in India. I want to express my gratitude to Construction World for the award.”

Dineshchandra Agrawal, CMD, Dineshchandra R Agrawal Infracon Pvt Ltd (DRAIPL) honoured with the prestigious Construction World Person of the Year (Private Sector) award.

Partnership galore

The industry’s overwhelming support was evident from the numerous partnerships it was able to garner as below:

- **22nd Construction World Global Awards:** Powered by BKT, Varindera Construction as the Platinum Partner, ITD Cementation, Gmmco, and Dinesh Chandra R. Agrawal Infracon Pvt. Ltd. as Gold Partners, Liugong as the Silver Partner, TATA Hitachi as the Equipment Partner, LivSYT as the Technology Partner, and Shyam Steel and Action Construction Equipment as Association Partners.
- **12th Annual Equipment India Awards:** Presented by BKT, Timken as the Platinum Partner, TATA Hitachi

as the Equipment Partner, and Schwing Stetter and Action Construction Equipment as Association Partners.

- **India RAHSTA Conference:** Presented by BKT, Timken as the Gold Partner, Liugong and Nemetschek India as Silver Partners, TATA Hitachi as the Equipment Partner, LivSYT as the Technology Partner, and Action Construction Equipment as the Association Partner.
- **RAHSTA Expo:** Hosted by MSRDC as the Host State Partner, Birla Pivot as the Powered By Partner, AF Star as the Platinum Partner, ArcelorMittal Nippon Steel India as the Gold Partner, NPL Bluesky Automotive as the Silver Partner, Mahindra Construction Equipment, Terex, Shyam Steel, and PNC Infratech as Associate Partners, TATA Hitachi as the Equipment Partner, Volvo as the Badge Partner, SANY as the Lanyard Partner, Steel Authority of India as the VIP Lounge Partner, and Automark Industries as the Bag Partner.
- **10th India Construction Festival:** Larsen & Toubro as the Gold Partner, TATA Hitachi as the Equipment Partner, and Action Construction Equipment as the Associate Partner.



Exhibitors having busy a day at RAHSTA Expo with a throng of visitors inquiring about their products & technologies

See you again in Sept 2025

International CE makers are using domestic arm to not just serve India but also the global market. Indian Construction Equipment Manufacturers’ Association (ICEMA) has set the target of \$ 3 billion CE exports by 2030, which can be easily achieved considering the fact that India exported CE worth \$ 0.5 billion in FY24.

Increased government spending, rapid urbanisation, technological advancements, and the ‘Make in India’ initiative will propel demand for construction equipment in the coming years. Thus, RAHSTA (road) ahead for the construction equipment industry is full of bright prospect laying a foundation for a strong, better India. To continue the industry’s growth momentum, RAHSTA Expo is all set to return next year in September 2025. 



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Protect The Facility With Gandhi Automations' Sectional Overhead Doors



Sectional overhead doors offer numerous benefits for commercial buildings, making them an excellent choice for both retail and industrial settings. These doors consist of multiple panels connected by hinges, allowing the door to bend/slide and open vertically. When fully opened, the door rests parallel to the ceiling, maximizing space both inside and outside the building.

Sectional overhead doors by Gandhi Automations Pvt Ltd (GAPL) are renowned for their reliability and durability. GAPL engineers them to withstand rigorous use while providing excellent thermal insulation and soundproofing. Customisable to fit a range of opening sizes and designed to meet high aesthetic standards, these doors enhance the appearance of the facility while contributing to long-term cost savings. Their robustness and energy-efficient features make them a smart investment, ensuring both operational effectiveness and financial benefits over time.

GAPL's range of sectional overhead doors, including the Porto and Max Vista models, are designed for industrial and commercial buildings. They are available in multiple operational versions: manual push-pull, electrically operated, and chain-hoist operated by pulling an endless chain. This flexibility ensures our doors meet the diverse needs of various applications. Additionally, both models are offered with different lifting systems tailored to the available overhead space. The sliding system options include normal lift, high lift, vertical lift, low headroom lift, and inclined lift, providing optimal solutions for every setting.

Porto sectional overhead doors seamlessly blend with any architectural style. They are easy to use, quiet, and reliable. Built with pre-painted, galvanized steel

and 40 mm thick sandwich panels, they ensure robust protection and energy efficiency.

Max Vista sectional overhead doors combine aluminium panels with special glazed panels enhancing natural light, gridded, or meshed windows for a distinctive look. These doors provide ample natural light, creating a bright and pleasant work environment. They are durable and visually appealing, suitable for various commercial and industrial applications.

Key features of GAPL's sectional overhead doors are:

- Reliable and low-noise operation
- Extreme robustness for long-lasting use
- Includes safety features in accordance with EN 13241-1 CE, including finger trap protection between the door panels to avoid the risk of fingers being pinched, and side trap guards where the side frames are completely closed to prevent injuries.
- Design-oriented surfaces and optimal light solutions
- Minimal bulk, providing more usable space indoors and outdoors
- Easy and practical to open and operate
- Energy savings and enhanced comfort
- Bright indoor environments and attractive design aesthetics
- Constructed from pre-painted, galvanized steel with a 40 mm thick sandwich panel
- Equipped with special non-aging rubber gaskets that seal the perimeter, preventing water, air, and dust infiltration
- Customizable as Gas Tight Ripening Room Doors
- For easy access for people and small transport vehicles, a side door or pedestrian door can be provided to reduce the number of times the door is operated, making it energy efficient.
- Opening-closing speed: 0.2–0.4 m/s
- Available sizes: Width up to 15,000 mm, Height up to 10,000 mm

Gandhi Automations' sectional overhead doors are the ideal solution for all industrial and logistic needs. 

For details, contact Gandhi Automations, Mumbai, on
Tel: +91 22 6672 0200, 6672 0300, or
Email: sales@geapl.com, or visit www.geapl.com

(Communication provided by the management of the company)

PLENTY OF MOTION POSSIBILITIES IN A COMPACT HOUSING

B&R Industrial Automation offers a wide range of plenty of motion possibilities in a compact housing.



Features:

- Designed for automating machine components like conveyors and adjustment axes, B&R Industrial Automation X2o Drives offer a wide range of motion possibilities in a compact design.
- Perfect for controlling motors from a few watts up to 1 kW, these drives provide a cost and energy-efficient solution for your automation needs. With its well-thought-out details and a sophisticated ergonomic design, X2o Drives with 48V low voltage technology, enable control of stepper and brushless DC motors up to 1 Kw in the familiar form factor of X2o slice based I/O family.
- The new drive series brings increased scalability and flexibility in a compact design, with the ability to control two motor option axes in a width of only 27.5 mm. A variety of encoder options, including encoderless operation, cater to diverse application needs.

About the Company: B&R Industrial Automation GmbH is a manufacturer of automation technology and ABB's global center for machine and factory automation. B&R is one of the world's leading solution providers for machine and factory automation and is responsible for machine automation within ABB's Robotics & Factory Automation division.

Contact:

B&R Industrial Automation
(A member of the ABB Group), Pune
Tel: 020 41478999
Email: marketing.in@br-automation.com

Scan the QR Code for instant product enquiry



FILES

PFERD offers a wide range of files.

Features:

- For manual roughing, finishing, chamfering and sharpening tasks, PFERD offers an extensive range of files and rasps, holders, handles and devices ideal for coarse to delicate work on a variety of materials.



About the Company: PFERD engages in development, production and support and distribution of tool solutions on jobs for surfaces and material cutting.

Contact:

PFERD, Bengaluru
Tel: 080-42187117
Mobile: 09880665415, 09741481117
Email: sales@swit.in

Scan the QR Code for instant product enquiry



HIGH SPEED TRIPPING RELAY TWO ELEMENT RELAY - JRV 181X2

JVS Electronics Pvt Ltd offers a wide range of high speed tripping relay two element relay JRV 181x2.



Features:

- High speed tripping relays are voltage operated, attracted armature type with 5 contacts per element. Each element is enclosed in a dust proof moulded, transparent, polycarbonate cover.
- Radio metal is used for the magnetic components such as the armature, the core and the yoke of the tripping relay to ensure good electrical performance.
- The contact tips are made of pure silver. The use of these materials ensures very good contact performance. High speed interface between the protection system and the circuit breaker Functions requiring a number of simultaneous switching operations, interlocks in control and closing circuits.
- Its features include: wide range of voltage & contacts configurations; Electromechanical design; Hand reset contacts; Protective transparent cover for the element; Compact panel mounting case.

About the Company: JVS Electronics Pvt Ltd is an exporter, manufacturer and supplier of audio indicating instruments, visual indicating instruments, electrical indicating instruments, etc.

Contact:

JVS Electronics Pvt Ltd, Bangalore
Mobile: 09448288863
Email: bangalore@jvselectronics.in

Scan the QR Code for instant product enquiry



PF SERIES FIXED PUMP

HTM Hydraulics Pvt Ltd offers a wide range of PF Series fixed pump.



Features:

- For high pressure applications and extreme conditions including dirty environments, extreme temperatures, and long & difficult duty cycles. Compatible with various water-based, phosphate ester and MIL-SPEC fluids makes these pumps ideal for testing aerospace components.
- One split-flow pump can supply independent flows from upto ten separate outlets.

About the Company: HTM Group has been in the field of hydraulics since 1995. Their expertise in the industry makes us one of the leading competitive companies in the field of trading, marketing & servicing.

Contact:

HTM Hydraulics Pvt Ltd, Bangalore
Tel: 080-41572101 Mobile: 09741165877
Email: info@htmhydraulics.co.in

Scan the QR Code for instant product enquiry



PROPORTIONAL ROTARY SOLENOIDS

Magnets India offers a wide range of proportional rotary solenoids.

Features:

- These proportional rotary solenoids proportional rotary solenoid according to DIN VDE 0580 Horizontal torque vs. rotation angle characteristic constant torque in the working area Proportional relation between torque and current Short correcting times through per-magnetized system clockwise and anti clockwise.
- Drive for industrial control units, control technology, rotary slides and flap valves in fluid technology.
- By reversing the polarity armature guided in ball bearings Insulation materials of excitation winding correspond to thermal class B Electrical connection and protection class with duly executed installation free flexible lead ends Protection class according to DIN VDE 0470-1/DIN EN 60529 - IP 20.

About the Company: Established in the year, 1997, we 'Magnets India', are one of the leading trader, distributor & suppliers of an extensive range of Electromagnetic Actuators and Electromagnetic Products. These products are widely used by a wide spectrum of industries for automation of varied processes.

Scan the QR Code for instant product enquiry



Contact:

Magnets India, Chennai
Tel: 044-42833346
Mobile: 09840091969
Email: info@magnetsindia.net



ADHESIVE GRIPPERS - ADHESO

Schunk Intec India Pvt Ltd offers a wide range of adhesive grippers Adheso.



Features:

- The gripper technology of ADHESO grippers is based on an adhesive system modeled on nature. The adhesive forces used by animals such as geckos for locomotion are now being utilized by Schunk for handling applications in the most diverse of fields.
- The bionically inspired ADHESO gripper technology is based on the principle of adhesion and uses inter molecularly acting Van der Waals forces to handle various work pieces.
- SCHUNK's application experts take advantage of these benefits and develop customer-specific adhesive grippers with ADHESO gripper technology. Due to the high variability of the adhesive structures, grippers with ADHESO technology can be directly tailored to the requirements of your application.

About the Company: Schunk Intec India is engaged in products distribution and supply of industrial automation systems, automation work holding, tool holding, heat shrink tool holder, etc.

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Contact:

Schunk Intec India Pvt Ltd, Bangalore
Tel: 080-40538999
Email: rakhi.singh@in.schunk.com, info@in.schunk.com

COMPOUND BALL SPLINES

IBK Engineers Pvt Ltd offers a wide range of compound ball splines - ball screw spline (FBR type).

Features:

- This is spiral type ball spline. An integration of Rotary ball spline and ball screw.
- The combination of the two nuts achieves linear, rotary, and helical motion.
- SCARA Robots, wafer polishing equipment, winding machines.

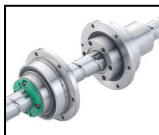
About the Company: Established in 2014, IBK Engineers Pvt Ltd, is engaged in the wholesaling, supplying, distributing and trading of deep groove ball bearing, mechanical bearing, roller chain, steel rear sprocket, safety equipment, etc.

Scan the QR Code for instant product enquiry



Contact:

IBK Engineers Pvt Ltd, Bengaluru
Tel: 080-26321112 Mobile: 09880566644
Email: raju.kn@ibizkart.com



IMPACT SOCKETS

Reliable Trade Links offers a wide range of impact sockets.

Features:

- Impact sockets are designed for use with powered impact wrenches or 'drivers'. Impact wrenches can be powered pneumatically, electrically, or hydraulically (oil).
- The combination of an impact wrench and impact socket can deliver greater torque to the head of a fastener than can be achieved with a manual wrench.
- Its features include: Can be used with both impact and powered turning tools as well as manual ones; Less chance of injury from sockets shattering.

About the Company: Reliable Trade Links was established on April 1999. They are a team of quality professionals in the field of engineering, sourcing and commercial activities.

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Contact:

Reliable Trade Links, Chennai
Tel: 044-26547920 Mobile: 09381045752
Email: teamreliable@rediffmail.com, treliable@rediffmail.com



FEATURED PRODUCT

SWISS MAKE "EQUOTIP 550 LEEB+UCI METAL HARDNESS TESTER"

Testing & Measuring Equipments offers the new Equotip® 550 LEEB+UCI. Equotip enables portable hardness inspection of almost any object, polished parts and heat-treated surfaces. The hardness measurements are made by using the dynamic rebound testing method according to Leeb, the static Portable Rockwell hardness test and the Ultrasonic Contact Impedance (UCI) method. The rugged Swiss-made metal NDT hardness testers are designed for portable hardness testing in the lab, in the workshop, at production facilities. Technical Specification of Equotip 550 Touch



screen Unit: Display: 7" color display 800x480 pixels; Memory: <100000 Measurements; Battery: Lithium Polymer, 3.6 V; Battery lifetime: > 8h; Weight: About 1525 g (incl. Battery); Dimensions: 250 x 162 x 62 mm; Operating temperature: -10°C to 50°C (14 to 122°F); Protection: IP54 fully rugged with shock-absorbing casing. Equotip UCI Probe: Measuring Range: 20-2000HV; Measuring Accuracy: $\pm 2\%$ (150-950HV); Resolution: 1HV (UCI), 0.1 HRC; Test Load: Adjustable load HV1, HV5, HV10; Diamond Indenter: Vickers diamond according to ISO6507-2; Probe Dimensions: 155x Ø 40mm(6.1xØ1.57 Inches) without Foot; Scale: HB, HV, HRA, HRB, HRC, HR15N, HR15T, MPA. Equotip Leeb Probe: Native Scale: HLx (x=C, D, DC, DL, E, G, S); Conversion scales: HB, HV, HRA, HRB, HRC, HS, MPA; Measurement range: 100-999 HLx; Impact energy: 90 Nmm (G), 11 Nmm (D, DC, DL, S, E), 3 Nmm (C); Measurement resolution: 1 HLx/HV/HB; 0.1 HRC/HRB/HS 1 N/mm² (Rm).

Contact:

Testing & Measuring Equipments
Contact Person: Nisarg Shah
L-120, GIDC Industrial Estate, Odhav Fire Station
BRTS, Odhav, Ahmedabad 382 415
Tel: 079-22871096 Mobile: 09825045607
Email: nisarg.shah@tmeglobal.co.in

POROSIL - REVOLUTIONARY FUSION PROCESS

Purvi Products offers - porosil - revolutionary fusion process.

Features:

- Purvi Products helping industry through problem solving machines.
- It has made a novel welding machine - POROSIL - for porosity sealing and surface restoration without heat affected zone (HAZ).
- Porosil is useful for casting defects repairing, it eliminates the need for costly annealing, welding and rehardening procedures on base metal items.

About the Company: Purvi Products is a team of Ele. Mech. and Chem. engineers and make problem solving machines. 25 years back they made India's first Brush Plating Machine and supplied to BARC, ISRO, BHEL, Reliance Ind. and so many other companies. In 2022, ASM Gujarat Chapter awarded them the Industry Innovation Award for their Brush Plating Machine.

Scan the QR Code for instant product enquiry



Email their, they will send working videos of the POROSIL and Brush Plating process.

Contact:

Purvi Products, Ahmedabad.
Mobile: 09825628705, 09824093103
Email: pathikoo@gmail.com



CUTTING FACING CHAMFERING MACHINE, ITL-CFC 50

ITL Industries Ltd offers ITL-CFC 50 cutting facing chamfering machine, which performs cutting, facing and chamfering both in ID & OD in single setting.

Features:

- Cutting Capacity(Min) : Min. OD 16 x ID 10mm & Cutting Capacity (max) : Max. OD 50 x ID 48mm.
- It can achieve very high production rate of 450-600 Pcs/hour, which saves material handling time.
- Both chamfering heads are feed motions operated through servo motor and ball screw. Pipe indexing is done through servo motor and ball screw. The saw speed is controlled by AC frequency drive depending upon the application and cutter details, automatically through PLC. The machine is equipped with "micro mist cooling" arrangement as standard supply..

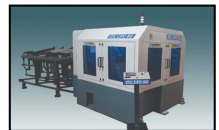
About the Company: ITL Industries Ltd is the leading manufacturer and exporter of a wide range of circular saw machine, horizontal band saw machine, etc. Bigger model CFC-75 & CFC-100 also available.

Scan the QR Code for instant product enquiry



Contact:

ITL Industries Ltd, Indore
Tel: 0731-7104400, 7104412
Email: marketing@itl.co.in, info@itl.co.in



UNIQUE ALUMINUM LABELS FOR PHARMACEUTICAL PLANTS

Strokes India offers Metalpro™ unique aluminum labels for pharmaceutical plants.

Features:

- Pharmaceutical companies, similar to other process industries, require distinct signage specifications for various departments, including housekeeping, production, packing, stores, engineering, lab, QA/QC/R&D, administration, safety & security, and others.
- METALPRO™ labels, developed recently by Strokes India, offered pharmaceutical companies a cost-saving opportunity when used for interior and exterior signage instead of printed vinyl or similar materials. .
- These product and process provide a unique advantage compared to conventional alternatives: it can be used as a reusable writing surface, just like a blackboard or chalkboard.
- This versatility makes it suitable for various applications across different departments, such as Mobile Phase, A.H.U. Code, Calibration Status, Dissolution Tester, Volumetric Solution, Equipment Clean Status, Room Status, DOP Testing, Equipment Code, Batch Code, Quarantine label, etc.
- The exceptional combination of durability, high-resolution graphic printing in color, and variable data functionality sets METALPRO™ labels apart from other graphic identification materials.●
- This product has several key characteristics: it has a 3M adhesive that allows it to be securely attached to smooth, solid surfaces that are free of grease; it can be printed in individual pieces; it supports multi-coloured printing; it can be written on and rewritten; and it is long-lasting in most industrial settings, both for the printed content and the aluminium sheet itself.
- As a result, it will greatly help all industry professionals in pharmaceutical formulation manufacturing, bulk drugs, and laboratories if this labeling method is implemented in their organizations.
- “This practice will motivate employees, keep production steady, guarantee safety for all, enhance productivity, and lower expenses related to workplace accidents, ultimately leading to better performance and increased profits,”

About the Company: Strokes India is a strategic design, in-depth print and signage solution provider to convey adept business identity of associations.

Contact:

Strokes India, Pune
Mobile: 09822065602
Email: sales.strokesindia@gmail.com



PUSH BUTTON SAFETY QUICK RELEASE COUPLING

Siemag Industries offers a wide range of push button safety quick release coupling.

Features:

- Siemag introduces the all new push button safety quick release couplings. The 2 Stage release mechanism prevents hose whipping that cause injury that could result from accidental disconnection.
- It also prevents scratches or damage to working surface due to the contoured body with round edges.
- Its features include: 2 stage release action; press button once: instantaneous pressure relief; Press button twice: Instant disconnection; Impact & Scratch Resistant; Eliminates hose whips; Contoured Body; Comply to ISO 4414.

About the Company: Siemag Industries a certified ISO 9001:2000 company was established in the year 1959 primarily for the manufacture and supply of field power accessories especially in the field of pneumatics.

Scan the QR Code for instant product enquiry



Contact:

Siemag Industries, Mumbai
Tel: 08478847821/31/91
Mobile: 07718875757, 07710920909
Email: info@siemag.net



HIGH SPEED TRIPPING RELAY THREE ELEMENT RELAY - JRV 181X3

JVS Electronics Pvt Ltd offers a wide range of high speed tripping relay three element relay - JRV 181X3.

Features:

- High speed tripping relays are voltage operated, attracted armature type with 5 contacts per element. Each element is enclosed in a dust proof moulded, transparent, polycarbonate cover. Radio metal is used for the magnetic components such as the armature, the core and the yoke of the tripping relay to ensure good electrical performance.
- The contacts are made of phosphor bronze and are nickel plated. The contact tips are made of pure silver.
- Its features include: wide range of voltage & contacts configurations; Electromechanical design; Hand reset contacts; Protective transparent cover for the element; Compact panel mounting case

About the Company: JVS Electronics Pvt Ltd is an exporter, manufacturer and supplier of audio indicating instruments, visual indicating instruments, etc.

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Contact:

JVS Electronics Pvt Ltd, Bangalore
Mobile: 09448288863
Email: bangalore@jvselectronics.in

Scan the QR Code for instant product enquiry



VIBRATORY FURNACE CHARGER

Elektromag-Joest Vibration Pvt Ltd offers vibratory furnace charger.

Features:

- This vibratory furnace chargers are a cost effective method of increasing productivity and quality of melt.
- With constant improvement in technology, furnaces require rapid and uniform charging to keep pace with the melting power of the system.
- By using the furnace charger, controlled vibrations the metal is uniformly fed into the furnace whereby the melting cycle is reduced.
- The entangled pieces of scrap metal form a layer above and if unrecognized by furnace operator, bridging can lead to super heating of bath and failure of furnace lining and run out.



About the Company: Elektromag-Joest Vibration Pvt. Ltd., is a leading manufacture of Vibrating equipments for foundry, steel, mining, quarrying, chemical, food, recycling, etc.

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Contact:

*Elektromag-Joest Vibration Pvt Ltd,
Mumbai
Tel: 022-66624444
Email: vibration@elektromag.com*

PURGE SET

Placka Instruments India Pvt Ltd offers a wide range of purge set.

Features:

- A purge set is a combination of a variable area flow meter and a regulator.
- It is a combination of purge set, filter regulator and inlet/outlet pressure gauge in one panel board. The necessary components for air purging are combined in one panel board that offers easy installation at site.
- They are manufactured completely according to the customers required specification.



About the Company: Placka Instruments & Controls (Shreyas Instruments Pvt Ltd), established in 1974, manufactures process control instruments, such as air filter regulators, rotameters, level switches, level gauges, liquid level controllers, transmitters etc.

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Contact:

*Placka Instruments India Pvt Ltd,
Chennai
Tel: 044-22231559
Email: plackainstruments@yahoo.com,
sales@plackainstruments.com*

CABLE DRAG CHAINS

Elektromag offers a wide range of metallic/plastic cable drag chains.

Features:

- This Elektromag drag chains enable the conveyance of flexible cables/hoses, etc to movable units with maximum reliability.
- Its advantages of Elektromag cable drag chains is avoidance of mechanical strain on the cables/hoses.
- No tensile stress or compression, no frictional wear as there is no relative movement between the cables/hoses and the cable drag chain, no bending below an established radius, no crushing, buckling or forming of loops or torsion strain.



About the Company: Established in the year 1958, Elektromag is engaged in manufacturing of metallic/plastic cable drag chains and supplying to various steel plant, machine tools, cement, foundries, etc.

Scan the QR Code for instant product enquiry



Contact:

*Elektromag Methods, Mumbai
Mobile: 09820192772
Email: cablereels@elektromag.com*

VACUUM CIRCUIT BREAKER

Excel Power Switchgear Pvt Ltd offers a wide range of vacuum circuit breaker.

Features:

- The vacuum circuit breaker is the heart of the Switchgear which consists of the Vacuum Interrupter, spring charged motor, closing solenoid, opening solenoid, anti pumping device, contact arm with isolating contact, buffer system, with-drawable trolley and multi pole control wiring plug & socket through which the circuit breaker is coupled with the control and protection circuit.
- The With-drawable trolley mechanism establishes the mechanical connection between the panel and the circuit breaker.
- This allows the mechanism to close the vacuum interrupter contacts, compress the contact pressure springs, charge the opening spring and overcome frictional force.



About the Company: Excel Power Switchgear, a high tech manufacturing unit established in 1998, is engaged in R&D, production, and manufacturing of low & medium voltage switchgear.

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Contact:

*Excel Power Switchgear Pvt Ltd, Chennai
Tel: 044-22254870
Email: sales@excelpower.co.in*

QUICK RELEASE COUPLERS

Vijay Air Control offers a wide range of quick release couplers -New Generation = ST Series.



Features:

- Its valveless construction drastically saves pressure loss and achieves high flow rate.
- It is suitable for high viscosity fluids (such as grease).
- Available in various standard body materials, sizes and end configurations to cope with diversified and operating situations.

About the Company: Vijay Air Control is a one large workplace where work is done and then put on the market in the form of products and services. This work must be benefit if it is to hold its own in the face of competition. Only company based on sound economic, technical and organisation principles and which is in a position to have a say in future developments is a match for the challenges presented by the market and competition.

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Contact:

Vijay Air Control, Bengaluru
Tel: 080-23148871, 23141136
Mobile: 08951101436, 09880652082
Email: saivacblr@vacpneumatic.co.in

SHAFT & AXLE MEASURING MACHINES

Blum-Novotest Measuring & Testing Technology Pvt Ltd offers a wide range of shaft & axle measuring machines.



Features:

- The multipoint measuring machines for rotationally symmetric work pieces offer quick acquisition of component geometry during dynamic measurement.
- Loading is possible manually as well as automatically. Its loading position is easy accessible from above right on top of the final measuring position.
- Its features include: Post-process multipoint measuring system with independent PLC. Easy integration into existing automation system. Short, optimised feed motions. Flexibly configurable measuring unit using measuring forks/callipers with intelligent universal clamping system.

About the Company: Blum Novotest Measuring & Testing Technology Pvt Ltd has made a name for itself in the list of top suppliers of bore gauge, radio receiver in India.

Scan the QR Code for instant product enquiry



Contact:

Blum-Novotest Measuring & Testing Technology Pvt Ltd, Bangalore
Tel: 080-23185468 Mobile: 09075004435
Email: info@blumnovotestindia.in

FREQUENCY INVERTOR - SJ200 SERIES

Pro-Med Instruments (P) Ltd offers a wide range of frequency inverter - SJ200 series.



Features:

- The SJ200 is a true muscle-man, featuring enhanced ISPM-technology with vector control. Outstanding performance and design characteristics, such as superior torque for demanding applications and exceptionally compact size, for SJ200 inverter in a class of their own.
- They are suited for various applications in textile, paper and printing industries as well as for all areas of the metalworking industry, cranes and elevators.

About the Company: Pro-Med Instruments (P) Ltd, was incorporated in 1994 by a team of highly skilled professionals having experience for the past 15 years in process control instrumentation field with an objective to cater to the growing need for superior products having latest technology. They deal the products of Shinko, Hitachi, Brain Child, Autonics, Germs Sensors, RKC and Kyowa.

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Contact:

Pro-Med Instruments (P) Ltd, Chennai
Tel: 044-42132295 Mobile: 09840832296
Email: sales@promedindia.com

POWER HYDRAULIC MACHINE VICE

B R Precisions offers a wide range of power hydraulic machine vice.



Features:

- This type of Power Hydraulic vice Is suitable for Horizontal and vertical combined heavy cutting for CNC machining center VMC and HMC angle fixed type spherical segment ball can produce the force for angle locking which can make the vice plate floating upward and avoid slanting of the workpiece.
- Powerful material cast iron with high absorption and has strong anti-tension which can keep long durability for absorption and has strong rigidity with high precision tenon slot grounded, Made out of high tensile casting machined and surface ground to ensure maximum accuracy jaw plates.

About the Company: B R Precisions is dedicated to the manufacturing of clamping solutions; our main products are high pressure and precision vices.

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Contact:

B R Precisions, Bangalore
Mobile: 09845208854, 09449648171
Email: brvices@rediffmail.com

SURFACE GRINDING MACHINE (MANUAL)

Universal Machine Tools Corporation offers surface grinding machine (manual).



Features:

- The machine is built of heavy cast iron hand scrapped to fine tolerance, easy movement of table slide by providing V – ways & flat ways.
- The grinding wheel spindle is hardened and round and runs in precision contact angular bearing and driven by flange, vertical grinding wheel slide movement down at right side in the body.
- The vertical wheel dial least count in 0.01mm and micro feed least count in 0.001 mm.
- These machines are available in various sizes: 450 X 225 mm , 600 X 300 mm.

About the Company: Universal Machine Tools Corporation, established in 1981, is one of the leading companies in the machine tool industry.

Contact:

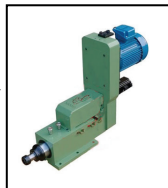
Universal Machine Tools Corporation,
Bangalore
Tel: 080-23356231 Mobile: 09845006959
Email: universalblr@gmail.com,
info@universalblr.com

Scan the QR Code for instant product enquiry



SERVO TYPE DRILLING/ TAPPING SPINDLE HEAD UNIT

Secon Technological Solutions Inc offers a wide range of servo type drilling/tapping spindle head unit.



Features:

- Every hardy precision spindle is built with high rigidity and quality housing material which is process by boring and honing. All spindles are made of alloy steel with the process of heat-treatment.
- The accuracy of the spindle is strictly under 0.003mm, this unit allows it to perform all types of machining applications such as drilling, peck drilling, threading, tapping, chamfering, reaming and countersinking.
- Standard 3-phase AC motor 0.75kW is included, optional motor up to 1.5kW. Belt driven at fixed speed and incorporated with a timing, V or Poly-V belt.

About the Company: Secon Technological Solutions Inc. is engaged as a manufacturer, trader, service provider, distributor of CNC machines tools, etc.

Contact:

Secon Technological Solutions Inc,
Bangalore
Telefax: 080-23575752
Email: secontech2000@gmail.com,
secontech@hotmail.com

Scan the QR Code for instant product enquiry



WIRE HARNESS

Miracle Electronic Devices Pvt Ltd offers a wide range of wire harness.



Features:

- As a leading looms manufacturer in India, we exemplify the commitment to excellence in providing cutting-edge wire harness solutions that meet the highest industry standards. Offered a range of wiring solutions, including circular connectors, D sub connectors, Mil-spec. connectors, D-38999 circular connectors, UL 1015 / 1007 grade PVC lead wires, Mil-W-16878, Mil-W-22759, and more.
- These harnesses cater to various applications such as single & discrete EMI cables, EMI-shielded cable harnesses, wiring harness multiwire, flat cable harness assembly, RF cable assembly, airborne looms, ribbon cable harness assembly, power cable, etc.

About the Company: Miracle Electronics is a renowned Transformer manufacturer in India, engaged in manufacturing power transformers, toroidal transformers, etc.

Contact:

Miracle Electronic Devices Pvt Ltd,
Bangalore
Tel: 080-28362750
Email: sales@miracle.net.in

Scan the QR Code for instant product enquiry



BREATHER VALVE

Caliber Valves Pvt Ltd offers a wide range of breather valve.



Features:

- Caliber - carbon steel/stainless steel body and housing stand alone and all internals are AISI 304/316, Co-axial type Breather valve with bias spring settings for pressure relief device with integral Flame arrester construction and with manual testing provision and relieving provision and external sand and dust protection suitable for outdoor installations. End connection - Flanged and drilled to ANSI 16.5, Class 150.

About the Company: Caliber Valves Private Limited is a Company to recon with and has a vision to its products with a cost effective one and at an affordable price with fullest satisfaction in terms of products and quality to its esteemed Customers. These can be presented with our new ultra modern reverie factory constructed with International Std and inbuilt with all the facilities.

Contact:

Caliber Valves Pvt Ltd, Chennai
Tel: 044-43500192 Mobile: 08939734853
Email: info@calibervalves.com,
mktg@calibervalves.com

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TRANSFORMER OIL PUMPS

Ajay Engineers offers transformer oil pumps. This centrifugal monoblock (pump & motor have been combined to form a single unit) type pump is fitted with single stage closed impeller in volute



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casing having axial end suction and vertical centerline delivery.

Contact:

*Ajay Engineers, Ahmedabad
Mobile: 09227792099
Email: contact@ajayengineers.com*

BUTTERFLY VALVE

Coimbatore Flow Controls Pvt Ltd provides a wide range of butterfly valve. These products are widely used in process and across industries like power, building and construction, water treatment plant, sugar



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and cement industries. These valves are manufactured in various material.

Contact:

*Coimbatore Flow Controls Pvt Ltd,
Coimbatore
Tel: 0422-2232435
Email: coflow@rediffmail.com*

TURBINE INLET VALVE

Baroda Flowtech Private Limited offers turbine inlet valve. The inlet valve in a hydro power station is used as a safety device. The valve is located within the



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power house on the upstream side. o.

Contact:

*Baroda Flowtech Pvt Ltd, Gujarat
Tel: 0265-2711141
Email: deepak@barodaflowtech.com*

HORIZONTAL PUMPS

Plastico Pumps is offering horizontal pumps. These horizontal pumps are available as end suction, horizontal, centrifugal coupled pumps with semi open impeller.



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Contact:

*Plastico Pumps, Vadodara
Tel: 0265-2840787, 3295818
Mobile: 09825069165/ 09428764521
Email: plasticopumps@gmail.com*

STAINLESS STEEL AND CAST IRON PUMPS

Investa Pumps Pvt Ltd manufacturers stainless steel and cast iron pumps. These pumps are manufactured with stainless steel and cast iron or cast steel castings for various duties in chemical plants. .



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Contact:

*Investa Pumps Pvt Ltd, Mumbai
Tel: 022-24460630/31, 24474434
Email: office@investapumps.co.in*

HIGH VACUUM SYSTEM

Vindi Vak Pump Pvt Ltd offers high vacuum system. The operating vacuum of around 710 mm hg is considered low now-a-days, due to the recent development in the manufacturing process.



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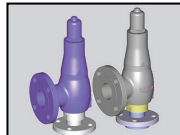


Contact:

*Vindi Vak Pump Pvt Ltd, Ahmedabad
Tel: 079-25893659
Mobile: 08347004222
Email: info@vindivak.com*

THERMAL RELIEF VALVE

V Tech Valves and Controls offers thermal relief valve, VT 100. These safety & thermal relief valves are designed and manufactured in compliance with ASME B & PVC, section VIII for small



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capacity applications. They safely relieve thermal expansion of process fluids in vessels and long lengths of pipe work.

Contact:

*V Tech Valves and Controls, Ahmedabad
Mobile: 09898469586
Email: info@vtechvalvescontrols.com*

LINED GLOBE CONTROL VALVE

Protrol Valves engages as manufacturer of lined globe control valve. The teflon lined globe control valve is designed to control the pressure of chemicals such as hydrochloric, sulfuric, nitric acids and many more. It is



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available in different specifications and other customisable options.

Contact:

*Protrol Valves, Thane
Mobile: 09324372771
Email: protrol51@yahoo.co.in*

FORGED STEEL VALVES

Component Engineering offers a wide range of forged steel valves. These valves are compact in size and with forged steel bodies. They are available in OS & Y type, bolted bonnet rising stem with renewable seat rings.



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The valves are checked with spring loaded disc for better performance.

Contact:

Component Engineering, Nashik
Tel: 0253-2380160
Email: sales@componentengineering.in

GLOBE VALVES

Fluidline Valves Co Pvt Ltd. Is offering globe valves. These valves are used for regulating flow in a pipeline and comprise of a movable disk-type element and a stationary ring-seat, in a spherical body. It



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is designed for least possible obstruction to free flow by providing curvature turns.

Contact:

Fluidline Valves Co Pvt Ltd, Mumbai
Tel: 022- 24944057/2494
Email: fluidline@hathway.com

STEAM JACKETED KETTLE

Nav Durga Boiler And Equipments Pvt Ltd offers steam jacketed kettle. The product, steam-jacketed kettle is very large, deep kettles mounted on a pedestal or legs to stand on the floor.



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Contact:

Nav Durga Boiler And Equipments Pvt Ltd, Nagpur
Tel: 0712-2721005 Mobile: 09422111525
Email: navdurgaboiler@yahoo.in

THERMIC FLUID HEATERS

Hitze Equipments (India) Pvt Ltd is offering thermic fluid heaters, TFH series. These thermic fluid heaters(TFH) are used for temperature requirements upto 300 degree C.



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Contact:

Hitze Equipments (India) Pvt Ltd, Bangalore
Tel: 080-28395610
Mobile: 08884219514, 09343736558
Email: info@hitze.in

SUCKING BLOWER

Shama Global Pvt Ltd engages as a manufacturer and supplier of sucking blowers. These high vacuum blowers comprise of a dynamically balanced impeller which revolves around a stator-cum-



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compression chamber having very fine clearances between them.

Contact:

Shama Global Pvt Ltd, Faridabad
Mobile: 09999022825
Email: Shamaglobal786@Gmail.Com

MINI ROTARY RACK OVENS

Naik Oven Manufacturing Co is offering mini rotary rack ovens. These mini rotary rack ovens are manufactured by us feature a rotating interior rack to promote even baking for all kind of bread products. These over sized viewing windows are well-suited for the visibility of products.



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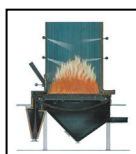


Contact:

Naik Oven Manufacturing Co, Thane
Mobile: 09821343053
Email: response@naikoven.net

GRATE BOILER

Rajdeep Boiler Pvt Ltd offers travelling/ dumping/reciprocating grate boilers based on fuel options. These boilers come with fuel flexibility, low maintenance and maximum operating availability. Some of its



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benefits include that of system designed to deliver continuous discharge of ash, / pneumatic drives.

Contact:

Rajdeep Boiler Pvt Ltd, Surat
Mobile: 09099898985
Email: info@rajdeepboiler.co.in

DOUBLE BURNER GAS OVEN

Heating Tools And Systems(HTS) are offering double burner gas oven. HTS provides automatic and manual gas oven in the deck modules. These deck ovens have won appreciation for their durability, performance



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and service in the bakery and food processing industry.

Contact:

Heating Tools And Systems, Rajasthan
Tel: 01423-648230
Mobile: 09024891181
Email: info@bakersequipments.com

SMOKE TUBE IBR

Hi Tech Boilers Pvt Ltd offers smoke tube IBR. These smoke tube oil/gas fired, wet back, horizontal, fully automatic, three pass design are manufactured & designed as per IBR 1950. Some of its benefits are that of large heating surface area and furnace with high radiant heating surface maintain furnace temperature below the permission limits.



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Contact:

Hi Tech Boilers Pvt Ltd, Vadodara
Mobile: 09825031498
Email: contact@hitechboilers.in

ELECTRIC HOLDING FURNACE

Entec Industrial Furnaces Pvt Ltd is offering electric holding furnace. The company is prominent electric holding furnace manufacturers, suppliers, and exporters of India. Their products are widely used in pressure die casting auto part components.



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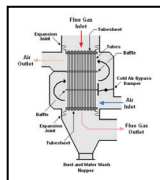


Contact:

Entec Industrial Furnaces Pvt Ltd,
Faridabad
Mobile: 09810005354
Email: info@entecfurnaces.com

AIR PRE HEATERS

Qucon Boilers Pvt Ltd is offering air pre heaters. These air pre heaters (APHs) are used to heat air before another process (for example, combustion in a boiler) with the primary objective of increasing the thermal efficiency of the process.



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Contact:

Qucon Boilers Pvt Ltd, Hyderabad
Mobile: 09849025390, 09908948786
Email: quconboilers@gmail.com

GEARED MOTOR

Powertek Equipment Company is offering PEC geared motor in various specifications.



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These motors are high on efficiency, comes with a compact and robust design, and wide range of reduction ratios. These motors are high on quality and performance.

Contact:

Powertek Equipment Company, Mumbai
Mobile: 09820193114, 09320193114
Email: info@powertekindia.com

RUST CONVERTOR

Bans Aerosol offers a wide range of rust convertors. The rust convertor is manufactured by skilled professionals using superlative quality raw material and advanced methodologies. This product has attributes like dimensional precision, robust construction and balanced weight



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Contact:

Bans Aerosol Private Limited, Ghaziabad
Tel: 0120-2696463, 2696464
Email: bansaerosol@hotmail.com

ALKALINE COIL CLEANER

Chemtex Speciality offers alkaline coil cleaner. Chemtex's alkaline coil cleaner is a highly concentrated and effective liquid cleaner and brightener for complete removal of dust, dirt, greasy-oily soils, carbon deposits and grime on the aluminum fins and copper coils of AHU, FCU and indoor.



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Contact:

Chemtex Speciality Limited, Kolkata
Mobile: 08961111111
Email: sales@chemtexlimited.com

POLYSILOXANE ANTI CORROSION COATING

Clean Coats offers polysiloxane anti corrosion coating. The Corrotech PSH 75 is a new generation two-component high performance polysiloxane coating based on silicon - organic resin hybrid technology.



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Contact:

Clean Coats Pvt Ltd, Mumbai
Tel: 022-26500846/0847/
0848/5576/3468
Email: enquiry@cleancoats.com

RUST REMOVER

Zam Enterprises offers rust remover, Phosphozam. Rust remover is processed utilising quality approved chemical compounds under experts' guidance. This remover is mainly



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used for preventing corrosion in components.

Contact:

Zam Enterprise, Mumbai
Tel: 022-66762699
Mobile: 09820797920
Email: zamentp@gmail.com

PROTECTIVE COATING CHEMICALS

S V Enterprises offers a wide range of protective coating chemicals. Due to chemical resistance, excellent adhesion, and elevated durability, these coatings are widely used by customers. Higher film thickness provides tough waterproof membrane ensuring no ingress of water.

Contact:

*S V Enterprises, Hyderabad
Mobile: 09392455698, 09391285489
Email: sve_fosroc@yahoo.co.in*



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SOLID FUEL FIRED BOILERS

Shanti Boilers & Pressure Vessels offers a wide range of solid fuel fired boilers. A water-free heating device, delivering high volumes of hot water with consistently high efficiency; made of stainless steel in rugged design with cylindrical combustion chamber can be effectually operated with wood and coal.

Contact:

*Shanti Boilers & Pressure Vessels (P) Ltd, Hyderabad
Mobile: 09490494915, 09490190970
Email: santiboilers_best@yahoo.co.in*



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MINI STEAM BOILER

Balkrishna Boilers offers a wide range of mini steam boiler. It is a highly reliable, packaged instant steam generator suitable for steam or hot water requirements in laundries or factory canteens.

Contact:

*Balkrishna Boilers Pvt Ltd, Ahmedabad
Mobile: 09825024450, 09227524450
Email: info@balkrishn.com
balboilers@yahoo.co.in*



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ULTRASONIC CLEANING MACHINES

Samarth Electronics offers a wide range of ultrasonic cleaning machines. This is a two chamber or three chamber cleaning machine consisting of ultrasonic tank, drying tank and rinsing tank.

Contact:

*Samarth Electronics, Thane
Mobile: 09322916496, 09320240250
Email: samarthelectronics@yahoo.com*



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VACUUM CLEANERS, WET & DRY

Prompt Sales & Service offers a wide range of wet and dry vacuum cleaners. These are developed under the supervision of experts using advanced technology and tested raw materials. All products are available as per the diverse demands of the end users, available at affordable prices.

Contact:

*Prompt Sales & Service, Indore
Mobile: 09826057879, 09826019879
Email: prompt_cleaning@rediffmail.com*



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DUST COLLECTORS

Trade-In Services offers a wide range of dust collectors. Manufactured by trusted vendors using high quality inputs and components, widely appreciated for features like durability and reliability. Available in different sizes and specifications as per the requirements..

Contact:

*Trade-In Services, Uttarakhand
Mobile: 09720985233
Email: service.tradein@gmail.com*



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OPEN SPRING MOUNTING

Saketh Exim Ltd offers open spring mounting. This unique range of open spring mounting uses an integral rubber and fixing of the spring which sets them apart from all other designs. Its loose spring and plats are now history and high frequency and noise attenuation is provided regardless of whether rubber seating pad is used or not.

Contact:

*Saketh Exim Limited, Navi Mumbai
Mobile: 07045686823, 07045793742
Email: info@sakethexim.com*



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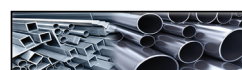


STAINLESS STEEL SEAMLESS PIPES

Steel Samrat (India) manufacturers a qualitative range of stainless steel seamless pipes. Its is made using optimum grade stainless steel, our stainless steel seamless pipes are appreciated for superb finish, high corrosion resistance, and optimum strength.

Contact:

*Steel Samrat (India), Mumbai
Tel: 022-23851407, 23890350
Mobile: 09819098305
Email: steelsamrat@hotmail.com*



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PUNJAB MACHINE TOOLS SHOW - CHANDIGARH	November, 21-24, 2024 Sub. City Center, Sector 34, Chandigarh	K AND D Communication Ltd. (KDCL) Ahmedabad Mobile: 09909041613 Email: info@kdclglobal.com
FACTORY AUTOMATION EXPO - PUNE	November 22-24, 2024 Pune International Exhibition and Convention Center, Pune	FME (Future Market Events) Media Pvt Ltd Noida Email: eisha@futuremarketevents.com, futuremarketevents.com
WIRE INDIA - MUMBAI	November 27-29, 2024 Bombay Exhibition Centre (BEC) NESCO Mumbai	Messe Düsseldorf GmbH Germany Tel: +49 (0)211 456001 Fax: +49 (0)211 4560668 Email: infoservice@messe-duesseldorf.de
UTECH INDIA - MUMBAI	December 04-06, 2024 Bombay Exhibition Centre (BEC) NESCO Mumbai	Urethanes Technology International EC2V 8EY London, United Kingdom of Great Britain and Northern Ireland Tel: +1 (313) 446-0450 Email: customerservice@utech-polyurethane.com
IFSEC INDIA - NEW DELHI	December, 12-14, 2024 Pragati Maidan Exhibition Center New Delhi	Informa Markets India Private Limited Mumbai Tel: 022-6172 7000 Email: informamarkets@informa.com
GLOBAL INDUSTRIAL EXPO - PUNE	December, 13-15, 2024 Auto Cluster Exhibition Center, Mumbai Pune Road Chinchwad East, Pune	Global Media Communication Sanskriti Darshan Pune Email: satish@globalindustrialexpo.com
IMTEX – FORMING, BANGALORE	January 23-29, 2025 BIEC - Bangalore International Exhibition Center Bangalore	Indian Machine Tool Manufacturers Association Bangalore Tel: 080-66246600 Email: imtma@imtma.in
PAINTINDIA - NEW DELHI	January 30-31, 2025 IICC India international Convention and Expo Center New Delhi	ExpoNova Exhibitions & Conferences (India) Pvt Ltd Mumbai Tel: 022-62165323 Email: hpci.india@nm-india.com
MECTECH EXPO - NEW DELHI	February 13-15, 2025 Pragati Maidan Exhibition Center New Delhi	Confederation of Indian Industry Gurugram Email: amit.sharma@cii.in
INTERNATIONAL		
INTERNATIONAL ELECTRONICS CIRCUIT EXHIBITION - SHENZHEN	December 04-06, 2024 Shenzhen World Exhibition & Convention Center Guangdong, China	Baobab Tree Event Management Co. Ltd. Hong Kong, China Email: info@baobab-tree-event.com
DPES SIGN EXPO - CHINA GUANGZHOU	February 15-17, 2025 PWTC Poly World Trade Center Guangdong, China	Guangzhou Baoxuan Exhibition Co Ltd 510335 Guangzhou, China Tel: +86 (0)20 89089736 Email: sales@dpes.com.cn
IMEX - TIANJIN	March 06-09, 2025 Tianjin Meijiang Convention and Exhibition Center Tianjin, Tianjin, China	Zhenwei International Exhibition Group Guangzhou, China Email: hjn@zhenweiexpo.com

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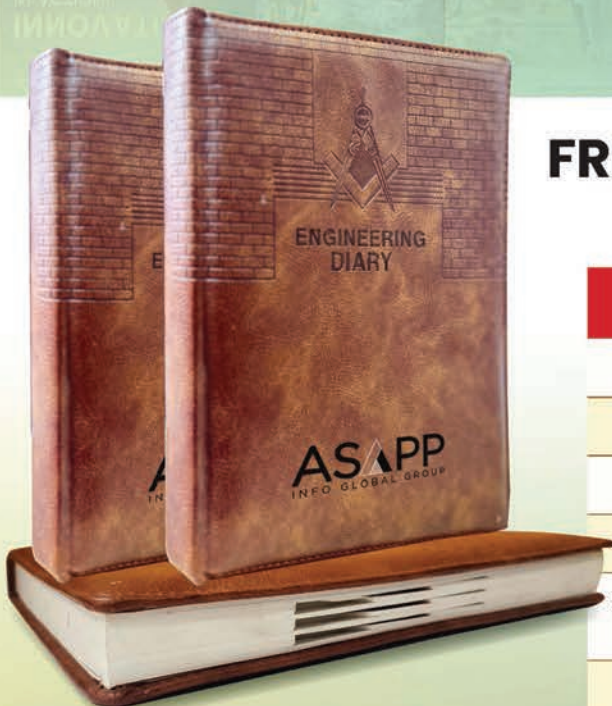
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Narendra Modi



A boost to 'Make in India' and India-Spain cooperation! The President of the Government of Spain, Mr. Pedro Sánchez and I inaugurated the aircraft complex in Vadodra, where the C-295 aircraft will be manufactured. #C295MadeInIndia



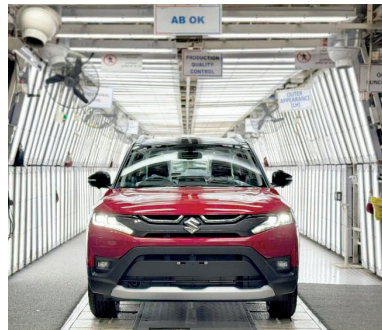
Bharat Forge Ltd



We are pleased to announce that Bharat Forge Ltd., Mundhwa has been honored with the Gold Award for the Low Cost Automation Kaizen on CL2 line in state of art machining division MCD2 - Breakthrough Category at the prestigious CII National Kaizen Competition in Chennai.



Maruti Suzuki



Maruti Suzuki Brezza becomes the 1 crore vehicle to roll out from the Manesar facility

#MarutiSuzuki Manesar facility achieves 1 crore cumulative production, fastest among Suzuki facilities globally, in a span of 18 years. We thank our customers, employees, business associates and Government of India for their continued support.



HellermannTyton Global



We are excited to announce the start of construction for our manufacturing facility at Greenbase Industrial and Logistics Parks in Chennai/India. Set to be completed by Q3 2025, this facility will significantly enhance our production capabilities and become a key hub for the Indian sub-continent. Alasdair Abercrombie-Barnett, President, Asia Pacific, shared, "India is a key driver for growth, both domestically and internationally. We're here to grow alongside our customers!" Stay tuned for more updates on this exciting journey!



Make In India



#NewIndia's merchandise #exports soared to USD 437 Billion+ in FY 2023-24, showcasing #MakeInIndia's success in turning #manufacturing ambition into global trade power.

Elevate your game with India today!



Ratandeep Tripathi



Exciting News from Vjaitra Air Mobility
We are thrilled to announce the opening of our brand-new state-of-the-art assembly facility in Noida Sector-63 Delhi NCR ! This facility marks a significant milestone in our journey towards delivering cutting-edge drone solutions for agriculture,urban mobility sectors. With this expansion, we are enhancing our production capabilities to meet the growing demand for our advanced drones, including the much-anticipated KM-10 Agriculture Drone and our next-gen Hydrogen Air Taxi for air mobility solutions. This facility is designed to streamline our operations, ensuring faster delivery, enhanced innovation, and a stronger focus on Make in India initiatives. Join us as we continue to soar to new heights!



ideaForge Technology Limited

@ideaforge_tech
Introducing FLYGHT Franchise— India's first app-based Drone as a Service (DRaaS)! Empower your business with state-of-the-art drone technology on demand.



Sanjiv Singh

Launched in September 2014, the #Make in #India initiative aims to position India as a global manufacturing hub. A vital aspect of this success is the introduction of Quality Control Orders (#QCOs), which ensure product quality and consumer safety, reflecting the Prime Minister's vision of "Zero Defect - Zero Effect" manufacturing.



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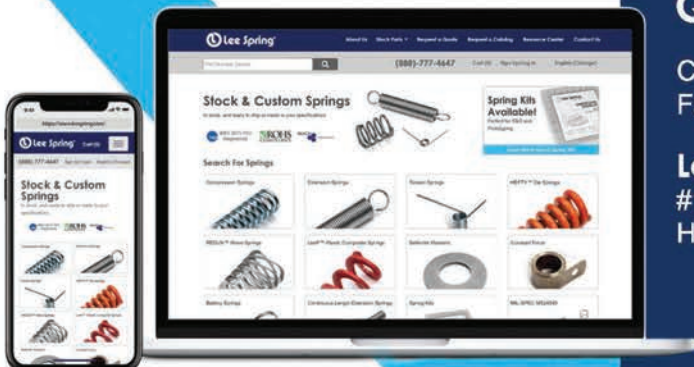
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