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ON TRACK TO HIGH-SPEED GROWTH

With ₹2.65 trillion capex, the Indian railway sector presents a big opportunity for suppliers because of investments in Vande Bharat, wagons, high-speed trains & tracks, etc.



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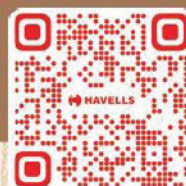


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“Despite the completion of 10 years of the Make in India program, the share of manufacturing in India's GDP has decreased from 16.7 per cent in 2013-14 to 15.9 per cent in 2023-24.

On a fast-track growth

On September 25, 2024, Make in India initiative completed 10 years. Lauding the country's achievements in manufacturing, Prime Minister Narendra Modi, in a LinkedIn post, described the initiative as a roaring success that has transformed India from a nation reliant on imports to an emerging manufacturing hub.

To strengthen the country's manufacturing sector and reduce reliance on imports, the government launched the Production Linked Incentive (PLI) scheme for 14 key sectors, with a budget of ₹1.97 trillion. Since its introduction in 2020, the PLI scheme, which provides 4-6 per cent cash incentives on incremental sales to manufacturers, has attracted investments of ₹1.4 trillion (\$16.73 billion). This has led to manufacturing output worth ₹12 trillion (\$143.4 billion), the creation of 8.5 lakh jobs, and exports totaling ₹4 trillion (\$47.8 billion). The scheme's success has been varied—sectors like mobile phones, telecom, pharmaceuticals, drones, and food processing have shown strong performance, while industries such as automobiles, auto components, textiles, ACC batteries, specialty steel, white goods, and medical devices have lagged behind.

Despite the completion of 10 years of the Make in India program, the share of manufacturing in India's GDP has decreased from 16.7 per cent in 2013-14 to 15.9 per cent in 2023-24, falling short of the government's target of 25 per cent by 2030. Experts note that while India's factory gate costs are on par with countries like Mexico, Vietnam, and Bangladesh, higher logistics costs reduce its competitiveness.

To address this, the government introduced the PM Gati Shakti National Master Plan in October 2021, aimed at facilitating data-driven decisions for the integrated planning of multimodal infrastructure, thereby reducing logistics costs. Indian Railways plays a significant role in this initiative, enhancing industrial linkages and supply chain efficiency. The Union government has identified 434 railway projects across three PM Gati Shakti economic corridors, spanning 40,900 km, with an investment of approximately ₹11.2 trillion.

Over the past decade, the Government of India has significantly ramped up infrastructure investments, with Indian Railways being one of the primary beneficiaries. The capital expenditure for Indian Railways has risen more than ninefold, from ₹281.74 billion in 2013-14 to ₹2.652 trillion in 2024-25. The government is heavily investing in expanding Vande Bharat and Metro services, enhancing freight cargo capacity, building rail infrastructure, and developing high-speed trains, creating substantial growth opportunities for stakeholders in the sector. It's no surprise that the top three spots in *SME's* list of **Top 100 Engineering Companies in India for 2024** are held by firms (Jupiter Wagons, Titagarh Rail Systems, and Texmaco Rail) that are key suppliers to Indian Railways.

Alongside railways, the road sector has been a major priority for the government in its infrastructure development initiatives. To explore the latest advancements in road construction technologies and equipment, visit the RAHSTA (Roads & Highways Sustainable Technologies & Advancements) Expo, scheduled for October 9-10 at the Jio World Convention Centre in Mumbai. On October 10, *SME* and *Equipment India* will co-host a CEO Panel Discussion during the Expo to discuss the Rahsta (road) ahead for the construction equipment industry. To participate, register at www.RAHSTAexpo.com.

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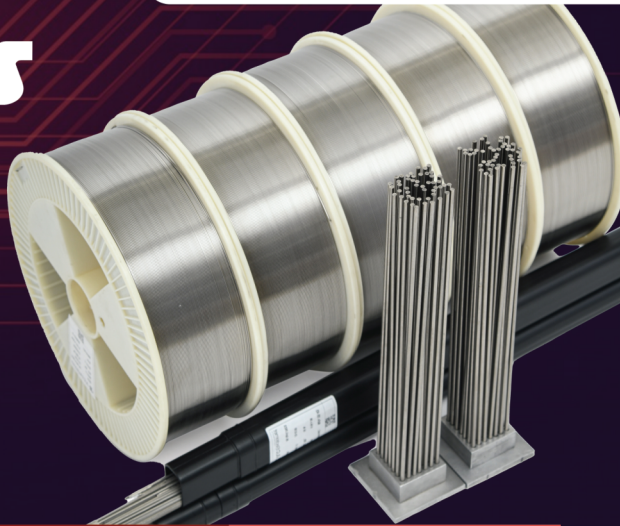


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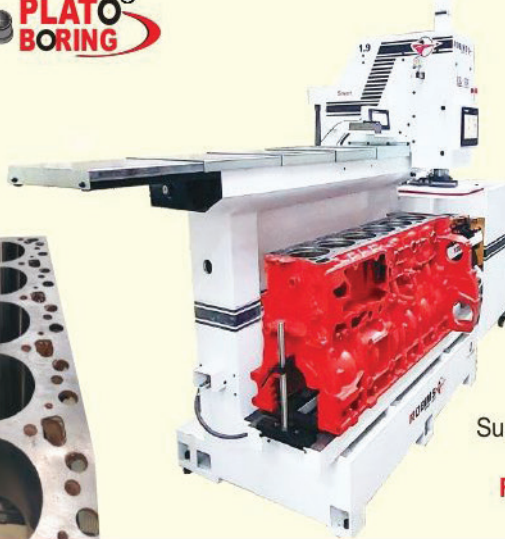
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Casting & Forging

AIFI has appointed Yash Munot as President & S Ravishankar as Vice President

The Association of Indian Forging Industry (AIFI), the apex body representing the Indian forging industry, elected Yash Munot as the new President of AIFI for the term 2024-26. S Ravishankar has been elected as the Vice President of AIFI, marking the beginning of a new chapter in the organisation's leadership.

Yash Munot, who previously served as Vice-President of AIFI from 2020 to 2024, is the youngest to undertake the role of President in the organisation's history. He succeeds Vikas Bajaj, who served as President from 2020 to 2024.

Munot currently serves as the Chief Executive Officer at Varsha Forgings Private Limited and the Managing Director at KCTR Varsha Automotive. His journey in the forging industry began in 2005 with him being inducted into Varsha Forgings Private Limited, the family business. Beyond his industrial achievements, Munot is recognised for his diversified business ventures

in sectors such as lifestyle products, health food, hospitality and philanthropy, including the adoption of an orphanage and medical aid distribution during the pandemic.

His leadership within AIFI has been marked by significant contributions, including his contribution in organising major industry events like IFC 2011, Forgetech India 2016, Asia Forge 2019 and ForgeTech India 2023. He has served as the Western Region Chairman from 2018 to 2020.

He holds a Bachelor of Arts (Honors) in Finance and Marketing from Regents Business School of London and a leadership degree from the London Business School. He is also a member of EO, an esteemed organisation for entrepreneurs.

The Association of Indian Forging Industry community warmly welcomes Yash Munot and S Ravishankar in their new roles.

Machine Tools

IMTMA to hold IMTEX 2025 from January 23 to 29 at BIEC, Bengaluru

Indian Machine Tool Manufacturers' Association (IMTMA) is all set to host its flagship exhibition - IMTEX 2025, the largest machine tool and manufacturing technology exhibition in Southeast Asia, from January 23 to 29, 2025 at Bangalore International Exhibition Centre (BIEC), Bengaluru.

IMTEX 2025 along with concurrent shows of Tooltech 2025 & Digital Manufacturing 2025 will showcase a wide range of advanced solutions in CNC machining, tooling, automation, robotics, additive manufacturing, CAD/CAM, metrology, and smart manufacturing technologies that will help transform Indian manufacturing industry. OEMs, sourcing agents, researchers, academia, and students among others, will be at the exhibition to explore and source their requirements. Enumerating the current trends of the machine tool industry, Rajendra S Rajamane, President-IMTMA said "Globally, India ranks 9th in production and 6th in consumption as per World Machine Tool Survey 2023 by Gardner Intelligence. Production during FY 2023-24 is estimated to have risen by around 10 per cent

reaching ₹135.71 billion, Consumption during the period is estimated to have increased by 11 per cent to reach ₹272.65 billion in FY24.

"IMTEX 2025 will be the largest machine tool exhibition surpassing all its previous editions, covering an area of around 80,000 sqm and over 1000 exhibitors presenting an exciting range of technologies and solutions, providing an ideal platform for machine tool user industries," said Jibak Dasgupta, Director General & CEO, IMTMA.

"As in the past, the display of 'LIVE' machines at IMTEX 2025 would enable visitors to witness the solutions and technologies. Exhibitors, both large and small, can favourably enhance their brand at IMTEX", Dasgupta added.

While Tooltech 2025 and Digital Manufacturing 2025 will be concurrent shows, IMTEX 2025 will feature many parallel events such as i2 Academia Square, Manufacturing Quiz Contest, Jagruti, and Job Connect. A large number of industry representatives will be visiting IMTEX as trade delegations.



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Auto Components

Drive System Design displayed solutions at IAA Transportation 2024

Drive System Design (DSD), a leading engineering consultancy and a key subsidiary of Hinduja Tech acquired in December 2022, showcased its latest advancements in electrified propulsion systems at IAA Transportation 2024, held in Hannover, Germany, from September 17 to September 22, 2024.

As the premier partner for cutting-edge mobility solutions, Hinduja Tech (HT) delivers exceptional value across all vehicle platforms, including the burgeoning realm of new energy vehicles.

Together, HT and DSD are providing innovative engineering solutions for all vehicles, including electric, hybrid, and conventional powertrains. Drive System Design (DSD) is a global engineering consultancy with a



rich legacy in designing drivelines and transmission systems for conventional internal combustion engine (ICE) vehicles.

Building on this foundation, DSD has been at the forefront of the electric vehicle revolution since 2010, specialising in the rapid engineering and development of electrified

propulsion systems and associated technologies.

DSD offers expertise trusted by leading OEMs, Tier-1 suppliers, and research institutions across the automotive, commercial vehicle, aerospace, off-highway, and defence sectors. As a one-stop shop for propulsion systems engineering, DSD operates technical centres in North America and the UK, with commercial centres in South Korea, Japan, and India.

Auto Components

Automechanika displayed innovative futuristic mobility solutions

Automechanika Frankfurt showed once again in 2024 why it is the leading international trade fair for the automotive industry. 4,200 companies from 80 countries presented their very latest products and innovative solutions for retail, workshops and industry. Over an area of 320,000 square metres and 26 hall levels, trade visitors from 172 countries were able to discover pioneering technologies and even try some of them out in the outdoor exhibition area. This year's trends were electrification, vehicle connectivity, driver assistance systems and digitalisation.

The expanded supporting programme was a hit, with 108,000 visitors from 172 countries taking advantage of this chance to find out what matters in the industry today. Detlef Braun, Member- Executive Board, Messe Frankfurt, "Even in the midst of the digital transformation, the industry once again demonstrated



its wealth of innovation, providing countless highlights over the course of the five-day event. Together with our exhibitors, we were able to find the right players to present the most important topics – including alternative drive systems, sustainability and the use of AI and robotics in the automotive aftermarket – on the stages and in the exhibition halls. We are also

delighted by growing demand from both German and international visitors."

A total of five stages played host to discussions of trends and developments in various industry sectors. In the Future Mobility Park and the corresponding expert forum Innovation4Mobility, visitors had the opportunity to experience vehicles with alternative drive systems up close – including electric, hydrogen and hybrid – and even to get behind the wheel themselves. This year also marked the debut of 'Ambition', a special area for Gen Z with brief and captivating presentations.



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Industrial Supplies

Deccan Gold Mines Ltd's subsidiary DGMoZ, shipped first lithium ore to China

Deccan Gold Mines Limited (DGML), India's only listed gold exploration and mining company, has successfully shipped its first consignment of lithium ore to China through its step-down subsidiary, Deccan Gold Mozambique LDA (DGMoZ). The shipment, totalling 150 tons with a grade of 2.5 per cent Li_2O , marks DGML's debut in the fast-growing lithium market.

"This milestone underscores our transition into the critical minerals sector, with lithium being a key raw material in the production of batteries for electric vehicles and renewable energy storage systems. We are on track to play a significant role in the global supply chain for critical minerals, thereby reinforcing our commitment to sustainable resource development," said Hanuma Prasad Modali, Managing Director, Deccan Gold Mines Limited.

Following this initial shipment, DGML plans to rapidly scale its exports, aiming to reach 1,000 tons per

month in the near future. The company will also broaden its product range to include high-grade spodumene with 4 per cent+ Li_2O and lepidolite with 2 per cent+ Li_2O , further strengthening its presence in the global lithium market.

DGML continues to advance exploration activities across its licensed areas in Mozambique. Comprehensive geological surveys and sampling are underway, with a bulk sample already sent to SGS South Africa for beneficiation test work.

This test work will help optimise the process plant design, which is expected to have a capacity of 100 tons per day (tpd) and be operational by the end of 2025.

Once completed, the plant will produce approximately 7,000 tons per annum of high-grade concentrate, boosting DGML's production.

Additionally, the company is pursuing partnerships to solidify its position in the market and drive innovation.

Air Conditioning & Refrigeration

Thermo King launched upgraded high-roof truck solutions in Aisa Pacific

Thermo King, a brand of Trane Technologies, (a global climate innovator), has upgraded its high-roof truck solutions for launched RV1200/1100/1000S ultra-slim, vehicle- powered truck refrigeration units.

Specifically designed for heavy-duty refrigeration trucks, this high-roof series has achieved remarkable success in the market with its excellent performance and high reliability since its launch in 2022. With this new upgrade, Thermo King has introduced comprehensive innovations spanning from product design to production efficiency. The upgrade not only expands the driver's cab of the refrigeration truck by up to 20 per cent, but also significantly enhances the energy efficiency by 20 per cent. This series offers the cold chain transportation industry an innovative experience that combines superior performance with lower costs. Looking ahead, the series is set to enter more markets, such as Singapore and Malaysia.

"With over 80 years of experience in global cold chain transportation, Thermo King always adheres to the principles of customer focus, innovation and excellence,"

said Michael Shi, Product Management and Engineering Leader- Asia Pacific, Thermo King. "We have optimised our high roof RV-series vehicle-powered truck refrigeration solutions to exceed customer expectations for efficiency, reliability and economy. The newly upgraded products quickly became popular choices in the heavy-duty truck market, reinforcing our commitment to advancing the cold chain transportation industry with our customers."

Greater refrigeration capacity and reliability

Since its launch in 2022, the high roof RV-series vehicle-powered truck refrigeration units have led the heavy-duty truck market in the Asia Pacific region, driven by strong growth in annual orders and sales. Featuring a series of innovative technologies, the newly upgraded solutions have significantly improved energy efficiency by 20 per cent, offering exceptional performance for heavy-duty refrigeration trucks.

To meet the core demand for refrigeration efficiency in cold chain transportation, these products feature a new evaporator design.



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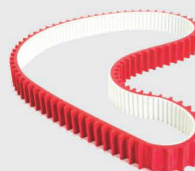
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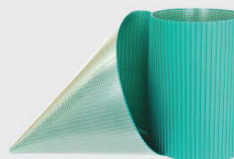
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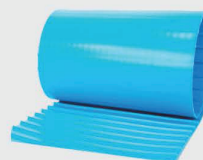
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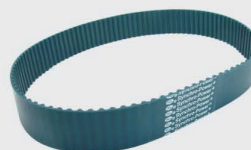
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Renewable Energy

Orkla India and CleanMax partner to make MTR Karnataka factories 100 per cent renewable

Orkla India, the parent company of MTR and Eastern, to partner with CleanMax, a Brookfield backed company, to solidify its sustainability goals and accelerate its journey towards net-zero emissions. The partnership involves a 25-year power purchase agreement (PPA) for the generation and supply of renewable energy from a 6.6 MWp Solar Captive Power Project located in Jagalur, Karnataka. With this partnership, Orkla India factories based out of Karnataka will run on 100 per cent renewable energy.

The project is structured under a Special Purpose Vehicle (SPV), with Orkla India holding a 26 per cent equity stake and CleanMax retaining the remaining 74 per cent. Under this arrangement, CleanMax will manage the energy generation, operation, and maintenance of the solar plant, ensuring optimal performance



throughout the 25-year term.

This 6.6MW plant will provide 10 million KWh units per annum which is equivalent to the reduction of 7500 tons of CO2 emission annually which corresponds to planting 1.3 lakh trees annually.

Aligning with the company's global sustainability objectives, this initiative will significantly reduce Orkla India's carbon footprint, with all its manufacturing units in Karnataka achieving net-zero upon complete implementation.

Niklas Stoltz, Director-Sustainability said, "Orkla India's partnership with CleanMax is about powering change. We want to set a new standard for sustainable manufacturing in India's FMCG sector. Orkla India remains committed to creating a resilient and healthier future."

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Renewable Energy

Saatvik Solar delivered 70.2 MW solar modules

In a significant boost to India's renewable energy sector, Saatvik Solar has successfully delivered 70.2MW of high-efficiency Mono PERC 545Wp Solar PV modules to Indian hydroelectric power generation PSU Satluj Jal Vidyut Nigam (SJVN) for their marquee project in Punjab. This landmark supply for SJVN's marquee project in Punjab was completed in a record-breaking four months, highlighting Saatvik Solar's commitment to accelerating India's transition to clean energy.

The Punjab project, set to substantially increase the state's renewable energy capacity, aligns perfectly with India's ambitious sustainable power development goals. This collaboration between Saatvik Solar and SJVN marks a crucial step towards achieving these national objectives.

Saatvik Solar's high-efficiency Mono PERC modules were a crucial element for the timely execution and optimal performance of SJVN's Punjab project, which is poised to make a significant impact on the state's renewable energy landscape. The modules supplied for this project showcase Saatvik Solar's technological prowess. These Monocrystalline - Full Cell modules, composed of single-crystal silicon, feature a uniform black appearance and offer superior efficiency, particularly in low-light conditions. This makes them ideal for installations where space optimisation is critical.

Prashant Mathur, CEO, Saatvik Solar, commented, "At Saatvik, we're not just manufacturing solar modules; we're crafting the building blocks of India's energy future. Our successful delivery to SJVN demonstrates our capability to support large-scale solar initiatives with cutting-edge technology. Our partnership with SJVN strengthens our market position and, more importantly, accelerates our country's progress towards its ambitious clean energy targets."

Saatvik Solar's influence in India's renewable sector continues to grow, backed by its 3.8 GW module manufacturing facility in Ambala. The company is actively pursuing key technological innovations, including high-efficiency half-cut modules and premium modules with advanced buzz bar technology. Saatvik is also expanding its footprint in the renewable energy value chain, exploring investments in battery manufacturing and storage solutions, while offering comprehensive EPC services for both domestic and global markets.



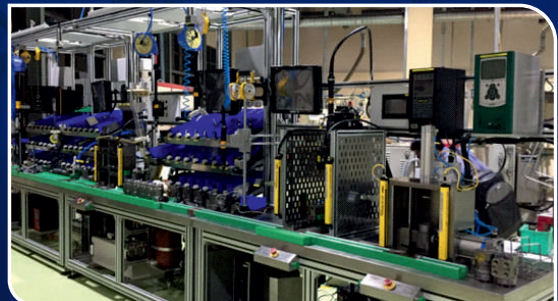
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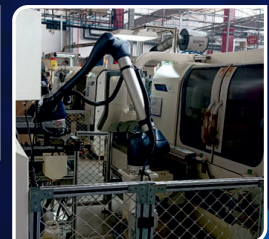


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Industrial Supplies

NMDC sets ₹22 billion capex in FY25 for slurry pipeline and processing plants

NMDC Ltd., India's largest iron ore producer and a Navratna public sector enterprise, has allocated ₹22 billion for FY25 to establish a slurry pipeline and new processing plants. This investment aims to boost the company's production capacity to 100 MT by 2030. The ambitious expansion will significantly improve NMDC's infrastructure and operations, elevating its global standing while aligning with India's industrial growth trajectory.

Shri Amitava Mukherjee, CMD (Additional Charge), NMDC, emphasised that the transition from 45 MnT to 100 MnT by 2030 is ambitious yet rooted in sustainability and innovation. "Our roadmap is not just about increasing production; it's about doing so responsibly. We are dedicated to reducing our environmental impact while positively contributing to the communities we serve," he stated with a commitment to sustainable growth".

NMDC's expansion is driven by the growing domestic and international demand for iron ore, fueled by rapid industrialisation. The company's strategic investment plan focuses on boosting production capacity and improving evacuation infrastructure. Key initiatives include the development of advanced slurry pipelines, pellet and beneficiation plants, and a robust network of stockyards. A flagship project in this plan is the 135-kilometer slurry pipeline from Bachel to Nagarnar. This eco-friendly, cost-effective pipeline will reduce reliance on traditional, carbon-intensive transportation methods. Additionally, the new Screening Plant III at Kirandul and screening plant III at Donimalai will enhance NMDC's processing capabilities, enabling the company to handle increased production volumes while maintaining high quality standards.

NMDC is also expanding rail transport by increasing the KK line's capacity from 28 MTPA to 40 MTPA.

Auto Components

Honeywell launched program to reduce environmental impact of older cars

Honeywell has launched European program 'Direct to YF Retrofitting Program', enabling older cars using refrigerants with a high global warming potential (GWP) to be serviced directly with Solstice® 1234yf, the leading low-GWP automotive refrigerant. The program underscores Honeywell's commitment to supporting customers in their journey to net zero and also supports Honeywell's alignment of its portfolio with several compelling megatrends, including the energy transition.

More than 140 million cars in Europe currently have air conditioning systems that use R-134a, a [high-GWP] refrigerant that is being phased out under Europe's F-Gas Regulation.

Over the past nine years, the availability of these types of F-gases on the European market has been reduced by two-thirds and the EU has set a goal of complete removal by 2050. As R-134a becomes more expensive and harder to find, Honeywell's Solstice yf offers the automotive aftermarket industry an economical and emissions-reducing option when servicing older vehicles.

"Solstice 1234yf has been widely adopted by the automotive industry, and this retrofitting process is the easiest, most reliable and best-performing option for car repair shops across Europe as they service older vehicle air conditioning systems," said Richard Winick, Vice President and General Manager, Honeywell Automotive Refrigerants.

"As R-134a is phased out in the coming years, our Direct to YF retrofitting option directly addresses an urgent need in Europe and also highlights our commitment to supporting customers in the journey to net zero."

The five-step Direct to YF Retrofitting Program can easily be adopted by service garages because it uses existing service tools and equipment commonly found in automotive repair shops across Europe.

Since Honeywell's development of Solstice yf more than a decade ago, demand and production capability for the refrigerant have increased around the world.

Today, there are more than 200 million cars on the road using Solstice yf.

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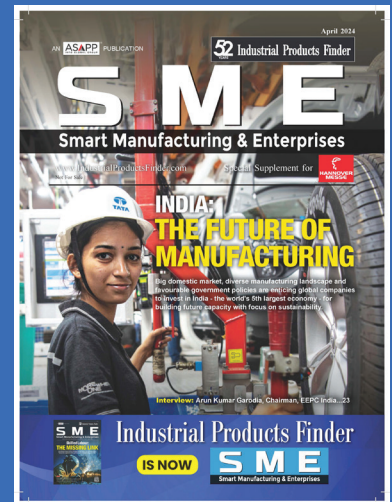
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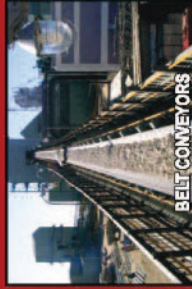
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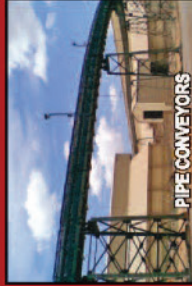
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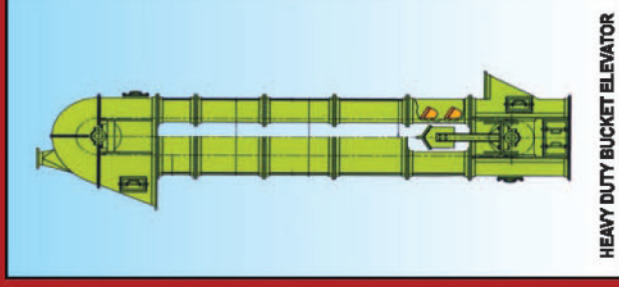
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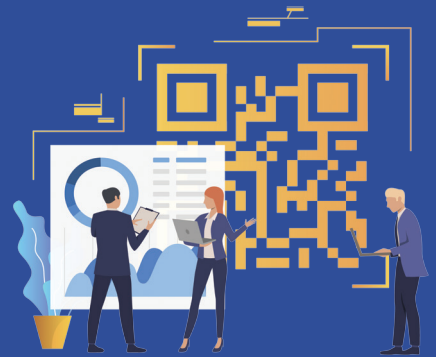
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Renewable Energy

Grew Energy signed module supply agreement with BluPine Energy

Grew Energy Pvt Ltd, one of India's youngest yet fastest growing solar manufacturing company, has signed a module supply agreement with BluPine Energy Pvt Ltd for their upcoming project in Banaskantha, Gujarat. BluPine Energy is established in India by Actis, a global investor and world leader in funding and building sustainable infrastructure companies. With an investment of \$800 million from Actis' Energy Fund 5, BluPine Energy is dedicated to developing a state-of-the-art 4+GW renewable energy portfolio, exclusively in India.

The association with BluPine Energy will further strengthen Grew's position as a leading solar module manufacturer in the country. TOPCON Modules are one of Grew Energy's premier products that are in demand for commercial as well as industrial solar power projects.



Commenting on the order received, Hardip Singh, COO, Grew Energy Pvt Ltd said "Such collaboration are the rewards that we receive for our efforts in providing technologically advanced products like TOPCON Modules and our other trusted products which are being recognized by leading solar power installation companies.

We are committed to delivering high-quality products to all our customers and making the latest innovative technologies in solar power generation accessible to everyone. We are grateful to BluPine Energy for their trust in giving this significant order to us"

Grew is on a mission to create provisions for solar energy sources within India and around the globe to ensure sustainable living for all. Through this partnership, Grew has come one step closer to their mission.

Auto Components

Indian EV market expected to grow at over 40 per cent CAGR till 2027: Niveshaay

The Indian Electric Vehicle (EV) market is expected to grow in the range of 35-40 per cent CAGR till year 2027, said a study by Niveshaay, that manages the Green Energy smallcase (A portfolio of stocks, which will get benefit from the Renewable Energy sector development). Currently, the Indian EV market is concentrated on the two and three-wheeler EV segment, which accounts for about 80 per cent of its vehicle market.

Arvind Kothari, Smallcase Manager & Founder, Niveshaay, said, "The Indian government is aiming to boost local manufacturing and reduce import dependency. It has introduced Production Linked Incentive (PLI) schemes and reduced customs duties on critical minerals to boost local manufacturing. The balanced approach to policy support and market development is facilitating India to emerge as a remarkable contender in the global EV landscape, despite challenges like limited charging infrastructure."

The study further projects, sale of around 3-4 million EVs in India annually by the year 2025. EVs are expected to penetrate the market with approximately 10-15 per

cent of new vehicle sales in India (including two-wheelers, three-wheelers, and passenger vehicles), driven by government incentives, rising fuel prices, and increased consumer awareness.

By the year 2030, annual EV sales are projected to surpass 10 million units, with substantial growth in the deployment of electric buses, commercial vehicles, and private cars. EVs could represent 30-40 per cent of new vehicle sales in the market. With more than two million public charging stations projected nationwide, the study predicts a strong EV Infrastructure.

Indian Government's Budget allocations for the EV sector, over the last few years, has significantly contributed to EV Adoption, infrastructure as well as manufacturing.

The Union Budget 2024-25 has allocated ₹26.71 billion under the FAME scheme, primarily to cover remaining liabilities from FAME II.

Additionally, the government has introduced Electric Mobility Promotion Scheme (EMPS) to boost electric two- and three-wheelers.

Industrial Supplies

Shyam Metalics began Phase I of CRM in WB

Shyam Metalics and Energy Ltd. (SMEL), a leading integrated metal manufacturing company in India, to expand its production capabilities with the establishment of a greenfield Cold Rolling Mill (CRM) in Jamuria, West Bengal.

This strategic investment highlights Shyam Metalics' commitment to enhancing its product portfolio and extending its reach in both domestic and international markets.

The facility commenced trial run under Shyam Metalics Flat Products Pvt Ltd., a wholly owned step-down subsidiary of SMEL. It is in line with government industrial policies and supports the company's strategic strategy.

The facility, strategically located in the eastern region of India, provides significant logistical advantages and enables Shyam Metalics to solve the region's shortage of colour-coated sheet manufacturing units.



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Renewable Energy

GPS Renewables partnered with Steer Engineering to build bio-processor

GPS Renewables, a leading full-stack technology and engineering company focusing on clean fuels, has partnered with Steer Engineering, a global leader in advanced materials and extruder technology, to build cutting edge solutions for the BioCNG sector. This partnership promises to bring innovation and sustainable solutions to the forefront of the industry.

As part of the partnership, Steer Engineering will develop a state-of-the-art 2.5+ tons per hour bio-processor designed specifically for agro-residue and biomass feedstocks such as paddy straw, mustard stalk, cotton stalk, maize, and Napier grass. STEER's bio-processors will streamline the pre-conditioning of the agro-residue and biomass feedstocks, leading to enhanced biofuel yields.

The collaborative effort aims to enhance the efficiency of feed processing and overall output, presenting a robust solution for the BioCNG industry

that is made in India. The newly designed processor is meticulously engineered to maximise performance and minimise lifecycle costs, poised to revolutionise GPS Renewables' projects and the broader biofuel sector.

The gross agro-residue and surplus biomass potential generated in India is estimated at nearly 700 million tonnes a year and India has ambitious plans to tap this for sustainable energy in the form of biofuels,

This visionary initiative will not only drive substantial waste reduction but also bolster energy security and champion sustainable development while helping the nation in its efforts to save up to \$30 billion in oil import bills up to 2030.

Nitin Gupta, the Chief Executive Officer, Steer Engineering said, "At Steer, we're on a mission to revolutionise the renewable energy and biofuel industries with our wealth of experience, expertise, and cutting-edge technology."

Auto Components

TSF Group showcased product line for global markets at IAA 2024

At IAA 2024, the TSF Group, that derives its legacy from the erstwhile TVS group – one of the largest automotive groups based in India – showcased its exhaustive product offerings including brakes, axles & wheels aimed primarily at the global trailer market.

As a renowned tier-1 supplier to global OEMs for over 60 years, the group strongly focuses on design, development, world-class quality, competitive cost and superior customer centricity.

Brakes India exhibited its 22.5-inch light-weight monobloc Single Piston Air Disk Brake at the IAA Transportation 24. The product is designed to cater to truck, bus, and trailer applications. With its robust design tested to global standards, the product is expected to be a benchmark in the commercial vehicles segment. Also on display would be its extensive range of Braking solutions for the light commercial and heavy commercial vehicles including complete pneumatic braking systems.

Axles India marked the opening of day 01 with its 9T – 12T trailer axles that come with a higher strength,

are fully dressed from hub to hub and are compatible with air suspension. The axles come with an option for both disc and drum brakes.

"Over the last six decades, Wheels India and Axles India have made it a mission to be the benchmark in global quality with a focus on putting the customer first. We strive to keep evolving our approach to meet our customers' needs. We believe the best innovation happen indoors with a world-class Research and Development team." said Srivats Ram, Managing Director, Wheels India, and Director, Axles India; members of the TSF Group companies.

Wheels India will exhibit their Diamond cut cast alloy wheel, Powder black forged alloy wheel & Light weight steel wheel for the commercial vehicle segment, suitable for low bed trailer, EV-bus & truck applications.

"We understand the importance of the European market through our existing customers. We have always excelled in meeting the product and service expectations, and endeavour to continue to offer value added products to the market", added Srivats Ram.

Renewable Energy

Govt approved NPCIL-NTPC JV company

The Government on September 11, 2024 accorded approval to the Anushakti Vidhyut Nigam Ltd. (ASHVINI), a Joint Venture (JV) of Nuclear Power Corporation of India Limited – NPCIL (51 per cent) and NTPC Ltd. (49 per cent) to build, own & operate nuclear power plants in India in accordance with provisions of the Atomic Energy Act. Additionally Govt. of India has approved transfer of Mahi Banswara Rajasthan Atomic Power Project (MBRAPP) 4x700 MWe based on indigenous PHWR technology, from NPCIL to the JV Company ASHVINI.

This will pave the way for pooling of resources from both NTPC & NPCIL, in terms of finances, technology & project expertise for the rapid expansion of nuclear power productivity in the country to meet the targets of net zero by 2070. Department of Atomic Energy has formally handed over the Government approval to CMD, NPCIL and CMD, NTPC on September 17, 2024.



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Electricals & Electronics

Delta inaugurates India headquarters and global R&D centre in Bengaluru

Delta, global leader in power management and a provider of IoT-based smart green solutions, has inaugurated its new LEED Gold-certified India headquarters (HQ) green building and its new Global Research & Development (R&D) Centre in Bengaluru.

Strategically located in the vibrant Bommasandra Industrial Area, the 61,000-square-meter HQs green building has the capacity to house up to 3,000 management, R&D and engineering professionals as Delta deepens its commitment to the Indian market. Moreover, Delta is expected to employ up to 750 R&D engineers over the next 3 years to strengthen its unique capabilities in developing smart, energy-saving high-voltage power management solutions for telecom, data centres, EV



charging, and energy storage applications, as well as IoT, AI-related software, all tailored for India's transformation. The Deputy Chief Minister of Karnataka, D K Shivakumar also congratulated Delta on this occasion, highlighting the company's significant contributions to the state's growing

technological and industrial ecosystem, reinforcing its position as a leader in innovation and sustainability.

Sharath Kumar B, Chairman, KEONICS, said, "The inauguration of Delta Electronics India's new headquarters and global R&D center is a testament to Karnataka's growing leadership in technology and innovation. We at KEONICS are proud to support initiatives that foster economic growth, job creation, and technological advancements."



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Electricals & Electronics

Valeo unveils power electronics facility

Valeo, a global leader in mobility technology, is set to expand its industrial footprint in India with the inauguration of a production facility in Pune for power electronics products. This innovative infrastructure covering over 7,000 sq. mt. area will augment Valeo's capabilities in electrification in India with a vibrant workplace that attracts top talent and fosters collaboration, creativity, and excellence.

Yann Keraudren, Vice President - Asia Regional Operations, Valeo Power inaugurated the new office in the presence of Jayakumar G, Group President & Managing Director, Valeo India, and Nitin Chaudhary, Site General Manager, Valeo Pune Plant.

Jayakumar G, Group President & Managing Director, Valeo India, said, "The inauguration marks a significant milestone in Valeo's journey in India. This new facility in Pune is a key element of our strategic plan for deeper localisation and long-term competitiveness in electrification products. It will meet the growing demand from our customers for the On-Board Power Supply 3-in-1 combination unit, comprising an On Board Charger, DC-DC converter, and power distribution unit." Valeo Pune is committed to enhancing workforce diversity and sustainability. Over the past five years, the site has actively driven this initiative, and today, it proudly employs over 40 individuals with disabilities. In line with Valeo's sustainability goals, the company has installed a 900 kW rooftop solar panel in the existing plant and is expanding its capacity with an additional 700 kW at this new facility. Additionally, to reduce emissions, the site has replaced its employee transportation buses with new BS VI-compliant vehicles, introduced two electric vehicles for guest commutes, and implemented various other energy efficiency improvements within the plant to lower the carbon footprint.

The new site will start producing the On Board Power Supply 3-in-1 combo unit, a combination of three standalone power electronics products:

- On-Board Charger (OBC) is the system built into the car to recharge the high voltage battery from the AC grid with different power range: 7, 11 and 22kW;
- DCDC converter is used to convert power from the high voltage (HV) network to the 12V Low Voltage (LV) network to charge the LV battery and power the electric devices;
- Power Distribution Unit (PDU) delivers power to all critical electric loads within an EV.

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Tracks to High-speed Growth

With ₹2.65 trillion capex in 2024-25, Indian railway sector presents a big opportunity for suppliers because of Vande Bharat, rising wagon demands (due to dedicated freight corridors), investments in high-speed trains & tracks, etc, says Rakesh Rao.



In the last 10 years, the Government of India has been investing heavily in infrastructure development. Indian Railways (IR) – operating one of the world’s largest railway networks – has been one of the biggest beneficiaries of this largess. The capital expenditure (capex) for the Indian Railways has increased more than nine times in the last decade – from ₹281.74 billion in 2013-14 to ₹2.652 trillion in 2024-25 (as per the budget estimate). “Starting from 2014, the government has been investing heavily in infrastructure development, especially railways. Capex funds available for Indian Railways has gone up by 5-6 times in the last 5-7 years – touching ₹2.65 trillion (in FY25),” states **Dr Sudhanshu Mani**, retired General Manager of Integral Coach Factory (ICF), Chennai.

Along with the government emphasize on infrastructure

development, merging of the railway budget with the general budget (starting from February 1, 2017) has been the major reason for this huge rise in capex.

Electrifying progress

In spite of not generating revenue surplus, railways’ capital expenditure has grown from ₹935.20 billion in 2015-16 to ₹2.65 trillion in 2024-25 – an annualised increase of

12 per cent. This was possible because of grants from the central government and extra budgetary borrowings. Budgetary support (from the union government) will finance 95 per cent of the ₹2.65-trillion expenditure in 2024-25, while 4 per cent and 1 per cent will be financed through extra-budgetary resources and internal revenue, respectively.



“Except for wheels and a few critical components, all products that go into VB trains are manufactured

locally. Although indigenisation has increased, there have not been many technological upgrades in the train in the last six years.”

Dr Sudhanshu Mani, retired GM, Integral Coach Factory

During 2023-24, railway witness highest ever capex utilisation of 100 per cent for ₹2.4 trillion resulting in

Table 1: A decade of growth: Comparing period 2004-2014 with 2014-24

	2004-2014	2014-2024
Cumulative freight loading	8,473 mn tonnes	12,660 mn tonnes
Track laid	15,000 km	31,000 km
Rail electrification	5,000 km	44,000 km
Coaches produced	32000 units	54000 units
Locomotive produced	4,600 units	9000 units
Cumulative revenue generation	₹8.64 trn	₹18.56 trn

Source: www.ETInfra.com

acceleration of rail electrification, laying of new lines and tracks, doubling and gauge conversion. According to reports, the Indian Railways plans to procure 7,000-8,000 new train sets over the next 10 years to enhance passenger and domestic goods transportation capabilities.

To achieve net-zero emissions by 2030, the government targeted 100-per cent electrification of Indian Railways by December 2023. However, due to delays caused by Covid pandemic-related lockdowns and the slow progress of electrification efforts, full electrification is now anticipated by fiscal year 2027. **Moonish Ghuge**, President, Traction division, Motion business, ABB India Ltd, states, "The Indian railway sector has seen a remarkable transformation over the past five years. One of the most



“The Indian railway sector has seen a remarkable transformation over the past five years. One of the most significant developments has been the rapid pace of electrification, with approximately 1,000 electric locomotives being produced annually.”

Moonish Ghuge, President, Traction Division, Motion Business, ABB India Ltd

significant developments has been the rapid pace of electrification, with approximately 1,000 electric locomotives being produced annually. This electrification drive supports India's vision of reducing its carbon footprint, while enhancing

the efficiency and sustainability of rail transport.”

Freight traffic

Indian Railways has developed a National Rail Plan (NRP) to establish a 'future-ready' railway system by 2030. Its goal is to build capacity ahead of demand to accommodate future growth through 2050, aiming to increase and sustain the railways' freight modal share at 45 per cent, according to a Crisil report.

Following the mantra 'Hungry for cargo', Indian Railways has been focusing on bolstering cargo transportation by improving ease of doing business and offering service delivery at competitive prices. Despite a sluggish start in FY24, Indian Railways achieved a 5 per cent growth in freight traffic, moving 1.59 billion tonnes of goods compared to 1.52 billion tonnes in the previous

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Table 2: Key projects under National Infrastructure Pipeline (NIP) in Railways sector

Category	No of projects	Capex over FY20–FY25 (₹trillion)
New lines/gauge conversion	259	4.40
Capacity augmentation	266	2.48
Dedicated Freight Corridor	7	1.66
Rolling stock	31	2.75
High-speed rail	2	1.11
Others	159	1.18
Total	724	13.58

Source: Report of the Task Force NIP – DEA, CRISIL Consulting

year.

The government's initiatives like the Gati Shakti Master Plan and National Logistics Policy have prioritised rail-centric multi-modal logistics to facilitate industrial linkages and enhance supply chain efficiency. To achieve this objective, experts believe the railway sector should aim for growth rates of 1.2 to 1.5 times of the country's GDP. Although the current growth rate is 5 per cent for 2023-24, with a 6 per cent Compound Annual Growth Rate (CAGR) in recent years, projects like the Dedicated Freight Corridor (DFC) are expected to accelerate this growth further. IR aims to increase railways' share in freight transportation from 25 per cent to over 40 per cent with DFCs. The DFC – an initiative aimed at reducing logistics costs and enhancing the efficiency of India's transport network is a cornerstone of the National Logistics Policy, designed to lower logistics costs from the current 15 per cent of GDP to a more manageable 8 per cent by 2030.

In Phase 1, the Ministry is constructing two DFCs – Eastern DFC (EDFC) and Western DFC (WDFC). While Indian Railways has completed the construction of EDFC in December 2023, over 85 per cent work on WDFC has been completed so far. Both these corridors have significantly reduced freight

transportation time, attracting industries to opt for rail transport. "DFC has been commissioned and is now largely operational. This has significantly reduced the load on the main network of Indian Railways, especially in terms of freight traffic. As a result, the turnaround time for freight trains on the western and eastern corridors has improved, providing better transit times and offering some level of transit time guarantee to its users," points out **Sanjiv Garg**, Secretary General of Chartered Institute of Logistics & Transport (CILT), who was earlier (in 2016-18) associated with Railway Board as Additional Member.



“Dedicated Freight Corridor has been commissioned and is now largely operational. This has significantly reduced the load on the main network of Indian Railways, especially in terms of freight traffic.”

Sanjiv Garg, Secretary General, CILT

The Indian rail freight industry is witnessing substantial growth and advancements, driven by ambitious plans and increased investments to

boost capacity, efficiency, and sustainability. The annual freight target is projected to rise from 1,400 million tonnes (MT) to 3,000 MT by 2027, necessitating an expansion of the wagon fleet from the current approximately 336,900 to around 500,000 by 2027. As Indian Railways' freight growth accelerates, companies anticipate higher demand for rolling stocks (wagons) in line with the upward trajectory of the rail freight sector.

Table 3: Capex for rolling stock

	Rolling Stock
FY23 (Actuals)	₹442.93 bn
FY24 (BE)	₹ 475.10 bn
FY24 (RE)	₹ 503.25 bn
FY25 (BE)	₹ 523.14 bn
% change from FY24 RE to FY25 BE	4%

RE: Revised Estimates; BE: Budget Estimates
Sources: PRS Legislative Research; Union Budget 2024-25

Furthermore, there are plans to establish 100 PM Gati Shakti Cargo terminals for multimodal logistics over the next three years. The wagon industry, which has faced challenges due to under-utilisation of capacity, is expected to improve with significant orders from both Indian Railways and the private sector. With the launch of dedicated freight corridors leading to increase in the railways' share of freight transport, IR plans to acquire 90,000 wagons by 2025 — the largest procurement in its history, nearly five times the annual number of wagons typically acquired.

Passenger coaches

Fueled by substantial budget allocation and a series of ambitious infrastructure projects, IR's passenger rolling stock is also poised for unprecedented growth of ₹4.75 trillion over the next five years — representing a remarkable surge. To improve passenger traffic, Indian

Railways has started many new trains. In February 2019, railways introduced the first Vande Bharat (VB) Express train – India’s first indigenously developed semi-high-speed train. “With the active support of the industry (which had developed or had access to latest technologies for propulsion system, brake system, bogies, etc), ICF managed to roll out the first Vande Bharat trainset (then known as Train 18) in 2018 in record 18-months. Train 18 was India’s first indigenously developed semi-high speed train set that was rolled out very quickly and at low cost,” opines Dr Sudhanshu Mani, who led the Train 18/Vande Bharat project in 2017-2018 as the GM ICF.

As on July 19, 2024, 102 Vande Bharat AC chair car trains are operating across the country. IR has also introduced Amrit Bharat sleeper trains in the non-AC segment. Sanjiv

Table 4: Physical target & achievement for rolling stock capex

Head	2022-23		2023-24		2024-25	% change from FY24 RE to FY BE
	Budget Target	Achievement	Budget Target	Revised Target	Budget Target	
Diesel locomotives	100	103	100	100	100	0%
Electric locomotives	1290	1086	1290	1280	1600	25%
Coaches	7551	5877	6978	7000	8405	20%
Wagons (vehicle units)	13000	17935	26000	23000	38000	65%

Sources: PRS Legislative Research; Union Budget Documents

Garg opines, “The introduction of the Vande Bharat trains, a notable development, aims to rationalise passenger traffic by reducing slow-moving trains. Their primary advantage lies in their higher rates of acceleration and deceleration, reducing overall journey times. Over 100 VB trains are now operational

across the country, reflecting the public’s demand for this service.”

Vande Bharat train, which has seen significant contributions from various local and global Original Equipment Manufacturers (OEMs), represents a significant departure from conventional loco-hauled passenger coaches. Ghuge explains,

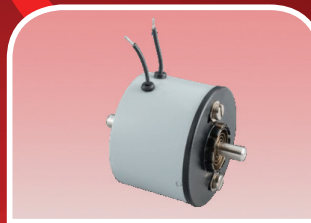
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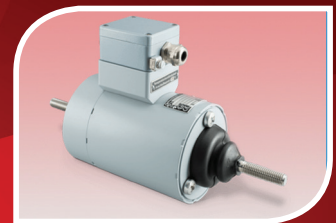
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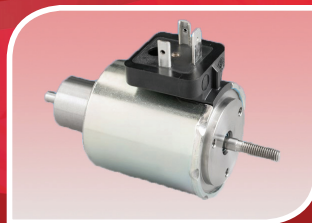
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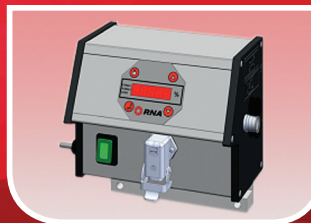
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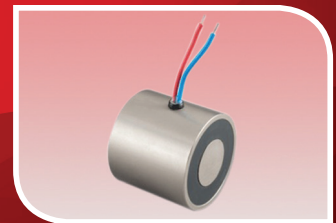
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Aluminium: The future of coach making?

With sustainability and energy efficiency becoming the key areas of focus, push for greener, more energy-efficient materials in train production is expected to increase in the near future. "The use of aluminium in India's railways is growing steadily. Being a lightweight material, aluminium significantly lowers energy consumption, making it an excellent choice for improving trains' overall carbon footprint. Aluminium's natural properties, such as its resistance to corrosion, ductility, malleability, and electrical and thermal conductivity, make it a sustainable and environment friendly solution. These characteristics are essential for modern high-performance trains, such as the Vande Bharat, where energy efficiency, durability, and strength are necessary for achieving top performance and safety standards," states A S Ganeshan of Jindal Aluminium.

According to Dr Sudhanshu Mani, India should start developing aluminium body for high-speed trains. Globally, aluminium is a preferred material for constructing coaches as it is lighter, it is energy-efficient. However, to manufacture aluminium coaches huge investment is required, which companies are not ready to make because of lack of clarity from the government on the future procurement of aluminium coaches. In 2022, Indian Railways floated a tender of about ₹300 billion for 100 trains (made from aluminium), but they cancelled the tender in 2024 citing pricing issue. According to the news report, the supplier (Alstom) was ready to supply aluminium-bodied Vande Bharat trains for ₹1.45 billion per train set, but railways wanted it for ₹1.40 billion. "The future of high-speed trains is aluminium and we are nowhere. Nevertheless, we have to work on this and I hope something is done in this direction," states Dr Mani.

Sharing a contrary view, Sanjiv Garg says, "Though aluminium is lightweight making it energy-efficient, steel has its own advantages. In case of an accident, steel is sturdier, while aluminium is more likely to disintegrate or sustain damage more easily. Aluminium is also significantly more expensive. I would certainly recommend aluminium if we were able to recover the full cost from the passengers. So, every material has its pros and cons."

"One of the most notable differences is the use of distributed power, which enhances the train's performance with higher acceleration, increased speed, and greater redundancy. Unlike conventional trains that rely on a single locomotive, Vande Bharat's distributed power configuration ensures that even if one section of the train experiences a failure, other sections can maintain operation, improving reliability and availability."

Indian Railways plans to cover 10-12 lakh km with these semi-high speed VB trains in three years. The GoI aims to launch 400 Vande Bharat train (16 coaches) in the next 3-4 years and 1,000 mini-Vande Bharat train (8 coaches) in next 3-4 years. IR is also targeting Europe, South America, and East Asia for exporting

'Made in India' trains. Moonish Ghuge states, "The Vande Bharat train sets are not only transforming rail travel in India but also hold significant potential for export to global markets. As Indian Railways looks to expand this technology, ABB, with its global presence and local expertise, is well-positioned to support this growth."

Indian Railways has also launched

the Regional Rapid Transit System (RRTS) projects and several metro initiatives nationwide. Increase in Vande Bharat trains and metros is expected to significantly enhance the requirements for passenger rolling stocks. The railway sector is projected to grow at a CAGR of 45.94 per cent, while the metro sector is expected to expand at a CAGR of 38.57 per cent. This robust growth rate presents a golden opportunity for component suppliers to deliver high quality products essential for these initiatives. Indian Railways is expected to procure 8,000-9,000 incremental passenger coaches between FY22-26.

The government's emphasis on indigenisation has enabled Indian Railways to reduce production costs. For instance, each Vande Bharat train was manufactured at a cost of ₹0.98 billion, significantly less than the estimated expense of importing comparable advanced technology trains, which would have ranged between ₹2.25-2.50 billion per train. This represents a significant cost saving for Indian Railways. Similarly, seats of VB trains, which were imported earlier, are now built in India.

"Except for wheels and a few critical components, all products that go into Vande Bharat trains are manufactured indigenously. Today, I think, more than 90 per cent is indigenous content. Although indigenisation has increased over the last few years, there have not been many technological upgrades in the train in the last six years," observes

Table 5: Overview of rolling stock requirement

Year	Locomotives numbers	Freight wagon numbers	Passenger coaches numbers
FY26	16,799	4,07,769	60,741
FY31	20,739	5,45,225	72,115
FY41	31,581	7,79,071	1,06,427
FY51	46,017	10,68,130	1,52,509

Source: Budget documents, CRISIL Consulting

Dr Sudhanshu Mani.

At the same time, the government's policy to allow 100-per cent FDI in the railway sector has helped in attracting investment from multinational companies (MNCs) who are involved in the manufacturing of rolling stock (including coaches, wagons, and their components) as well as signaling equipment, diesel and electric locomotives, and locomotive parts. Some of the major foreign collaborators active in rolling stocks in India are Alstom, Bombardier, Ansaldo STS, CAF S.A., etc.

Speed-breakers on track

Though IR has been increasing its capex in the past few years, achievement of budget target on capital works has been uneven, according to PRS Legislative Research study. For example, new line construction was significantly higher than the budget target in 2022-23 (1,815 route km against a target of 300 route km). However, it fell short by 4 per cent in 2021-22. Similarly, while the achievement on track renewals has generally been higher than budgeted, gauge conversion targets have not been met.

Despite advancements, some challenges remain in the sector. Sanjiv Garg states, "The railways continue to subsidise passenger traffic by approximately ₹600 billion annually, which is cross-subsidised by charging higher freight rates. As a result, freight services are overpriced, causing certain streams of freight traffic, which should be transported by rail, to shift to road transport. This contradicts National Transport Policy recommendations, which suggest that traffic over 400 km should move by rail."

While VB train was cleared for 160 kph speed, proliferation of tracks to support this speed has not happened. So VB trains are running at suboptimal speed at present.



As IR's freight growth accelerates, companies anticipate higher demand for rolling stocks (wagons).

"Because the acceleration-deceleration is fast, Vande Bharat is able to cut down travel time. But, this is nothing compared to what it could have achieved if it was able to run at optimal speed of 160 km. While Vande Bharat was a major milestone in the development of passenger coaches in India using top-class equipment, we need to continue to strive to make it world class in terms of finish of exterior and interiors," observes Dr Sudhanshu Mani.



“Vande Bharat is only the beginning, we now need to concentrate to increase the speed capacity of railway tracks, signals and the traction installation to 200 kph so that the journey times are drastically reduced.”

Dr Anirudh Gautam, Principal Executive Director (Special), RDSO

Countries like Japan, China, Korea, Taiwan and European Union have used advancement in the railway sector as the engine for growth of economy. Globally, railway sector market has reached a level of ₹22 trillion per year. Unfortunately,

Indian Railways and its industries do not have any significant share in it. "Tremendous technological advancements have been achieved in areas like rolling stock, train communication & control, high-speed railway tracks, smart railways, and services. Indian Railways has to strive to become global leader in all of these areas, which is possible only if we strengthen our railway research and innovation ecosystem. Railway Board has taken initiative to set-up Centers for Railway Research in four IITs to harness the research and innovation skills of the IITs. Next step is to create a long-term railway research and innovation entity, fully autonomous and staffed by scientist and experts," says Dr Anirudh Gautam, Principal Executive Director (Special), Research Designs & Standards Organisation (RDSO), Lucknow.

He adds, "It is important for Indian Railways to upgrade its railway track structure to 200 kph. At present, on IR, the average speed to the passenger trains is 50 kph and of goods train is 25 kph. This has to be doubled at least if the customers continue to patronise Indian Railways. For implementation of the PM Gati Shakti master plan, IR has to act as backbone for passenger and goods movement. So enhancing the track speeds to 200 kph is very important. For faster movement of



While VB train was cleared for 160 kph speed, proliferation of tracks to support this speed has not happened.

Courtesy: Freepik

trains, reliability of the signalling systems is of utmost value. Therefore, this is also a crucial step for the growth of Indian Railways.”

Speedier progress

The industry is experimenting with new propulsion systems based on alternate fuels (such as hydrogen, biofuels, fuel cells, etc). However, some experts feel this will have no impact in India. “You cannot replace electricity with hydrogen. After making huge investment in electrification, it doesn’t make any sense to invest in hydrogen technology for railways,” observes Dr Mani.

Indian Railways is anticipated to introduce more trains like the Vande Bharat and Amrit Bharat models. Additionally, the ongoing Mumbai-Ahmedabad Bullet Train is likely to boost economic growth in various regions. The wagon fleet is projected to expand from 336,900 to 500,000 by 2027.

The Indian government’s significant investment in the railway sector, including plans for electrification, modernisation, and the expansion of metro rail networks, is creating new opportunities for growth and expansion. “With a focus on both freight and passenger services, electrification will accelerate further. Additionally, there



“The use of aluminium in India’s railways is growing steadily. Being a lightweight material, aluminium significantly lowers energy consumption, making it an excellent choice for improving trains’ overall carbon footprint.”

A S Ganeshan, Associate VP for Domestic Sales and Marketing, Jindal Aluminium

will be a growing emphasis on sustainability, driven by India’s commitment to reducing greenhouse gas emissions in transportation. This will lead to increased demand for energy-efficient technologies, including advanced propulsion systems and electrification solutions,” feels ABB’s Moonish Ghuge.

Post Vande Bharat, there has not been any significant development in the train. “The next step is to design a train with speed of 240-250 kph on standard gauge. This high-speed train can also open up huge export market. To make a proto type of this high-speed train, it should take approximately three years as many things change when you go from 160

kph to 240 kph speed,” states Dr Sudhanshu Mani.

According to Dr Anirudh Gautam, Vande Bharat trainset is a paradigm shift in the thought process of self-reliance. However, he states, “Vande Bharat is only the beginning, we now need to concentrate to increase the speed capacity of railway tracks, signals and the traction installation to 200 kph so that the journey times are drastically reduced and more trains can be run on the same lines to meet the needs of the populace.”

He adds, “Involvement and training of Indian Railways and private industry personnel has to be carried out on an emergency basis. IR should now work on developing high-speed trainsets capable of operating at speeds of 350 kph and also design and develop matching high-speed tracks.”

The government’s substantial investment in rail infrastructure, including high-speed trains and metro systems, will create significant opportunities for ancillary industries. A S Ganeshan, Associate Vice President for Domestic Sales and Marketing, Jindal Aluminium, observes, “In the next 4-5 years, we expect to see a shift from heavy to lightweight materials in railway manufacturing, driven by the need for fuel efficiency and sustainability. Aluminium will continue to be the material of choice for future railway developments, with expanding metro rail networks and the introduction of high-speed trains like Vande Bharat and bullet trains requiring lightweight, durable materials.”

To augment Vande Bharat & Metro services, strengthen freight cargo, build rail infrastructure and develop high-speed trains, the Government of India will continue to make substantial investments in the railway sector; thus, presenting a promising growth opportunity to all stakeholders in the sector.

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Harnessing the Power of the Sun

India's journey toward harnessing solar energy has been nothing short of remarkable. Today, India stands proudly among the global leaders in solar energy deployment, with large-scale solar parks, rooftop solar initiatives, and off-grid solutions revolutionising how energy is produced and consumed, says **Tanya Singhal**, Founder, Mynzo Carbon & SolarArise.



India is rapidly transforming its energy landscape, driven by the twin goals of reducing carbon emissions and meeting its growing energy demand. As the third-largest energy consumer in the world, India has recognised the urgent need to transition to clean, sustainable energy sources. Solar power has emerged as a key solution to this challenge, offering immense potential due to India's abundant sunlight and large, arid landscapes.

India's journey toward harnessing solar energy has been nothing short of remarkable. It gained momentum with the launch of the Jawaharlal Nehru National Solar

Mission (JNNSM) in 2010, which set ambitious targets for solar capacity. Today, India stands proudly among the global leaders in solar energy deployment, with large-scale solar parks, rooftop solar initiatives, and off-grid solutions revolutionising how energy is produced and consumed. With a government committed to achieving 500 GW of renewable energy by 2030, of which a significant share is solar, India is set to revolutionise its energy sector while reducing dependence on fossil fuels.

Current status of solar energy in India

India has surpassed its original targets set under the National Solar Mission. Initially, the goal under JNNSM was to achieve 20 GW of solar capacity by 2020. India had far exceeded this target, having a total installed capacity of >200 GW renewables, of which over 40% or ~85 GW comes from solar power. The momentum continues to build, with the government planning to auction 50 GW of new solar projects every year. In the first half of FY2024 alone, the country has already seen 31.8 GW of new solar tenders, with 14.7 GW of new installations, including 11.7 GW of utility-scale projects and 3 GW of rooftop solar installations. Solar Energy Corporation of India (SECI), NTPC, NHPC, and SJVN play pivotal roles in these auctions, leading the country toward its ambitious 500 GW renewable energy target by 2030. This massive scale of expansion strengthens India's energy security and establishes the nation as a global leader in the transition to clean energy.

The science behind solar panels

Solar panels capture the sun's abundant energy and convert it into electricity using photovoltaic (PV) technology. At the heart of a solar panel are solar cells, usually made from silicon, a semiconductor material. When sunlight hits these cells, it energizes electrons, causing them to flow and create an electric current, a process known as the photoelectric effect. This simple yet powerful mechanism forms the basis for harnessing solar energy globally, and India has embraced it at an impressive scale.

Different types of solar panels power India's vast solar capacity, each offering unique benefits suited to various needs. Monocrystalline solar panels, made from single silicon crystals, are highly efficient and ideal for installations where space is limited. Polycrystalline panels, though slightly less efficient, are more cost-effective, making them popular for residential installations across India. Thin-film solar panels, which use different materials and offer flexibility, are better suited for specific conditions, particularly in high-temperature environments. However, their lower efficiency limits their use in large-scale projects in India.

India is also exploring advanced technologies such as bifacial solar panels, which capture sunlight on both sides and promise to enhance efficiency and lower costs. With these innovations, solar technology continues to evolve, enabling India to increase its solar power generation capacity and reach its ambitious energy goals.

Environmental benefits of solar panels

One of the most remarkable aspects of solar power in India is how vast tracts of barren, unproductive land are being transformed into green, energy-producing hubs. In regions like Rajasthan, Gujarat, and Madhya Pradesh,

where the land was once considered arid and unsuitable for most forms of agriculture or development, solar farms now dot the landscape, harnessing the abundant sunlight and converting it into electricity. These areas, often remote and desolate, have become vital contributors to India's clean energy revolution, turning wastelands into centres of economic activity and environmental sustainability. Take, for example, the Rewa Ultra Mega Solar Power Project in Madhya Pradesh, located far from urban centres.

This massive solar park generates power that is transmitted across the country. Remarkably, the electricity produced in Rewa powers the Delhi Metro, a system located hundreds of kilometres away. This highlights one of the most significant advantages of solar energy: the ability to generate power in one location and transmit it efficiently across vast distances through India's grid infrastructure. This ability to generate green energy in underutilised regions without needing nearby large water sources, fuel supplies, or population centres is a game-changer for India. The flexibility of solar power helps reduce the environmental footprint by avoiding the need for large, resource-intensive infrastructure developments, such as dams or coal mines, while also contributing to energy security.



India is also exploring advanced technologies such as bifacial solar panels, which capture sunlight on both sides and promise to enhance efficiency and lower costs.

Economic impact of solar energy in India

The economic impact of solar energy in India is profound, driving both the energy transition and economic growth. Thanks to its rapidly declining costs and the government's strong policy support, solar energy has become a vital component of India's energy mix. Today, solar power is being produced at a cost of sub-₹3 per kilowatt-hour (kWh), making it significantly cheaper than electricity generated from fossil fuels, such as coal, which costs around ₹4-5 per kWh. This dramatic reduction in solar power costs is due to two significant factors: the global decline in raw material prices and India's engineering expertise in building an efficient and robust solar ecosystem.

The economic value of solar power is increasingly embedded in the installation process itself. While there

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may be significant upfront capital expenditure (CAPEX) in setting up solar plants, the return on investment (ROI) is high over the long term. Once installed, solar panels require minimal maintenance and have low operating costs, making them an ideal investment for both businesses and households looking to hedge against fluctuating energy prices.

The Indian government has been instrumental in driving the growth of the solar sector by offering various forms of support, including Production-Linked Incentive (PLI) schemes. This scheme promotes domestic manufacturing of solar components, including solar modules, cells, and wafers. This initiative is expected to reduce India's reliance on imported solar equipment and create a robust domestic manufacturing base that supports the entire solar value chain.



The Indian government has been instrumental in driving the growth of the solar sector by offering various PLI schemes.

Technological advancements

As solar energy becomes a dominant force in India's renewable energy landscape, technological advancements ensure that it can power the country around the clock. While solar energy generation is inherently limited to daylight hours, India is increasingly focusing on 24-hour solar solutions by integrating energy storage technologies and hybrid systems. One of the key innovations enabling 24-hour solar power is integrating energy storage systems, primarily in the form of lithium-ion batteries and pumped hydro storage. Battery storage allows excess energy generated during the day to be stored and used during peak demand hours or the night. Now battery prices have plummeted, and it's possible to generate round-the-clock green power at sub 5/unit!

Additionally, solar power is emerging as a critical enabler in producing green hydrogen, poised to revolutionise industries that are difficult to decarbonise, such as steel, chemicals, and heavy transportation. India's National Hydrogen Mission underscores its commitment to becoming a global hub for green hydrogen by investing over ₹200 billion to drive the cost of green hydrogen down to competitive levels.

Challenges facing solar energy in India

Despite rapid progress, some challenges in scaling solar energy across India remain. One of the primary

hurdles (especially for residential consumers) is the initial capital expenditure required. While solar power is now cheaper than coal in terms of per-unit cost, the financial barrier to investing upfront has slowed adoption rates for rooftop installation. Given that the long-term benefits far outweigh these costs, the government of India has launched the PM Surya Ghar Muft Bijli Yojna, which gives a capital subsidy and additional debt support to overcome these hurdles. For large-scale installations, there is also a pressing need for improvements in grid infrastructure to ensure offtake in remote areas.

The future of solar energy in India

The future of solar energy in India is undeniably bright, with the country poised to become one of the world's largest producers and consumers of solar power. From transforming barren land into green energy hubs to powering major urban infrastructure projects, solar panels are revolutionising India's energy landscape, providing the country with a sustainable, reliable, and cost-effective alternative to fossil fuels with the government's strong support, technological advancements, and ambitious goals, India is set to achieve its ambitious goal of 500 GW of renewable energy capacity by 2030, with solar playing a pivotal role. The integration of energy storage systems, hybrid solutions, and solar-powered hydrogen production will further enhance the role of solar in powering India around the clock.

In addition to grid-connected solar projects, the future will see significant growth in decentralised solar systems, particularly in rural and remote areas. Off-grid solar solutions will play a vital role in electrifying underserved regions. These systems, coupled with innovations in solar batteries, will help address the challenge of providing reliable, round-the-clock electricity.

India's solar journey is not just about meeting energy demand; it is about leading the world in the clean energy transition. By embracing solar power, India is transforming its own energy future and contributing to global efforts to combat climate change and create a more sustainable world.

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About the author:

Tanya Singhal, Founder, Mynzo Carbon & SolarArise. She is an expert in the renewable energy and climate tech space with over 18 years of experience. At SolarArise, Tanya raised and deployed over ₹20 billion to build largescale grid connected solar plants across multiple states in India. Tanya is building Mynzo Carbon - MyNetZerO, which uses AI to promote climate consciousness in the masses and get them to net zero.

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Sun-Powered Success

The future of energy is shining brighter than ever. As the world turns its focus toward sustainable solutions, solar energy has emerged as the frontrunner in the race to redefine how we power our lives. With ever-advancing technology, visionary projects, and an unwavering commitment to a greener tomorrow, the solar revolution is not just a trend—it's a transformative force reshaping industries and redefining possibilities, says Sanskriti Ramachandran.



The Indian solar energy market is undergoing a significant transformation, driven by both government initiatives and a global push for sustainable energy. As the demand for clean energy grows, India's solar sector is not only expanding but also innovating to meet the challenges posed by large-scale solar installations.

Growing Indian market

India's solar energy market has experienced remarkable growth, generating revenues of \$10.4 billion in 2023. This is expected to witness a compound annual growth rate (CAGR) of 13.4% between 2024 and 2030, with the market projected to reach \$24.9 billion by 2030. Much of this growth can be attributed to government policies and initiatives aimed at promoting solar energy adoption. Regulatory support, subsidies, and financial

incentives provided by the National Solar Mission (NSM) and various state organisations have played a critical role in this expansion.

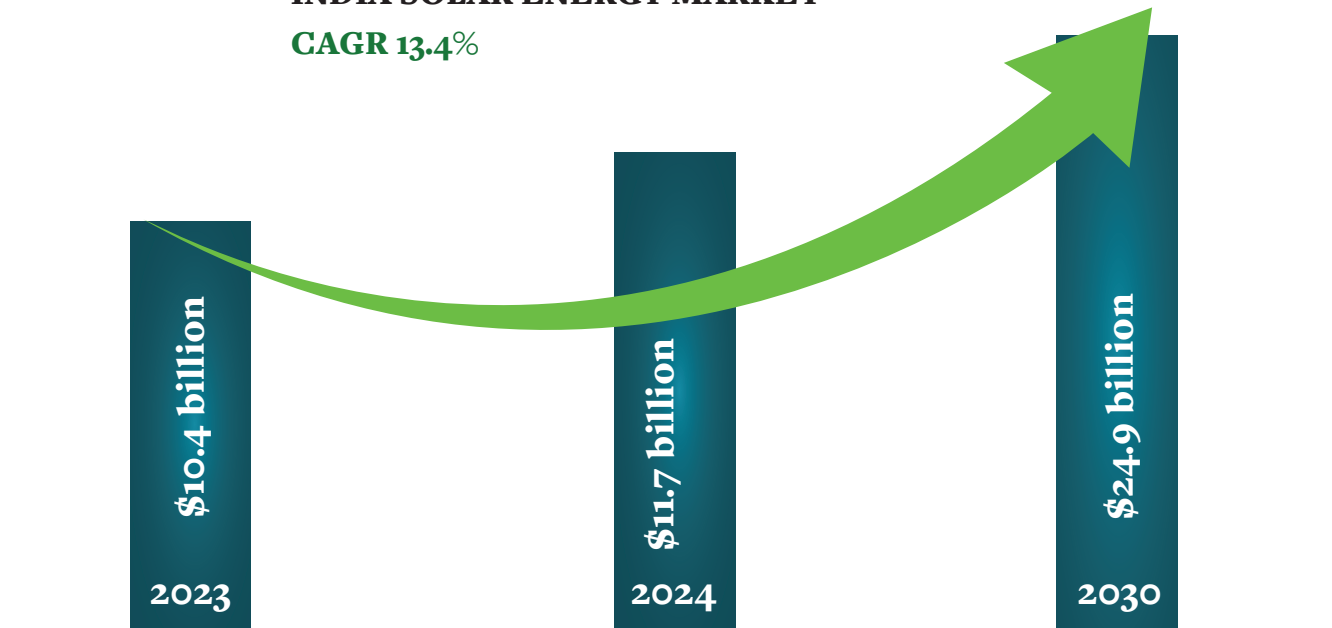
The Ministry of New and Renewable Energy (MNRE) is actively working to increase the share of renewable energy in the country's total energy mix. Numerous government schemes, such as the CPSU Scheme, Solar Park Scheme, Defense Scheme, VGF Schemes, Bundling Scheme, Grid Connected Solar Rooftop Scheme, and Canal Bank and Canal Top Schemes, are aimed at increasing solar power generation in India. These initiatives have made solar energy more accessible and attractive to businesses and individuals, fostering growth in the sector.

India benefits from its geographic location, receiving around 5,000 trillion kWh of solar energy annually, with most parts of the country receiving 4-7 kWh per square

Market Size Comparison

INDIA SOLAR ENERGY MARKET

CAGR 13.4%



Source: P&S Intelligence

metre per day. International collaborations and foreign investments, coupled with research and development (R&D) projects, have further propelled the market. As a result, solar technology has advanced, making solar energy more cost-effective and efficient, while addressing the country's increasing energy demand.



Khushboo Doshi,
MD, Rajoo Engineers Ltd

Challenges and infrastructure development

Despite the robust growth, the Indian solar energy market faces significant challenges, particularly in terms of transmission infrastructure and energy storage. According to **Bigyan Parija**, Chief Operating Officer-Solar and Storage, Serentica Renewables, “One of the primary challenges is the need for the rapid expansion of

transmission capacity to match the pace of renewable energy installations.” India has set an ambitious target of adding 50 GW of renewable capacity annually. However, without the corresponding expansion of transmission infrastructure, delays in evacuating power from solar projects could occur. This highlights the need for substantial investments in transmission to ensure timely grid connectivity and prevent bottlenecks.

The intermittency of solar and wind energy poses another challenge, as large volumes of renewable energy must be integrated into the grid. Parija further emphasises that “advanced energy storage solutions are crucial for maintaining a stable and reliable power supply.” While batteries remain the primary option, exploring alternative storage technologies and driving innovation will be essential to enhancing the resilience of India's energy system.

In some renewable energy-rich states, new grid connectivity might not be available until 2028, pending the implementation of high-voltage direct current (HVDC) systems. This delay could slow down planned solar installations, underlining the importance of timely investments in transmission infrastructure and energy storage technologies to manage the complexities of integrating solar energy into the grid.

Government initiatives and policies

The Indian government has launched several

initiatives to accelerate the adoption of solar energy. The National Solar Mission (NSM), launched in 2010, set an ambitious goal of achieving 100 GW of solar capacity by 2022. Although this target was not fully met, the NSM has been instrumental in increasing solar energy adoption in India. The project aligns with India's Nationally Determined Contributions (NDCs) to reduce the GDP's emission intensity by 45% from 2005 levels by 2030, and to derive 50% of the total installed capacity for electric power from non-fossil fuel-based energy assets.

Additionally, clients benefit from tax cuts provided by the government, which reduce installation costs and the overall expense of solar energy. This has made solar energy more economically feasible for both businesses and households, encouraging widespread adoption.

Rooftop solar installations have gained momentum, driven by government programs and financial incentives. "The implementation of rooftop solar panels is expected to generate significant demand, driven by both consumer interest and supportive government initiatives," notes Parija. The 'Muft Bijli Yojana' and similar programs have made rooftop solar more accessible, offering long-term financial savings and energy independence for households and businesses.



"We observe a shift towards decentralised energy production and increased demand for energy storage solutions. To adapt, we are innovating our product line to include smart solar systems that integrate seamlessly with battery storage and IoT technology."

Tanmoy Duari,
CEO, AXITEC Energy India Pvt. Ltd

Technological advancements, particularly in energy storage, have also played a role in boosting the appeal of rooftop solar systems. As these systems become more reliable and efficient, they are expected to contribute significantly to India's renewable energy goals, particularly the 100 GW solar target by 2030.

Local manufacturing and technological advancements

India is also focusing on developing its domestic manufacturing capabilities in the solar sector. The Production-Linked Incentive (PLI) scheme, introduced by the government, aims to boost local production of solar modules and cells, thereby reducing the country's dependence on imports. As **Khushboo Doshi**, Managing Director, Rajoo Engineers Ltd, notes, "The solar sector

in India presents significant growth opportunities. With the government's ambitious targets, local manufacturing initiatives, technological advancements, and supportive infrastructure development, the country aims to achieve a renewable energy (RE) target of 450 GW by 2030." Solar power is expected to contribute around 280 GW to this target.



"The Production Linked Incentive (PLI) scheme has significantly impacted our operations and growth. It has enabled us to expand production capacity through financial incentives, allowing us to meet the rising demand for solar technologies."

Raman Bhatia,
Founder & MD, Servotech Power Systems

The PLI scheme has significantly benefited local manufacturers by reducing production costs and promoting quality control measures. **Tanmoy Duari**, CEO, AXITEC Energy India Pvt. Ltd., shares how the scheme has impacted operations, "The Production-Linked Incentive (PLI) scheme has provided substantial benefits to our operations by lowering manufacturing costs and improving quality control measures." Duari further explains that AXITEC plans to expand its production capacity from 300 MW to 600 MW by utilising more advanced machinery, which will help the company contribute more significantly to India's sustainability targets for 2030.

Technological advancements have also played a key role in the solar sector's growth. Innovations in solar modules, energy storage solutions, and solar-powered electric vehicle (EV) charging stations have helped India stay at the forefront of the global renewable energy market. **Raman Bhatia**, Founder and Managing Director, Servotech Power Systems Ltd., emphasises the importance of innovation, "We are developing advanced solar modules, integrating storage solutions, and leading in solar-powered EV charging stations."

Large-scale projects

Large-scale solar installations have been a driving force behind India's renewable energy capacity expansion. The Solar Photovoltaic (PV) technology segment dominates the market, accounting for around 75% of India's solar capacity in 2023. The affordability of solar modules and the wide range of applications, from water heating to electricity production, have made solar PVs the preferred choice for large-scale solar projects.

India has seen a steady increase in its installed solar capacity. As of June 2024, the country had a cumulative installed solar capacity of 87.2 GW, accounting for 19.5% of India's total installed power capacity and 44% of the total installed renewable energy capacity. Rajasthan, Gujarat, and Karnataka have led the country in terms of large-scale solar installations. Additionally, India's large-scale solar project pipeline stood at 146 GW, with another 104 GW of projects tendered and pending auction.

However, project delays due to grid connectivity and transmission infrastructure issues have significantly impacted solar capacity additions. The reimposition of the Approved List of Models and Manufacturers (ALMM) order has further contributed to project delays, particularly for open access solar projects.



“The implementation of rooftop solar panels is expected to generate demand, driven by both consumer interest and supportive government initiatives. As households and businesses adopt rooftop solar, they gain energy independence.”

Bigyan Parija,
Chief Operating Officer-Solar and Storage, Serentica Renewables

Future outlook

Despite the challenges, India's solar energy market is poised for continued growth. The country aims to achieve 450 GW of installed renewable energy capacity by 2030, with solar power contributing more than 60% of this target. The Indian government's commitment to fostering local manufacturing and technological innovation, coupled with international collaborations and investments, will further drive the solar sector's development.

The rooftop solar market, in particular, offers immense potential for growth, especially among micro, small, and medium enterprises (MSMEs). As financing options improve and state-level policies become more supportive, rooftop solar adoption is expected to rise significantly in the coming years.

The future of solar energy in India looks promising, with government initiatives, technological advancements, and infrastructure investments creating a favourable environment for growth. As India continues to expand its renewable energy capacity, the solar sector will play a pivotal role in achieving the country's long-term sustainability goals.

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(Source: Mercom India & PSMarketResearch, Image: Freepik)

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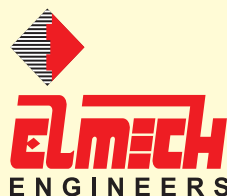
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"Solar Continues to Lead Driven by Lower Costs."

Our long-term strategy focuses on driving innovation and growth in renewable energy, contributing to a sustainable future. We plan to scale up our solar energy offerings, focusing on high-efficiency panels, says **Raman Bhatia**, Founder & MD, Servotech Power Systems Ltd.

How are you supporting the growth of the solar energy sector?

We are making solar energy more accessible and approachable through a wide range of installation projects. From small-scale systems to larger-capacity solar installations, we have successfully brought clean energy to the homes of everyday people, supported by government subsidies. Our goal is to bring solar energy to every household and make it more accessible to the masses. To achieve this, we are building a strong network of dealers and distributors across the country. By raising awareness of the benefits of solar energy, we are helping to drive its widespread adoption. We got enrolled with 62 DISCOMs under PM Surya Ghar Muft Bijli Yojana which will directly benefit consumers by enabling them to avail government subsidies when purchasing solar solutions from the company. Overall, as a company, we believe in creating value through transformational change, with a mission to drive a green future through sustainable development and relentless innovation. Our eco-friendly solutions are at the forefront of the global transition to renewable energy and electric mobility, ensuring a sustainable planet for future generations. With over two decades of experience in the electrical and electronics industry, we have pioneered high-value solutions that contribute to a cleaner, more sustainable world.

What strategies do you employ to minimise the carbon footprint of your module production?

We prioritise energy efficiency and sustainability across all operations. Our manufacturing processes use energy-efficient equipment to minimise consumption, while our facilities are optimised to reduce waste. Whenever possible, we power our production with renewable energy, lowering our dependence on fossil fuels and cutting carbon emissions. We also source raw



materials from suppliers who follow sustainable practices, focusing on those with lower environmental impacts. To further enhance sustainability, we continuously optimise production to reduce material waste and improve efficiency through advanced technologies and lean manufacturing. We work closely with supply chain partners to ensure they align with our commitment to reducing carbon footprints. Lastly, we ensure responsible disposal, adhering to regulatory standards.

How will the implementation of rooftop solar panels lead to greater demand?

When we talk about increasing demand, the attractive subsidies provided by the government have played a crucial role in raising awareness and driving the demand for rooftop solar panels. One such initiative is the PM Surya Ghar Muft Bijli Yojana, which has significantly contributed to this growth. Expanding the penetration of renewable energy across all social strata is essential, and I believe this demand will only continue to grow in the future.

What trends are you seeing across Indian and global markets?

In both Indian and global markets, several key trends are shaping the renewable energy landscape, and we are adapting through innovation. Solar power continues to dominate, driven by declining costs and improved efficiency, with schemes like PM Surya Ghar Yojana and state-based solar scheme boosting growth. We are developing advanced solar modules, integrating storage solutions, and leading in solar-powered EV charging stations. Energy storage is crucial, and our R&D focuses on hybrid solar-plus-storage solutions. We are exploring green hydrogen opportunities, integrating AI-driven energy management systems, and prioritising sustainability through recycling initiatives and circular

economy practices to minimise waste and enhance efficiency.

What are some of the challenges you face?

Like any other sector, renewable energy also comes with its fair share of challenges. My perspective is that these challenges provide valuable lessons and opportunities for growth. We believe that every challenge presents a chance to innovate and improve. By addressing them directly, we can develop more efficient technologies, streamline processes, and strengthen our position in the market. Whether it's improving energy storage solutions, or expanding infrastructure, we view challenges as opportunities to drive progress and lead the way in shaping a more sustainable future. We tackle them head-on, turning obstacles into stepping stones for success.



PLI scheme has improved cost efficiency, allowing us to offer competitive pricing and make our products more accessible.

How has the PLI scheme benefited you?

The PLI scheme has significantly impacted our operations and growth. It has enabled us to expand production capacity through financial incentives, allowing us to meet the rising demand for solar technologies. With increased resources, we have accelerated research and development, driving innovation and creating advanced, efficient products. The scheme has also improved cost efficiency, allowing us to offer competitive pricing and make our products more accessible. The expansion of our manufacturing facilities has led to job creation, fostering local economic growth and skilled labour in the renewable energy sector. Additionally, the PLI scheme has strengthened our supply chain by improving infrastructure and logistics, ensuring timely and reliable delivery to customers. By aligning with the PLI scheme, we are supporting national goals for sustainable development, contributing to India's vision of becoming a global leader in renewable energy while reinforcing our commitment to environmental responsibility.

What are your long-term plans?

Our long-term strategy focuses on driving innovation and growth in renewable energy, contributing to a sustainable future. We plan to scale up our solar energy offerings, focusing on high-efficiency panels.

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"The PLI Scheme Has Benefitted Us Greatly."

In India, the rising demand for renewable energy is driven by government initiatives and declining solar tariffs, while the focus on domestic manufacturing has increased due to policy support and incentives. Consumers are placing greater emphasis on high-efficiency modules, and solar energy is playing a critical role in expanding rural electrification, addressing energy access gaps, says **Tanmoy Duari**, CEO, AXITEC Energy India Pvt. Ltd.

How are you supporting the growth of the solar energy sector?

At Axitec, we are committed to driving the growth of the solar energy sector through a comprehensive approach. Our state-of-the-art manufacturing facilities leverage technology to produce high-quality solar modules, while strategic investments in capacity expansion meet the increasing demand. Innovation is at the core of our operations, with on-going research focused on improving the efficiency of cells and modules, as well as developing bifacial and smart modules to enhance energy yield and monitoring capabilities. We also prioritise supply chain development by encouraging domestic sourcing to reduce import dependence and forming partnerships with suppliers to ensure stable, high-quality inputs.



digitalisation and advanced monitoring systems optimise performance.

How will the implementation of rooftop solar panels lead to greater demand?

The implementation of rooftop solar panels is driving demand as consumers seek energy independence and cost savings. As awareness grows about their environmental benefits, more residential and commercial properties are adopting this technology.

What trends are you seeing across Indian and global markets? How are you adapting to them in terms of innovation?

As a leading solar module manufacturer, we are witnessing transformative trends in both the Indian and global markets. In India, the rising demand for renewable energy is driven by government initiatives and declining solar tariffs, while the focus on domestic manufacturing has increased due to policy support and incentives. Consumers are placing greater emphasis on high-efficiency modules, and solar energy is playing a critical role in expanding rural electrification, addressing energy access gaps.

Globally, advancements in bifacial and multi-junction technologies are enhancing energy yield, and the integration of solar-plus-storage solutions is improving efficiency. Applications like floating solar and agro-photovoltaics are also expanding solar's reach, while

What are some of the challenges you face?

Key challenges include regulatory hurdles, competition from cheaper imports, and the need for public awareness about solar technology. We are actively engaging with policymakers and conducting awareness campaigns to address these issues.

How has the PLI scheme affected/benefited you?

The Production-Linked Incentive (PLI) scheme has provided substantial benefits to our operations by lowering manufacturing costs and improving quality control measures. Additionally, it has promoted local production, which has helped us strengthen our supply chain.

What are your long-term plans?

We are currently focused on optimising operations at our newly launched manufacturing plant. Our next strategic move will be to expand its production capacity from 300 MW to 600 MW, utilising more advanced and efficient machinery. This expansion will enable us to contribute more significantly to India's sustainability targets for 2030.

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“India is to Reach 450 GW of Renewable Energy by 2030.”

By diversifying our focus, we aim to capture a broader market share and foster sustainable practices across various industries. As we expand our capabilities in supplying solar cell manufacturing, we are also exploring export opportunities for our innovative products, says **Khushboo Doshi**, MD, Rajoo Engineers Ltd.

Provide us an overview of Rajoo Engineers and its businesses.

Rajoo Engineers based in Rajkot, Gujarat, has been a trusted name in plastic extrusion machinery since its inception in 1986.

Over the years, we have built a strong reputation as leaders in blown film lines, sheet lines, thermoformers, extrusion coating and lines across the world.

At Rajoo, we offer a wide range of machinery and solutions tailored to meet the needs of various industries such as renewable energy, packaging, construction, agriculture, automobile and healthcare.

Technologies / products categories available include:

- Mono & Multilayer Blown Film Lines - upwards and downward extrusion (up to 9 layers)
- Mono & multilayer sheet lines (up to 5 layers)
- Single & Multi-Station Thermoforming Machine (up to 4 stations)
- Cross Lamination Film Line for Tarpaulin
- Extrusion Coating & Lamination Line

How is Rajoo Engineers serving the solar energy sector?

Rajoo Engineers has strategically entered the renewable energy sector, building on over three decades of innovation in plastics extrusion machinery and extrusion being the forte.

Our commitment to supporting India's clean energy goals, including the ambitious target of 450 GW renewable capacity by 2030, has driven this strategic shift, particularly in the solar energy space.

We recognised the critical role we could play in this transformation and the significant opportunity in solar cell manufacturing. This move not only reinforces Rajoo Engineers' commitment to innovation but also supports the government's 'Make-in-India' initiative, emphasising self-reliance in the solar sector and reducing dependence on imports, particularly from China.

We are proud to actively contribute to India's journey



toward sustainable development and energy security, further cementing our position as a leader in the industry, and more specifically in plastic extrusion with sheet extrusion technology

Leveraging our expertise in extrusion technology, we have introduced LAMINA-E, India's first mono & multi-layer EVA/POE sheet extrusion line for producing encapsulant sheets used in solar cells, Rajoo is set to transform the solar panel manufacturing industry.

With output ranges from 300 to 900 kg/hr and the flexibility to produce sheets of varying widths and thicknesses, LAMINA-E enhances the efficiency and quality of solar panels. Rajoo Engineers is actively leveraging government initiatives, particularly the Production-Linked Incentive (PLI) scheme, to enhance the solar manufacturing capabilities for processors.

While we do not directly manufacture solar cells or modules, our products are critical components in the solar panel manufacturing process. We are aligning our production capabilities to meet the increased demand expected from the PLI scheme and exploring partnerships with PLI beneficiaries.

Furthermore, our expansion into solar manufacturing is contributing to job creation and growth in the renewable energy sector. We are creating new jobs within our organisation, particularly in areas such as solar technology, materials science, and renewable energy systems. As we scale up our operations, we are also investing in training and skill development programs to ensure continuous up skilling in the renewable energy sector.

By providing cutting-edge technology to sheet manufacturers catering to the solar panel manufacturers, we are indirectly supporting job creation in the broader solar industry, contributing to the growth of India's solar manufacturing capabilities.

What are the key advantages of Rajoo Engineers' encapsulant sheets for solar cell producers? What is driving the demand for your products?

Our mono and multilayer EVA/POE sheet line for producing encapsulant sheets, LAMINA-e, offers numerous key advantages for solar cell producers.

The advanced features of LAMINA-E ensure precise and consistent material input, crucial for producing high-quality EVA/POE encapsulant sheets. This accuracy minimises material waste and ensures uniformity, resulting in more reliable solar cells.

LAMINA-E's energy-efficient extruders further enhance its value.

They reduce energy consumption during the manufacturing process, aligning with the renewable energy sector's focus on sustainability. Additionally, it provides versatility, allowing manufacturers to experiment with different materials and develop innovative encapsulant formulations.

First being high-output which is possible due to our high-performance technology that ensures low melt temperature. This is crucial for the quality of encapsulant sheets.

Coupled with our ability to process resins with different VA content and melt flow index using the same screw design, provides flexibility and efficiency to manufacturers.

Secondly, our system operates at high line speed with low winder tension, keeping shrinkage under control. This eliminates the need for post-annealing systems, streamlining the production process.

What kinds of growth opportunities the solar sector presents to you?

The solar sector in India presents significant growth opportunities. With Government's ambitious targets, local manufacturing initiatives, technological advancements, and supportive infrastructure development, the country aims to achieve a renewable energy (RE) target of 450 GW by 2030. Thereby, the solar industry is expected to contribute around 280 GW.

It's notable that India is on track to reach 450 GW of installed renewable energy capacity by 2030, with solar power accounting for more than 60 per cent of this target.

This ambitious plan creates a robust demand for solar technologies and components. By implementing several measures to boost domestic manufacturing of solar modules and cells, the Government of India has initiated a Production-Linked Incentive (PLI) scheme, aimed at reducing import dependence on countries like China, thereby fostering local production capabilities.

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What are your plans to further tap the growing segment of solar energy? (with respect to capacity expansion, R&D/new launches, exports, etc)?

At Rajoo Engineers, we are actively pursuing numerous strategies to tap into the growing segment of solar energy, aligning with India's ambitious renewable energy goals.

We have recently installed and commissioned a 304.64 KW (DC) solar power plant in Hadamtala, Gujarat, as part of our commitment to increasing our renewable energy footprint.

Our growth strategy involves targeting key sectors such as infrastructure, agriculture, electronics, and renewable energy. By diversifying our focus, we aim to capture a broader market share and foster sustainable practices across various industries.

As we expand our capabilities in supplying solar cell manufacturing, we are also exploring export opportunities for our innovative products.

By leveraging our advanced manufacturing technologies and aligning with global standards, we aim to position ourselves as a competitive player in international markets.

SME



“Energy Storage is Crucial to Maintain Grid Stability.”

Integrating large volumes of wind and solar energy poses a challenge due to their intermittency. Advanced energy storage solutions are crucial for maintaining a stable and reliable power supply. While batteries are the current primary option, exploring alternative storage technologies and driving innovation in this area will be necessary to enhance system resilience, says **Bigyan Parija**, Chief Operating Officer – Solar and Storage, Serentica Renewables.

How are you supporting the growth of the solar energy sector?

At Serentica, we are actively supporting the growth of the solar energy sector by leveraging our expertise and resources to expand renewable energy infrastructure. Our primary focus is on developing large-scale solar projects that significantly increase solar energy capacity across the country. In addition to expanding capacity, we are integrating advanced energy storage solutions to provide round-the-clock (RTC) energy supply from solar sources. This ensures that solar energy, traditionally limited by daylight hours, becomes a reliable 24/7 energy source for industries and businesses, further enhancing its viability.

Our commitment to driving technological innovation is reflected in our adoption of the latest advancements in photovoltaic (PV) technology, which improves both performance and cost-effectiveness. Through partnerships and collaborations with global leaders in the solar sector, we are bringing cutting-edge solutions to the Indian market. This not only increases the efficiency of solar installations but also makes solar energy more scalable and affordable.

Moreover, our projects are aligned with key government initiatives, such as the National Solar Mission, which aims to increase India's solar energy output. By contributing to this mission, we are helping India achieve its broader climate goals and its commitment to a sustainable energy future.

What are your biggest challenges?

One of the primary challenges is the need for the rapid expansion of transmission capacity to match the pace of renewable energy installations. As a country, we have set an ambitious target of adding 50 GW of



renewable capacity annually. However, without corresponding growth in transmission infrastructure, we risk delays in evacuating power from these projects. To overcome this, substantial investment in transmission infrastructure is crucial to ensure timely grid connectivity and prevent bottlenecks.

Integrating large volumes of wind and solar energy poses a challenge due to their intermittency. Advanced energy storage solutions are crucial for maintaining a stable and reliable power supply. While batteries are the current primary option, exploring alternative storage technologies and driving innovation in this area will be necessary to enhance system resilience.

With large capacities of wind and solar to be interconnected, managing integration complexities due to the intermittency of solar and wind expansion will also necessitate investments in energy storage. Advancing storage technologies will require collaborative efforts to drive innovation and reduce costs. Moreover, policy certainty surrounding domestic manufacturing requirements will be important to foster industry growth and stability.

Are you exploring other renewable energy sources in combination with solar, such as wind or hydropower?

Serentica Renewables is making significant strides in integrating various renewable energy sources to enhance the reliability and sustainability of our power solutions. Our strategic approach includes combining solar and wind power to create hybrid solutions that address the intermittency challenges associated with renewable energy.

Our current projects include the development of

wind-solar hybrid systems, with noteworthy projects such as our wind park in Maharashtra, which will complement our solar installations in Bikaner. This hybrid approach is designed to ensure a more consistent power supply by providing wind energy during non-sunlight hours and seasons when solar generation might be lower. By integrating wind power with solar, we aim to maximise capacity utilisation and deliver reliable green energy to our industrial clients, including Hindustan Zinc.

We are also exploring advanced technologies and partnerships, such as energy storage systems, to further optimise the performance and reliability of our renewable energy projects. Our commitment to leveraging advanced technology underscores our dedication to providing sustainable and efficient energy solutions.

Overall, Serentica's strategy reflects the commitment to leveraging diverse renewable resources and technologies that only meets the growing demand for clean energy but also significantly contributes to reducing carbon emissions and supporting India's clean energy transition.

How will the implementation of rooftop solar panels lead to greater demand?

The implementation of rooftop solar panels is expected to generate significant demand, driven by both consumer interest and supportive government initiatives. As households and businesses adopt rooftop solar, they gain energy independence, reducing their reliance on the grid and offering long-term financial savings. Government programs, such as the 'Muft Bijli Yojana', make this technology more accessible by offering financial incentives and subsidies, which encourage greater participation, especially in regions with high solar potential.

The reduction in technology costs and the integration of advanced solutions like energy storage further enhance the appeal of rooftop solar systems. These improvements increase reliability and efficiency, making rooftop solar an attractive option for consumers across various segments. As awareness campaigns and training programs expand, we will also see a growing workforce capable of supporting the rising demand.

Moreover, streamlined policies and simplified approvals, combined with easy financing options, will ensure that rooftop solar adoption continues to grow.

How is the current Indian and global market scenario and what are some trends seen?

In recent years, both the Indian and global renewable energy markets have been experiencing transformative

growth. In India, the sector has seen impressive advancements, particularly in wind and solar energy installations. A remarkable trend is the rise of dispatchable green energy solutions, with developers now offering such solutions through Firm Dispatchable Renewable Energy (FDRE) contracts, a significant milestone facilitated by the Solar Energy Corporation of India Limited (SECI). This development underscores a positive shift towards more reliable and consistent renewable energy supply.

Globally, energy storage has become a cornerstone for maintaining grid stability, driven by innovations and supportive policies. The reduction in storage technology costs and government initiatives, such as viability gap funding, have propelled this trend forward. Additionally, the green hydrogen sector is gaining momentum, with the approval of national missions and increased investments shaping it into a pivotal area for future energy strategies.

India's renewable energy landscape is further buoyed by the government's ambitious targets, including the goal to add 50 GW of renewable capacity annually until 2028. However, the sector faces challenges such as the need for expanded transmission infrastructure and policy certainty. Addressing these issues is crucial for maintaining growth and achieving the vision of 500 GW by 2030. Overall, the global market is witnessing a shift towards sustainable energy solutions with a strong emphasis on technological advancements and policy support, while India is strategically positioning itself as a leader in the renewable energy revolution.

How has the PLI scheme affected/benefited you?

The PLI scheme's emphasis on critical components such as HVDC systems and energy storage supports Serentica's goal of developing robust infrastructure for large-scale renewable energy integration. By enhancing domestic capabilities, it helps mitigate supply chain issues and ensures that India's renewable energy targets, such as adding 50 GW annually, are met without delays.

Financial incentives from the PLI scheme have enabled Serentica to adopt cost-efficient technologies.

How can policy initiatives be improved to better support the sector's growth?

Addressing grid connectivity issues in resource-rich regions is critical. With new grid connections potentially delayed until 2028 in some areas, heavy investment in transmission infrastructure is necessary to support future energy demands and avoid project delays. Overall, improving these policies will enhance operational efficiency and support the successful integration of renewable energy into the grid.

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“Next Focus Should be on High-Speed 250-kph Trains.”

Dr Sudhanshu Mani retired as General Manager, Integral Coach Factory (ICF), Chennai, in December 2018 after serving Indian Railways (IR) for 38 years. He led the Train 18/Vande Bharat project, the first ever indigenous semi high-speed train of India, from concept to delivery. He has also authored a book on the subject, *My Train 18 Story*, among others. He now writes regularly in leading newspapers and portals and works as an Independent Consultant. In this exclusive interview with Rakesh Rao, Dr Sudhanshu Mani highlights on the evolution of the railway sector in the last few years and what the future holds for the sector.

How has the railways sector evolved in the last 5 years with respect to coach manufacturing?

In 2017, when I was heading the Integral Coach Factory (ICF), as the General Manager, we, with some difficulty, managed to get the sanction for the project to develop India's the first indigenous semi-high speed train capable of running at 160 km per hour (kph). In spite of tight deadline for completing the project, we were rearing to do something new instead of producing the same kind of trains. With the active support of the industry (which had developed or had access to latest technologies for propulsion system, brake system, bogies, etc), ICF managed to roll out the first Vande Bharat (VB) trainset (then known as Train 18) in 2018 in record 18-months. Train 18 was India's first indigenously developed semi-high speed train set that was rolled out very quickly and at low cost.

For making VB, there were some departures in the regular train. For the first time in the country, all equipment were mounted below the chassis in VB. Then there were new amenities provided such as talkback facility, CC camera, PIS (passenger information system), etc. It had automatic doors, which remain closed when the train is in motion. New bogie technology ensured smooth ride even at high speed.

While VB train was cleared for 160 kph speed, proliferation of tracks that can support this speed has not happened. So, the train is running at suboptimal speed at present. Because the acceleration-deceleration is fast, Vande Bharat is able to cut down travel time. But, this is nothing compared to what it could have achieved if it was able to run at optimal speed of 160 km. While



Vande Bharat was a major milestone in the development of passenger coaches in India using top-class equipment, we need to continue to strive to make it world class in terms of finish of exterior and interiors.

After Vande Bharat Express, the next task was to design the sleeper coach (with 15-20 per cent modification). The sleeper version (manufactured by BEML with the design of ICF), much delayed already, is expected to come into service by this year end. Although indigenisation has increased over the last few years, there have not been many technological upgrades in the train in

the last six years. For example, seats, which were imported earlier, are now built in India. Except for wheels and a few critical components, all products that go into Vande Bharat trains are manufactured indigenously. Today, I think, more than 90 per cent is indigenous content.

Keeping in view the lack of any significant development in the train, we are waiting for the next evolution to happen. The next step is to design a train with speed of 240-250 kph on standard gauge. This high-speed train can also open up huge export market. To make a proto type of this high-speed train, it should take approximately three years as many things change when you go from 160 kph to 240 kph speed.

Is upgrading tracks to suit high-speed train time consuming?

Availability of funds (required for upgradation) is not a problem today. Starting from 2014, the government has been investing heavily in infrastructure development, especially railways. Capex funds available for Indian

Railways has gone up by 5-6 times in the last 5-7 years - from approximately Rs 400 billion to Rs 2.65 trillion (in FY25). But, utilising these funds toward meaningful projects is the issue. Yes, track upgradation (which is largely contractual civil engineering work) is time consuming; but the progress is very slow. Contract execution has to be improved (track upgradation has to be faster) so that we get the fruits of these faster trains.

Delhi-Mumbai and Delhi-Howrah 160-km upgrade was announced many years back but we have hardly achieved any meaningful progress in the last 5-6 years.

What are the new areas that you would like Indian Railways to work on to fulfil the future requirements?

First, priority should to develop high-speed train (which can run at 240 kph speed) on standard gauge. Work has been allotted, albeit sadly to BEML and not ICF and should take another 3-4 years for these trains to be available for the service.

Second, India should start developing aluminium body for high-speed trains. Globally, aluminium is a preferred material for constructing coaches as it is lighter, it is energy-efficient, and has better finish, aesthetics and even durability. Because of these qualities, usually for semi-high speed and high-speed trains, aluminium is used for coach construction. Decision to manufacture new versions of Vande Bharat in stainless steel, according to me, is not a good decision.

Aluminium trains require very large profiles/ structural members that are extruded in a special plant which is pretty expensive to set up. Although there are big aluminium producers in India, we do not have this kind of facility. Local aluminium producers will be interested in setting up such plants only when large numbers of orders for aluminium trains are given. When I was GM, we tried to get approval for 20 aluminium trains (called Train 20), but because of some bureaucratic reason it didn't happen. In 2022, Indian Railways floated a tender of about Rs 30,000 crore for 100 trains (made from aluminium), which was a bold step but they cancelled the tender in 2024 citing pricing issue. According to the news report, the supplier was ready to supply aluminium-bodied Vande Bharat trains for Rs 145 crore per train set, but railways wanted it for Rs 140 crore. Tenders do not get cancelled for 3 per cent price difference. So, I don't know the real reason for this cancellation. The future of high-speed trains is aluminium and we are nowhere. Nevertheless, we have to work on this and I hope something is done in this direction.

Third, if India wants to be a developed country, then travel for common passengers should be comfortable. Today, passengers have to travel in jam-packed trains.

Some say they pay very little fare, so they deserve this. I totally disagree; they deserve comfort and dignity both while travelling. We have to subsidise coaches for these passengers through the money earned from Vande Bharat and other high-end trains where people are willing to pay high-prices. If you run these semi & high-speed trains efficiently, speedily, people will prefer trains to air and you will earn money. Use this money to make trains, preferably all AC coaches except a few, to accommodate everyone. That's my thinking. Railways may suffer another loss of Rs 500 billion or so, which is nothing if you are investing Rs 2.65 trillion in capex. So give everyone AC travel comfortable, maybe cramped, but with the dignity of sitting accommodation assured.

There are solutions like increasing the number of seating capacity in coaches. Don't increase the fare now right now, take the loss. As India develops, people will have money in their pocket and will pay for their transport someday. It is important to improve travel experience for common people.

Another critical area for improvement is safety. Some people say that safety has improved from what it was ten years back. But, it is not a great achievement to boast of when you compare the kind of technologies that are available today. Roll out of Kavach is excruciatingly slow in spite of a decision to employ it as a modern signalling system in preference to imported ones. Artificial intelligence (AI) should be used to improve safety. Safety has improved, but it needs to be further enhanced. There is a need to bring in a safety culture in railways and safety has to be of paramount importance. Zero accidents may be a dream, a movement towards zero accident is possible with so many tools and knowledge available today.

How do you see the future of alternate propulsion system (especially based on hydrogen) for railways?

After going for complete electrification, talks about developing propulsion system based on alternate fuels (like biofuels, hydrogen, fuel cell, etc) is totally misplaced. After realising the mistake, railways said that the hydrogen fuel will be used to run trains where electrification is not possible (like, in heritage sections). But, there are hardly 30-40 such trains, so I don't see much future for hydrogen trains; it is not feasible. For example, in Germany, diesel train routes only were used for promoting hydrogen trains.

You cannot replace electricity with hydrogen. After making huge investment in electrification, it doesn't make any sense to invest in hydrogen technology for railways. The decision to electrify indiscriminately is another inexplicable one as the electricity used for them is generated by burning coal, the most polluting fuel. SME



"Strong R&D is Crucial for the Success of Indian Railways."

The Research Designs & Standards Organisation (RDSO), Lucknow (Uttar Pradesh) – the research and development (R&D) body under the Ministry of Railways, Government of India – has been involved in large scale standardisation and indigenisation of the Indian Railways (IR) assets. In this interview with Rakesh Rao, **Dr Anirudh Gautam**, Principal Executive Director (Special), RDSO, explains the role of RDSO in the development of railway sector and importance of R&D to make India a global player in railway technologies.

As the R&D arm of the railway, how is RDSO aiding the development of Indian Railways?

RDSO was set-up in 1958 by merging two organisations dealing with standardisation and research and development (R&D) at Shimla and Lucknow. At that time Indian Railways (IR) was having different track gauges, rolling stock, signalling system etc. imported from England and Europe. As a first step, RDSO started the standardisation of these assets so that these can be manufactured in India and the economy of scale lowers the cost of manufacture in India. Subsequently, RDSO was involved in indigenisation of imported technologies either through transfer of technologies (ToT) or through reverse engineering. These efforts led to large scale standardization and indigenization of the Indian Railways assets. It was the mandate of RDSO to develop indigenous railway technologies to overcome dependence on foreign technologies. In many areas, RDSO worked to develop indigenous technologies - e.g. track, signals, traction installation, coaches, wagons, locomotives etc. and this led to setting-up of railway industry in India.

RDSO was however required to become a proper R&D organisation with permanent scientific cadre similar to ISRO, DRDO, CSIR, etc. for which proposals have been sent to the Railway Board. As and when this happens, RDSO will become fully energised to develop indigenous state-of-the-art railway technologies for IR and export.

Being a part of RDSO, how do you see the development of the Vande Bharat train set?

Vande Bharat train and all its further variants is a



technological leap for Indian Railways. Railway Ministry was earlier trying to introduce electrical trainsets on the IR network but could not make progress due to very high cost of imported trainsets (Rs 250 crore for a 12 coach train set). Against this background, ICF and its General Manager Dr Sudhanshu Mani along with Indian industry (Medha, Hyderabad) took up the challenge to develop an indigenous electrical trainset.

This 16 coach trainset was designed and developed in a record time of less than 18 months at a cost of ₹1 billion and successfully tested. So, Vande Bharat trainset is a paradigm shift in the thought process of self-reliance. However, Vande Bharat is only the beginning, we now need to concentrate to increase the speed capacity of railway tracks, signals and the traction installation to 200 kph so that the journey times are drastically reduced and more trains can be run on the same lines to meet the needs of the populace.

What are key challenges in the growth of Indian Railways? What are probable solutions for it?

Main challenge in the growth of Indian Railways is setting-up of proper long-term R&D organisation for developing of cutting edge novel railway technologies to suit Indian conditions. Indian Railways must set up this organisation within few months. China and Korea who are late entrants to the railway club have made huge progress in railway technology because of its strong R&D ecosystem.

In China, for example, the Chinese Academy of Railway Sciences (CARS) is carrying out cutting-edge railway research and has developed many state-of-the-art

indigenous railway technologies, notable amongst these are high speed (more than 350 kph) train technology and a network of more than 45,000 km of high speed infrastructure. Chinese have developed own designs of magnetic levitation trains, tested Hyperloop trains at speeds of 625 kph, designed and developed their own communication based train control and communication, traction installations systems for high speeds etc.

China has formed a very effective ecosystem of railway research and innovation which includes its technical institutes, government scientific bodies, local industries and CARS. It has also created many international collaborations in this sphere.

Moto of Chinese Railways is to: a) Acquire technology, b) Absorb technology, c) Innovate and improve technology and d) Exploit technology. In contrast, Indian Railways has adopted the policy of purchasing equipment and in few cases ToT which does not lead to development of in-house local technologies.

In Korea also, the Korean Rail Research Institute (KRRI) has collaboration with its industry, academic institutes, scientific bodies and international railway research bodies. So, strong in-house railway research and innovation is the first and the most crucial step for success of Indian Railways.

Second most important step in advancement of Indian Railways is upgrading its railway track structure to 200 kph. At present, on IR, the average speed to the passenger trains is 50 kph and of goods train is 25 kph. This has to be doubled at least if the customers continue to patronise Indian Railways. For implementation of the PM Gati Shakti master plan, IR has to act as backbone for passenger and goods movement. So enhancing the track speeds to 200 kph is the second most important action.

For faster movement of trains, reliability of the signalling systems is of utmost value. Therefore, this is the third crucial step for growth of Indian Railways.

India won the two wars with Pakistan due to its human assets although its equipment and apparatus were older. There has to be policy of recruiting engineers for IR immediately after class 12th similar to the NDA system and similar to the erstwhile Special Class Railway Apprenticeship system.

So 50 per cent recruitment should be after class 12th through Gati Shakti Vidyalaya and Jamalpur Institute, Nasik Institute, Poona Institute and Hyderabad Institute. Balance 50 per cent recruitment can be done from engineering graduates. Indian Railways is predominantly an engineering organisation, therefore, recruitment of capable apprentices or engineers is the most important ingredient for growth and development of IR.

What kinds of trends do you foresee in the sector in the next 4-5 years?

Most important action would be to strengthen our track and signal infrastructure and remove all speed restrictions on the track and signals so that maximum speed capability of track be 200 kph. Massive inputs in terms of investment and manpower in this area is the top priority.

Involvement and training of IR and private industry personnel has to be carried out on an emergency basis. IR should now work on developing high-speed trainsets capable of operating at speeds of 350 kph and also design and develop matching high-speed tracks.

Conversion of existing diesel locomotives to operate on methanol is the need of the hour. At present IR consumes about 1.6 billion litres of diesel per year for diesel traction. Although IR will be electrified 100 per cent by end of 2025, there will be need of operating 30-40 per cent diesel (methanol) locomotives for reliability of traction and to take care of exigencies. RDSO is already in the process of converting diesel locomotive engines to use methanol fuel. Methanol fuel can be produced from indigenous coal and biomass so this will be completely home-grown fuel.

Use of fuel cells and batteries for traction will be required especially to reduce the cost of running suburban and urban trains.

A healthy mix of say 10 per cent traction will be running on hydrogen fuel cell battery trains. This technology will be required to reduce the cost of Metro railways which is about Rs 250 crore per km. With the use of fuel cell battery train this can be brought down to less than ₹750 million per km.

Diesel locomotives are already running with 7 per cent biodiesel blended in diesel supplied by IOCL so there is a direct displacement of diesel with biodiesel.

IIT Madras is working on development of Hyperloop train technology, further investment is required to speed up the development in this area especially since China has already tested Hyperloop train at 625 kph through indigenous technology development. An investment of ₹50 billion is immediately required in Hyperloop train technology development as this is a very promising technology.

Wireless charged trams and metro trains for long traffic density urban areas are other promising technology development areas. Smart wagon with digital technology and self-power will be needed to increase the freight loading output for the growing sector of other balanced goods.

Development of 160-180 kph freight wagon bogie for light wagons is required to be taken up immediately.



“DFCs have Improved Turnaround Time for Freight.”

... says **Sanjiv Garg**, Secretary General, Chartered Institute of Logistics & Transport (CILT), in this interview with Rakesh Rao. Garg was earlier (in 2016–18) associated with Railway Board as Additional Member.

How has Indian Railways transformed in the last 5-6 years?

In the last five years, several positive developments have occurred. First, the dedicated freight corridor (DFC) has been commissioned and is now largely operational. This has significantly reduced the load on the main Indian Railways network, especially in terms of freight traffic. As a result, the turnaround time for freight trains on the western and eastern corridors has improved, providing better transit times and offering some level of transit time guarantee to its users.



Secondly, Indian Railways has made significant strides towards full electrification, with approximately 80-90 per cent of the network now electrified. While the Railways considers this a significant achievement, from a user perspective, the impact might seem minimal, as speeds have not noticeably changed, remaining roughly the same regardless of whether a train is hauled by diesel or electric engines. Nonetheless, the reduction in the need to change traction is an operational improvement, and it can indeed be seen as an achievement.

A third notable development is the introduction of the Vande Bharat (VB) trains, aimed at rationalising passenger traffic by reducing slow-moving trains that stop at every station. Their primary advantage lies in their higher rates of acceleration and deceleration, reducing overall journey times. Though passengers experience little change in terms of the interior travel experience, they seem to appreciate these trains. Over 100 VB trains are now operational across the country, reflecting the public's demand for this service.

Another accomplishment in recent years is the elimination of unmanned level crossings, which had been the cause of numerous accidents and fatalities. All unmanned crossings have either been manned or replaced with rail underbridges or overbridges. Despite these advancements, some challenges remain. The Railways continue to subsidise passenger traffic by approximately ₹600 billion annually, which is cross-

subsidised by charging higher freight rates. This has two effects: first, short-distance passenger traffic, which ideally should use other modes of transport, is moving by rail, affecting the efficiency of long-distance trains. Second, freight services are overpriced, causing certain streams of freight traffic, which should be transported by rail, to shift to road transport. This contradicts National Transport Policy recommendations, which suggest that traffic over 400 kilometres should move by rail. Instead, even traffic over 600-700 km is shifting to roads, which is inefficient and

environmentally detrimental due to higher land use, reliance on fossil fuels, and increased pollution, in contrast to the more sustainable option of rail transport.

Indian Railways is planning to introduce sleeper and metro versions of Vande Bharat. What has been the impact of VB trains on the supplier ecosystem?

Indian Railways had floated several tenders and awarded contracts to consortia of suppliers, typically comprising one Indian and one foreign participant. For instance, Rail Vikas Nigam partnered with a Russian company, and Titagarh Systems also collaborated with another foreign firm. This has allowed the development of many more companies, especially in the private sector. Previously, almost all coaches were manufactured by railway coach factories in Chennai, Kapurthala, and Rae Bareilly. However, Alstom has now established its facilities near Vadodara. Initially, it was only supplying to the Metro Railways, Alstom has now entered the broader Indian market with LHV technology, which was originally imported but is now being manufactured and assembled domestically. Additionally, BEML has partnered to produce Vande Bharat rakes. As a result, there are many more suppliers, bringing various types of technology, and ultimately, the most robust will endure in the long run. This is a positive development for the country.



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“Vande Bharat Trains Hold Significant Export Potential.”

As a key solution provider of propulsion systems for the railway sector, ABB has been growing its foothold in India's locomotive market by providing efficient and sustainable transportation solutions. In this interaction with Rakesh Rao, **Moonish Ghuge**, President, Traction division, Motion business, ABB India Ltd, highlights on how heavy investment in the railway sector is creating business opportunities for OEMs and their suppliers.

How is ABB serving the railway sector in India?

ABB India is a key solution provider of propulsion systems for the railway sector, with a strong presence in the domestic market. Currently, around 1,000 locomotives across the country operate with ABB propulsion technologies, showcasing our deep commitment to driving India's rail industry forward.

Aligned with the Indian government's Atmanirbhar Bharat initiative, ABB has been strengthening its local manufacturing capabilities to support the nation's self-reliance goals.

Our facilities in Vadodara and Bengaluru produce all key components for traction systems, making ABB well-positioned to deliver locally manufactured solutions for both Indian Railways and metro systems. This supports the government's push towards “Make in India” by encouraging domestic production and reducing reliance on imports.

ABB's collaboration extends beyond traditional locomotives, as we are increasingly involved in the mass transit passenger transportation and metro rail segments. For instance, ABB is supporting projects like the Surat and Ahmedabad metro systems, providing advanced propulsion systems in partnership with a leading train OEM.

ABB actively contributes to the global rail sector by exporting propulsion systems through our collaborations with rail OEMs for various international projects. Our focus remains on growing our foothold in India's locomotive market while also expanding into emerging sectors like metro rail, ensuring efficient and sustainable transportation solutions for the future.

How has the railways sector evolved in



recent years? What kinds of trends do you foresee in the next 4-5 years?

The Indian railway sector has seen a remarkable transformation over the past five years. One of the most significant developments has been the rapid pace of electrification, with approximately 1,000 electric locomotives being produced annually. This electrification drive supports India's vision of reducing its carbon footprint, while enhancing the efficiency and sustainability of rail transport. Urban mobility has also been revolutionised by

the expansion of metro rail systems. Major cities like Mumbai, Surat, and Ahmedabad have introduced new metro lines, offering a reliable, energy-efficient alternative for millions of daily commuters. The adoption of advanced technologies in metro rail systems, such as automation and digitalization, has set new benchmarks in terms of safety, efficiency, and passenger comfort.

Over the next four to five years, this momentum is expected to continue. We foresee the development of new metro lines in cities such as Chennai, Bhubaneswar, and Patna, further enhancing urban connectivity. Electrification will also accelerate, with a focus on both freight and passenger services. Additionally, there will be a growing emphasis on sustainability, driven by India's commitment to reducing greenhouse gas emissions in transportation.

This will lead to increased demand for energy-efficient technologies, including advanced propulsion systems and electrification solutions.

At ABB, we are well-prepared to support this growth. Our expertise in traction solutions, combined with cutting-edge digital and electrification technologies, positions us to play a key role in the ongoing evolution of

India's rail network. As the country continues to modernise its railway infrastructure, ABB is committed to enabling sustainable, efficient, and future-ready rail transport.

The government has been investing heavily in the railway sector. How is this creating business opportunities for ABB?

The Indian government's significant investment in the railway sector, including plans for electrification, modernization, and the expansion of metro rail networks, is creating new opportunities for growth and expansion. These investments align with ABB's focus on supporting sustainable transportation solutions through advanced electrification and automation technologies.

As the rail sector continues to evolve, ABB is well-positioned to cater to the growing demand for energy-efficient propulsion systems, traction converters, and power supply solutions.

Our manufacturing facilities in Vadodara and Bengaluru are key hubs in our expansion efforts, allowing us to scale up production to meet the increasing needs of both domestic and international rail projects. These facilities will play a pivotal role in supplying cutting-edge technologies for electric locomotives, metro systems, and high-speed rail, all of which are central to India's railway modernisation plans.

In addition to manufacturing, ABB's deep expertise in digitalization, automation, and energy management equips us to support the railways' long-term sustainability goals.

With the government's focus on electrifying the rail network and reducing carbon emissions, we see significant potential in delivering solutions that enhance operational efficiency while minimizing environmental impact. Overall, the government's investment plans are creating an exciting growth trajectory for ABB in the railway sector, and we are committed to partnering with the railways to deliver smarter, greener, and more efficient transportation solutions.

How is ABB assisting the development of Vande Bharat trains?

Vande Bharat train, a hallmark of Indian Railways' modernisation efforts, has seen significant contributions from various local and global Original Equipment Manufacturers (OEMs). These OEMs are providing state-of-the-art technologies and components to ensure that Vande Bharat trains meet global standards for speed, efficiency, and passenger comfort. As part of this ecosystem, ABB is also playing a role by supplying advanced traction technology that powers these trains.

ABB has partnered with key OEMs to deliver energy-efficient propulsion systems, ensuring optimal

performance and reliability. Our cutting-edge traction solutions, including converters and traction motors, are designed to enhance energy efficiency, reduce maintenance requirements, and support seamless operation at high speeds.

What kinds of R&D/innovations were required for Vande Bharat coaches?

Vande Bharat trains represent a significant departure from conventional loco-hauled passenger coaches. One of the most notable differences is the use of distributed power, which enhances the train's performance with higher acceleration, increased speed, and greater redundancy.

Unlike conventional trains that rely on a single locomotive, Vande Bharat's distributed power configuration ensures that even if one section of the train experiences a failure, other sections can maintain operation, improving reliability and availability.

ABB's traction offerings are part of these trains like the highly efficient underfloor-mounted traction and auxiliary converters that can withstand extreme conditions, including track flooding of up to 650mm. These converters are designed not only for durability but also for efficiency, ensuring that the train operates with minimal energy consumption while delivering top-tier performance.

Another key innovation has been in the development of higher-efficiency propulsion systems that are lighter and more compact, contributing to the overall speed and energy efficiency of the train.

What kinds of new opportunities are you exploring in the railway space for future growth?

The Vande Bharat train sets are not only transforming rail travel in India but also hold significant potential for export to global markets. As Indian Railways looks to expand this technology, ABB, with its global presence and local expertise, is well-positioned to support this growth. We are actively exploring opportunities to collaborate with entities like ICF, RCF, MCF, and private OEMs to cater to the ever-growing demand for advanced train systems.

In addition to Vande Bharat, ABB is focused on expanding its presence in other segments of the rail industry, including metro rail and high-speed passenger coaches. Our propulsion technology offers flexibility and reliability, positioning us as a trusted partner for OEMs in India and abroad.

By continuing to invest in R&D and driving innovation in traction systems, ABB aims to support the future of sustainable and efficient rail transportation in India and across the world.

SME



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“Use of Aluminium in Indian Railways is Growing Steadily.”

The need for fuel efficiency and sustainability is driving the demand for lightweight materials, like aluminium, in railway manufacturing. In this interview with Rakesh Rao, **A S Ganeshan**, Associate Vice President for Domestic Sales and Marketing, Jindal Aluminium, elaborates more on advantages of using aluminium in railway applications.

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

Yes, the use of aluminium in India's railways is growing steadily. One primary reason is aluminium's ability to enhance fuel efficiency while reducing operating costs. Being a lightweight material, aluminium significantly lowers energy consumption, making it an excellent choice for improving trains' overall carbon footprint.

Aluminium's natural properties, such as its resistance to corrosion, ductility, malleability, and electrical and thermal conductivity, make it a sustainable and environmentally friendly solution.

These characteristics are essential for modern high-performance trains, such as the Vande Bharat (VB), where energy efficiency, durability, and strength are necessary for achieving top performance and safety standards. With the continued push for sustainable infrastructure, aluminium's role in the sector is set to grow even further.

What kinds of trends do you foresee in the railway sector in the next 4-5 years?

In the next 4-5 years, we expect to see a shift from heavy to lightweight materials in railway manufacturing, driven by the need for fuel efficiency and sustainability. Aluminium will continue to be the material of choice for future railway developments, with expanding metro rail networks and the introduction of high-speed trains like Vande Bharat and bullet trains requiring lightweight, durable materials.

Sustainability and energy efficiency will also be key areas of focus. The push for greener, more energy-efficient trains will create new opportunities for engineered aluminium to contribute to reducing carbon footprints.



Is Jindal Aluminium involved in manufacturing of Vande Bharat?

Yes, engineered aluminium has been a key contributor to the Vande Bharat project. Aluminium is used in critical components such as seats, pantographs, brake systems, luggage carriers, electrical panels, and doors. Given the energy-efficient and high-speed nature of these trains, the use of lightweight yet strong aluminium solutions has been crucial in meeting performance standards.

Significant R&D has led to meeting the unique requirements of the Vande Bharat trains. Special aluminium alloys like 6063 and 6005, known for their strength, lightweight, and corrosion resistance, meet these requirements. These alloys provide the necessary structural support while ensuring energy efficiency. Additionally, advanced engineering and design optimisation have been employed to ensure these components can withstand high stress and deliver greater comfort and safety for passengers.

What kinds of opportunities are you looking to tap in the railways space?

The government's substantial investments in rail infrastructure, including high-speed trains and metro systems, create significant opportunities for aluminium. This focus on modernising and expanding rail networks aligns perfectly with aluminium's strengths as a lightweight, durable, and energy-efficient material. High-speed trains and metro projects demand materials that enhance performance while minimising weight, making aluminium an ideal choice. Its use in train bodies and components contributes to improved fuel efficiency and reduced energy consumption, supporting the government's sustainability goals. Additionally, these investments open doors for expanding domestic and international aluminium applications.

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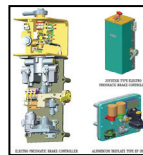


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Emissions Under Control

Honeywell and Samsung E&A are collaborating to help reduce power plant emissions by providing customers a carbon capture solution for power plants.

Honeywell has joined hands with Samsung E&A to jointly market solutions aimed at the hard-to-abate power plant sector globally. The initiative seeks to reduce carbon emissions and contribute to the fight against climate change. It also supports Honeywell's alignment of its portfolio to three powerful megatrends, including the energy transition.

Samsung E&A, a total solutions provider for the global energy industry, will leverage Honeywell's industry-leading carbon capture technologies to help power plants reduce carbon emissions and meet environmental goals. Together, the companies will offer customers access to a carbon capture solution by jointly marketing Honeywell's advanced solvent carbon capture (ASCC) technology.

Honeywell



been a global leader in carbon capture technologies and our collaboration with Samsung E&A only further highlights our commitment to reducing emissions and tackling climate challenges. With decades of experience and a broad portfolio of carbon capture solutions, we are ready to help businesses meet growing carbon mitigation expectations and increasingly stringent environment goals by abating emissions from existing sources."

Honeywell's CCUS technologies have been developed and deployed in numerous applications globally. Between 2023 and 2030, Honeywell estimates that the company's CCUS technologies will have a cumulative impact of mitigating 320 million metric tons of CO₂e.

Honeywell is an integrated operating company serving a broad range of industries and geographies around the world. The company's business is aligned with three powerful megatrends – automation, the future of aviation and energy transition – underpinned by its Honeywell Accelerator operating system and Honeywell Forge IoT platform. As a trusted partner, Honeywell helps organisations solve the world's toughest, most complex challenges, providing actionable solutions and innovations through its Aerospace Technologies, Industrial Automation, Building Automation and Energy and Sustainability Solutions business segments that help make the world smarter, safer and more sustainable.

Samsung E&A is a total solutions provider, offers comprehensive solutions in areas ranging from project development, engineering, procurement, construction and commissioning to O&M, taking the lead in the global energy industry such as energy transition, oil-gas processing, refinery, petrochemical, environmental, industrial and bio. Samsung E&A has delivered exceptional customer-oriented services, completing over 1,500 projects worldwide in regions such as the Middle East, Asia, Americas and Europe.

SME



Carbon capture, utilisation, and storage (CCUS) can significantly reduce carbon dioxide (CO₂) emissions, acting as a crucial stopgap during the expected transition from fossil fuels to lower carbon energy sources.

"As two carbon capture leaders, our collaboration highlights the importance of cooperative approaches in reducing greenhouse gas emissions. Deploying Honeywell's carbon capture technologies allows Samsung E&A to offer viable, more sustainable solutions for global clients during this energy transition," said Hong Namkoong, President and CEO of Samsung E&A.

Carbon capture, utilisation, and storage (CCUS) can significantly reduce carbon dioxide (CO₂) emissions, acting as a crucial stopgap during the expected transition from fossil fuels to lower carbon energy sources. These technologies help to mitigate the environmental impact of various industries responsible for greenhouse gas emissions.

Ken West, President and CEO of Honeywell Energy and Sustainability Solutions, added, "Honeywell has long



Hengst: Filtration on the Move

Under the motto "Filtration on the Move", Hengst presented innovative products for liquid and air filtration as well as a world first: a completely CO₂ -neutral filter at the IAA Transportation 2024, Hannover.



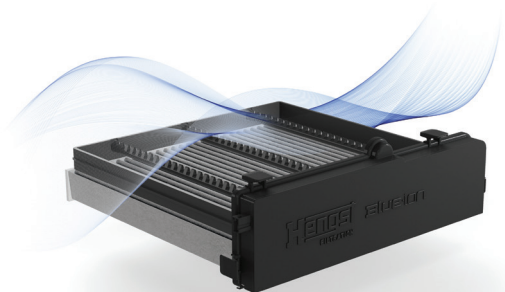
The innovative Blue.iox ion exchanger offers a particularly high level of protection with minimal maintenance

The path to CO₂ -neutral mobility of the future is increasingly shaking up markets worldwide and accelerating change in the automotive and engine industry. Hengst, a specialist in filtration and fluid management, is consistently aligning its product range with future requirements. In order to be able to continue to offer drive and vehicle manufacturers a wide range of innovative solutions, Hengst has pooled its resources in the field of basic research and pre-development at the TechCenter Filtration in Münster. The developers there are researching issues of the future and developing solutions that contribute to the success of the mobility transition and energy transformation, for example. At the IAA Transportation, held in Hannover (Germany) from September 17-22, 2024, the company demonstrated how innovative products from Hengst help to reduce environmental and air pollution, among other things.

Electrified cabin air filter Blue.ion

In the field of air filtration, Hengst utilises its many years of expertise in industrial filtration, on the basis of which it is increasingly developing products for original vehicle equipment. One example is the Blue.ion cabin air filter. It achieves its filter effect through a combination of ionization of the particles in the air flow and polarization of the filter medium. The ionizer is located directly in front of the filter and ensures that the

particles are electrostatically charged. This makes it easier to separate them in the filter, which is also charged. However, ionization alone would reduce the charge in the filter over time and lead to a loss of performance with reduced particle separation. At this point, polarization has a complementary effect. By building up an electrostatic field, the charge in the filter medium is permanently maintained.



The innovative Blue.ion. cabin air filter achieves its filter effect through a combination of ionization of the particles in the air flow and polarization of the filter medium.

Overall, the combined system ensures a consistently high level of separation over the entire service life. The Blue.ion also impresses with its high and energy-efficient filtration performance. It removes even the finest particles (PM₁: particle size 1 µm and smaller) from the intake air, thereby offering maximum protection against pollutants, viruses and allergens and making a significant contribution to a healthy and hygienic interior climate in the vehicle.

Nevertheless, it has a compact design - conventional filters require around five times more installation space for the same differential pressure - and offers low flow resistance even when filtering the finest particles. This means less energy consumption by the fan and lower noise emissions. Here too, the Blue.ion is ahead of conventional filters, which have to work with a five times higher differential pressure to achieve the same performance values.

Solutions for alternative fuels (e-fuels, FAME, HVO)

The defossilization of the transport sector, but also

of off-highway and stationary applications, makes a broad mix of different drive and fuel concepts necessary. This diversification takes into account the countless special requirements in the many different segments and the specific conditions in the various regions worldwide. Depending on the area of application, electric drives with batteries and/or fuel cells as well as combustion engines with synthetic fuels such as e-fuels and hydrogen or with biofuels such as hydrogenated vegetable oils (HVO) or fatty acid methyl esters (FAME) are used.

Hengst continues to develop its fuel filter concepts so that they can also be used with alternative fuels. The Blue.maxx fuel filter system, for example, is suitable for all current and future fuels used worldwide - whether fossil, biogenic or synthetic. In order to meet the diverse requirements of modern engine technology in the commercial vehicle and off-highway sectors, Hengst has designed the system with a modular structure so that it can be quickly and easily adapted to different applications as an original equipment or retrofit solution. Depending on the separation, fineness and fuel requirements, various single or multi-layer elements of the Energetic fuel filter insert are available.

The Blue.maxx system can be designed in two parts as a pre-filter and main filter or as a combined main filter with integrated water separation. The modular system contains four basic variants for volume flows of 50 to 750 litres/hour, which can be individually adapted using various additional elements.



The Blue.maxx fuel filter system, for example, is suitable for all current and future fuels used worldwide

Filter systems for hydrogen engines and fuel cells

When developing combustion engines that run on hydrogen, a potentially increased accumulation of water in the engine oil and the easy flammability of hydrogen must be taken into account. If unfavorable engine operating conditions are likely to cause water to enter the engine oil, Hengst offers specially designed fully synthetic filter elements and sealing materials. The oil filter modules from Hengst can be flexibly configured and cover the specific requirements of hydrogen as well as other alternative fuels such as FAME or HVO. In hydrogen engines, blow-by gases that enter the crankcase via the cylinders can form an explosive mixture.

An innovative active ventilation system from Hengst minimizes the hydrogen concentration in the crankcase and effectively counteracts the risk of ignition. It consists of specially developed air valves through which fresh air is fed directly into the crankcase, so that there is always a positive pressure gradient to the crankcase. Hengst has developed the active ventilation as part of an overall filter concept for hydrogen engines, which also consists of the electrically driven Blue.tron disk separator. Depending on the speed and load of the combustion engine, an optimum separation rate is always achieved for the engine oil in the blow-by flow.

In fuel cells, ions are introduced into the coolant during operation due to ageing. Effective filtration is therefore required to ensure safe operation. The innovative Blue.iox ion exchanger from Hengst offers a particularly high level of protection with minimal maintenance. The unique design of the filter cartridge with axial filter flow and the special mixed bed resin system for cation and anion exchange ensure high filtration efficiency over the entire service interval. The ion concentration in the coolant circuit of the fuel cell is thus reduced very quickly.

The air path of a fuel cell also places special demands on filtration. In order to achieve a long service life and high performance, the intake air must be cleaned very effectively of particles and substances such as nitrogen oxides, ammonia and sulphur oxide. A specially developed cathode air filter system from Hengst with a multi-layer structure protects the components of the fuel cell. Thanks to its modular design, the system can cover a wide power range of fuel cells from 100 to 500 kilowatts. In addition to products for coolant and air filtration, Hengst also develops solutions for system integration directly on the fuel cell stack. One example of this is a water separator for anode gas recirculation, which is characterized by an innovative valve configuration of the purge and drain valve.



Food for “Safety” Thoughts

Sesotec's X-ray inspection devices reliably detect foreign bodies in food products. These X-ray scanners ensure maximum safety in food production thanks to the eSIGN LED signal tower.



Extremely high hygiene standards apply in the food industry - the eSIGN LED signal tower meets these standards and safely and reliably indicates the current status of the system

Safety and quality are paramount in the production, processing and packaging of food. Compliance with hygiene regulations and the guarantee of first-class end products is a top priority. Consumers expect high-quality and hygienically flawless products, while manufacturers rely on smooth, process-optimised and efficient production.

An important aspect of this is the detection of foreign bodies and contaminants that could impair the quality and integrity of the food. This is where X-ray inspection devices from Sesotec come into play, reliably detecting and identifying foreign bodies in unpackaged and packaged products.

A key component of the X-ray scanners is the eSIGN LED signal column (manufactured by WERMA). Thanks to its bright signals, it clearly and reliably displays the current status and thus not only ensures a quick and clear overview of the inspection process, but also enables rapid intervention and reaction in the event of faults or error messages.

Sesotec reliably detects foreign objects

Sesotec was founded almost 50 years ago in Schönberg, Bavaria (Germany). The company is a leader in the field of mechanical engineering for foreign object detection, material sorting and analysis and has always been firmly rooted in the Bavarian Forest. **Johann Süß** has been working as an X-Ray Engineer in the Electrical

Design department at Sesotec for five years and smiles: “We work where others go on vacation!”

The company now employs more than 740 people and, in addition to its headquarters in Germany, is represented by a total of six subsidiaries in Singapore, China, USA, India, Canada and Thailand, six foreign subsidiaries in Italy, France, Spain, Poland, the Czech Republic and Malaysia, as well as over 60 partners in all major markets around the world.

Maximum safety thanks to X-ray scanner

At Sesotec, the focus is on top quality combined with passion and technological progress. “It is our goal and our aspiration to be able to offer every customer a tailor-made solution that not only meets their requirements, but exceeds them,” says Johann Süß. “On this basis, we have developed an X-ray inspection system specifically for users in the food industry that immediately detects foreign objects in unpackaged products clearly, quickly and reliably.”

The “Raycon D+ HX LW Hygienic” X-ray inspection system not only offers maximum performance in the inspection of unpackaged food and bulk goods, but also meets the highest standards, complies with all important food industry guidelines and applies the principles of hygienic design. “This combines highly efficient foreign body detection with maximum user-friendliness and



X-ray scanner including LED signal light

hygienic design,” says Johann Süß. “And reliable protection against complaints and recalls can be ensured.”

Clear signals to indicate faults

The way the Raycon D+ Bulk series works is very simple: the bulk materials are distributed evenly across the entire width of the conveyor belt via an integrated feed hopper and inspected. The X-ray scanners not only detect metals, but also contaminants such as glass, ceramics, raw bones, PVC and stone.

“As soon as the scanner detects a foreign object - no matter how small - it is sorted out. The system stops immediately in the event of an ‘error status’ and the signal light clearly indicates this,” explains Johann Süß. “The yellow light of the eSIGN LED signal tower cannot be overlooked. This allows the machine operator responsible to react immediately and not only prevents contamination of the food, but also avoids long downtimes. This saves time, money and increases productivity!”

Hygienic design - down to the last detail

The materials of all components of the Raycon D+ HX LW Hygienic are designed for the high protection class IP69 so that they can be cleaned repeatedly and intensively without abrasion. These requirements were also placed on the signal towers that were to be used.

“For our X-ray scanners, we were looking for a light that not only had a high degree of protection, but also complied with all applicable regulations in the food sector and was constructed in accordance with hygienic design guidelines.” He continues: “We have already been using various signaling devices from WERMA for many years. In the course of this project, however, we also looked at solutions from competitors. However, no other beacon was able to meet the high requirements and we are very pleased that we have once again found what we were looking for at WERMA.”

Gottfried Zeidler works in technical sales at WERMA and immediately introduces Sesotec to the new, elegant and versatile eSIGN LED signal tower. “This signal tower has been developed, tested and certified according to the highest criteria and bears the ‘Fraunhofer Tested Device’ seal of approval - an internationally renowned test mark for products that have been objectively qualified according to recognized standards and guidelines with regard to their cleanroom suitability,” says Zeidler. “In addition, the high degree of protection IP66 / IP69k ensures improved resistance to typical production substances, while UL Type 4X guarantees resistance to UV radiation and environmental influences. Simply the perfect solution for status indication in the food production sector!”



The eSIGN LED signal tower

eSIGN LED signal tower: The best signal tower ever with IP 69K

The eSIGN is a shining example of a signal tower with visibly more performance: more colours, more effects, more flexibility and more individuality! Thanks to electrical modularity combined with the latest LED technology, various signaling modes with multiple colours, brightness levels and illuminated images can be implemented - from the classic traffic light display to completely customer-specific settings.

Sesotec uses the version with 9 segments, which display the current status in the colours red, yellow, green and blue over the entire surface. If the red signal lights up, the X-rays are on, green means the food is being inspected, yellow indicates a fault in the system and the blue signal indicates an audit check. In addition, this visual display is reinforced by an audible alarm, which uses an insistent, loud tone to indicate that there is a fault condition, e.g. the inspection is interrupted or the conveyor belt is at a standstill.

“We at Sesotec are delighted with the elegant design, the excellent workmanship and the simple installation and easy integration into our systems,” says Johann Süß. “What’s more, the eSIGN has all the necessary approvals and the required high degree of protection - simply perfect!”

Johann Süß says: “The bright and loud signal tower shows the current status of our Raycon D X-ray scanners safely and reliably. Our customers are happy and so are we, of course!”

When asked whether the eSIGN LED signal tower was able to meet expectations, Süß replies with a smile: “100 per cent! The eSIGN is by far the best product for our application!”

SME



Avians High-Speed Clean Room Doors for Precision and Sterility

The company's high-speed clean room doors have emerged as a critical asset in healthcare and research laboratories.

In the realm of healthcare and scientific research, precision and sterility are paramount. Avians high-speed clean room doors have emerged as a critical asset in these sectors, facilitating the creation of controlled environments that uphold the integrity of experiments, tests, and medical procedures. Let's delve into how these doors are revolutionising healthcare and research laboratories.

1. Creating sterile environments: Healthcare and research laboratories operate in spaces where even the slightest contamination can alter experimental outcomes or compromise patient safety. Avians high-speed clean room doors provide an extra layer of protection by effectively sealing off the laboratory from external pollutants. This ensures that delicate medical procedures, sample handling, and intricate research processes take place in a controlled environment, free from interference.

2. Precision in research: From microbiology to genetics, research conducted in laboratories demands precision and accuracy. Avians high-speed clean room doors contribute to the precision by minimizing disruptions caused by slower door systems. The doors' rapid operation enables researchers to move swiftly between areas without compromising the controlled conditions required for their work.

3. Supporting medical procedures: In medical settings, where surgical procedures and critical treatments are performed, maintaining sterility is a matter of life and death. Avians high-speed clean room doors play a crucial role by swiftly sealing off sterile operating rooms and procedure areas. This prevents the ingress of contaminants that could lead to post-surgical infections or complications, safeguarding patient well-being.

4. Streamlining workflow: In bustling healthcare and research environments, time is of the essence. Avians high-speed clean room doors facilitate the seamless movement of medical professionals, researchers, and equipment. Rapid door operation ensures that there's minimal disruption to the workflow, allowing medical staff to focus on patient care and researchers to stay immersed in their studies.

5. Compliance with stringent regulations:



Healthcare and research laboratories are subject to stringent regulations to ensure safety and accuracy. Avians high-speed clean room doors are designed with these regulations in mind, incorporating features that enhance safety and sterility. This compliance helps laboratories meet the standards set by governing bodies and maintain their reputation for quality research and patient care.

6. Future-ready solutions: As healthcare and research fields evolve, so do the technologies that support them. Avians' commitment to innovation positions its high-speed clean room doors as future-ready solutions. The continuous development of these doors aligns with the dynamic nature of healthcare and research, allowing laboratories to stay ahead in an ever-advancing landscape.

Conclusion

Avians high-speed clean room doors are invaluable tools in healthcare and research laboratories, where precision and sterility are non-negotiable. By creating controlled environments, streamlining workflows, and complying with regulations, these doors empower medical professionals and researchers to perform their tasks with the utmost confidence and accuracy. As we conclude this series, it's clear that Avians' innovation is not just about doors; it's about enabling progress, enhancing efficiency, and driving excellence in every industry it touches.

SME

For details, contact Avians on Mob: +91 83903 00400,
Email: sales@avians.co.in or visit www.avians.co.in

(Communication provided by the management of the company)

HEPA FILTER

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Noida
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Email: sales@teral-aerotech.com

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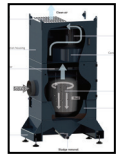


Contact:

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STATIONARY WET SCRUBBERS

Neos Air Filtration Private Limited offers a wide range of wet scrubbers. It offers stationary wet scrubbers for highly explosive and high spark applications. The wet scrubber, NAS, is designed for such applications where a mechanical filter cannot be used.



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Dynavac India Pvt Ltd offers a wide range of multiple bag dust collector. It can be used for a variety of applications while providing dependable, long life-cycle, maintenance free performance. These are some of the most efficient and cost effective dust collector models.



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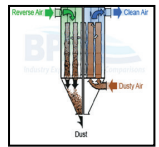


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Dynavac India Pvt Ltd, Coimbatore
Mobile: 08220011158, 09443721682
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DUST COLLECTOR - DEDUSTING SYSTEM

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“Safety in robotic systems is must for smooth operations.”

The Reliance-backed Addverb Technologies is known for offering cutting edge robotic products to enhance efficiencies & productivity in warehouses & factories. The company is preparing for the future by focusing on advanced technologies such as AI, machine learning, and 5G, says **Satish Shukla**, who co-founded Addverb in June 2016 with a vision of touching lives by pioneering human-robot collaboration. Speaking to Rakesh Rao, Satish Shukla emphasises on the importance of R&D to develop unique automation solutions for the factories of the future.



How is Addverb serving the needs of manufacturing sector?

At Addverb, we focus on providing automation solutions tailored to meet diverse operational needs. Our portfolio includes various types of robots, such as mobile robots, sorting robots, and multi-carton picking robots, designed to enhance warehouse and manufacturing operations. We use AI, machine learning, and IIoT to improve performance and efficiency. Our goal is to offer adaptable and scalable solutions that support different industries, including manufacturing and logistics. We also strive to keep our solutions flexible and responsive to changing demands, ensuring that we can help our clients stay competitive and efficient.

How critical is R&D for robot makers?

R&D is crucial for driving innovation and maintaining competitive advantage in robotics. It fuels the development of new technologies and solutions, such as customised automation systems and modular robotics, which cater to evolving industry needs. Investing in R&D allows us to integrate advanced technologies like AI, IoT, and 5G into our robots, enhancing their capabilities and adaptability. This ongoing innovation not only improves our product offerings but also boosts customer satisfaction and market adoption, directly impacting our sales and market position.

What is the present status of adoption of automation and robotics in India?

Automation and robotics adoption in India is on the rise, particularly in manufacturing, logistics, and healthcare sectors. The push towards Industry 4.0 and the Indian government's Make in India initiative are key drivers. Increased demand for precision, scalability, and quality, coupled with a shortage of skilled labour, are

accelerating the shift towards automation. While challenges like high initial costs and technical expertise gaps exist, sectors such as automotive, e-commerce, and pharmaceuticals are increasingly leveraging robotics to stay competitive both domestically and globally.

How are emerging technologies influencing development of robots?

Emerging technologies are transforming robotic solutions by enhancing their intelligence, connectivity, and adaptability. AI and machine learning enable robots to perform complex tasks and learn from data, improving efficiency and reducing human intervention. IoT facilitates seamless integration and real-time data sharing between robots and other systems, while 5G ensures rapid and reliable communication, crucial for dynamic environments. Together, these technologies make robots more autonomous, responsive, and capable of handling diverse industrial challenges.



The future shopfloor will be characterised by smart, self-sufficient environments. Robots and cobots will work efficiently alongside humans, adapting to real-time data and optimising processes.

How important is it to ensure adequate machine safety features in robots?

Ensuring machine safety in robots is paramount to preventing accidents, protecting human workers, and complying with safety standards. With the increasing integration of robots in industries, especially collaborative robots (cobots) that work alongside humans, robust safety features are essential. Safety measures include sensors, emergency stop systems, and fail-safes that ensure the robot ceases operation if it detects human presence or anomalies in performance.

Moreover, regulatory compliance with safety standards such as ISO 10218 and ISO/TS 15066 for robot safety ensures that manufacturers adhere to strict guidelines. These standards are crucial not only for protecting the workforce but also for building customer trust and reducing liability risks. Safety in robotic systems also plays a key role in ensuring smooth operations, as any safety incident can result in operational downtime and financial losses. In an era where robots are integral to production lines, safety

features are critical to their adoption and long-term success.

While large companies are investing in robotics solutions in India, small and medium enterprises (SMEs) are hesitant (because of lack of funding and technical know-how). Do you serve SME manufacturers?

Yes, Addverb serves SME manufacturers by offering scalable and cost-effective automation solutions. We understand the financial and technical constraints SMEs face, so we provide modular robotics systems that can be customised to fit their specific needs. Our flexible financing options and comprehensive support, including training and user-friendly interfaces, help bridge the knowledge gap and reduce the burden of high initial costs. By focusing on productivity and efficiency, we enable SMEs to benefit from automation without extensive technical know-how or large capital investments.

How are you managing your supply chain efficiently amid uncertainty in the market?

To navigate market uncertainties, Addverb employs advanced digital tools and real-time analytics for supply chain management. We use AI for demand forecasting and inventory management, ensuring resilience against disruptions. By diversifying our supplier base and leveraging IoT for supply chain monitoring, we maintain control and adaptability. Regular assessments and strong supplier partnerships help us manage risks and optimise operations, allowing us to respond effectively to changes in demand and supply chain dynamics.

How are you gearing up to meet the needs of the factories of the future?

The future shopfloor will be characterised by smart, self-sufficient environments where AI, IoT, and 5G technologies are seamlessly integrated. Robots and cobots will work efficiently alongside humans, adapting to real-time data and optimising processes. Smart factories will feature minimal human interaction, relying on AI-driven decision-making and digital twins to simulate and enhance operations. 5G connectivity will enable faster, more flexible manufacturing, leading to improved safety, productivity, and product quality.

We are preparing for the future by focusing on advanced technologies such as AI, machine learning, and 5G. Our goal is to develop flexible and scalable solutions that can integrate well with future factory environments. We are committed to continuous innovation and collaboration with our partners to ensure our solutions meet the needs of modern industrial facilities.

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Intelligent Partnership!

Detroit Engineered Products (DEP) and Hexagon have forged strategic partnership to expand distribution of CAE platform DEP MeshWorks in India.

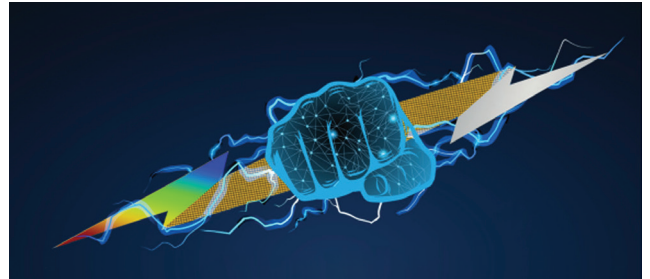
Detroit Engineered Products (DEP), an engineering solutions and product development company that created the CAE platform DEP MeshWorks, has formed a strategic partnership with the 'Design & Engineering' (formerly MSC Software) business unit of Hexagon Manufacturing Intelligence India Pvt Ltd (HMII). Hexagon Manufacturing Intelligence is a renowned global pioneer in simulation software, offering powerful tools that enhance engineering methods and drive innovation in product manufacturing.

Under this new partnership, HMII will support expansion of DEP's groundbreaking CAE platform DEP MeshWorks in India. MeshWorks is distinguished by its advanced capabilities such as highly efficient CAE meshing & model assembly tools that cut down model build time drastically, Morphing & Parametric CAE technology for fast design iterations & optimization, Concept CAE modelling with Zero CAD, Process automation that provides 2X to 5X CAE workflow time reduction and much more. This suite of features empowers engineers to tremendously accelerate CAE workflow time, optimise products to meet/exceed performance & reduce cost & weight – all this with significantly reduced software investment cost.

Some of the key highlights of the partnership are:

- **Enhanced innovation:** The partnership aims to drive technological advancement by equipping Indian companies with cutting-edge CAE tools at an exceptional value. This initiative is expected to boost engineering and design capabilities, fostering growth and innovation within the region.
- **Expanded reach:** HMII's robust distribution network and deep understanding of the Indian market will facilitate DEP's access to a broader customer base, increasing the availability of MeshWorks to local businesses and engineering professionals.
- **Comprehensive support:** Both DEP and HMII are committed to providing localized support and training for MeshWorks users. This collaborative effort ensures a smooth transition and maximizes the software's effectiveness in meeting the specific needs of the Indian market.

Radha Krishnan, President and Founder of DEP, commented, "We could not have chosen a better partner, and are thrilled to partner with HMII. HMII's in-depth



market knowledge and extensive network make them the ideal partner to introduce our MeshWorks software platform to a wider audience. We are confident that this collaboration will deliver substantial value to the CAE users in India."

Sridhar Dharmarajan, Executive Vice President & Managing Director of Hexagon Manufacturing Intelligence India, added, "Over the years, we've built valued partnerships that have helped us better serve our customers and meet the growing demands of the industries we serve. We are thrilled to collaborate with DEP MeshWorks for its expansion in India. MeshWorks promises to be a revolutionary CAE platform poised to transform product development across industries. We look forward to working closely with the DEP team to ensure that our customers always stay at the forefront of technology and innovation."

Detroit Engineered Products is a prominent engineering solutions and product development company founded in 1998 in Troy (Michigan, USA). Fuelled by a strong commitment to research and development, DEP has a global footprint extending to Europe, China, Korea, Japan, Canada, and India. At the heart of DEP is a deep-seated passion for engineering, which inspired the creation of DEP MeshWorks, an advanced CAE platform designed for rapid concept CAE and CAD model generation, parametrization of CAE models, optimisation, and sophisticated meshing and CAD morphing. By transforming the product development process, DEP MeshWorks has delivered innovative solutions and substantial value to numerous clients across multiple industries.

Hexagon is the global leader in digital reality solutions, combining sensor, software, and autonomous technologies. Hexagon has approximately 24,000 employees in 50 countries and net sales of approximately Euro 5.4 billion.

SME



Tata Steel Commissions India's Largest Blast Furnace

With a total investment of ₹270 billion, the Phase II expansion at Kalinganagar will take the total capacity at the site from 3 million tonnes per annum (MTPA) to 8 MTPA.



Tata Steel successfully commissioned India's largest blast furnace at Kalinganagar, Odisha. With a total investment of ₹270 billion, the Phase II expansion at Kalinganagar will take the total capacity at the site from 3 million tonnes per annum (MTPA) to 8 MTPA. The new facility was inaugurated by **T. V. Narendran**, CEO and Managing Director, Tata Steel, in the presence of senior leaders of the Company.

The new blast furnace will significantly boost the plant's overall production capabilities, allowing Tata Steel to meet the growing demands of various industries, including automotive, infrastructure, power, shipbuilding, and defence. It will also provide advantages in specific areas like oil & gas, lifting & excavation, and construction.

With the Phase II expansion, Odisha has emerged as the largest investment destination in India for Tata Steel, with a total cumulated investment of over ₹1000 billion in the last 10 years.

T. V. Narendran, CEO and Managing Director, Tata Steel commented, "The commissioning of India's largest blast furnace at Kalinganagar is a momentous occasion for the steel industry, setting new benchmarks in capacity, technology, and sustainability. A key enabler of socio-economic development in the region, the expansion not only strengthens Tata Steel's position as a leader in high-end, value-added steel segments but also showcases our advanced engineering prowess. It underscores our commitment to boosting private investment in India, aligning with the nation's vision for

self-reliance and sustainable industrial growth. On behalf of Tata Steel, I thank the Government of Odisha for their unwavering support and applaud the collective efforts of our employees, suppliers & vendor partners, and all other stakeholders in enabling this significant milestone."

The new blast furnace, with a volume of 5,870 m³, is equipped with state-of-the-art features for long campaign life and an eco-friendly design to optimise the steelmaking process. This blast furnace will utilise four top combustion stoves, a first in India, along with two preheating stoves for optimum specific fuel consumption in hot metal production. In a first for Tata Steel, a dry gas cleaning plant has been installed to maximise energy recovery from by-product gas. The world's largest Top Gas Recovery Turbine (TRT) of 35 MW power generation capacity will help with the recovery of an additional 10 per cent of energy. An evaporative cooling system is being employed for the first time in an Indian blast furnace, optimising space footprint while lowering specific water and power consumption by approximately 20 per cent compared to conventional designs. The blast furnace will also have a zero-process water discharge plan with rainwater harvesting.

Key facilities in Phase II expansion at Kalinganagar also include a pellet plant, coke plant, and cold rolling mill, each incorporating advanced technologies and sustainable practices. The new state-of-the-art steel plant incorporates modern technologies focused on value-added products, operational efficiency, and a significant reduction in carbon footprint.

The Kalinganagar plant is not just an industrial complex; it is a key contributor to the socio-economic development of the region. Tata Steel has invested significantly in community development programmes that focus on education, healthcare, and livelihood opportunities, positively impacting over 200,000 people in the surrounding areas.

The success of Tata Steel Kalinganagar is also deeply rooted in its workforce. Tata Steel's 'Safety First' culture ensures that the highest safety standards are maintained, making Kalinganagar one of the safest steel plants in the country and the world.



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Powering Energy Efficiency

Industrial products with premium resistance wire, optimal heat transfer, customised solutions, and maintenance-free designs provide substantial advantages in the quest for energy efficiency. They not only contribute to a decrease in energy usage, but they also enhance overall operational effectiveness and lower expenses over time, says **Dhawal Gupta**, Co-Founder, Subhot Enterprises.



In today's industrial landscape, energy efficiency has become a critical focus. Industries are constantly seeking ways to optimise their operations and reduce energy use as environmental concerns and energy costs rise. Industrial products' energy efficiency is essential for cutting expenses and minimising their negative environmental effects. High-quality resistant wire ensures precise control of heat and electrical resistance, which is crucial for improving the energy performance of equipment in numerous industries.

This lowers power losses and promotes effective energy conversion. Another crucial component is optimised heat transfer, which guarantees efficient thermal energy distribution throughout industrial

systems to maximise productivity and reduce waste. Optimised heat transmission makes Better thermal management possible when paired with cutting-edge materials, effective engineering, and design. This is crucial for energy-intensive processes like manufacturing, heating, and power generation.

Not less important than customisation is attaining energy efficiency. Customised solutions enable industrial goods to fulfill certain operating needs, enhancing efficiency while cutting energy usage. By making materials and components unique, you may maximise their lifespan and operating efficiency by ensuring that they are appropriate for particular temperatures, conditions, and workloads. High-quality resistance wire,

superior heat transfer characteristics, tailored products, and maintenance-free designs can significantly increase energy efficiency.

Let's address how these elements affect industrial systems' overall performance and energy savings.

1. High resistance wire for energy savings

An essential part of many industrial heating applications is resistant wire. The type of wire used in heating components, furnaces, or ovens can have a big impact on how much energy they use. The goal of high-quality resistant wire is to minimise energy loss while providing constant resistance.

- Low energy loss: High-grade resistive wire makes sure that more electrical energy is used for the intended heating operation by reducing the amount of energy dissipated as heat.
- Durability: These cables frequently last longer, which reduces the need for repairs and maintenance expenses and increases operational efficiency.
- Increased efficiency: These wires' improved conductivity and heat resistance lead to increased heating efficiency, which results in energy savings.

2. Heat transfer optimisation for maximum energy utilisation

Energy efficiency in any industrial operation involving heating or cooling depends on efficient heat transmission. Processes operate as efficiently as possible with little energy loss thanks to optimised heat transmission.

- Even heat distribution: Excellent engineering and materials guarantee that heat is dispersed uniformly throughout the system, avoiding hot or cold areas that might cause inefficiencies.
- Decreased heat loss: More energy that stays in the process is directed toward the environment thanks to improved insulation and materials with exceptional heat retention qualities.
- Quick heat recovery: Industrial systems that have effective heat transfer mechanisms recover more quickly, resulting in reduced downtime and higher energy efficiency.

3. Personalised industrial products: designed for effectiveness

When improving industrial equipment for energy savings, customisation is essential. There could be inefficiencies if off-the-shelf solutions don't always match the unique requirements of every industrial operation.

- Tailored to application: When designing customised industrial goods, the unique thermal and operational needs of an industrial process are taken into

consideration. As a result, no energy is lost in systems that are either overpowered or underpowered.

- Appropriate measurement: By optimising customised equipment for precise energy requirements, excessively large systems that use more energy than required can be avoided.
- Advanced materials: By tailoring the material selection for certain applications, energy efficiency can be optimised under particular operating conditions.

4. Low-maintenance options for extended effectiveness

The energy efficiency of industrial operations can be adversely affected by frequent maintenance and downtime. Designs that require no maintenance are crucial for optimising uptime and reducing wasteful energy usage.

- Decreased downtime: Low-maintenance equipment has fewer shutdowns, which guarantees uninterrupted operation and uses less energy to restart systems.
- Longer equipment life: Maintenance-free solutions typically have a longer lifespan, which means less frequent replacements and the energy expenditures involved in producing and setting up new parts.
- Optimised performance: Designs that don't require maintenance are frequently built to operate at their best for extended periods, guaranteeing steady energy efficiency throughout their lifetime.

Summing up

Industrial products with premium resistance wire, optimal heat transfer, customised solutions, and maintenance-free designs provide substantial advantages in the quest for energy efficiency. They not only contribute to a decrease in energy usage, but they also enhance overall operational effectiveness and lower expenses over time. Adopting these latest innovations is crucial for being competitive and ecologically conscious as firms prioritise sustainability.

Industries may enhance their bottom line and the environment by using these energy-saving solutions, which can also drastically reduce their carbon footprint, energy expenditures, and system longevity and dependability.

SME



About the author:

Dhawal Gupta is the co-founder of Subhot Enterprises. The expansion and prosperity of Subhot Enterprises have been greatly attributed to his vision and leadership. The company has grown immensely, turning over ₹600 million during his leadership.



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Igus Ensures Maintenance-Free Bottling Systems

After an extensive series of tests and optimisations, the igubal H3 bearing proved to be the optimal choice and since the changeover in September 2022, these bearings have shown very little wear.



Chimay brewery was able to significantly increase its efficiency and reduce maintenance costs by choosing igus® bearings.

The renowned Belgian brewery Chimay, known for its traditional Trappist beer, relies on maintenance-free spherical bearings from igus in its bottling plant. By replacing rusty, seized ball bearings with lubrication-free igubal H3 bearing inserts, the brewery was able to increase efficiency and reduce maintenance.

The Chimay Brewery is one of twelve breweries in the world that produces Trappist beer, made by monks. Interestingly, the majority of their profits are intended for social projects. Brewed at Notre-Dame de Scourmont Abbey in the Belgian province of Hainaut, Chimay produced around 18.5 megalitres of beer in 2018. The high production requirements posed special challenges for the bottling plants, especially due to frequent failures and the seizing of conventional metallic ball bearings to shafts. The replacement of a defective ball bearing could

take up to one and a half days, which unfortunately led to production losses. As part of a project to optimise the filling lines, Chimay turned to igus® to find a permanent solution to this problem. After an extensive series of tests and optimisations, the igubal H3 bearing proved to be the optimal choice and since the changeover in September 2022, these bearings have shown very little wear.

Lubrication-free, safe and easy to clean

The igubal H3 bearings offer many advantages that significantly improve the brewery's production process. They are made of tribologically optimised high-performance plastics. This makes them lubrication-free, maintenance-free and corrosion resistant. Even at speeds of 200 rpm, the bearing material is working well within design limits. The igubal bearing inserts are much easier to install and replace than metal ball

bearings, which drastically reduces maintenance times. In addition, there is no longer any wear-related shaft damage, which extends the service life of the entire system. Another advantage is the high resistance of the igubal H3 bearing inserts to chemicals.

Despite regular cleaning processes, they show no signs of damage. Due to these characteristics, the line achieves an impressive speed of 55,000 bottles per hour. After a successful test phase on three different production conveyors, Chimay has already ordered 150 additional bearing inserts to replace the remaining ball bearings. "With the igubal H3 bearings, we have been able to solve the most important problem on our conveyor systems and significantly extend the service life of our systems," says Vivien De Schryver, Maintenance Technician, Chimay.

SME



Electrified Growth of Mobile Hydraulics

By 2030, we're expecting approximately 150k battery powered vehicles to be sold in the off-highway space (excluding forklifts, boom lifts, and scissor lifts). 2030 could represent an inflection point for electrification in off-highway as many off-highway OEMs have set for achieving various emissions-related sustainability goals, says **Blake Griffin**, Research Manager, Interact Analysis.



The electrification of the powertrain is viewed as an inevitability by most of those involved in the off-highway vehicle space. However, opinions regarding the extent of electrification reach, the timing, and the means to electrify, vary greatly depending on who you ask. Opinions become even more convoluted when discussing the impact that powertrain electrification is likely to have on the working functions of a vehicle.

Changes to the hydraulic system (often the least efficient system on an off-highway vehicle) are viewed by

many vehicle OEMs as necessary to achieve electrification ambitions. These changes range from the installation of more efficient hydraulic components to full hydraulic replacement, and the suitability of each potential solution is determined by factors such as the size of the vehicle and the number of working functions.

In our view, future hydraulic system architectures amidst powertrain electrification can be grouped into three categories:

- Electrified powertrain coupled with a centralised

hydraulic system

- Electrified powertrain coupled with a decentralised hydraulic system
- Electrified powertrain with complete hydraulic replacement

We've spent several months hosting interviews with hydraulic suppliers and vehicle OEMs alike to gather opinions on the suitability of each of these as vehicles become increasingly electrified. This insight will weigh the pros and cons of each, and offer an opinion on the suitability of each of these systems within future off-highway vehicles.

How quickly is the electrification of the powertrain actually approaching within?

During the interviews we conducted with hydraulic vendors and vehicle OEMs, it became clear that the trend toward electrification would hover and influence nearly every discussion point. Many hydraulics suppliers are fearful of electrification as they view it as an existential threat to the market, while others are embracing it as an opportunity to innovate and differentiate. In this context, we want to first express our perspective on how quickly the electrification trend is approaching in the off-highway space.

Below is a forecast we've derived based on conversations with vehicle OEMs, the timing of public announcements from vehicle suppliers, and proposed legislation expected to drive electrification. This forecast is part of a broader study we conduct annually on the off-highway vehicle market.

The vehicle types included in this calculation are:

- Tractors
- Combine harvesters
- Full tree forestry system
- Cut-to-length forestry system
- Telehandlers
- Forklifts
- Boom lifts
- Scissor lifts
- Cranes
- Crawler loaders
- Crawler dozers
- Excavators
- Wheeled loaders
- Backhoe loaders
- CTL/skid-steer loaders
- Asphalt finishers
- Motor graders
- Rollers
- Cement mixer trucks
- Commercial Dump Trucks
- Haul/dump truck
- Underground LHDs

- Mining shovels

It should be noted that forklifts and various aerial work platforms are excluded from this figure (these tend to have the highest electrification rates currently).

The first thing you will likely notice, is the limited adoption of electrified off-highway vehicles through 2030. It's true that while there has been a lot of discussion surrounding electrification for the last decade, the actual adoption of electrified off-highway vehicles remains limited. A combination of factors has led to slow adoption including battery limitations (both in terms of performance and cost), as well as a generally conservative approach by off-highway OEMs towards implementing significant changes within their vehicles.

By 2030, we're expecting approximately 150k battery powered vehicles to be sold in the off-highway space (excluding forklifts, boom lifts, and scissor lifts). In our view, 2030 could represent an inflection point for electrification in off-highway as it is the date many off-highway OEMs have set for achieving various emissions-related sustainability goals. From 2030 onwards, we expect the market for these vehicles to expand more rapidly.

Three paths for electrification of mobile hydraulic architectures

As electrification approaches, there's a large question looming over mobile hydraulic vendors regarding which direction to take their portfolios to support these changes. As mentioned, we expect the market for mobile hydraulics to move in three separate directions:

1: An electrified powertrain with a centralised hydraulic architecture

The largest gains vehicle OEMs will see from a sustainability perspective come when the vehicle becomes electrified. In certain cases, when this shift is made, it is unlikely that the hydraulic architecture within the vehicle system will change dramatically. Under a centralised architecture, there will be one or a few centralised pumps driving fluid throughout the system to the working functions. Within certain vehicles, this design just makes practical sense. It is the most cost-effective from a production standpoint, and represents the least amount of risk associated with system redesign.

This system requires the least amount of redesign from a vehicle OEM perspective, but it does not address the efficiency issues that arise when utilising a traditional hydraulic architecture. Under this architecture, the losses resulting from the hydraulic system remain large. As a result, it becomes difficult to electrify large vehicles or those with a high number of working functions due to limitations on the battery side of the equation.

- Advantages of electrified powertrain without centralised hydraulic system are:
 1. Most Cost-Effective Solution (from production standpoint)
 2. Legacy System i.e. thoroughly vetted/tested. Represents the current status quo which is perceived largely to be less risky from a design perspective.
 3. Well suited for tractor applications which need to support non-standard implement systems. Maintaining a legacy hydraulic system in this case can make integrating with 3rd party implement systems more feasible.
- Dwarbacks of electrified powertrain without centralised hydraulic system are:
 1. The least efficient system of the three being considered.
 2. Still requires a trained fluid power engineer for maintenance.
 3. Becomes less efficient as the number of axes in a system increases.

2: Electrified powertrain with decentralised hydraulic system

In this architecture, the working functions of a machine are independently controlled. Take an excavator for example; the three main working functions include a boom, arm, and a bucket. Each will require different pressures to operate optimally. Under a decentralised hydraulic system, each working function would have its own electric motor, pump, and cylinder controlling the movements.

- Benefits of electrified powertrain without decentralised hydraulic system include:
 1. Significantly more efficient than a centralised system. Higher efficiency of the hydraulic system means an extension of the battery life on a vehicle which is a key barrier to electrification.
 2. Is a middle ground between electromechanical actuation and a centralised hydraulic system.
 3. Retains the benefits of fluid power physics i.e. power density & shock absorption.
- Some of the constraints of electrified powertrain without decentralised hydraulic system are:
 1. Adds weight to the overall system in most cases due to the number of electric motors required.
 2. Represents a fairly significant design change which goes against the conservative instincts of vehicle OEMs.

3: Hydraulic replacement

Likely the most worrying for hydraulics suppliers, is hydraulic replacement. Vehicle OEMs have already been trialling vehicles with complete hydraulic replacement.

These tend to be machines on the smaller-end of the spectrum which are used more heavily in urban atmospheres.

Hydraulic replacement without electromechanical actuators offer benefits like:

1. Hydraulic replacement eliminates a messy hydraulic system in favor of one that is more harmonious with an electric powertrain. This can serve to simplify overall system design.
2. Future proofing the machine to allow for more sophisticated feature sets. Under a fully electric system, a vehicle OEM has a much greater ability to make incremental changes to its machine without completely redesigning the system.

It also has limitations like

1. Limited ceiling of applicability due to battery technology constraints. Currently, only low-power applications are suitable, and practical limitations to electromechanical actuators may limit the prospects for hydraulic replacement in machines of higher power. The size of electromechanical actuators is prohibitively large when you get above ~15-ton machines.
2. Hydraulic cylinders can act as shock absorbers thanks to the physics of fluid power. This is not the case with electromechanical actuators. Although engineers have found ways of compensating for this in the design of these actuators, there are still questions regarding performance in the field as a result.
3. The economics of hydraulic replacement are still difficult to justify. We estimate electromechanical actuators can be more than twice the cost of their fluid power counterparts.

Final thoughts

With vehicle design changes often taking 3-5 years or more to test and bring to market, the 2030 timeline for sustainability goals that many off-highway OEMs have communicated is rapidly approaching. These design changes will begin occurring at an increasing rate, and when the hydraulic system remains intact, it will be looked upon as a 'low hanging fruit' to reduce losses in the overall vehicle. This point will be an opportunity for vendors to differentiate themselves from each other. SME



About the author:

Blake Griffin is an expert in automation systems, industrial digitalisation, and off highway-electrification. Since joining Interact Analysis in 2017, he has written in-depth reports on the markets for low voltage AC motor drives, predictive maintenance, and mobile hydraulics.



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IMS and its significance

Invoice Management System (IMS) is indeed a pivotal move to enhance the efficiency and transparency of credit availment under the GST framework, say **Kanchan R Umranikar**, Director and **Pranjali Tendulkar**, Senior Consultant, Ernst & Young LLP, India



Invoices submitted by suppliers through GSTR-1 would be displayed on dashboard to taxpayers. The system will allow taxpayers to accept, reject, or mark invoices as pending - particularly useful when discrepancies arise between reported invoices and the taxpayer's purchase register. In the absence of any action by the taxpayer, the system will default to treating the invoices as "deemed accepted" at the time of GSTR 2B generation.

Immediate action and transaction validation

For specific transactions like credit notes and amendments, IMS would compel the

The evolution of the GST compliance framework has been marked by continuous advancements and the latest stride in this journey comes from the 54th meeting of the Council, which has proposed a significant transformation with the introduction of the Invoice Management System (IMS) alongwith other recommendations.

Introduction to IMS and its impact on compliance

IMS is indeed a pivotal move to enhance the efficiency and transparency of credit availment under the GST framework. It is proposed to be launched from October 1, 2024. This move is expected to streamline the credit management process, providing taxpayers with a centralised dashboard for invoice reconciliation on the GST portal.

recipients to accept or reject without delay, eliminating the option to defer decisions. A rejection escalates the supplier's tax liability in the subsequent GSTR-3B filing.

The IMS's core aim is to enable users to verify the commercial validity of transactions, without considering the eligibility of credit. For example, recipients must acknowledge credit notes for transactions where ITC was not claimed on original invoice or for invoice with ineligible ITC, based on the transaction's commercial integrity, even if it is not to be considered in GSTR-3B. Taxpayers will determine ITC basis eligibility under GST laws at the time of filing GSTR-3B.

With the implementation of the IMS, changes in GSTR-3B format can be expected. Firstly, the requirement for "Temporary reversal" of credit, as depicted in Table 4B(2), may become obsolete as transactions can be marked as "Pending" in the IMS.

Secondly, there would be a need for an additional table in GSTR-3B to reflect credit notes that have commercial validity but are not to be considered for ITC in GSTR-3B as credit was not availed on original invoice. This addition will ensure that all transactions are accounted for, even if they do not affect the ITC computation. Impact of IMS on the accounting methodology needs to be evaluated wherein GST portion may have to be accounted for separately before posting in ITC ledger or expensing out.

Opening balance declaration

A one-time opportunity is presented to taxpayers to declare their opening balance, with the due date set for October 31, 2024. This balance should include only those transactions that are pending from the last tax period and are eligible as per the time limit stipulated under section 16 of the CGST Act. Taxpayers must be cautious with the amounts entered as opening balances, as the ITC availed during subsequent year cannot exceed the sum of the opening balance and invoices accepted or deemed accepted on the IMS system during such year. Looking ahead, the necessity for manual entry of opening balances may not be required as the IMS is anticipated to have the capability to automatically calculate these amounts based on transactions that the recipient has earmarked as "pending" subject to time limit under section 16 of CGST Act. This prospective feature of the IMS would show the system's evolving sophistication and its potential to streamline the tax compliance process further.

Implications of IMS implementation

Despite its optional label, the IMS's inherent impact makes it virtually mandatory for compliance, demanding real-time invoice reconciliation and cross-functional collaboration.

Anticipating legislative validation

Legal concerns over IMS's implementation without legislative backing may lead to amendments in next Finance Bill. As the industry seeks possible deferral, we may witness industry representations being filed to clarify on legal validity of IMS.

Should the government maintain the proposed timeline for IMS, taxpayers will face the challenge of adhering to both the new system and the existing timelines for annual compliances and compulsory implementation of ISD mechanism.

This evolving tax compliance landscape is undeniably pushing taxpayers towards digital transformation, necessitating the automation and integration of various business processes.

The taxpayer has to ensure complete collaboration

between AP, Procurement, Tax and Finance teams.

Key recommendations of the Council:

1. A pilot for B2C e-Invoicing is set to be launched post successful implementation of e-invoicing for B2B and export invoices. This initiative is expected to significantly reduce the prevalence of fictitious invoices and establish a comprehensive record of all sales transactions for taxation purposes.
2. A recommendation to increase the GST rate for car seats from 18% to 28% could impact the auto industry's pricing structure. This rate revision is intended to align with the GST rate on seats of two-wheelers and will be applied prospectively upon the issuance of a government notification.
3. Renting of commercial property by an unregistered person to a registered person will be brought under Reverse Charge Mechanism ('RCM'). This strategic shift is designed to address the issue of tax leakage by ensuring to capture tax payments that might otherwise go unreported. Moreover, this change has the potential to facilitate inter-departmental collaboration, particularly benefiting the Income Tax Department by providing precise data on rental income received by unregistered landlords.
4. The Council has recommended bringing supply of metal scrap from an unregistered to a registered person under RCM. A 2% TDS to be applied on B2B transactions of metal scrap. The specifics regarding the minimum contract value for TDS applicability will be clarified in notification. This move may lead to additional compliance requirements. Controversies around the classification of mixed scrap to continue.
5. The Council has made several other recommendations that span across various sectors and aspects of the GST framework.

Way forward:

In conclusion, the 54th GST Council meeting has laid the groundwork for a more robust and efficient GST regime. Taxpayers must now prepare to navigate this new compliance terrain, ensuring they are well-equipped to meet the demands of the IMS and other council recommendations. The journey towards perfecting GST invoice management continues while keeping the promise of a more transparent and accountable tax system for India.

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(Views expressed above are personal)

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The ₹286 Billion Manufacturing Boost!

The Cabinet has approved 12 new industrial cities with ₹286 billion investment to boost India's global manufacturing edge.

In a landmark move to position India as a global manufacturing hub, the Cabinet Committee on Economic Affairs, led by Prime Minister Narendra Modi, has greenlit the creation of 12 industrial smart cities across 10 states with a massive investment of ₹286.02 billion. These industrial corridors will strengthen India's manufacturing ecosystem, accelerate economic growth and enhance global competitiveness. They will be located in Khurpia in Uttarakhand, Rajpura-Patiala in Punjab, Dighi in Maharashtra, Palakkad in Kerala, Agra and Prayagraj in Uttar Pradesh, Gaya in Bihar, Zaheerabad in Telangana, Orvakal and Kopparthy in Andhra Pradesh and Jodhpur-Pali in Rajasthan.

These cities are part of the National Industrial Corridor Development Programme (NICDP). This strategic initiative is projected to create significant opportunities for investment, generating a potential of ₹1.52 trillion while aligning with India's ambitious target of achieving \$ 2 trillion in exports by 2030.

Driving India's manufacturing future

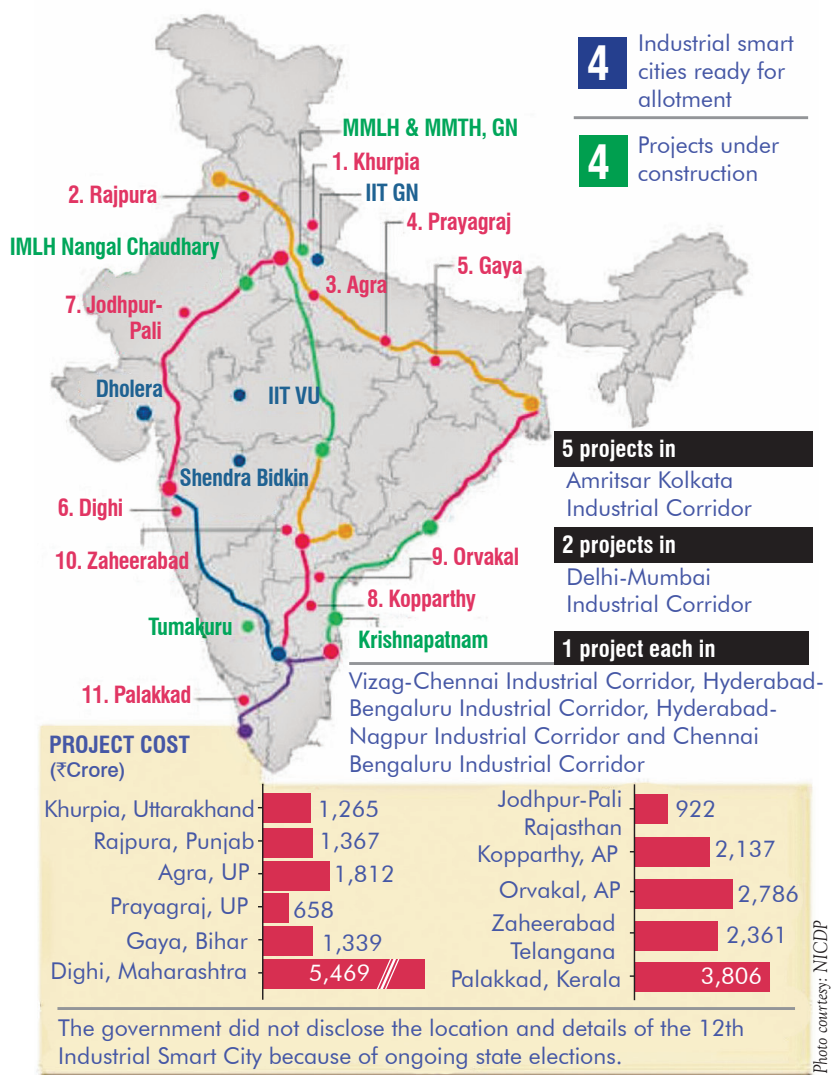
The NICDP is at the heart of India's industrial strategy, focusing on building sustainable and integrated industrial ecosystems that promote investments from both large-scale industries and MSMEs. With the development of these 12 industrial nodes, the Government seeks to position India as a global leader in manufacturing, boosting employment and achieving balanced regional growth.

These smart cities, backed by advanced infrastructure and multimodal connectivity under the PM Gati Shakti National Master Plan, will serve as vital growth centres. They are being developed ahead of demand, ready to support rapid industrialisation with the ultimate goal of fostering long-term economic prosperity.

Sustainability and job creation

The NICDP is designed with sustainability at its core, integrating green technologies to minimise environmental impact while enhancing operational efficiency. By 2027, these projects are expected to generate 1 million direct jobs and up to 3 million indirect jobs, providing significant socioeconomic benefits across the regions where they are being implemented.

OVERVIEW OF PROPOSED INDUSTRIAL SMART CITIES





The 'necklace' of smart cities will offer walk-to-work solutions.

Greenfield Industrial Smart Cities

- Dholera Special Investment Region (DSIR) is a greenfield industrial smart city located 100 km southwest of Ahmedabad, Gujarat, designed to be India's leading hub for manufacturing and industrial development. As the country's first Platinum-rated industrial smart city, it features the largest land parcels in Southeast Asia and targets key sectors like defence, aviation, technology and pharmaceuticals. The Dholera Industrial City Development (DICDL) special purpose vehicle (SPV) focuses on sustainable, non-polluting industries to drive regional and national growth.
- Aurangabad Industrial City (AURIC), located near Aurangabad at Shendra and Bidkin, is a meticulously planned greenfield smart industrial city covering 10,000 acre in Maharashtra and developed as part of the Delhi-Mumbai Industrial Corridor (DMIC). The city dedicates 60 per cent of its land to industrial use with the remaining 40 per cent for residential, commercial and recreational facilities.
- The Vikram Udyogpuri (VU) Industrial Township Project in Madhya Pradesh is located in Narwar village, 8 km from Ujjain and 12 km from Dewas. The project, spanning 442.3 hectare, is designed to create a sustainable economic base focusing on manufacturing and is supported by institutional, residential and commercial activities.

Key Highlights

- India will build a 'necklace' of industrial smart cities across the country, supported by the Golden Quadrilateral.
- The Government has approved 12 projects aimed at transforming the industrial landscape, incorporating world-class infrastructure.
- Designed as greenfield smart cities, these industrial hubs will offer plug-n-play and walk-to-work solutions.
- These projects align with the Government's vision of a Viksit Bharat.

Building for the future

Projects such as the Dholera Special Investment Region (Gujarat), Aurangabad Industrial City (Maharashtra) and other notable industrial nodes have already set the benchmark for India's industrial transformation. The recent approval of 12 new nodes signals a continued commitment to creating world-class industrial infrastructure, ready to cater to both domestic and international investments. Additionally, it includes railway infrastructure projects and support for renewable energy in the northeastern states.

As these projects come to life, India's journey towards becoming a global manufacturing powerhouse is set to accelerate, redefining its role in global value chains and driving sustained economic growth for years to come.



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Aiding circularity in plastics

By capturing and processing 32,000 tonnes of waste and reducing 15,000 tonnes of CO₂ emissions annually, the project initiated by Re Sustainability and Sharrp Ventures aims to produce over 9,000 tonnes of superior recycled polymers each year.



Left to right: Harsh Mariwala, Founder and Chairman, Marico Limited and Masood Mallick, MD and CEO, Re Sustainability Limited.

In a move towards sustainable waste management in India, Re Sustainability, Asia's leading integrated sustainability solutions provider and Sharrp Ventures, the investment office of the Harsh Mariwala family, collaborate to launch a plastics circularity initiative in Hyderabad, Telangana, and Raipur, Chhattisgarh.

The goals of this initiative are twofold: to increase the supply of very high-quality recycled polyolefins for the FMCG industry and to create sustained environmental and social impact. Currently, the FMCG sector in India faces a critical challenge in sourcing high-quality recycled materials, which limits their ability to meet sustainability targets and reduce reliance on virgin plastics. By capturing and processing 32,000 tonnes of waste and reducing 15,000 tonnes of CO₂ emissions annually, this project aims to produce over 9,000 tonnes of superior recycled polymers each year, providing a reliable supply of these materials for various FMCG and other applications. Over the next five years, this initiative intends to evolve into a nationwide, large-scale recycled polymers enterprise, reducing environmental impact and setting a new standard for responsible waste management practices.

Hyderabad and Raipur have been strategically chosen

for this initiative due to their unique demographics and waste management challenges. Hyderabad, as a major metropolitan city, generates a significant amount of plastic waste, making it an ideal location to implement large-scale recycling processes and demonstrate the impact of advanced waste management technologies. Raipur, representing smaller urban centres, faces different but equally critical waste management issues. By implementing the project in both cities, the initiative can address diverse challenges, create scalable solutions, and set a replicable model for other cities across India.

This landmark circularity project will commence with the setup of infrastructure now in both cities, with facilities expected to be operational by early FY26. Setting up this infrastructure involves building advanced recycling facilities equipped to handle large volumes of waste efficiently. From 2026 onwards, high-quality recycled polymer is likely to be available for purchase by the FMCG and other industries, providing a new revenue stream for the project. This infrastructure setup aims to achieve nearly 100% diversion of dry waste from landfills through comprehensive recycling processes.

Marico Innovation Foundation (MIF), subsidiary of Marico Limited, identifies and supports the scale up of disruptive Indian innovations with the potential to create long-lasting socio-economic and environmental impact in India. In 2022, MIF embarked on a mission to address plastic waste through its playbook "Innovation in Plastics: The Potential and Possibilities," which highlighted the urgent need for a resilient circular economy in India. Further to the same, Re Sustainability and Sharrp Ventures have come together to launch Plastics Circularity Initiative, with MIF being the knowledge partner.

Re Sustainability, with over 30 years of experience in waste management across 11 countries, brings its extensive expertise and innovative approaches to this initiative. Their commitment to sustainable practices has positioned them as a global leader in the field, managing over 8 million tonnes of waste annually. Sharrp Ventures, the investment office of the Harsh Mariwala family, is involved by providing the necessary risk capital and strategic support, ensuring the initiative's scalability and success.

SME



Intelligent Automation at Work

MR Components relies on intelligent automation with EMAG machines and benefits from unmanned production in the evening hours



MR Components' modern and highly automated machinery. The company continuously invests in the latest technologies in order to offer customers the best possible quality.

MR Components, a medium-sized company from Grigno, Italy, has significantly increased its production capacity and simultaneously improved quality by introducing intelligent automation with EMAG machines. The company, which specializes in the production of parts for differential and planetary gears, now produces around 80,000 components per month, with some of the machines running unmanned in the evenings.

From garage to modern production site

Alessandro Reguzzo, Founder and Managing Director, MR Components, started out in 1995 with just one CNC lathe in a garage. Since the business grew quickly, Reguzzo invested in additional machines and moved to a larger production hall. In 2006, the company built its first own production hall with 2,500 m². In January 2024, the company finally moved into its new, modern 6,000 m² headquarters.

Intelligent automation as the key to success

Reguzzo sees the key to success in the consistent automation of production. "The use of automated machines was the key to speeding up production," says Reguzzo. "The machines run unmanned, allowing us to produce in the evening hours without having to introduce a night shift."

EMAG machines guarantee quality and efficiency

MR Components relies on EMAG machines that

are equipped with integrated measuring probes. "This allows us to check all components 100 percent," explains Reguzzo. "The stable design and high quality of the machine components are essential in batch production in order to stand out from the competition."

Flexible manufacturing systems for different requirements

The company uses various manufacturing systems from EMAG to meet the different production requirements of its customers. "In one of our production lines, we work with VL 7 machines, where the operator manually places the workpieces on the automation belt," explains Reguzzo. "In other production lines, we work with VL 4 machines that are equipped with TrackMotion automation. Here, the automation is very fast and we have greater autonomy, so we can also run the machines in unmanned mode." There are also other manufacturing systems, also VL 4 and VL 6, which are automated with robots. The decision was made to use a system with robots here, as many components have to undergo other operations in addition to turning, such as marking, which can be carried out very easily and flexibly with the robot.

"Free" production hours in the evening

Unmanned production in the evening hours allows MR Components to significantly increase its production time. "We call this time 'free' hours, as it allows us to produce without additional personnel costs," explains Reguzzo. "This is a great advantage, as it is difficult to find staff for the night shift these days."

Investing in the future

MR Components has planned further investments for the future. "We are planning to use two VL 8 machines in combination with robots to machine components with a diameter of up to 450 mm," says Reguzzo. "We also want to further develop our gear cutting and assembly technologies in order to be able to offer our customers even more comprehensive solutions."

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Importance of Preventative Maintenance in Industrial Settings

To enhance the effectiveness of preventative maintenance, industrial facilities are increasingly turning to advanced technologies such as thermography.



In the fast-paced world of industrial operations, maintaining the efficiency and reliability of machinery is crucial for seamless production, asset availability and operational continuity. Preventative maintenance is a strategic approach that plays a pivotal role in ensuring the longevity and optimal performance of equipment. In this article, we will delve into the significance of preventative maintenance in industrial settings, exploring its impact on operations, the role of advanced technologies, and the benefits of adopting a proactive maintenance approach.

Overview of preventative maintenance

Preventative maintenance involves scheduled inspections, tasks, and repairs aimed at preventing equipment failure before it occurs. Unlike reactive maintenance, which addresses issues after they've already disrupted operations, preventative maintenance takes a proactive stance to identify and address potential problems beforehand. This systematic approach is essential for minimizing unexpected downtime, extending the lifespan of machinery, optimizing overall operational efficiency and keeping employees safe. Simply put, as organizations focus on the consequence of failure, actions can be taken to ensure alignment with preventing or mitigating those consequences.

Impact of equipment downtime on operations and costs

Downtime in industrial settings can have far-reaching consequences. Every minute of equipment failure translates into lost productivity, missed

deadlines, and increased costs. Unplanned downtime not only disrupts the immediate production process but also has a domino effect on downstream operations. The financial impact, in many cases, can be significant when considering the costs associated with emergency repairs, replacement parts, and the potential loss of customer trust. Preventative maintenance acts as a safeguard against these disruptions, helping organizations avoid the detrimental effects of unexpected equipment failures.

The role of thermography and electrical inspections in preventative maintenance

With the changes to NFPA 70B in 2023, shifting from a recommended to required activity, thermography has become a requirement every 6 months. Beyond being a requirement, the value that thermography brings to an electrical maintenance program should be recognised as a critical component of an effective Electrical Preventative Maintenance program.

To enhance the effectiveness of preventative maintenance, industrial facilities are increasingly turning to advanced technologies such as thermography. The use of thermography enables maintenance teams to identify potential issues in electrical systems and machinery components that may not be visible through traditional methods. By using infrared thermography, anomalies in temperature can be detected, indicating potential faults or inefficiencies. Electrical inspections help pinpoint issues like loose connections or overloaded circuits, allowing for timely intervention before a breakdown occurs.

Benefits of a proactive maintenance approach

Adopting a proactive maintenance approach brings a multitude of benefits to industrial operations including:

- At its core, it helps in extending the lifespan of equipment, reducing the frequency of breakdowns, and minimizing the need for costly emergency repairs.
- By identifying and addressing potential issues early on, organizations can plan maintenance activities during scheduled downtimes, avoiding

disruptions to regular production schedules.

- Lastly, and more importantly, this approach also enhances workplace safety by preventing accidents that may result from equipment failures.

In conclusion, preventative maintenance is the cornerstone of efficient and cost-effective industrial operations. By prioritising the proactive care of equipment through scheduled inspections and the incorporation of prescriptive methods such as thermography, organisations can significantly reduce

downtime, extend the life of machinery, and optimise overall productivity, all while ensuring workplace safety. Embracing a preventative maintenance culture in your organisation is not just a strategic choice but a necessary one for those seeking to ensure reliability and safety.

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(Communication provided by the management of the company)

Communication Feature

Eplan Network 2024 and Eplan Design Challenge to be held in Bangalore and Pune

In today's rapidly evolving world, the automation industry stands as a beacon of innovation and transformation. Engineers and designers are not only shaping the future but also pushing the boundaries of what's possible. If you are ready to be part of this exciting journey, there's no better opportunity than the Eplan Network 2024 event and the Eplan Design Challenge.

Why attend Eplan Network 2024?

Eplan Network 2024 is the gateway to discovering the latest advancements in the ecosystem of automation. Held in two premier locations – Bangalore on 23 October 2024 at Sheraton Grand Bangalore Hotel and Pune on 21 November 2024 at JW Marriott, Senapati Bapat Road – this event will gather professionals from across the industry to share knowledge, explore solutions and inspire innovation.

With a full day of insightful presentations, product demonstrations and networking opportunities, this event will showcase Eplan's cutting-edge tools and technologies. Whether you're an experienced engineer or a newcomer to the industry, you'll walk away with new ideas and solutions to drive efficiency in your projects.

Enter the Eplan Design Challenge 2024

The Eplan Design Challenge 2024 presents a platform to showcase your engineering-design creativity. This contest invites engineers and

designers to submit their best projects across three categories:

1. Panel Building (MCC, PCC, PDB, etc.)
2. Industrial Automation (PLC, DCS systems)
3. Machine Building (Machine tools, SPMs, etc.)

Winning isn't just about recognition – it's about standing out in the automation and design community. Winners will receive exciting prizes and a platform to showcase their work to industry leaders. Every participant will be rewarded with a participation certificate, a valuable addition to your professional portfolio.

The last date for project submission is 14 October 2024. So, gather your ideas, design your project and seize this incredible opportunity. One can submit their entries for Eplan Design Challenge 2024 to email: info@eplan.in

Register Now!

The automation industry is changing, and you have the chance to be part of this transformation. Whether by attending the Eplan Network 2024 event or participating in the Eplan Design Challenge, this is your moment to lead, innovate and make an impact.

Register today to be a part of this grand event.

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To know more about the event, visit <https://solutions.eplan.in/eplan-network-2024>

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Boosting Automotive Assembly with Binar Handling's Lifting solutions

The automotive industry is under constant pressure to improve efficiency, ensure worker safety, and maintain high levels of precision in production processes. As vehicles become more advanced, so does the complexity of their manufacturing.



In modern automotive manufacturing, handling a wide array of parts—engines, body panels, dashboards, and suspension systems—presents unique challenges. The repetitive lifting of heavy or awkward components can lead to physical strain and worker fatigue, often resulting in musculoskeletal injuries. These issues affect not only worker health but also productivity, leading to downtime and increased operational costs. Additionally, precision is critical when assembling high-value automotive components. Misalignment or damage during handling can compromise the quality of the final product, making it essential for manufacturers to adopt solutions that ensure both accuracy and safety.

Schmalz expanded its product portfolio with Binar

Handling's ergonomic lifting solutions, which are specifically designed to meet the diverse needs of automotive production. Their range of products focuses on reducing physical strain, enhancing precision, and improving overall safety. At the heart of Binar's product line-up is the NEO 30 Control Handle. This highly responsive device converts subtle hand movements into precise lifting motions, allowing operators to control parts with minimal effort. In automotive manufacturing, the NEO 30 is ideal for handling medium-sized components like exhaust systems, fuel tanks, and dashboards. By minimising operator fatigue and offering precise control, the NEO 30 improves both safety and efficiency on the production floor.

For larger and heavier components, Binar Handling's

quick lift arm provide a robust solution. These arm is capable of lifting up to 300 kg, making them perfect for moving components like doors, hoods, windshields, and body panels. Designed to mimic the natural movement of the human arm, these manipulators allow for precise placement of components, ensuring accurate alignment during assembly. This is particularly important when installing large parts, as it reduces the risk of damage and improves the overall quality of the assembly process.

In addition to individual lifting devices, Binar Handling's Quick Lift Rail Systems offer a flexible solution for moving parts across the production line. These systems allow operators to transport large or heavy components along a rail structure effortlessly, reducing the physical strain of manual handling. In automotive manufacturing, this is particularly useful for handling the bulkier parts of a vehicle, such as engines and transmissions between stations. The Quick Lift Rail System ensures that large parts can be transported smoothly, improving the efficiency of the assembly process while reducing the risk of injury.

A key feature of Binar Handling's offering is the extensive range of customisable end effects. These tools are designed to handle a variety of automotive components using pneumatic, magnetic, mechanical, or vacuum-actuated systems. For example, vacuum end effectors are perfect for handling fragile parts like windshields and side windows, ensuring safe, accurate installation. Magnetic end effectors, on the other hand, are ideal for metallic parts such as axles, brake discs, and suspension components. The versatility of Binar's end effectors ensures that automotive manufacturers can tailor their lifting systems to the specific needs of each production stage, improving both efficiency and safety.

One of Binar's standout products is the Ergo Glass End Effectors, which are specifically designed for handling delicate glass components. These vacuum-based tools securely grip windshields, rear windows, and other glass parts, reducing the risk of damage during installation. In the automotive sector, where precision and care are essential for fitting glass components, the Ergo Glass End Effectors offer a safe and efficient solution that enhances the quality of the final assembly.

Safety is at the core of all Binar Handling's products. Their ergonomic lifting systems are equipped with advanced control features that prevent human error and ensure that heavy loads are handled safely. The control handles include sensors that accurately detect hand movements, while built-in auto-balance features ensure that parts remain stable during lifting. In addition, safety-critical components are doubled or

monitored for redundancy, minimising the risk of equipment failure. This is particularly important in the automotive industry, where mishandling of high-value parts can result in costly delays or defects.

Binar Handling's ergonomic lifting systems are not only safe but also designed for efficiency. The rotating swivel built into their lifting devices ensures that signal cables, air lines, and wire ropes remain tangle-free, reducing wear and extending the life of the equipment. This smooth operation minimises downtime and ensures continuous production, helping automotive manufacturers meet tight production schedules while maintaining high standards of quality.

What sets Binar Handling apart is the flexibility and adaptability of their products. With over 6,000 customisable end effectors and a wide range of modular lifting solutions, Binar's systems can be tailored to fit the specific needs of any automotive manufacturing process. Whether lifting heavy chassis components or handling delicate electronics, Binar Handling's ergonomic solutions integrate seamlessly into existing workflows, ensuring that every stage of production is optimised for safety, precision, and efficiency.

In conclusion, Binar Handling's ergonomic lifting solutions provide automotive manufacturers with the tools they need to overcome the challenges of modern vehicle production. By reducing physical strain, enhancing precision, and improving safety, Binar's products help manufacturers streamline their operations and improve overall productivity. With a diverse range of products tailored to handle everything from heavy engines to fragile windshields, Binar Handling's solutions ensure that every component is installed with care and confidence, driving efficiency and quality in the automotive industry.



Ergo Glass End Effectors

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About the Author:

Amit Ilme is the Industry Segment Manager - Vacuum Handling Solutions at Schmalz India Pvt Ltd. For details, contact Schmalz India Private Limited, EL 38, J Block, MIDC, Bhosari, Pune 411026 on Tel: 020-69115500 Email: marketing@schmalz.co.in

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Gandhi Automations Enhances Cold Chain Integrity

To address several heat related issues, the company offers advanced cold storage doors engineered to minimise heat infiltration and enhance sealing.

Maintaining precise temperatures is critical for cold storage operations, particularly in industries such as food and beverages, pharmaceuticals, and biotechnology, where even slight temperature fluctuations can result in significant losses. At Gandhi Automations Pvt Ltd, we understand the challenges of maintaining the cold chain, where frequent door openings allow heat to enter and inadequate door sealing can lead to energy loss, spillage, and product wastage.

To address these issues, we offer advanced cold storage doors engineered to minimise heat infiltration and enhance sealing, ensuring that your temperature-sensitive goods remain safe and fresh.

Our range includes cold storage sliding doors, hinged doors, and semi-insulating to & fro doors, all designed for superior insulation and durability.

Sliding doors: Our sliding doors are highly favoured in industrial manufacturing plants and cold storage facilities for their ability to maximise operational space and ease of use. We offer both single-leaf and double-leaf versions, suitable for various cold storage needs, including cold rooms and quick-freezing rooms. With thicknesses ranging from 70 mm to 150 mm, our sliding doors handle temperatures as low as -40 degrees Celsius.

Hinged doors: For smaller passage areas where



sliding doors might not be practical, our hinged doors are ideal. They facilitate the movement of pallet trucks and personnel in spaces with limited room. We provide a range of hinged doors with single and double-leaf options, suitable for cold rooms with door thicknesses from 70 mm to 150 mm.

Semi-insulating to & fro doors: Known for their sturdiness and precise design, our semi-insulating doors are versatile and cater to a range of applications, from small hatches to large openings. They are particularly suitable for areas with minimal temperature differences, such as manufacturing, processing, and handling areas. Commonly used in agro-industrial settings, dairy plants, fishing industries, logistics, nurseries, and meat processing facilities, these doors offer a "turnkey" service to meet diverse needs across various industries.

All our cold storage doors are tailor-made to fit the clear opening of your entrance facility and meet the specific temperature requirements of your establishment, ensuring optimal performance and efficiency.

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For details, contact:
Gandhi Automations Pvt Ltd, Mumbai on
Tel : +91 22 66720200 / 66720300(200 lines),
Email : sales@geapl.com, or visit www.geapl.com

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Igus OfficeChain: The Perfect Cable for Height-adjustable Desks

More and more people are using height-adjustable desks for ergonomic working. Organised cable guidance is essential to avoid tangled cables and tripping hazards.



its simple handling and discreet design, the chain blends into office environment while setting things in order. When straight, the OfficeChain impresses with its closed shape on one side, which makes it look neat and tidy.

"Its one-piece design with concealed pin/bore connection also gives it an appealing look from the side," explains Kira Weller, Product Manager-e-chains, igus. "Thanks to the tried-and-tested Easy design, the cables can be easily pushed into the chain and concealed."

The development of the OfficeChain began in 2019 with discussions between igus USA and a renowned global office furniture

The new OfficeChain OCO.32.37.0 from igus is the perfect solution for this. Thanks to its easy handling and simple design, the chain blends unobtrusively into all kinds of office environments while providing organisation and structure.

Height-adjustable desks are experiencing a great boom and have become an integral part of modern office environments. More and more people are opting for these desks so as to work more ergonomically and healthily. This is also reflected in the market: sales of adjustable desks have risen significantly over the last three years and are forecast to increase by an average of 5% every year until 2028. This growing demand reflects a stronger awareness of the health benefits of mobile working. A dynamic workplace that allows users to switch between sitting and standing positions also increases productivity and general well-being. However, these movements are usually not so good for the cables leading to the computer, monitor or telephone. Either they end up in a tangle, get caught in your feet or, in the worst case, twist.

Organised cable guidance is therefore the be-all and end-all. With the new OfficeChain OCO.32.37.0 from igus, cable organisation is child's play. Thanks to

its simple handling and discreet design, the chain blends into office environment while setting things in order. The latter was looking for a strong and appealing solution for its height-adjustable desks. The first samples from igus were convincing and led to good progress. The COVID-19 pandemic slowed down the project as the future of the office space was unclear. The office furniture manufacturer temporarily suspended the development process. However, igus continued to pursue the project and presented a refined concept at the end of 2022, which impressed the office furniture manufacturer.

Over the past two and a half years, several design iterations were carried out to optimise the size, strength and aesthetics of the chain and to test its functionality with the customer's cables inside. The final version of the OfficeChain has brackets at both ends, which are either screwed or attached with special rubber-coated magnets to provide additional support on the work surface.

"The OfficeChain OCO.32.37.0 is a real innovation for height-adjustable desks. It not only offers a functional solution, but also blends in perfectly with modern office environments", adds Kira Weller.

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AUTO RECLOSE RELAY WITH FAST RESET -JRV 142

JVS Electronics Pvt Ltd offers a wide range of auto reclose relay with fast reset -JRV 142.



Features:

- The relay receives the fault initiation from the protection relay and that triggers the auto reclose function. After tripping the circuit breaker (CB), the Auto reclose function can reclose the CB.
- Normally, the first reclose (or shot) is so short in time, that the consumer cannot notice anything.
- However, the fault will cleared and the feeder will continue in normal service. Even though the basic principle of Auto reclose is simple, there are a lot of different timers and parameters that have to be set.
- The auto reclose function is normally used in feeder protection relays that are protecting an overhead line. Most of the overhead line faults are temporary in nature. Upto 85% can be cleared by using the auto reclose function.

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

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instruments, visual indicating instruments, electrical indicating instruments, etc.

Contact:

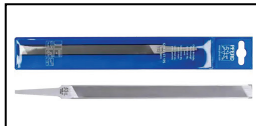
JVS Electronics Pvt Ltd, Bangalore
Mobile: 09448288863
Email: bangalore@jvselectronics.in

CHAIN SAW FILES HAND

PFERD offers a wide range of chain saw files hand.

Features:

- Chain saw files by PFERD are used around the world for sharpening saw chains. They can be used individually with a handle or in combination with depth gauge files in the popular CHAIN SHARP chain saw sharpeners.
- Flat file for servicing and sharpening saw chains with an angular tooth base. For edge grinding saw chains. Second cut for universal sharpening tasks.
- This flat chain saw file can be used for sharpening the cutting edge and for lowering the depth gauge. Highly recommended for beginners.



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

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Contact:

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

R1 SERIES ROTATING NUT BALLSCREW

IBK Engineers Pvt Ltd offers a wide range of R1 series rotating nut ballscrew.



Features:

- HIWIN uses precise procedure to create groove profiles, either by grinding or rolling. Accurate heat treatment is used to ensure the hardness of ballscrews. These result in maximum load capacity.
- The R1 series integrates the nut and bearing. With a compact nut and an angular contact bearing, it can withstand high axial load and provide high accuracy.

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, automotive components, electric equipment, etc.

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Contact:

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

ROTARY GRIPPING MODULE WITH PARALLEL GRIPPER

Schunk Intec India Pvt Ltd offers a wide range of rotary gripping module with parallel gripper-GSM-P.



Features:

- Offered gripper swivel modules by default as compact, modular designed parallel, centric, and angular gripper swivel modules.
- It can be used in a wide range of applications, from loading and unloading workpiece carriers to insertion operations in assembly processes and picking of finished goods in covering boxes.
- Furthermore, innovative design tweaks, such as the powerful rotor drive, as angle of rotation up to 180° and end-position and cushioning adjustment are combined with state-of-the-art production technology to give the grippers robust reliability and precision, therefore making them safe investments with a long service life.

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

MAGNET-SCHULTZ AC VIBRATORS

Magnets India offers a wide range of Magnet-Schultz AC vibrators.

Features:

- Offered open and encapsulated designs, devices for direct connection to the AC network (vibration frequency = twice the supply frequency) or devices for connection to the AC network via one-way rectifier (vibration frequency = supply frequency).
- Vibrators are components consisting of solenoid body and armature which are installed as electromagnetic drives in vibratory drives of the customer.
- The armature is kept by means of a suitable spring-mass-system so that there is always a nominal air gap.
- By applying the AC power supply, the system is put into vibration by the alternating voltage curve.
- Application Examples: As drive unit for vibratory systems in the materials- handling technology, e. g. mining, sieving and compressing

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.

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Contact:

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



INDUSTRIAL TOWER LIGHTS

Esbee Electrotech LLP offers a wide range of industrial tower lights.

Features:

- SMD LED technology for uniform & bright illumination. Choose different colors and 'Make your Own Combo'. Flexibility to upgrade from Single LED units to multiple (max 4) LED units. Optional features of Buzzer with dual sound mode-continuous & intermittent with 80 dB output. Different mounting options like base mounted, L clamp, wall mounted, swiveling base.
- Its features include: sleek & stackable design; > IP65 & NEMA (1 | 2 | 3 | 3R | 4 | 4X | 12 | 13); continuous, blinking, and revolving luminous operating modes; available in red/green / amber/blue/white/yellow colours; > CE, UL, ROHS Compliant; available in wireless version.

About the Company: Esbee Electrotech LLP is a pioneer in industrial products, switches and solutions for the white goods industry, as well as safety products for elevators. Esbee's push buttons, stations and LED indicators are one of its kind in the Indian market.

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Contact:

Esbee Electrotech LLP, Pune
Tel: 020-46907300
Email: info@esbee-electrotech.com



FLOW HOUR COUNTERS

HTM Hydraulics Pvt Ltd offers a wide range of flow hour counters.

Features:

- Ideal for recording the operational time of equipments in the hire market.
- Monitoring the service interval of attachments. Recording the time use of shared hydraulic tools between many users. This battery life is: 10+years.
- Max flow capacity: 200 lpm; max, working pressure: upto 420 bar.

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 and straining for customers in India and abroad. HTM group has headquarters in Bangalore, India.

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Contact:

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



ROTARY CAM SWITCH

Werner Electric Private Limited offers a wide range of rotary cam switch.

Features:

- Rotary cam switches enable precise control of electrical circuits in industrial applications, offering versatility, reliability, durability, and efficient operation in various machinery systems
- These products boasts clean and crispy design, bulletproof product consistency and intuitive builds.

About the Company: Werner Products are created by top industry leaders in mechanical design and with extensive feedback of user experience. They are obsessed with their customer's success and take pride in their achievements.

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Contact:

Werner Electric Private Limited, Mysore
Mobile: 7353947299
Email: info@wernerelektrik.com



INTELLIGENT DIGITAL MOTOR PROTECTION RELAYS

CECO Electronics Pvt Ltd offers a wide range of Intelligent digital motor protection relays – DMPi Series.

Features:

- Definite/Inverse time option and various protection methods. Operating time displayed for each model. Separated display part using cables. Storage of failure causes. MODBUS communication, 4-20mA DC output.
- Integrated digital motor protection relay based MCU: Real time processing and high precision are implemented. Applicable to inverter circuits: It may be applied to the secondary inverter control circuit with its outstanding resistance to harmonic noise.
- Function to store the cause(s) of failure/fault: Up to 5 motor failure events may be saved in the system, so that the failure history can be easily identified.
- Up to 5 motor failure events may be saved in the system, so that the failure history can be easily identified: The display part is separated and attached to the front panel, so that information on current/operating time and setup can be viewed without taking out the unit.
- Communication Function: General-purpose RS485/MODBUS communication mode is offered for various system and communication network configurations.
- Date information display: When a failure occurs, the date and time of failure occurrence are saved in the system to accurately identify the date of motor failure.
- Password setting: When changing the set values, a password must be inserted.
- Total operating time and operating time setting: When the predefined operating time has elapsed, related information is displayed so that operators may replace the motor bearing and check the refueling cycle.
- Terminal/Penetrated types are shared for application in various installation environments: Terminal blocks are detachable, which makes them applied to various installation environments. Reliability: Thermal inverse time. inverse time and definite time modes: According to user's needs, the motor can be protected in the inverse time mode or definite time mode.

About the Company: CECO group of companies was promoted in 1973 in Calcutta. The purpose of the company was to bring new technology in the field of Electrical & Electronics for the benefit of the Industry.

Contact:

CECO Electronics Pvt Ltd/Control Engineering Company, Kolkata
Tel: 033-22480192, 22108785
Fax: 033-22489721
Email: ceco@cecoelectronics.in, cecokolkata@gmail.com

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PUSHCORP AFD62 END EFFECTOR (EOAT)

SWIT offers a wide range of pushcorp AFD62 end effector (EOAT).

Features:

- The AFD62 is part of PushCorp's Passive Compliance series.
- This end effector can apply up to 27 lbf [120 N] in any orientation.
- Unlike the active series, this equipment relies on an external air pressure regulator to set the applied force.
- This pressure must change when a new orientation is programmed in order to maintain a constant force. For this reason, the AFD62 is most commonly used for robotic, material-removal applications with flat or prismatic parts.
- High speed spindles can be mounted to the AFD62. Together, they can automate a wide variety of light-duty, robotic processes: automated grinding; automated sanding; automated polishing; automated deburring; automated deflashing.
- If the application requires a heavier spindle, our AFD72 is the third largest in the series.
- It can apply up to 60 lbf [267 N] and features a more robust set of linear bearings.
- The AFD62 Series is available in two configurations: AFD62-1 Vertical and the AFD62-2 Horizontal. The units are functionally identical but differ in the orientation in which they attach to the robot's wrist. This allows you to optimize a robot's reach and dexterity for your particular application.
- Its features include: Single or Double acting force application; Carriage Position sensor included; Low cost; Smaller size; User supplied pressure regulator; All fittings, fasteners, and threaded holes are Metric.

About the Company: SWIT is a single stop supplier of high quality tools, tool drives and solution provider for industrial manufacturing. At SWIT, they recognize that they are always a work in progress, both as a company and as a product. This is why they encourage their team to embrace challenges and build the connections needed for solving them. A key vector that has helped SWIT to grow and establish ourselves on the domestic front is by the thoughts, processes, approaches and strategies with the sole objective to consistently deliver breakthrough cutting edge solutions and services.

Contact:

SWIT, Bengaluru
Tel: 080-42187117
Mobile: 09741481117, 09620201187
Email support@swit.in, mathew@swit.in

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SINGLE POLE, NON-DIRECTIONAL, IDMT O/C OR E/F RELAY

JVS Electronics Pvt Ltd offers a wide range of Single Pole, Non-Directional, IDMT O/C Or E/F Relay JRC 051P/JRC 051.



Features:

- The relay measures the line current from each of the phases and if exceeds the set operating current, then relay extends a trip signal after the operating time. The relays operating time is determined by selecting one of the four inverse time current characteristics.
- The relay has facility to active/ inhibit the high set protection feature. The relay output contacts are Self reset /Hand reset type. Relay operation without any fault current is determined by trip test facility.
- The relay provides time graded phase or earth fault protection of Generators, Transformers, Feeder, capacitors etc.

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

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TRANSMISSION CHAIN COUPLING

Hasmukhlal & Brothers offers a wide range of chain coupling.

Features:

- These offered products are used to join two pieces of rotating equipment while permitting the various degree of misalignment or end movement or both.
- Moreover, by careful installation and maintenance of couplings, substantial savings can be made in reduced downtime and maintenance costs.
- Its features include: longer service life; resistance against corrosion; sturdy construction; easy to use.

About the Company: Established in 1985, Hasmukhlal & Brothers, an ISO 9001:2000 certified company, is engaged in manufacturing, supplying and exporting power transmission equipment, oil seals, threads and various industrial components.

Contact:

Hasmukhlal & Brothers, Rajkot

Tel: 0281-2360761, 6591097

Mobile: 09825340600, 9879760004

Email: bonnaflex@gmail.com



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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:

- 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. It has specially-designed cartridge type facing and chamfering tool & tool holder. The cutter feed motion is controlled by ball screw & servo motor.
- Cutting Capacity(Min) : Min. OD 16 x ID 10mm & Cutting Capacity (max) : Max. OD 50 x ID 48mm.
- The saw speed is controlled by AC frequency drive depending upon the application and cutter details, automatically through PLC.
- Chamfering head and collect clamping positions indexing through servo motor and ball screw.

About the Company: ITL Industries Ltd is the leading manufacturer and exporter of a wide range of circular saw

machine, horizontal band saw machine, vertical band saw machine, circular saw cutter, etc.

Contact:

ITL Industries Ltd, Indore

Tel: 0731-7104400, 7104412

Email: marketing@itl.co.in, info@itl.co.in

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CHAIN SPROCKET & TRAILING WHEEL

National Engineering Works offers a wide range of link chain sprocket & trailing wheel.



Features:

- These chain wheels with projecting teeth replaceable rim type, with pocket teeth one piece casting, pocket teeth replaceable rim, suitable for calibrated round link steel chains in scraper conveyors, are manufactured from Cr Mo alloy steel.
- Also chain contact surfaces are case hardened to increase service life of sprocket.

About the Company: National Engineering Works is engaged in manufacturing precision engineering components and import-substitute transmission chains..

Contact:

National Engineering Works, Kolkata

Mobile: 092318-20839

Email: nationalengg@bsnl.in,

nationalengg@execs.com

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PRECISION SERIES FILTER REGULATOR

Siemag Industries offers a wide range of precision series filter regulator.

Features:

- Siemag Precision Series Filter Regulator are specifically designed for use in the process Instrument & Fluid power Field.
- It has high instrumental accuracy & large flow capacity. It has accurate flow & precise regulation characteristics. Also, it has rapid response & greater stability.
- These high capacity industrial combinations are compact & economical to provide clean, dry & regulated air for process instruments, diaphragm actuated control valve, valve positioners transmitters, air cylinders and I to P Convertors etc.

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.

Contact:

Siemag Industries, Mumbai

Tel: 08478847821/31/91

Mobile: 07718875757, 07710920909

Email: info@siemag.net



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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 and the furnace life and the bridging forming situation is avoided.
- 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, etc.

Contact:

Elektromag-Joest Vibration Pvt Ltd,

Mumbai

Tel: 022-66624444

Email: vibration@elektromag.com



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AUTOMATIC DRAIN

Siemag Industries offers a wide range of automatic drain.

Features:

- Siemag auto drain are the most economic & efficient method of discharging unwanted condensate from compressed air systems.
- Failure to carry out regular draining results in serious disruption to production schedules, deterioration in product quality, damage to sensitive pneumatic equipment, etc.
- The auto drain eliminates the risk of human error & a possible costly aftermath by providing regular system drainage. Siemag auto drain valves work with a micro processor based electronic circuit.
- These auto drains reliably discharge accumulated fluids from filters, air receivers, moisture separators, Inter / after coolers, dryers, pipeline drains, etc & other collection points to keep downstream operations free of liquid contaminants.

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.

Contact:

Siemag Industries, Mumbai

Tel: 08478847821/31/91

Mobile: 07718875757, 07710920909

Email: info@siemag.net



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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.

Contact:

Elektromag Methods, Mumbai

Mobile: 09820192772

Email: cablereels@elektromag.com



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QUICK RELEASE COUPLERS - STRAIGHT THROUGH

Vijay Air Control offers a wide range of quick release couplers - straight through.



Features:

- Valve less construction drastically saves pressure loss and achieves high flow rate.
- Suitable for high viscosity fluids (such as grease).
- Available in various standard body materials, sizes and end configurations to cope with diversified applications 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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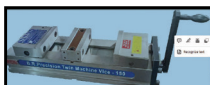


Contact:

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

PRECISION TWIN MACHINE VICE - BR - TWIN - 150

B R Precisions offers a wide range of precision twin machine vice model type BR - Twin - 150.



Features:

- B R Twin vice 150 made out of high tensile casting powerful with high absorption and has strong anti tension which can keep long durability for absorption and has strong rigidity with high precision Body surface are flame hardened and grounded tenon slot grounded machined and surface grounded to ensure maximum accuracy jaw plates.
- The function which permits first one work piece to be clamped and then the other enabling it to clamp the work piece.
- Maintaining the turn bring moveable jaw 'B' towards the work piece situated in the station 'B' until it is clamped.

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, brprecisions@gmail.com

COMPACT TOUCH PROBES FOR TURNING MACHINES

Blum-Novotest Measuring & Testing Technology Pvt Ltd offers a wide range of compact touch probes for turning machines - TC54-10/TC64-10.



Features:

- The trigger signal is generated via shading of a miniature light barrier.
- Enables much higher measuring speeds and accuracy than with conventional probes.
- Wear-free with long-term stability. The trigger signal is generated via shading of a miniature light barrier.
- Enables much higher measuring speeds and accuracy than with conventional probes.
- Touch probes by BLUM can be used for the most varied measurement and monitoring tasks in CNC machining centres.

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. The supplier company is located in Bengaluru, Karnataka.

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Contact:

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

BELT DRIVE SPINDLES - MV0910

Secon Technological Solutions Inc offers a wide range of belt drive spindles - MV0910.



Features:

- Offered two types of high precision spindles for CNC machining centers; belt drive spindles and direct drive spindles for a versatile range of machining options.
- The five series of CNC machining center spindles are all very rigid and feature very low run out tolerances, with speeds up to 12,000rpm.
- These high precision, high speed spindles are available in a range of sizes and are guaranteed to offer smooth operations and a long service life.

About the Company: Secon Technological Solutions Inc. is engaged as a manufacturer, trader, service provider, distributor of CNC machines tools, preventive maintenance and consultancy services.

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Contact:

Secon Technological Solutions Inc, Bangalore
Telefax: 080-23575752
Email: secontech2000@gmail.com, secontech@hotmail.com

DC CHOKE

Miracle Electronic Devices Pvt Ltd offers a wide range of D C choke.

Features:

- A DC choke, also known as a DC reactor or DC inductor, is an electrical component used to limit or control the flow of direct current (DC) in an electrical circuit.
- Voltage Stabilization: In some cases, DC chokes are used to stabilize the voltage levels in a circuit. They can help reduce voltage spikes or surges, ensuring a steady and reliable power supply for sensitive equipment.
- Current Limitation: DC chokes can be used to limit the amount of current flowing through a circuit.
- Harmonic Mitigation: In AC/DC conversion systems, such as variable frequency drives (VFDs), DC chokes are used to reduce harmonics in the current waveform.
- Inrush Current Limiting: When electrical equipment is turned on, there can be a surge of current called inrush current.
- DC Motor Control: DC chokes are used in DC motor control systems to smooth out the current supplied to the motor, reduce electromagnetic interference (EMI), and improve overall performance.
- Power Factor Correction: DC chokes can be used in power factor correction circuits to improve the power factor of electrical systems.
- Energy Storage Systems: In some energy storage systems like super capacitors, DC chokes are used to control the charging and discharging processes, preventing rapid current surges and ensuring safe and controlled energy storage.
- Power Electronics: In power electronic applications, DC chokes can be used in inverters, converters, and other devices to control and stabilize the flow of DC power, reducing electrical noise and improving the efficiency of these systems.
- Solar and Wind Power Systems: DC chokes are used in renewable energy systems to filter and stabilize the DC power generated by solar panels or wind turbines before it is fed into the grid or used in battery storage systems.

About the Company: Miracle Electronics is a renowned Transformer manufacturer in India, engaged in manufacturing Power transformers, Toroidal transformers, EI transformers, SMPS transformers, Medical Isolation Transformers, etc.

Contact:

Miracle Electronic Devices Pvt Ltd,
Bangalore
Tel: 080-28362750
Email: sales@miracle.net.in



POWER PRESS

Universal Machine Tools Corporation offers MS body, fixed/inclinable type power press.

Features:

- The frame is off all steel construction, fabricated from rolled steel plates with suitable ribbings.
- The clutch is of pin/rolling key type, crankshaft is made of special alloy steel, fitted with bronze bushes for smooth working, properly sized fly wheel gears all of steel cast / fabricated, table and ram made of heavy-duty cast iron, perfectly aligned to each other. Inclinable type presses are provided with inclining mechanism.
- These press are available in various sizes: 'C' type / inclinable – 3 tons to 300 tons; 'H' frame 20 tons to 300 tons.

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
Mobile: 09845006959, 09844199559
Email: universalblr@gmail.com,
info@universalblr.com



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33kV VACUUM CIRCUIT BREAKER

Excel Power Switchgear Pvt Ltd offers 33kV vacuum circuit breaker.

Features:

- The Medium Voltage Switchgear are manufactured in accordance with the relevant standard and widely used in various utilities and industries.
- The cubicle is made of high grade sheet steel and with the aid of numerically controlled machines precision punching, cutting, bending and welding techniques ensures all cubicles to be identical in every dimension; rigid and distortion resistant under short circuit conditions and during transport.

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. Since then, company has displayed a rapid growth in the switchgear industry by attaching primary importance to customer.

Contact:

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



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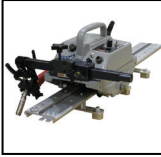


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AUTOMATION CARRIAGE - WELDING AND CUTTING

Gullco International India offers a wide range of Kat® welding and cutting automation carriage - rigid track. The Gullco rigid Kat® welding carriage is used



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throughout the world to automate a wide

Contact:

*Gullco International India Pvt Ltd, Pune
Tel: 07276060382
Mobile: 09920414253
Email: india.lo@gullco.com, indsales@gullco.com*

CUTTING EQUIPMENT - AIR PLASMA

Ador Welding offers a wide range of air plasma cutting equipment - Plasmacut 25. This machine is recommended for air plasma cutting of all electrically



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conducting sheet metal up to 25 mm thick in industries like sheet metal fabrication.

Contact:

*Ador Welding Ltd, Pune
Tel: 020-40706000
Email: cmo@adorians.com*

JOINING WELDER - COIL

Kriton Weld Equipments offers a wide range of coil joining welders. Coil-end welders for strips are available in a variety of models to suit individual line requirements of strip range. The equipment is offered with suitable automation and can be tuned to the line automation.



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Contact:

*Kriton Weld Equipments Pvt Ltd, Vadodara
Tel: 0265-2642809, 2645070, 2651718
Email: purohit@kritonwelders.com*

COREWELD 46 LS MILD STEEL WIRES

ESAB India Ltd offers a wide range of mild steel wires - Coreweld 46 LS. Coreweld 46 LS is a new generation metal cored wire



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based on ESAB's revolutionary cored wire surface technology.

Contact:

*ESAB India Ltd, Mumbai
Tel: 022-24018044, 28516724
Email: communications@esabindia.com, ravikumar.r@esabindia.com*

ARC WELDING MACHINE

Parmo Welding Machines offers a wide range of arc welding machines. These are high quality industrial grade welding machines suitable for rolling mills, workshop, sugar mills, ship yard, bridges, fabrication shops and steel furniture.



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Contact:

*Parmo Welding Machines (P) Ltd, Rajkot
Mobile: 09898770717
Email: paras@parmoelectro.com*

SPOT WELDING MACHINE

Vijay Electricals offers a wide range of portable spot welding machines. These spot welding machine guns are for high-speed production in metal fabrication shops, particularly for the manufacture of automobile bodies and sub-assemblies.



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Contact:

*Vijay Electricals, Faridabad
Tel: 0129-2231025
Mobile: 09891149638, 09811164638
Email: ajay_giri1981@yahoo.co.in*

PLASMA CUTTING MACHINE

Arc Welding Company offers a wide range of automated plasma cutting machines. The A120 system is based on an industrial proven platform; it offers standard features to meet the needs of many automated applications.



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Contact:

*Arc Welding Company, New Delhi
Tel: 011-25289751, 25288693
Mobile: 09999200148, 09811110477
Email: arcweldingcom@gmail.com, arcweldingcompany@gmail.com*

TAB SPOT WELDER - LITHIUM ION BATTERY

Cruxweld Industrial Equipments offers a wide range of lithium ion battery tab spot welder Excellent quality lithium ion battery tab spot welder manufactured using high grade material is offered.



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Contact:

*Cruxweld Industrial Equipments Pvt Ltd, Faridabad
Tel: 0129-4280900, 4280990
Mobile: 08800882983, 09560878350
Email: sales@cruxweld.com*

WELDING CURTAINS

Toss Weldtronics offers a wide range of welding curtains. These curtains are widely used to protect the worker from the flying sparks and hazardous glare of welding operations. This range, including industrial welding curtains, is in high demand owing to excellent quality, durability and long-lasting performance.

Contact:

Toss Weldtronics, Pune
Mobile: 09665011565, 08600890123
Email: response@cuttingmachinesindia.com



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CUTTING MACHINE - AIR PLASMA

ATE Welding Engineering Robotics & Automation manufactures a wide range of air plasma cutting machines. It is light in weight and compact in size and also can be used with ordinary compressed air.

Contact:

ATE Welding Engineering Robotics & Automation Pvt Ltd, Pune
Tel: 020-27474457, 66114196
Mobile: 08805002806, 08980504141
Email: indiasales@ate-engg.com



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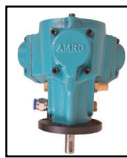


AIR MOTOR

Amro Airtech offers a wide range of air motor - AM-0707. This is an imported radial piston air motor with 5 pistons; it is very powerful and very compact. With 0.5 HP power, it generates a maximum torque of @ 7nm, and has a maximum speed of 1,700 rpm.

Contact:

AMRO Airtech, Pune
Mobile: 09890135193, 09545735193
Email: amroairtech@gmail.com



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ROLLER BEARINGS

Bhasin Overseas Corporation offers a wide range of special roller bearings. These highly efficient special roller bearings are made using high tensile raw materials. They are widely used for bearing jerks and shocks and to give linear or axial movements to the equipment.

Contact:

Bhasin Overseas Corporation, New Delhi
Mobile: 09811336846
Email: info@indianbearings.com



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QUALITY HELICAL GEARS

Sri Dhanalakshmi Gears offers a superior quality range of helical gears. These helical gears are manufactured incorporating the latest technology and making use of top-grade materials under the supervision of experts.

These products are extensively used in various industries.

Contact:

Sri Dhanalakshmi Gears, Coimbatore
Mobile: 09976970147
Email: dhanalakshmigears@gmail.com



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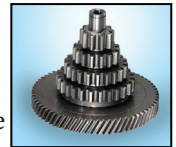


CLUSTER GEARS

Trishla Gear Industries manufactures and supplies a wide range of cluster gears. The robustly designed cluster gears offer hassle free performance. These products are checked for quality to make sure that the range complies with global industrial standards.

Contact:

Trishla Gear Industries, Chennai
Tel: 044-26880578, 26880520
Mobile: 09841025097, 09841874997
Email: trishla@eth.net



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PRECISION DEEP GROOVE BALL BEARINGS

Rohit International offers precision deep groove ball bearings. These bearings provide high speed and are widely used as radial bearings; the non-separable bearings are available in a wide variety of seal, shield and snap-ring arrangements.

Contact:

Rohit International, Kolkata
Tel: 033-39854505, 33475050
Mobile: 09830033458, 09830032458
Email: rohitinfo@ymail.com



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ALIGNED BRAKE MOTORS

Engineering Hindustan offers a range of brake motors. Offered is a wide range from fractional HP to 40 HP; TEFC (totally enclosed fan cooled) motors; and factory fitted and aligned brake motors. The brake mounting provision is in-built.

Contact:

Engineering Hindustan, Navi Mumbai
Tel: 022-65208640, 27683513
Mobile: 09821334017, 09820740067
Email: enghind@bom3.vsnl.net.in



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MOTOR DRIVES - VARIABLE SPEED

Concept Automation offers a wide range of variable speed motor drives. These are compact in design with low noise operation, and corrosion resistant;



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engineered under experienced quality controllers and following international industrial standards.

Contact:

Concept Automation Pvt Ltd, Kolkata
Mobile: 09432437981, 08017985832
Email: conceptautomationpvtltd@gmail.com

SERVO DRIVES

Bristol Industrial Electronics offers optimum quality, fully digital servo drives. These servo drives can be operated with ease and give excellent performance. They are equipped with a variety of control



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modes; high speed, current and position loop and sinusoidal outputs.

Contact:

Bristol Industrial Electronics, Delhi
Tel: 011-27396648, 32970441
Mobile: 09312223289
Email: bristolelectronics@rediffmail.com

SILENT MICROSTEPPING MOTOR DRIVER

Yugandhar Systems offers a silent microstepping motor driver – YSSPD 4. This is a compact, silent, yet a powerful driver,



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which eliminates all the problems related to vibration, resonance and sound in the stepper motor.

Contact:

Yugandhar Systems, Pune
Tel: 020-24228445 Mobile: 09823037997
Email: yugandharsystems@gmail.com

VECTOR DRIVES - COMPACT SPEED

Confident Automation offers compact speed vector drives. These are manufactured under rigid quality



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norms in keeping with global quality standards.

Contact:

Confident Automation, Coimbatore
Tel: 0422-3218099
Mobile: 09362264242, 09843264242.
Email: confidentautomation@gmail.com

WELDING WIRES

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
Mobile: 08393889192
Email: infodelhi.modiarc@groupmkm.in

MIG MAG WELDING MACHINE

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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Contact:

Mansoori Weldarc India Pvt Ltd, Faridabad
Mobile: 09313103366, 09811100410
Email: afzal@weldarcindia.com

WELDING MACHINE - PROFILE

Eewa Engineering Co offers a wide range of profile welding machines. The offered range is designed by skilled professionals employing fine quality components and progressive technology. To ensure quality and



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flawlessness, this range is stringently monitored on various quality parameters.

Contact:

Eewa Engineering Co Pvt Ltd, Ahmedabad
Tel: 079-22743075, 22748559
Mobile: 09879538559, 09998848278
Email: contact@eewaengineering.com

MOSFET BASE WELDING MACHINE - DC TIG

Welding Aids offers DC TIG (inverter base) mosfet base welding machine. This is soft switch technology, highly efficient with low power consumption. It offers automatic protection from over current, over heat, over/under voltage; TIG welding and MMA welding.



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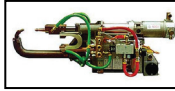


Contact:

Welding Aids, Delhi
Tel: 011-23214114, 23212453
Mobile: 09811062635, 09811945400
Email: weldingaids@gmail.com

PNEUMATIC WELDING GUNS

Shreeji Weld Industries manufactures a range of spot servo pneumatic welding guns. The offered pneumatic gun is manufactured using the best grade raw materials and latest technology in compliance with international quality standards. It is appreciated among clients for high performance, robust construction and compact structure.



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Contact:

Shreeji Weld Industries, Mumbai
Mobile: 09323275103, 09224572471
Email: shreejiweld@gmail.com

VIBRATORY MOTORS - THREE PHASE

Anup Industries offers a quality range of three phase vibratory motors. The firm deals in the finest quality range of 'MMIRACAL' three phase vibratory motors, known for flawless design and optimum performance. These products are known for their flawless design and optimum performance.



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Contact:

Anup Industries, Ahmedabad
Mobile: 09825310874, 09429716864
Email: anupind88@gmail.com

VIBRATORY MOTORS

NBE Motors offers a wide range of vibratory motors. These motors are used in a wide range of applications like scanners, medical instruments, control sticks and various other machines.



Its features include: maximum throughput; superior functionality; less power consumption; high efficiency.

Contact:

NBE Motors Pvt Ltd, Ahmedabad
Mobile: 09824035406
Email: info@newbharat.com

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PEN SPRAY HAND SANITIZER

Kavit Polybind Pvt Ltd trades and exports a wide range of pen spray hand sanitizer. This hand sanitizer contains 70 per cent alcohol with a special blend of vitamin-E moisturizers which not only kills all the germs.



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Contact:

Kavit Polybind Private Limited, Ahmedabad
Mobile: 08046040742
Email: tapanshah69@gmail.com

CLEANER HOT WATER / STEAM

Deluxe Cleaning Systems Pvt Ltd is a provider of a wide range of high pressure cleaner hot water/ steam, H21. H21 is a versatile and highly mobile industrial high pressure hot water and steam cleaner with advanced and comprehensive features to enhance reliability, safety and user-friendliness.



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Contact:

Deluxe Cleaning Systems Pvt Ltd, Pune
Tel: 020-24531777, 24545029
Email: info@deluxecleaningsystems.com

BLACK KNITTED HAND GLOVES

Balaji Enterprises is a manufacturer of a wide range of black knitted hand gloves. They are among the most prominent manufacturers and suppliers of an extensive range of black knitted hand gloves. These hand gloves are precisely designed using quality assured cotton-natural fibers and latest techniques.



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Contact:

Balaji Enterprises, Pune
Mobile: 08048710129
Email: sales@bajajenterprises.net

VARIETY AEROSPACE COMPONENTS

Kazi Industries offers a variety of aerospace components. These components are available in a wide variety of materials i.e, stainless steel, titanium, nickel alloy, heavy alloys, 316, 304 stainless steel, aluminum, copper, brass, bronze, aerospace special steel.



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Contact:

Kazi Industries, Pune
Tel: 020-25381995
Email: feeroz@kaziindustries.com, info@kaziindustries.com

3 WHEEL ELECTRIC FORKLIFT TRUCK

Maini Materials Movement offers Yale-Maini 1.5 tonne, 3-wheel electric forklift truck. High on performance and ergonomics, with lowest TCO RCF – the 3-wheel electric forklift truck scores high on operator comfort on account of its virtually effortless operation.



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Contact:

Maini Materials Movement, Bangalore
Tel: 080-43526555
Email: mtrlsmov@maini.com

HAND PALLET TRUCK

Mankalp Industries offers a wide range of hydraulic hand pallet trucks. The firm offers hand pallet truck, customised heavy-duty pallet truck, reel pallet truck, pallet truck with railing, high lift pallet truck and



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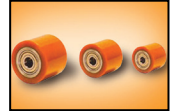
insulator lifting pallet truck. The vast assortment of hydraulic hand pallet trucks has high load bearing capacity.

Contact:

Mankalp Industries, Ahmedabad
Mobile: 09210044555
Email: info@mankalp.in

TRUCK ROLLERS

Muvtons Castors offers pallet truck rollers in a wide range of sizes. Heavy-duty premium polyurethane bonded to precision, machined steel core, offers low rolling resistance, smooth and noiseless running and is non-



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marking, floor-protective. These rollers have high abrasion and cut resistance and are resistant to tearing.

Contact:

Muvtons Castors Pvt Ltd, Noida
Mobile: 09910140111
Email: sales@muvton.com

PLATFORM TRUCK

Nandhi Technologies offers a wide range of platform trucks. These products are crafted with innovative techniques, are efficient to carry heavy loads and are tested on stiff quality



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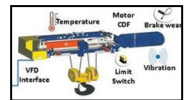
parameters. They are ideal for use in warehouses, airports, railway workshops, fertiliser plants and chemical factories.

Contact:

Nandhi Technologies, Bengaluru
Mobile: 09900097552
Email: nandhitech@gmail.com

MONITORING SOLUTION

VerveTronics Imagineering has launched its most advanced, fully indigenous, overhead crane monitoring solution. The main benefits of this solution include usage tracking,



preventive maintenance alerts, brake effectiveness monitoring and overload alerts.

Contact:

VerveTronics Imagineering Pvt Ltd, Pune
Mobile: 09021506588
Email: anuja.kelkar@vervetronics.com

BOOM & WELDING COLUMN

Mogra Engineering offers welding column and boom. This is equipment is designed to ease continuous automatic welding operations by suitably manipulating the welding head, which is fixed at the end of the boom. With the



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combination of horizontal movement of the boom.

Contact:

Mogra Engineering Pvt Ltd, Pune
Mobile: 09371034939, 09325383312
Email: mograengg@gmail.com

SHOT BLAST MACHINE

Patel Furnace & Forging offers a continuous monorail hanger type shot blast machine. This type of machine is with equipped with continuous overhead monorail; components are moved in blasting chamber and moved out continuously through the machine.



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Contact:

Patel Furnace & Forging Pvt Ltd, Vadodara
Mobile: 09737061333
Email: patelf@satyam.net.in

DIE SPOTTING PRESS, HYDRAULIC

Achieve Hydraulics & Pneumatics offers hydraulic die spotting presses. Die spotting presses are used with various applications, especially for the verification and



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manufacturing of moulds and dies.

Contact:

Achieve Hydraulics & Pneumatics Pvt Ltd, Pune
Tel: 020-65344771
Mobile: 09922443405, 08805983086
Email: response@achievehydraulics.com

AIR COMPRESSOR

Amrit Vayu Equipments manufactures, supplies and trades in premium quality single stage air compressors. Available at cost effective prices, these single stage air compressors are known for consistent performance,



longer service life and energy efficient design.

Contact:

Amrit Vayu Equipments Pvt Ltd, New Delhi
Mobile: 09891884492, 09821385910
Email: jainankit86@gmail.com

Event	Date & Venue	Contact
IFAT INDIA - MUMBAI	October 16-18, 2024 Bombay Exhibition Centre (BEC) NESCO, Mumbai	MMI India Pvt Ltd Mumbai, India Tel: 022-42554700 Email: info@mmi-india.in
INDIA FASTENER SHOW - PUNE	October 17-19, 2024 Auto Cluster Exhibition Center, Mumbai Pune Road, Chinchwad East, Pune	FME (Future Market Events) Media Pvt Ltd Noida Email: eisha@futuremarketevents.com
LASER WORLD OF PHOTONICS INDIA - MUMBAI	November 07-09, 2024 Jio World Convention Centre, Mumbai	MMI India Pvt Ltd Mumbai Tel: +91 (2)2 42554700 Email: info@mmi-india.in
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
INTERNATIONAL		
INTERNATIONAL METAL TECHNOLOGY - TAIWAN IMT TAIPEI	October 16-18, 2024 Taipei Nangang Exhibition Center, Taipei, Taiwan	Kaigo Co., Ltd. Taipei, Taiwan Tel: +886-2-2595-4212 Email: info@kaigo.com.tw
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DS PRINTECH - CHINA GUANGZHOU	November 11-13, 2024 China Import & Export Fair Canton Fair Complex, Guangdong, China	Messe Frankfurt (HK) Ltd Hong Kong, China Tel: +852 2802 7728 Email: info@hongkong.messefrankfurt.com

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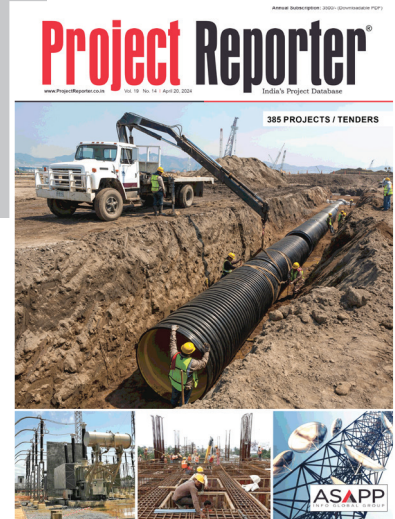
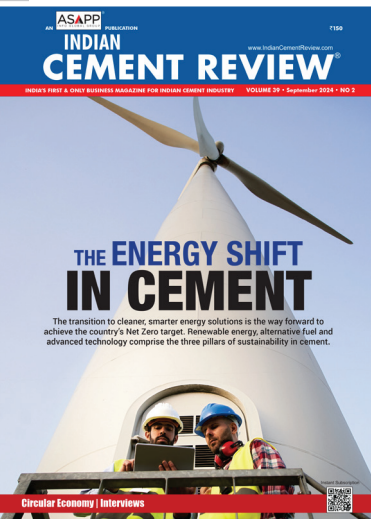
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Tata Steel



September 20, 2024 marked a historic milestone for us as we commissioned India's largest blast furnace at the Kalinganagar Plant, boosting production capacity from 3 MTPA to 8 MTPA. Commenting on this occasion, T. V. Narendran, CEO and Managing Director, Tata Steel, said: "The commissioning of India's largest blast furnace at Kalinganagar is a momentous occasion for the steel industry, setting new benchmarks in capacity, technology, and sustainability. A key enabler of socio-economic development in the region, the expansion not only strengthens Tata Steel's position as a leader in high-end, value-added steel segments but also showcases our advanced engineering prowess. It underscores our commitment to boosting private investment in India, aligning with the nation's vision for self-reliance and sustainable industrial growth. On behalf of Tata Steel, I thank the Government of Odisha for their unwavering support and applaud the collective efforts of our employees."



Adani Group

Ambuja Cements Limited has joined the Alliance for Industry Decarbonization (AFID), becoming the world's first cement manufacturer to do so. This membership underscores the company's commitment to achieving Net Zero by 2050.



Tata Power Renewable Energy



Tata Power has begun solar cell production at India's largest single-location 4.3 GW solar cell and module manufacturing plant in Tirunelveli, Tamil Nadu.



NSEFI - National Solar Energy Federation of India

Ghar Ke Upar Solar is Super - Flag Off in #Patna!

The journey to a solar-powered future began in Patna with the Ghar Ke Upar Solar is Super campaign! #NSEFI proudly flagged off this initiative in the city, advocating for the PM - Surya Ghar: Muft Bijli Yojana, bringing clean, cost-effective energy to homes across Bihar recently. Patna is paving the path to progress as each rooftop turns into a solar powerhouse, the city is setting an inspiring example for the rest of India.

Homes once reliant on traditional energy sources will now light up with renewable power, bringing hope and sustainability to every corner. With rooftop solar, Patna is not just adopting technology; it's embracing a vision of self-reliance and green living.

Together, we are powering homes, uplifting communities, and leading the charge toward a sustainable tomorrow.

#SolarIsSuper #GharKeUparSolar
#PatnaGoesSolar
#CleanEnergyForAll
#NSEFI #SustainableLiving
#PMSuryaGharYojana



Alstom

Today marked a truly remarkable milestone in our partnership with Delhi Metro Rail Corporation (DMRC) as we proudly handed over the latest Metropolis trainset for RS 17. Manufactured at our Sri City plant in Andhra Pradesh, this trainset isn't just a beacon of progress—it's a testament to our commitment to the #MakeInIndia and #AtmanirbharBharat visions. Designed for a smooth, driverless experience with GOA 4 features and an operational speed of 85 km/h, this train is set to transform how Delhi moves, connecting more parts of the city than ever before. This project is more than just a transport system, it is an emotion that binds the people and places of Delhi. With 52 six-car trainsets on their way, we're excited to see the new phase of urban mobility unfold.

The handover took place amidst the esteemed presence of DMRC's leaders, including Shri Vikas Kumar, Managing Director and Shri O. H. Pande, Director (Electrical). The handover is symbolic of Alstom's commitment to provide of a more connected and efficient transport for millions of Delhiites.

Dr. Vikas Kumar shared his views, "DMRC is one of the largest metro network in the world and carries more than 7 million passengers per day. It's a great pleasure to be here at Sri City for Handover of first RS17 Train. I'm sure Alstom RS17 fleet bring bring superior customer experience"





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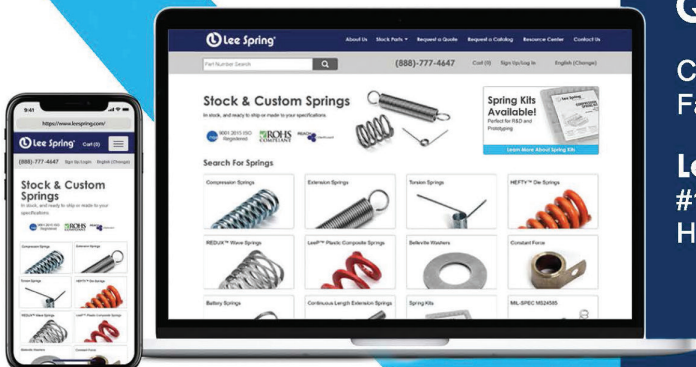
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