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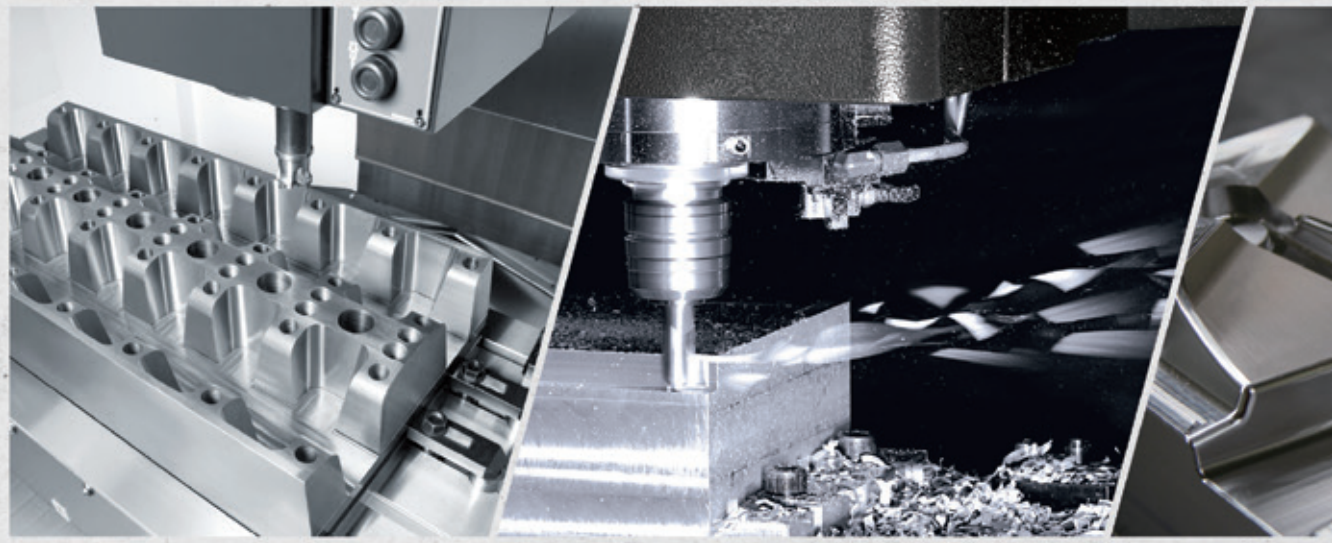

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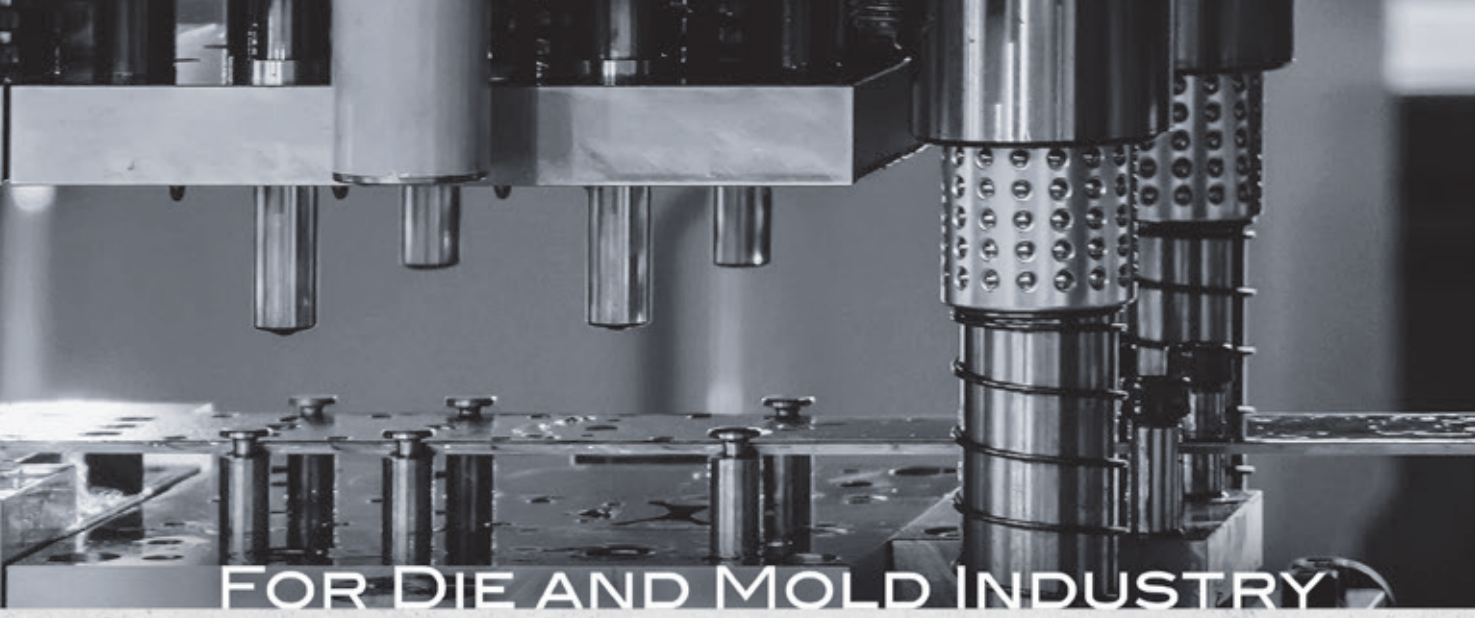

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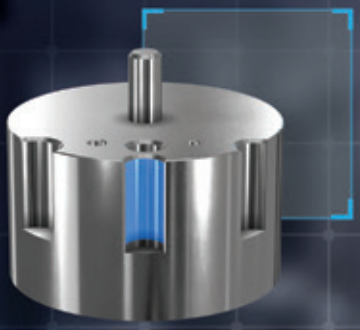

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FORGING AHEAD: THE ROADMAP FOR MANUFACTURING IN 2025

Photography: Vaibhav Nadgaonkar

The manufacturing sector is entering 2025 with renewed optimism, driven by remarkable advancements and strategic initiatives at both global and national levels.

Across the world, innovation in automation, artificial intelligence, and sustainable practices is reshaping the industry. Countries are racing to align their manufacturing ecosystems with net-zero goals, and the adoption of green technologies has become non-negotiable. At the same time, Industry 5.0 is emerging as a transformative shift, emphasising human-centric production where collaboration between humans and smart systems leads to more personalised, efficient, and innovative manufacturing processes.

In India, the sector continues to make significant strides, fueled by government initiatives such as Make in India and the expansion of Production Linked Incentive (PLI) schemes. These efforts have not only attracted substantial foreign investments but have also strengthened domestic capabilities in critical sectors like electronics, pharmaceuticals, and renewable energy. The government's focus on establishing a robust semiconductor manufacturing ecosystem is a game-changer, aiming to reduce dependency on imports and position India as a critical player in global supply chains. Additionally, the digitisation of MSMEs is accelerating, with small and medium enterprises adopting advanced technologies to remain competitive in a rapidly evolving market.

However, challenges remain on the horizon. Geopolitical uncertainties, supply chain disruptions, and the urgent need for workforce upskilling are pressing concerns that demand strategic responses. Indian manufacturers must focus on agility, innovation, and collaboration to navigate these challenges effectively. The sector's ability to embrace digital transformation, adopt sustainable practices, and invest in research and development will determine its competitiveness on the global stage.

As we usher in a new year, this first issue of ET Now Machinist sets the stage for what promises to be an exciting journey for the manufacturing industry. The publication remains committed to being a trusted resource for the sector, offering deep insights, expert perspectives, and a platform for knowledge exchange. With every issue, we aim to empower manufacturers, policymakers, and stakeholders with the tools and information they need to drive growth and innovation.

The road ahead is filled with opportunities and challenges, but with a shared vision and collective effort, the manufacturing industry can achieve greater heights in 2025. Happy Reading!

Amit Shanbaug
Editor.

ET NOW MACHINIST
ULTIMATE GUIDE TO PROFITABLE MANUFACTURING
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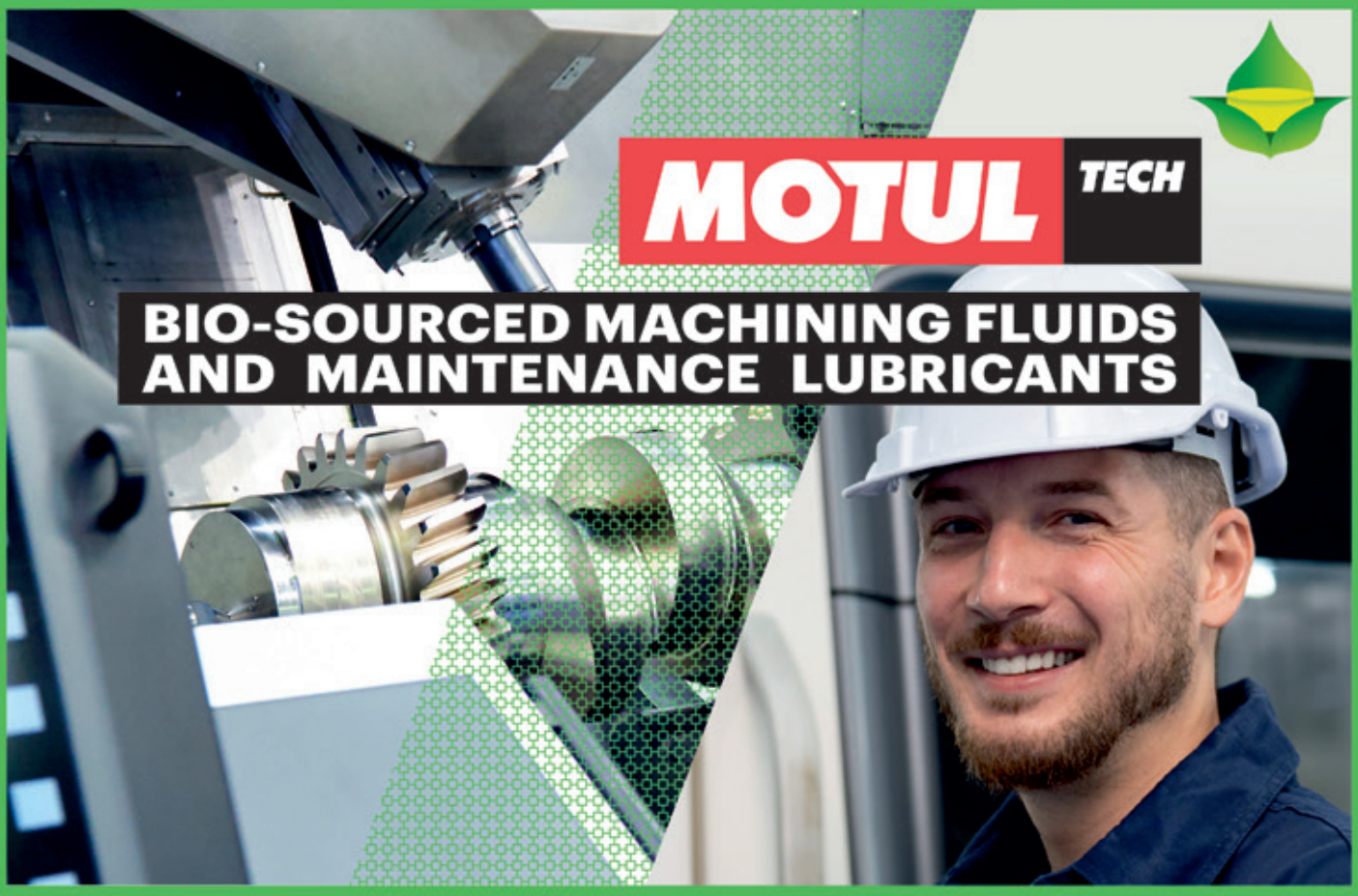

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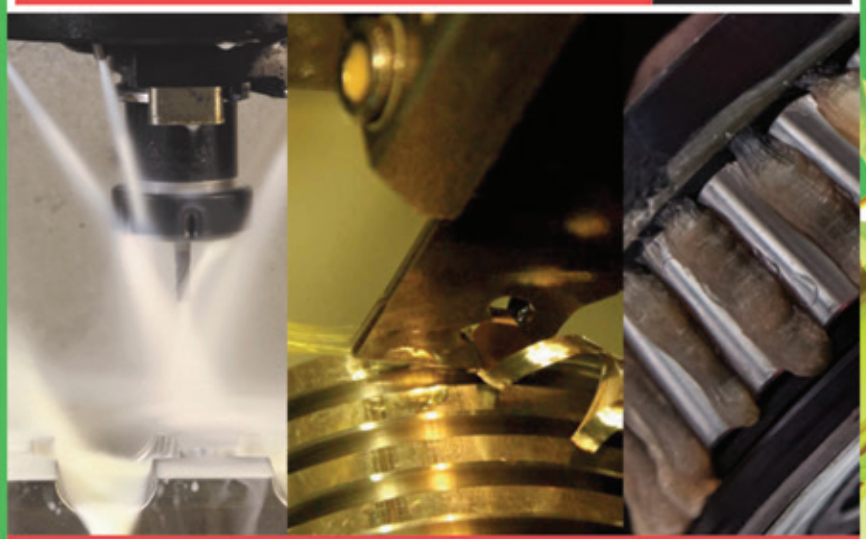

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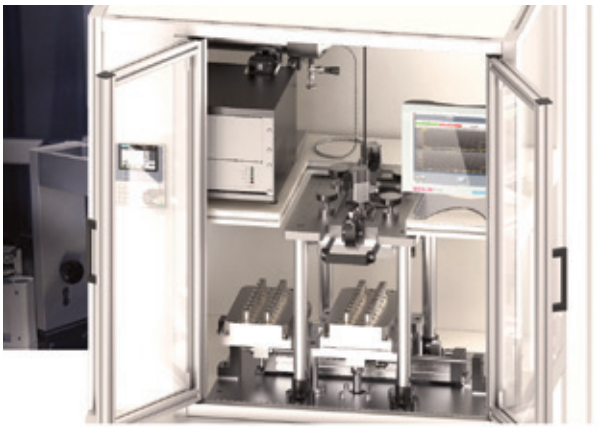
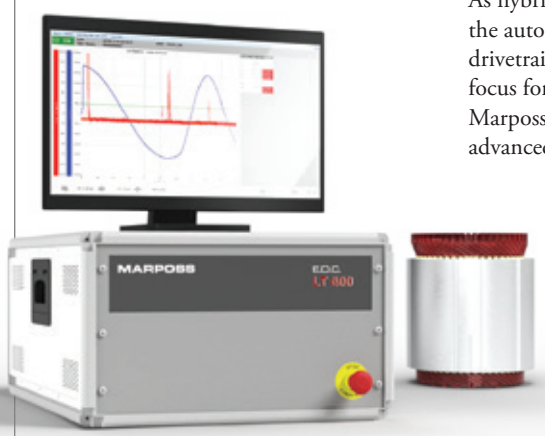
Marposs to showcase E-Mobility and Manufacturing Solutions at IMTEX 2025



At IMTEX 2025, Marposs is showcasing a trio of groundbreaking technologies that highlight its commitment to advancing e-mobility, manufacturing precision, and reliability in production environments. From enhancing battery safety to ensuring drivetrain efficiency, these innovative solutions highlight Marposs' role as a leader in cutting-edge testing systems.

Leak B-TRACER: Ensuring Battery Safety and Performance

The rise of e-mobility has made the safety and reliability of lithium-ion batteries a top priority. Marposs introduces the Leak B-TRACER, a semi-automatic testing station designed to detect leaks in lithium-ion battery cells, ensuring their safety and performance.



This advanced system employs a two-step leak detection process. In the first phase, helium leak detection identifies potential flaws before the electrolyte filling process. The second phase introduces Marposs' innovative Electrolyte Tracing technology, which detects leaks post-filling by vaporising and measuring any escaped electrolyte within a vacuum chamber.

With its user-friendly design, the Leak B-TRACER integrates seamlessly into production lines, offering flexibility for various battery cell formats and electrolyte types. It is ideal for prototype testing, statistical process control (SPC), and end-of-line quality checks, making it a versatile solution for the evolving demands of e-mobility.

NVH G-EAR: Revolutionizing Gear Noise Testing

As hybrid and electric vehicles dominate the automotive landscape, reducing drivetrain noise has become a crucial focus for manufacturers. To address this, Marposs presents the NVH G-EAR, an advanced machine designed to test the noise levels of individual gears at high operational conditions (3000 rpm and 40 Nm torque).

By identifying noisy gears during pre-assembly, the NVH G-EAR not only enhances mechanical reliability and efficiency but also contributes to a quieter and more comfortable driving experience. This solution is particularly valuable in optimising manufacturing processes, reducing costs, and ensuring end-user satisfaction.

LT400: Winding and Insulation Analyser for Enhanced Reliability

Electric vehicle components must meet rigorous reliability standards, especially in insulation systems. Marposs' LT400 offers a cutting-edge solution for identifying latent insulation defects that standard electrical tests cannot detect.

Using a sophisticated capacitor coupling technique, the LT400 detects partial discharges—an early indicator of insulation degradation—without external sensors. This system is easy to use, integrates seamlessly into production environments, and is compatible with Marposs' in-house developed flexible test software, ensuring consistent calibration across R&D and production lines.

Driving Progress in Manufacturing and E-Mobility

The innovative technologies showcased by Marposs at IMTEX 2025 reflect its dedication to addressing critical industry challenges. From improving battery safety to refining gear performance and insulation reliability, Marposs continues to set new standards in e-mobility and manufacturing excellence.

For more information, visit Marposs at Hall 3A, Booth B-102 at IMTEX 2025 or explore their solutions online at www.marposs.com.

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DRIVING INNOVATION AND GROWTH AT KENNAMETAL

Sanjay Chowbey focuses on innovation, operational excellence, and customer-driven solutions to steer Kennametal towards growth and value creation.

Since taking on the role of President and CEO of Kennametal last year, Sanjay Chowbey has prioritised a focused strategy built around the company's three Value Creation Pillars: Delivering Growth, Continuous Improvement, and Portfolio Optimisation. "These pillars are supported by a strong foundation of engaged employees, our core values, and a winning culture," Chowbey explains.

Under his leadership, Kennametal is leveraging its innovation advantage to drive above-market growth, delivering exceptional customer service and commercial excellence. Margin expansion through operational excellence and the application of lean principles remains a key focus, alongside executing a balanced capital allocation strategy.

"Innovation is at the heart of everything we do and has been since our founding over 86 years ago," says Chowbey. With a customer-centric approach, the company works closely with clients to address their unique challenges. A prime example of this is Kennametal's advanced manufacturing facility in Bengaluru, India. This state-of-the-art plant offers end-to-end capabilities, producing high-performance tooling and wear solutions. "Through expanded capacity, advanced equipment, and a highly skilled workforce, we bring improved quality, product performance, and timely delivery to our customers," he adds.

Chowbey's leadership style is rooted in clarity, teamwork, and continuous improvement. "For me, it's about charting a clear strategic course while building effective teams with a winning mindset," he shares. Transparency, integrity, and a commitment to driving innovation are central to his philosophy.

India stands out as a key region in Kennametal's growth story. The country not only represents a significant market but also plays a pivotal role in driving innovation and supporting the growth of the manufacturing sector. "Our focus in India is aligned with our Value Creation Pillars. When you create value for your customers, you create value for all," Chowbey remarks.

With a presence in nearly 100 countries and serving over 80,000 customers across industries like aerospace, energy, and transportation, Kennametal continues to push the boundaries of innovation and customer service. Chowbey's vision ensures the company remains committed to solving its customers' toughest challenges, helping them achieve new levels of excellence.

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Mr. Sanjay Sangam, Head of Sales, and Marketing

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The manufacturing and machining industries are witnessing transformative shifts driven by technological advancements and the growing demand for sustainability. Renishaw, a global leader in precision measurement and healthcare technologies, is at the forefront of these changes, embracing innovation to shape the future of the industry.

TECHNOLOGICAL ADVANCEMENTS DRIVING TRANSFORMATION

The past year has seen remarkable trends shaping the machine tools industry. Automation and smart factory solutions have become important across sectors. Renishaw's focus on data-driven manufacturing exemplifies this transformation. With its advanced systems for end-to-end process data capture, manufacturers can now identify inefficiencies, predict errors, and implement improvements to enhance productivity and profitability.

Technologies like machine tool probing systems, in-process gauging, and tool monitoring are revolutionising precision and real-time process control. Renishaw's flagship solutions, such as the Renishaw Central software platform, connect measurement machines and CNC systems, promoting greater automation in process control.

"Our purpose has never been more relevant," says Sanjay Sangam, Head of Sales, and Marketing at Renishaw. "By offering an integrated range of products, from machine calibration equipment to on-machine measurement systems, we empower manufacturers to build quality into their processes. This aligns seamlessly with Industry 4.0 principles."

INNOVATION AND SUSTAINABILITY: CORNERSTONES OF COMPETITIVENESS

Renishaw's competitive edge lies in its commitment to research and development, enabling the company to adapt to the evolving needs of its customers. The firm's precision technologies boost efficiency and quality, ensuring clients remain ahead in a dynamic market.

Sustainability is deeply embedded in Renishaw's operations. Efforts to reduce carbon emissions, minimise waste, and conserve resources align with the growing demand for eco-friendly solutions. By integrating innovation and sustainability, Renishaw delivers long-term value to its stakeholders while contributing to a greener future.

"Our mission is to create high-performance,

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intelligent, and personalised solutions that optimise resource usage," explains Sangam. "This dual focus on innovation and environmental responsibility positions us as a leader in the industry."

SPOTLIGHT ON IMTEX 2025

At the upcoming IMTEX 2025, Renishaw will showcase its theme "Automation for Everyone," highlighting the benefits of productivity, precision, and practicality through advanced metrology solutions. Key innovations include the Smart Manufacturing Data Platform: Renishaw Central, the world's smallest wireless probe for machine tools (RMP24-micro), and a suite of metrology fixtures, machine tool styli, CMM, Equator, and Encoder solutions.

Visitors to Hall 4A, Booth B101, from January 23 to 29, 2025, will experience live demonstrations of cutting-edge process control technologies. These include pre-process machine calibration and both online and offline post-process measurements, underscoring Renishaw's commitment to lean manufacturing practices.

A VISION FOR 2025 AND BEYOND

Looking ahead, Renishaw's strategy centres on delivering long-term value through innovative products and sustainable practices. The company's emphasis on R&D ensures that it remains at the forefront of industry trends, addressing the increasing demand for efficiency, flexibility, and reduced wastage in manufacturing processes.

"We see significant opportunities in the rapid industrialisation and modernisation of sectors globally," Sangam notes. "India's focus on local manufacturing and infrastructure development is particularly promising, driving the need for advanced technologies and precision solutions."

Renishaw's growth strategy emphasises strengthening stakeholder relationships, including customers, suppliers, and partners. These connections play a critical role in shaping future product roadmaps and prioritising investments in R&D. By providing holistic solutions that integrate advanced measurement technologies with process control, Renishaw helps OEMs differentiate their offerings and deliver greater value to end-users.

COMMITMENT TO EXCELLENCE AND SUSTAINABILITY

A key pillar of Renishaw's vision is sustainability. The company is committed to achieving Net Zero and incorporates green practices into its operations. By adopting environmentally friendly technologies and reducing resource consumption, Renishaw aims to make a positive impact on both the planet and society.

"Our dedication to sustainability goes hand in hand with our innovation-driven approach," says Sangam. "This synergy ensures that we meet the evolving demands of our customers while contributing to a sustainable future."

Renishaw also invests in building a skilled and resilient workforce, equipping employees with the knowledge and tools to navigate tomorrow's challenges. This focus on people, innovation, and sustainability underpins the company's mission to lead the industry and make a positive difference globally.

As the manufacturing and machining landscape continues to evolve, Renishaw's pioneering approach ensures it remains a trusted partner for industries seeking precision, productivity, and sustainability.


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WE AIM TO POSITION IMTEX AS ASIA'S PREMIER MACHINE TOOL AND MANUFACTURING EXHIBITION: RAJMANE

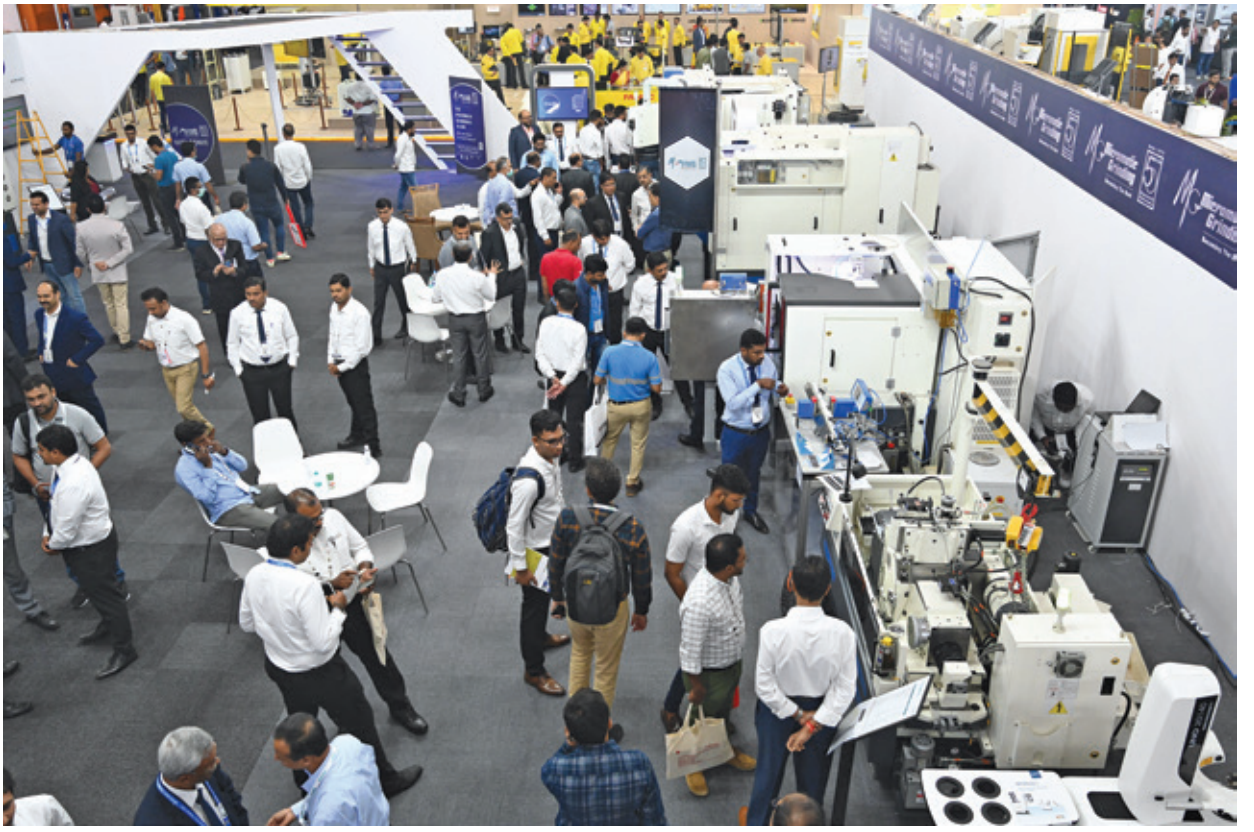
Rajendra S. Rajamane, President of IMTMA, highlights the importance of IMTEX, plans to build on 2023 success, and the exhibition's global impact on Industry 4.0, additive manufacturing, and digital transformation.

By Nisha Shukla

IMTEX is a premier event for machine tool builders and is recognised as one of the leading global exhibitions for machine tools and manufacturing technology. Organised by the Indian Machine Tool Manufacturers' Association (IMTMA), this highly anticipated event will hold its 21st edition, from January 23 to January 29, 2025, at the Bangalore International Exhibition Centre (BIEC) in Bengaluru.


Rajendra S. Rajamane, President of IMTMA

Rajendra S. Rajamane, President of IMTMA, celebrated IMTEX's legacy, stating, "IMTEX has been a leader in showcasing manufacturing innovation for over 50 years. It has evolved from showcasing traditional machines to cutting-edge CNC systems -contemporary digital manufacturing, consistently serving as a platform to introduce the latest



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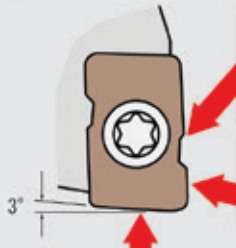
This insert has 3 cutting edges.



1 Cutting edge for reciprocating machining

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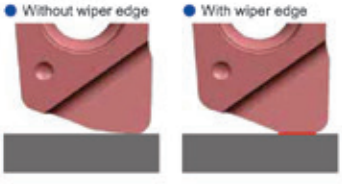

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Rajendra S. Rajamane, President, IMTMA; Jamshyd N. Godrej, Chairman, Exhibitions – IMTMA; Kamal Bali, President & Managing Director, Volvo India Group along with other dignitaries

technologies from the machine tool industry."

Regarding the upcoming IMTEX 2025 edition, Rajamane described it as the largest in the event's history. "IMTEX 2025 will feature over 1,100 exhibitors across 90,000 square metres in eight halls. It will showcase the latest technologies from the machine tool sector, including an exclusive pavilion on digital manufacturing, where visitors can explore innovations such as 3D laser scanners, IIoT solutions, and 3D printers," he said.

Rajamane highlighted the indispensable role of IMTEX for industry professionals and businesses, emphasising, "IMTEX is a vital learning ground for the manufacturing industry. Every edition offers something new to see, learn, and take away. Attendees will have the opportunity to witness live demonstrations of machines and technologies, which assist in making informed decisions."

He added, "The International Seminar on Machining Technologies, hosted alongside IMTEX 2025, will provide a valuable platform for stakeholders to learn about global trends from international experts."

Reflecting on the success of IMTEX 2023, Rajamane noted, "The 2023 edition marked a strong recovery for the exhibition and manufacturing industries post-pandemic. Since then, we have actively promoted IMTEX in countries such as Germany, Italy, Japan, Korea, and the USA, fostering global interest. For 2025, we are building on this momentum with new features like the Auto Components Industry Transformation Summit."

Discussing the concurrent Tooltech exhibition and special pavilions, he said, "Tooltech will showcase the latest advancements in tools and dies. The Digital Manufacturing pavilion will feature technologies like IoT-enabled machine tools, collaborative robots, autonomous mobile robots, and virtual product development solutions. Visitors can also experience augmented and virtual reality systems for installation, training, and demonstrations."

> "IMTEX 2025 will feature over 1,100 exhibitors across 90,000 square metres in eight halls where visitors can explore innovations such as 3D laser scanners, IIoT solutions, and 3D printers

On the transformative power of digital manufacturing, Rajamane remarked, "The Digital Manufacturing pavilion at IMTEX 2025 will lead the next generation of manufacturing with innovations such as digital twins, 3D printing, artificial intelligence, big data analytics, cloud computing, and augmented reality. These technologies represent the future of our industry."

Sharing his vision for IMTEX, Rajamane stated, "Our aim is to position IMTEX as Asia's leading machine tool and manufacturing technology exhibition. It will continue to serve as a catalyst for enhancing trade and business relations across the region while supporting India's journey towards self-reliance in manufacturing." He concluded by affirming, "IMTEX will remain a driving force for innovation, trade, and global collaboration in the manufacturing industry."

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A Staffing Perspective on Manufacturing

The report provides an extensive analysis of the manufacturing sector's contractual workforce, revealing key trends, challenges, and opportunities.

TeamLease Services, India's leading staffing solutions company revolutionising employment and workforce dynamics, has released its latest report, "A Staffing Perspective on Manufacturing."

As the manufacturing sector aims to achieve a $1 trillion valuation by 2025-26, addressing workforce dynamics will be pivotal in ensuring sustained growth. This growth is led by strategic government initiatives, technological advancements, and an evolving workforce landscape.

The report highlights how diverse industries drive growth in manufacturing, including automotive, chemical, textile, electronics, machinery and equipment, all of which play pivotal roles in employment and economic development. Coupled with Industry 4.0 technologies like IoT, AI, robotics, and automation, these sectors are rapidly transforming operations through smart factories, enhancing productivity and efficiency. This evolution requires large-scale upskilling and reskilling initiatives to bridge the growing skill gap.

The report reveals that the sector's workforce is predominantly young, with most individuals in the 28-37 age group (43.6 per cent). This demographic is well-positioned to embrace technological changes but requires urgent capacity-building efforts in technical and analytical domains.

The workforce is also diverse in terms of educational backgrounds, with nearly half being graduates. Both genders show the highest representation at the graduation level, 48.5 per cent for males and 46.4 per cent for females. Meanwhile, Maharashtra (17.2 per cent) and Tamil Nadu (14.6 per cent) are the leading states in contractual workforce contributions, followed by Uttar Pradesh (9.6 per cent) and Karnataka (9.4 per cent). This reflects the industrial prominence of these regions. Smaller contributions come from states like Delhi (3.6 per cent), Rajasthan (3.5 per cent), and Bihar (3.4 per cent), while other contributors (24 per cent) include West Bengal, Andhra Pradesh, Telangana, and Kerala.

One of the most notable findings is the gender disparity within the temporary workforce. A significant 89.5 per cent of employees in temporary roles are male, highlighting a significant underrepresentation of women. Females in the workforce, however, demonstrate higher representation in postgraduate qualifications (24.3 per cent compared to 10.5 per cent of males).

Despite the impressive progress, the report also lists the challenges. One of the most notable findings is the gender disparity within the temporary workforce. A significant 89.5 per cent of employees in temporary roles are male, highlighting a significant underrepresentation of women. Females in the workforce, however, demonstrate higher representation in postgraduate qualifications (24.3 per cent compared to 10.5 per cent of males). In comparison, males dominate in technical roles with greater representation in diplomas (13.5 per cent vs. 5.7 per cent) and ITIs (11.5 per cent absent for females). This imbalance calls for targeted efforts to foster gender parity and encourage women to take up technical roles.

The report also highlights attrition as a persistent challenge for the sector, with more than 43 per cent of temporary workers leaving within a year and 8.7 per cent exiting within the first three months of employment. Overall, more than half of the temporary workforce has a tenure of less than one year, indicating long-term retention challenges. Female employees face additional hurdles, with 66 per cent leaving their jobs within a year, often due to safety concerns, commuting difficulties, and the physical work requirement of the sector. The report highlights the urgent need for women-friendly workplaces to improve retention rates.

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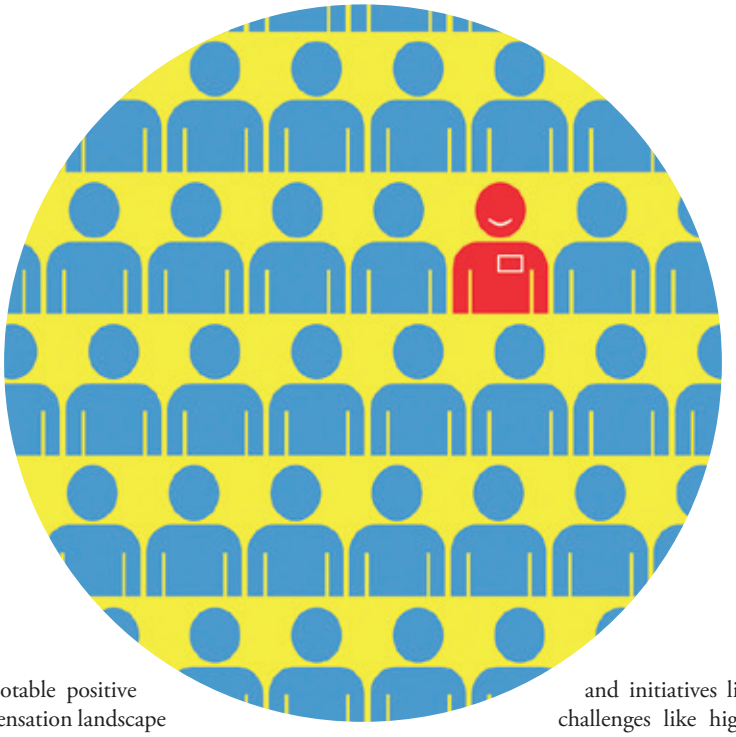

One of the notable positive trends is the compensation landscape in the manufacturing sector. The CTC grew from FY21 to FY24 with a 5.6 per cent CAGR. This growth is driven by inflation, increased demand for skilled workers, and the need for competitive pay to retain talent. However, the gender pay gap persists, with males in the temp workforce earning higher average CTCs than females, further emphasising the need for equitable pay practices.

Despite these challenges, the sector's demand for skilled roles continues to rise. Blue-collar and grey-collar positions such as assembly line workers, welders, and CNC operators remain critical. At the same time, white-collar roles like production supervisors, quality control inspectors, and supply chain managers are also in high demand.

Subburathinam P, Chief Operating Officer of TeamLease Staffing, said, "Our findings highlight a dual challenge and opportunity for India's manufacturing sector. While it is on a strong growth path, driven by a $447 billion export milestone and initiatives like PLI schemes, challenges like high attrition, skill gaps, and gender disparities persist. To unlock its potential, the sector must prioritise inclusive policies and invest in upskilling for Industry 4.0. Strategic workforce outsourcing can help reduce costs and address operational inefficiencies. By focusing on retention and adaptability, the sector can not only achieve its $1 trillion valuation goal but also set a global standard for sustainable and equitable industrial growth."

One of the notable positive trends is the compensation landscape in the manufacturing sector. The CTC grew from FY21 to FY24 with a 5.6 per cent CAGR. This growth is driven by inflation, increased demand for skilled workers, and the need for competitive pay to retain talent. However, the gender pay gap persists, with males in the temp workforce earning higher average CTCs than females.

The report outlines actionable strategies to address the challenges in India's manufacturing sector. Companies are encouraged to enhance workplace safety, foster inclusivity, and invest in career development initiatives such as structured mentorship programs. Workforce outsourcing is identified as a critical tool for reducing costs, with potential savings of 50-60 per cent, while improving operational efficiency. At the same time, employers are urged to implement data-driven feedback systems, employee recognition programs, and tailored retention strategies to reduce attrition and improve engagement.

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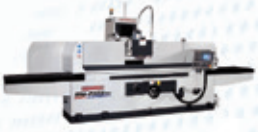

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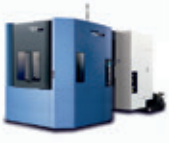

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Indian SMEs are harnessing digital transformation and sustainability to overcome challenges, enhance competitiveness, and drive economic growth.

Between 2000 and 2019, Small and Medium Enterprises (SMEs) in India faced significant challenges in connecting with clients and customers due to limited digital awareness. However, the pandemic acted as a turning point, pushing entrepreneurs to explore digital platforms for branding, marketing, and communication. The adoption of digitalisation enabled them to build stronger connections with stakeholders, unlocking new growth opportunities.

Despite these advances, SMEs have long struggled with barriers like limited access to finance, insufficient market information, low productivity, and fierce competition with larger firms. Challenges such as regulatory compliance, supply chain constraints, and technological gaps have often hindered their growth and competitiveness.

In recent years, digital transformation and sustainability have become important forces shaping the SME ecosystem. Digital transformation refers to integrating advanced technologies into business operations, fundamentally altering how companies operate and deliver value. For SMEs, this shift is not just a choice but a necessity in today's competitive and evolving digital world.

By adopting digital tools and technologies, SMEs can streamline operations, enhance customer experiences, and expand into new markets. From improving operational efficiency to reducing costs and boosting productivity, the transition toward digitalisation offers immense benefits. Entrepreneurs are leveraging digital platforms to reach global markets, harnessing the power of e-commerce, and creating branding opportunities across various media and portals.

Sustainability, meanwhile, focuses on meeting

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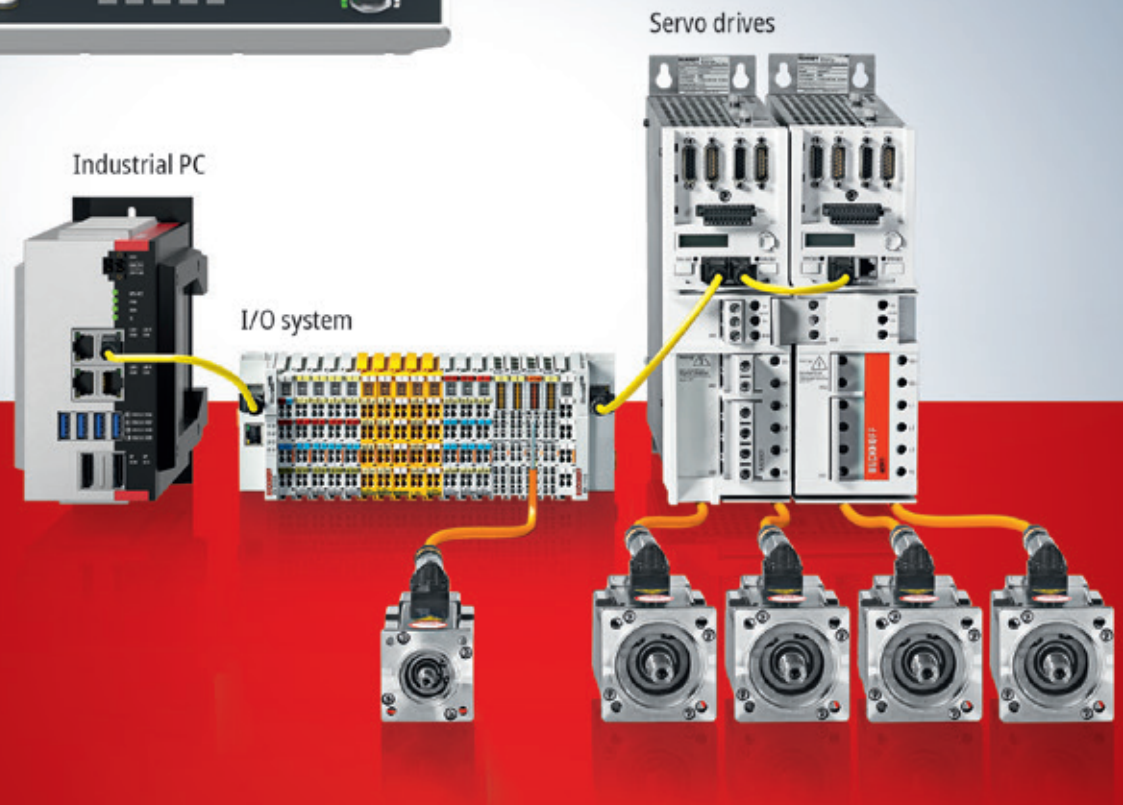

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present-day needs without compromising the future. For SMEs, adopting sustainable practices is no longer about corporate responsibility—it's a business imperative. Sustainable strategies lead to cost savings, enhance brand reputation, and ensure regulatory compliance. Measures like reducing waste and energy consumption not only lower operational costs but also provide a competitive edge in the market.

Yet, challenges persist. Securing finance remains a significant hurdle, as many lending institutions perceive SMEs as high-risk borrowers. Limited access to affordable funding restricts investments in digital technologies and sustainable practices. Compliance with regulatory frameworks also adds complexity, with SMEs often lacking the resources to navigate these requirements effectively. Additionally, workforce issues, including attracting and retaining skilled talent, exacerbate the situation. Existing employees often require upskilling to adapt to new digital tools and practices, creating additional strain on limited resources.

Despite these challenges, the potential opportunities for SMEs are vast. Export prospects have expanded, with digital platforms enabling access to global markets. Government initiatives, such as the Digital India programme and support for Sustainable Development Goals (SDGs), provide vital resources, financial aid, and training to help SMEs adopt modern practices.

Chandrakant Salunkhe, Founder & President, SME Chamber of India

> Digital transformation and sustainability empower Indian SMEs to overcome challenges, enhance competitiveness, and expand into global markets, driving economic growth and promoting innovation across industries and geographies.

Emerging technologies such as artificial intelligence, blockchain, and the Internet of Things (IoT) also present groundbreaking possibilities. These tools can enhance supply chain management, improve customer interactions, and increase operational efficiency. By embracing these innovations, SMEs can adapt to changing market dynamics and secure long-term growth.

The SME sector is a cornerstone of India's economic fabric, driving exports, employment generation, and entrepreneurship. It plays an important role in transforming unskilled labour into a skilled workforce and promoting industrialisation in Tier 2 and Tier 3 cities. With digital transformation and sustainability at the forefront, SMEs are equipped to contribute significantly to India's journey toward becoming a global manufacturing hub and achieving the vision of "Viksit Bharat."

The future of Indian SMEs lies in overcoming challenges, leveraging opportunities, and evolving into resilient, innovative enterprises that drive economic progress and solidify India's position as a leading global economy.

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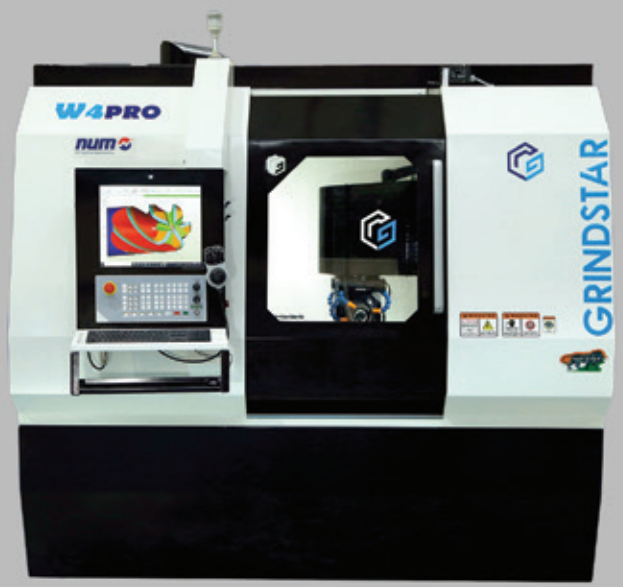

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Axis Solutions Pvt. Ltd. specialises in industrial automation and control systems, offering customised solutions for industries like oil and gas, petrochemicals, refineries, power plants, coal, mining, and chemicals. By combining advanced technologies with local expertise, the company addresses global market demands effectively.

Under Managing Director Dr. Bijal Sanghvi's leadership, Axis Solutions delivers products like Analyzer Shelters, Continuous Emissions Monitoring Systems (CEMS), and Steam and Water Analysis Systems (SWAS), all designed to ensure efficiency, compliance, and reliability in challenging environments.

For power plants, their solutions focus on emissions monitoring and efficiency tailored to regional grid needs, while for coal, mining, and chemical industries, they provide precise process control and environmental monitoring systems. Dr. Sanghvi highlights their localised strategy, which involves in-depth market research, strategic partnerships, and regional support teams, enabling their successful

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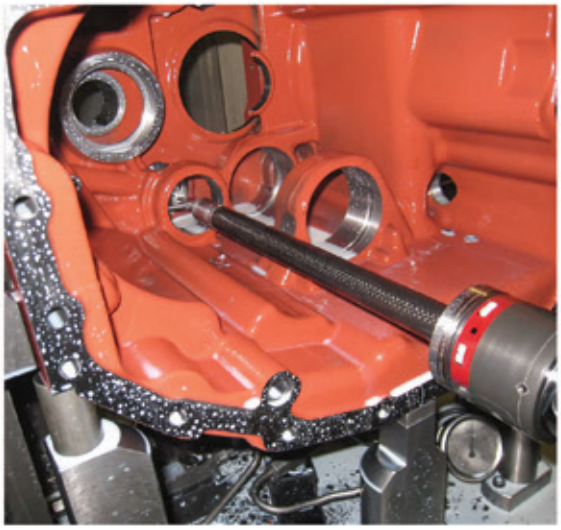

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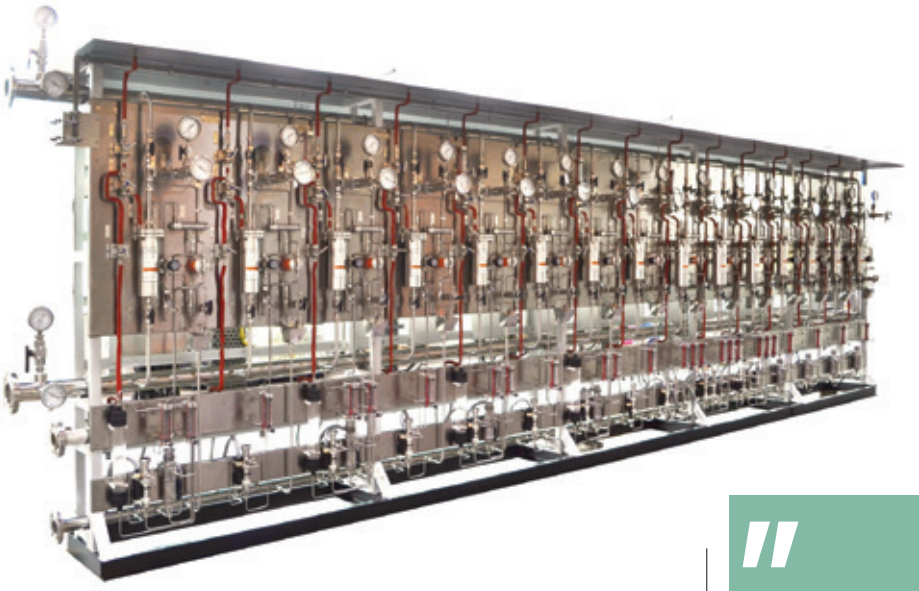

expansion into emerging markets in EMEA.

One of Axis Solutions' key offerings is its water analyzers, which play a crucial role in industrial water treatment plants and public sector projects to provide clean drinking water. Dr. Sanghvi explains, "Our water analyzers measure critical parameters like pH, chlorine, and turbidity with unmatched accuracy and reliability. To enhance their effectiveness, we integrate AI and cloud computing, enabling real-time data access and remote monitoring. These technologies allow us to predict maintenance needs, optimise processes, and ensure seamless operations."

The integration of advanced technologies like AI and cloud computing extends beyond water analyzers to other product lines. "AI helps us improve predictive analytics and process optimisation across our solutions," notes Dr. Sanghvi. "For example, in high-stakes industries like oil & gas, AI-driven analytics optimise operations, while cloud-based platforms facilitate real-time data management. This combination not only enhances performance but also ensures our solutions remain future-ready," he adds.

Sustainability is another cornerstone of Axis Solutions' strategy, particularly in industries traditionally seen as highly polluting. Dr. Sanghvi shares, "Our Continuous Emission Monitoring Systems (CEMS) and Analyzer Shelters are designed to monitor and reduce emissions, helping industries comply with environmental regulations. Additionally, our air quality monitoring solutions and advanced process analyzers enable precise control and optimisation, reducing waste and improving resource efficiency."

In terms of innovation, Axis Solutions continues to set industry benchmarks. "We've introduced advanced gas analysis systems featuring real-time monitoring capabilities and enhanced calibration," Dr. Sanghvi states. "Our latest Steam and Water Analysis Systems (SWAS) come with improved sensors for greater reliability, and our weather stations now provide high-resolution data integration. These innovations reflect our commitment to staying ahead of the curve," he added.

> "Our strategic focus for the next 5 to 10 years is on expanding into emerging markets while deepening our integration of AI and cloud computing. We aim to leverage these technologies to enhance our offerings, improve customer support, and drive operational excellence.

Looking ahead, Axis Solutions has a clear vision for the future. "Our strategic focus for the next 5 to 10 years is on expanding into emerging markets while deepening our integration of AI and cloud computing," explains Dr. Sanghvi. "We aim to leverage these technologies to enhance our offerings, improve customer support, and drive operational excellence. By aligning with industry trends and continuously innovating, we are well-positioned to lead the market," he concludes.

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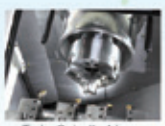
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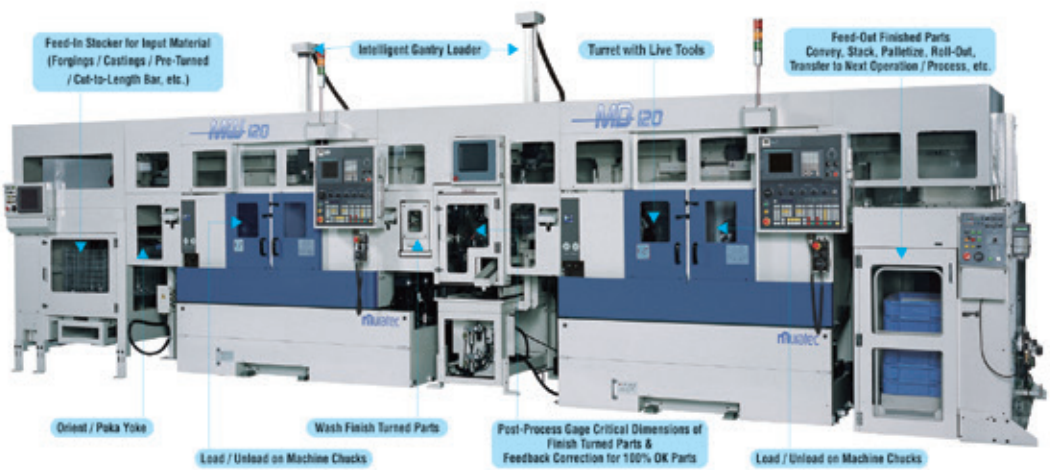

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DRIVING THE FUTURE OF WAREHOUSING AND INDUSTRIAL REAL ESTATE

ESR India's Abhijit Malkani discusses how sustainability, technology, and market-specific strategies are shaping the evolution of industrial real estate

By Team ET Now Machinist

The Industrial and warehousing real estate space in India is undergoing a lot of transformation. With the sector's rapid growth fueled by the e-commerce boom and the global recalibration of supply chains, it stands as a beacon of resilience and innovation. At the helm of this transformation is Abhijit Malkani, CEO of ESR India, who brings a wealth of knowledge and a visionary approach to one of the country's most dynamic industries.


Abhijit Malkani, ESR India

For Malkani, the journey of ESR India is rooted in a commitment to innovation, sustainability, and collaboration. As he aptly notes, the industrial and warehousing real estate market is no longer confined to traditional brick-and-mortar facilities. "It's about creating ecosystems that cater to evolving customer needs, optimise operations, and align with environmental goals," he shares.

PIONEERING MARKET-SPECIFIC STRATEGIES

One of the hallmarks of ESR India's approach under Malkani's leadership is its market-specific strategy. India's vast and diverse geography, coupled with varied consumer demands, necessitates tailored solutions. ESR India has embraced this complexity, focusing on regional requirements to create bespoke warehousing and logistics facilities.

"Each market in India has unique challenges and opportunities," Malkani explains. "Understanding the local nuances helps us deliver value to our clients while ensuring operational efficiency." From robust infrastructure in established urban hubs to tapping potential in Tier-II and Tier-III cities, ESR's approach highlights agility and adaptability.

SUSTAINABILITY AT THE CORE

Sustainability remains a cornerstone of ESR India's growth narrative. The industrial real estate sector, often scrutinised for its environmental impact, is witnessing a green revolution led by companies like ESR. Malkani explains that ESG (Environmental, Social, and Governance) is not merely a buzzword but a guiding principle for the company.

"Our parks are designed to reduce carbon footprints while enhancing the well-being of occupants and surrounding communities," Malkani asserts. ESR's initiatives, such as solar rooftops, rainwater harvesting systems, and energy-efficient building designs, are redefining standards for green industrial spaces in India.

Additionally, the company is actively pursuing certifications like IGBC and EDGE for its projects, signaling its commitment to environmentally responsible growth. These efforts not only mitigate

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STUDER

environmental risks but also align with the increasing expectations of global clients prioritising sustainability.

THE ROLE OF TECHNOLOGY

Another key area where ESR India is making strides is the integration of technology. Warehousing and logistics, traditionally labour-intensive industries, are now seeing the adoption of automation, AI, and IoT, revolutionising efficiency and transparency.

"Technology is the backbone of modern industrial real estate," Malkani remarks. ESR India has leveraged cutting-edge solutions to optimise its operations and improve customer experiences. From smart warehouses equipped with real-time inventory tracking systems to advanced data analytics that forecast market trends, the company is at the forefront of digital transformation.

This tech-first approach has not only enabled ESR India to enhance operational efficiencies but also provided clients with solutions that cater to the dynamic demands of their industries.

BUILDING A RESILIENT ECOSYSTEM

The pandemic has highlighted the importance of resilience in every industry. For ESR India, this resilience is deeply embedded in its operational framework. Malkani highlights how the company's strategic foresight and emphasis on agility have helped it navigate challenges and capitalise on emerging opportunities.

"We have seen the sector transform from a secondary asset class to a critical enabler of economic growth," he reflects. The rise of omnichannel retail, the push for last-mile delivery solutions, and the increasing preference for near-shoring have accelerated demand for well-connected, state-of-the-art facilities.

To meet this demand, ESR India has expanded its footprint across the country, developing logistics parks and industrial hubs that offer scalability, connectivity, and innovation. With infrastructure playing a vital role in the government's vision for a $5 trillion economy, the company is well-positioned to contribute meaningfully to this goal.

EMPOWERING COMMUNITIES

Beyond business metrics, ESR India's initiatives extend to community development. Malkani points out the importance of promoting partnerships with local stakeholders to create inclusive growth. The company's programs in education, skill development, and employment generation have positively impacted communities around its parks.

"It's essential to uplift the communities where we operate. This is as much about social responsibility as it is about long-term sustainability," Malkani informs.

LOOKING AHEAD

As India's industrial and warehousing landscape continues to evolve, ESR India remains steadfast in its commitment to innovation and sustainability. Malkani's vision for the company is rooted in creating world-class facilities that drive economic growth while aligning with global sustainability goals.

"The future is bright for industrial real estate in India," he concludes. "As we move forward, our focus will remain on building ecosystems that are not only efficient but also responsible, paving the way for a more sustainable tomorrow."

With visionaries like Abhijit Malkani leading the way, the industry is set to reach new milestones, setting higher standards and creating meaningful value for all its stakeholders.

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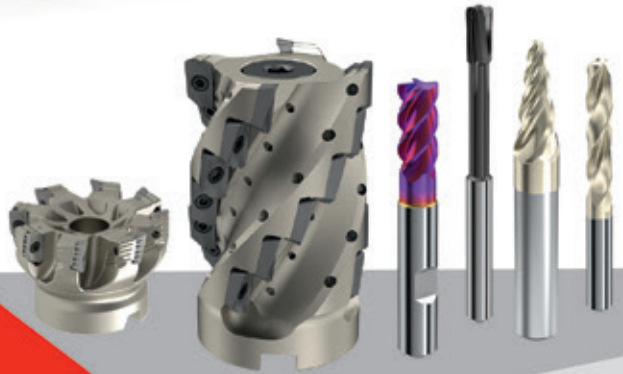

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THE HIDDEN COST OF NEGLECT: WHY CNC FIRE SAFETY IS A MUST

The article discusses why investing in CNC fire safety is crucial for manufacturers to ensure the smooth operation of their businesses.

By Rohit Warrier, CEO, WEFIRE- Warrier Electronics

CNC machines are the lifeblood of modern manufacturing, driving precision, productivity, and profitability. But behind their smooth operation lies an invisible risk—fire. This threat, often underestimated, can shatter operations in minutes, leaving behind financial and reputational devastation.

THE COST OF COMPLACENCY

Imagine this: A spark ignites within your CNC machine, fuelled by flammable neat cutting oils and the heat of high-speed machining. Within seconds, the fire spreads, engulfing the machine and halting your production line. The result?

1) ***Machine Damage:*** A single CNC machine can cost anywhere between Rs 30 lakhs to Rs 2 crore. Repair or replacement is not just expensive—it can take months, leaving you grappling with production delays.
2) ***Downtime Losses:*** Downtime costs escalate quickly. Lost production, delayed deliveries, and potential contract penalties can cost businesses lakhs—or even crores—in just a few days.
3. ***Reputation at Stake:*** Clients trust you for reliability. A fire incident doesn't just hurt your operations—it can erode trust, costing you long-term partnerships.

And here's the kicker: All of this could be avoided for less than 3 per cent of your machine's value by investing in a fire suppression system.

Rohit Warrier, CEO, WEFIRE- Warrier Electronics

THE VALUE OF FIRE SUPPRESSION

A CNC fire suppression system isn't just an expense; it's your insurance against catastrophe.

- ***Early Detection and Control:*** Modern systems identify and suppress fires before they escalate.
- ***Minimal Downtime:*** Fires that could halt operations for weeks are resolved in seconds.
- ***Cost-Effective Protection:*** At less than Rs 3-5 lakhs per machine, the cost is a fraction of your machine's value and infinitesimal compared to the potential losses of a fire.

REAL-WORLD CONSEQUENCES

In the rare but real instances of CNC fires, businesses without suppression systems have suffered massive downtime, lost contracts, and employee safety concerns. In contrast, businesses equipped with fire suppression systems not only protect their assets but also maintain operational continuity and client trust.

THE CHOICE IS CLEAR

The question is not if a fire will happen but when. With flammable oils, high temperatures, and the sheer pace of CNC operations, the risk is always present. Waiting for disaster to strike is a gamble no manufacturer can afford to take.

For less than 3 per cent of your machine's cost, you can safeguard 100 per cent of its value, protect production continuity, and secure your reputation.

Don't let a fire define your business. Invest in fire safety today—because the cost of prevention is nothing compared to the cost of recovery.

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T.K. Ramesh

FROM HUMBLE BEGINNINGS TO GLOBAL ASPIRATIONS

Rooted in design, Ace Micromatic blends innovation, precision, and customer focus to transform the machine tools industry.

By Team ET Now Machinist

Nearly 45 years ago, Ace Micromatic started its journey as a machine design consultancy, laying the groundwork for what would become India's largest machine tool group. Managing Director T.K. Ramesh attributes this success to the founders' deep understanding of design principles. "Design is the foundation of any product," he explains, emphasising how their focus on precision and purpose led to creating robust machines tailored to customer needs.

Today, Ace Micromatic boasts an expansive portfolio with over 200 models of turning machines and machining centres. From cutting-edge metal 3D printing to special-purpose machines, the company has continually expanded its capabilities, supported by an ecosystem that includes component manufacturing and exceptional customer service. "Our brand stands for value and customer support," says Ramesh, highlighting the company's ethos of growing alongside its customers.

While the automotive sector once accounted for 90% of its offerings, the company has successfully diversified. Industries like aerospace, precision engineering, and general manufacturing now contribute 45% of its business. On the global front, Ace Micromatic is making significant strides. With over 10,000 machines operating outside India, including 2,000 in China, exports now account for 10% of its revenue. The goal? To raise that number to 25% by leveraging its robust product lineup and trusted customer support.

Ace Micromatic isn't just a company—it's an institution in the making. With ethical practices, strong governance, and a relentless focus on innovation, it's working toward a bold vision: to become India's first truly global machine tool leader. In Ramesh's words, "It's about building not just machines, but a legacy."

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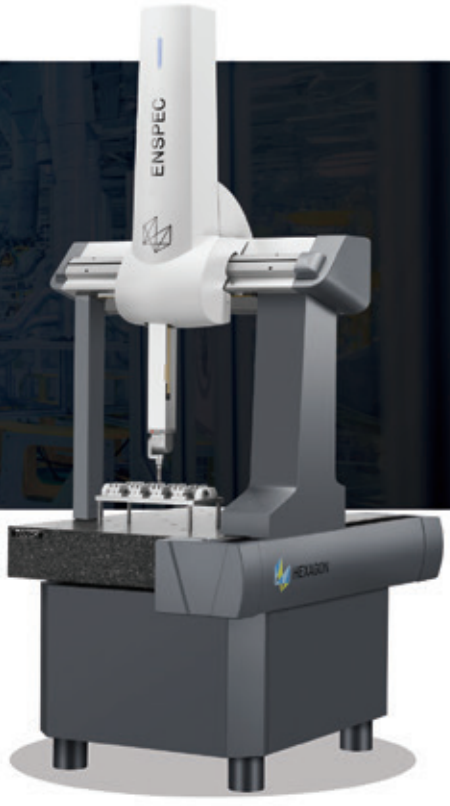

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Nearly 50% of our machine sales cater to the auto component and automotive sectors. If you've travelled in a two-wheeler or four-wheeler made in India, chances are several parts were machined on our CNC lathes and machining centres. The remaining 50% serves diverse industries like railways, defence, and general engineering.

Harish B.
Chief Executive Officer
Micromatic Machine Tools

The quality of our machines has come a long way, thanks to our strong designs and the excellent materials available in India. Our well-developed supply chain, including our own foundries and manufacturing units, ensures we deliver highly accurate parts that match or surpass the quality of any global product.

Umesh LS
Director - Machine Centre Division, Ace Designers

Digital transformation is crucial for improvement, alongside process optimisation—questioning lead time, takt time, and throughput. Embracing lean principles is essential, as 20–25% of activities in industries today are non-productive. Scaling up requires reducing these inefficiencies and improving standards to meet global benchmarks.

Muralidhara Rao
Joint Director - Machine Centre Division, Ace Designers

Each sector—auto, aerospace, defence, medical, electronics—has unique needs. Aerospace, for instance, demands rigid, high-accuracy machines for strength-to-weight components, with spindle speeds reaching 30,000 to 1 lakh rpm. Meanwhile, auto customers seek quieter vehicles. Our machining centres deliver precision under 5–10 microns, meeting these diverse and evolving demands.

Prakash G.
Joint Director - Turning Centre Division,
Ace Designers

We understand the challenges of last-mile connectivity for machines due to shop floor cables. That's why we are developing hardware to ensure machines are always connected from the moment they're powered on. With advanced algorithms, we analyse machine behaviour and provide feedback to help customers optimise utilisation and reduce ownership costs.

Sumit Waghmare
Chief Technology Designer
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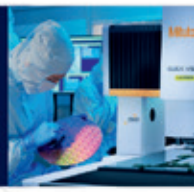

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P. Ramadas

SHAPING INDIA'S MANUFACTURING FUTURE

From humble beginnings in a garage to becoming India's leading machine tool group, Ace Designers aims to transform global manufacturing with innovation and integrity.

By Team ET Now Machinist

Ace Designers' journey began with a vision to revolutionise manufacturing. Speaking with ET Now, Shrinivas G. Shirgurkar, Founder & Director, shared how the company started as a design consultancy in a garage. "We began by designing machines for other manufacturers, but our dream was always to create large-scale manufacturing solutions," he recalled.

Reflecting on milestones, P. Ramadas, also a Founder & Director, highlighted the introduction of the nanopithin system in 1994 and their evolution from producing three machines annually to an impressive 2,480 machines last year. He credited the company's growth to innovation in vertical and horizontal machining centres, which cater to industries ranging from automotive to aerospace.

Ace Designers' commitment to ethical business practices and employee empowerment sets them apart. "We share a percentage of profits with all team members, making them feel like true partners," said Shirgurkar. The company has also embraced a unique culture that includes meditation and fitness to ensure employee well-being.

To scale further, Ace Designers merged three core entities—Ace Designers, AMS, and Micromatic Machine Tools—into one entity, aiming to become a billion-dollar enterprise within the next five years. Ramadas added, "We have built this company without government support, purely by competing in the market. Our vision is to serve the country with innovative products and impact manufacturing globally."

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Shrinivas C V V
Chief Financial Officer
– Ace Designers

Over 40 years, Ace Micromatic has delivered progressive manufacturing solutions, with 80,000+ machines performing globally. Our products optimise operational costs, boost productivity, and come with exceptional customer support—key advantages that position us strongly on the global stage.

CR Raguramachandran
Chief Executive Officer- Ace Micromatic International

At our company, management ensures equal employment opportunities for female employees and places a strong emphasis on skill development. We offer training programs to enhance leadership and interpersonal skills and encourage involvement in employee engagement activities. We proudly have women working in both technical and non-technical roles across various departments.

Malini CB
Executive - HR, Machine Centre Division, Ace Designers

The organisation offers a dedicated mentorship program where experienced leaders provide valuable guidance and support. This helps us focus on skill development and career growth, boosting our confidence and preparing us for leadership roles. The group is committed to empowering employees through a thorough learning process, fostering continuous growth.

Hema M.
Engineer – Technical Service Group,
Turning Centre Division, Ace Designers

At Ace Micromatic, we encourage all our members to engage in technology-driven initiatives. Our culture is centred on nurturing talent, encouraging a support ecosystem, and focusing on enhancing skills and abilities to drive innovation and success across the organisation.

Vijaya Bhaskar
Head - QMS & Business Excellence,
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EMPOWERING LIVES THROUGH SUSTAINABLE WATER SOLUTIONS

From revolutionising water solutions in rural India to leading sustainable innovations globally, Shakti Pumps embodies resilience, innovation, and a commitment to empowering lives through eco-friendly water management.

By Amit Shanbaug

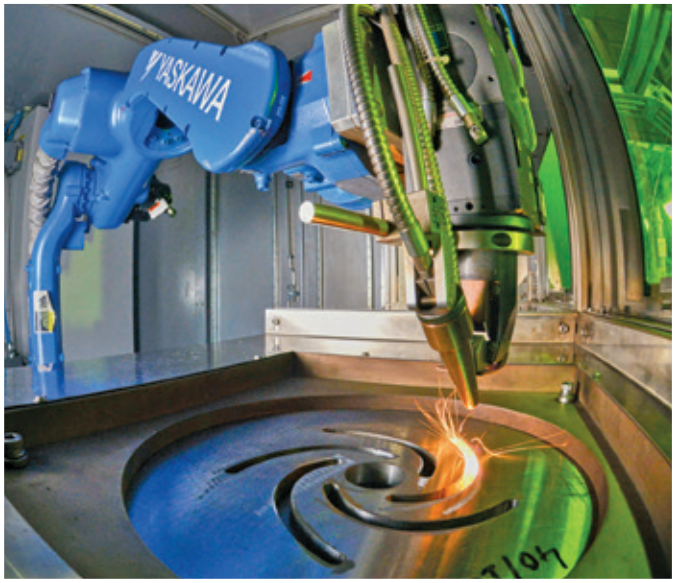
Shakti Pumps' journey, which began in 1982, is a proof to resilience, innovation, and a commitment to sustainability. The company entered the market at a time when industries were heavily regulated, dominated by state quotas, and fraught with challenges for Micro, Small, and Medium Enterprises (MSMEs). Despite these hurdles, Shakti Pumps persevered, initially focusing on government supplies and later diversifying into exports. By 1995, the company went public, setting its sights on the global stage and proving that Indian products could match the quality of their European and American counterparts.

PIONEERING ENERGY-EFFICIENT SOLUTIONS

In 2004, Shakti Pumps made an important move into energy-efficient products, revolutionising the pump industry. Recognising the potential of solar technology around 2009-2010, the company identified a massive opportunity in solar-powered pumps. By 2011, Shakti Pumps launched solar programs in India, introducing sustainable solutions for farmers. Today, Shakti Pumps exports to over 100 countries, holding a significant share of the global market.

SUSTAINABILITY AND GREEN INITIATIVES

Sustainability lies at the core of Shakti Pumps' operations.



As a zero-discharge company, Shakti Pumps focuses on green energy solutions that cater to both environmental and societal needs. The company's solar pumps are designed to save water and electricity while providing IoT-enabled systems for real-time monitoring. Their grid-connected solar pumps enable farmers to save costs and even generate additional income by supplying surplus energy back to the grid. These innovations reflect Shakti Pumps' commitment to reducing carbon footprints and promoting eco-friendly technologies.

CHALLENGES AND FUTURE GOALS

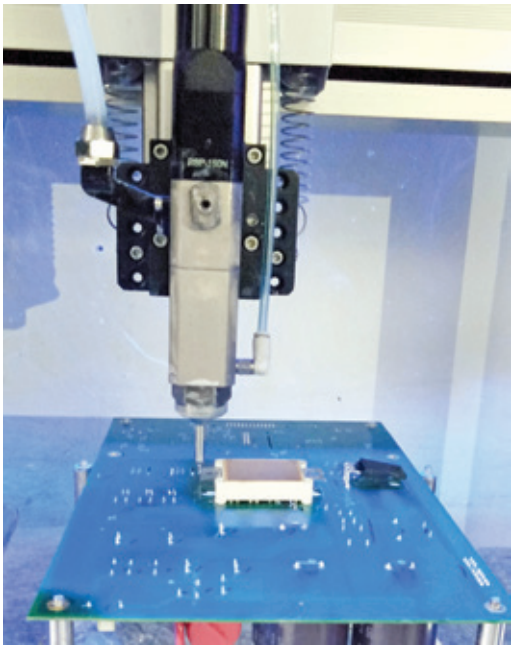
While Shakti Pumps has achieved remarkable milestones, challenges persist. The company faces hurdles in standardising systems and meeting government requirements. To address these issues, Shakti Pumps has actively collaborated with policymakers and invested in advancing renewable energy solutions. With 29 patents (15 already granted) and a robust R&D team of 150 professionals, the company continues to drive technological innovation, ensuring its sustained growth. Looking ahead, Shakti Pumps aims to maintain an annual growth rate of 25-30 per cent in solar energy solutions.

MOVE TOWARDS SUSTAINABILITY

Shakti Pumps' impact goes beyond business. By installing over 2.5 lakh solar pumps across India, the company has transformed rural livelihoods. Reliable power supply has enabled micro-irrigation, improved crop quality and increasing farmers' incomes. These efforts align with Prime Minister Narendra Modi's vision of promoting renewable energy and electrifying rural India. Shakti Pumps' initiatives highlight its role in empowering communities and promoting sustainable development.

DIVERSIFICATION INTO ELECTRIC VEHICLES

True to its innovative spirit, Shakti Pumps has ventured into the electric vehicle (EV) segment, manufacturing electronic controllers and motors for two- and three-wheelers. The company is now preparing to expand



into the four-wheeler industry. Chairman Dinesh Patidar, who has always been passionate about designing and developing new products, sees this as a natural extension of Shakti Pumps' expertise in energy-efficient technologies.

CELEBRATING MILESTONES

The story of Shakti Pumps is one of resilience and determination. Founded by Dinesh Patidar's father-Manoharlal Patidar and a couple of partners in 1982, Dinesh joined the business in the year 1985. Despite initial struggles, the company gained momentum, going public in 1995. Over the years, Shakti Pumps has earned various accolades and accreditations, including being the first company in India to receive the Bureau of Energy Efficiency (BEE) 5-star rating for its energy-efficient pumps. Today, the company manufactures nearly five lakh pumps and motors annually increasing the capacity to produce up to ten lakhs.

OVERCOMING CHALLENGES

In 2013, the company took a bold step by engaging Amitabh Bachchan as its brand ambassador to market its solar pumps. This move brought much-needed national recognition, helping the company communicate its unique selling propositions. Reflecting on the decision, Patidar humorously noted that while the company couldn't afford the megastar's fees or the extravagant ad shoots, the investment was worthwhile for the greater good of the organisation.

> "Solar pumps have transformed rural livelihoods by ensuring reliable power supply. With over 2.5 lakh installations, we have empowered farmers to improve crop quality, save resources, and boost income.

GLOBAL AMBITIONS: EXPANDING HORIZONS

Shakti Pumps' ambitions have always extended beyond India. By exporting its products to over 100 countries, the company has earned a reputation for high-quality, energy-efficient solutions. Its products, including 1,200 pump and motor variants are widely accepted in markets like the United States, Canada, and other developed nations.

EMBRACING SUSTAINABILITY: A SOLAR-POWERED FUTURE

The company's foray into solar-powered pumps marked a significant milestone, particularly in regions with limited access to electricity. These pumps offer an affordable and sustainable alternative, transforming lives in rural and drought-affected areas. Shakti Pumps' innovations align with global efforts to address water scarcity and energy access challenges while promoting environmental stewardship.

KEY FINANCIAL MILESTONES

Shakti Pumps' financial success mirrors its operational achievements. In Q2 FY25, the company reported a

> We have focused on innovation and sustainability from day one, developing energy-efficient pumps, solar solutions, and IoT-enabled technology to make farming and energy management smarter and more accessible.

315 per cent increase in net sales to Rs. 634.6 crore, compared to the same quarter the previous year, driven by robust demand for its products. Net profit for the same period rose significantly to Rs. 101.4 crore, reflecting effective cost management and operational efficiency. In H1 FY25 revenue increased to Rs. 1,202.2 Crores up by 352.2 per cent YoY as compared to Rs. 265.8 Crores in H1FY24. EBITDA Margin at 23.7 per cent in H1FY25 as against 8.7 per cent in H1YF24. PAT grew to Rs. 194.1 Crores in H1FY25 from Rs. 6.9 Crores in H1FY24. PAT Margin expanded to 16.1 per cent in H1FY25 from 2.6 per cent in H1FY24.

Additionally, in December 2024, Shakti Pumps secured a Rs 753 crore contract to supply and install 25,000 solar water pumps across Maharashtra cementing its industry leadership.

Under Dinesh Patidar's guidance, Shakti Pumps adopted a proactive approach, investing in research and development, expanding manufacturing capabilities, and fostering a customer-centric culture. These efforts have enabled the company to weather adversities and emerge stronger.

LEADING BY EXAMPLE: CORPORATE SOCIAL RESPONSIBILITY

Shakti Pumps' commitment to social responsibility is evident in its initiatives, such as solar water projects in drought-hit areas and free healthcare camps in rural communities. These efforts demonstrate that corporate success and social impact can go hand in hand, highlighting the company's dedication to creating shared value.

In the Covid times, company demonstrated exceptional corporate citizenship during the Covid-19 crisis, undertaking numerous philanthropic efforts that made a tangible difference in the lives of those affected. Shakti Pumps is also dedicated to nurturing young minds, providing steadfast support to a local school and helping to shape the leaders of tomorrow.

Today, the journey of Shakti Pumps reflects the power of determination, innovation, and sustainability in addressing critical challenges. By continually exploring advancements in technology and sustainable practices, the organisation has demonstrated how businesses can balance growth with environmental and social responsibility. Its efforts to transform water management solutions have had a meaningful impact, particularly in rural and underserved areas.

ASSESSING BEYOND SUSTAINABILITY

Dr. Miniya Chatterji, CEO of Sustain Labs Paris, shares insights into their comprehensive Life Cycle Assessment (LCA) conducted for a global beverage company's refrigerator coolers.

Dr. Miniya Chatterji, CEO, Sustain Labs Paris

Founded in 2017, Sustain Labs Paris is an enterprise based in India, the UAE, and New Zealand that establishes and manages new ventures and assets that significantly contribute to a sustainable future. Dr. Miniya Chatterji, CEO of Sustain Labs Paris, shared insights into their comprehensive Life Cycle Assessment (LCA) conducted for a global beverage company's refrigerator coolers.

The process began with defining the scope and objectives, followed by data collection through detailed collaboration with the company's R&D teams, vendors, and sub-vendors. "We also conducted physical inspections and product teardowns to ensure the data's accuracy," explained Dr. Chatterji. The study assessed the cooler's environmental footprint across its entire lifecycle—from manufacturing at a vendor's facility to its eventual end-of-life—spanning seven critical environmental impact categories, including global warming and water consumption.

Addressing the challenges in reducing these impacts, Dr. Chatterji highlighted that global warming posed the greatest hurdle. "The exterior cabinet and chassis were major contributors due to the extensive use of steel and the energy-intensive processes involved in its production," she noted. Enhanced waste management practices during manufacturing emerged as the most effective strategy to mitigate these emissions.

To identify impactful solutions, Sustain Labs Paris developed six alternative scenarios. Among these, improving waste management stood out, as it significantly reduced global warming, particulate matter formation, and freshwater ecotoxicity. Dr. Chatterji emphasised, "This approach not only lowered emissions but also offered resource recovery opportunities without requiring major supply chain overhauls."

Specific recommendations for the beverage company included using lower-carbon steel for the cooler's exterior and optimising waste management practices to align with sustainability goals. Local procurement of materials was also suggested to minimise transportation-related emissions. Dr. Chatterji pointed out, "Focusing on practical and operationally viable changes ensures that these initiatives can be implemented seamlessly."

Given the company's global operations, recommendations were tailored to accommodate regional manufacturing differences. Sustain Labs Paris started by collaborating with a key vendor to test the feasibility of the proposed changes. "Once proven effective, these practices can be scaled across the global supply chain," said Dr. Chatterji.

She further stated that the LCA framework developed here can be extended to other equipment types or even different sectors. "Such efforts not only improve environmental performance but also enhance brand perception, resonating with increasingly eco-conscious consumers," she concluded, underscoring the importance of consumer education in amplifying the impact of sustainability initiatives.

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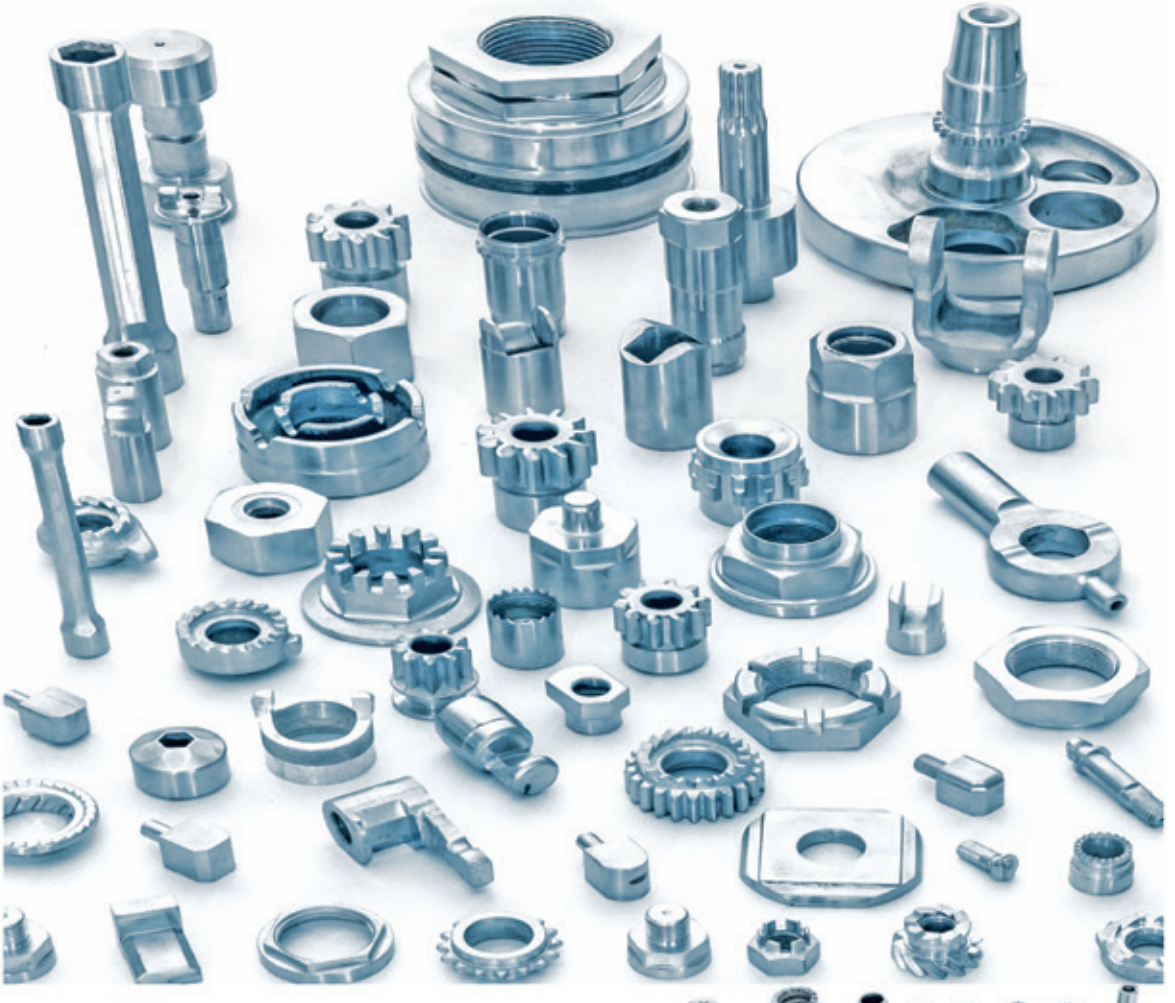

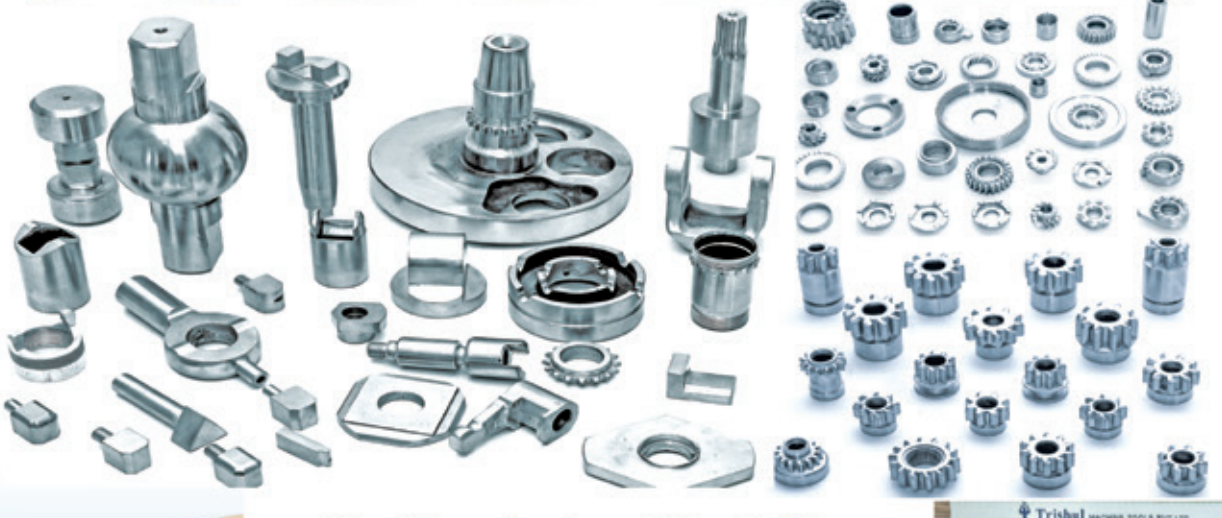

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Jameson Mendonca, Power Generation Business Leader at Cummins India Limited

Jameson Mendonca, Power Generation Business Leader at Cummins India Limited talks about Cummins India's journey to CPCB IV+ compliance, highlighting challenges overcome, technological advancements, and its vision for driving India's energy transition with emission-reducing technologies and alternative energy solutions.

By Nisha Shukla

With its undisputable leadership in the power generation sector, Cummins India has been consistently setting benchmarks in sustainability, advanced technology, and customer-focused solutions. As a pioneer in complying with CPCB IV+ norms, the company demonstrates its commitment to meeting stringent emission standards while catering to diverse genset applications.

Jameson Mendonca, Power Generation Business Leader at Cummins India Limited, shared insights into this journey, highlighting the challenges that have been overcome, the technological

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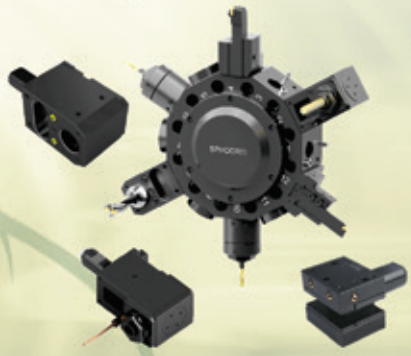

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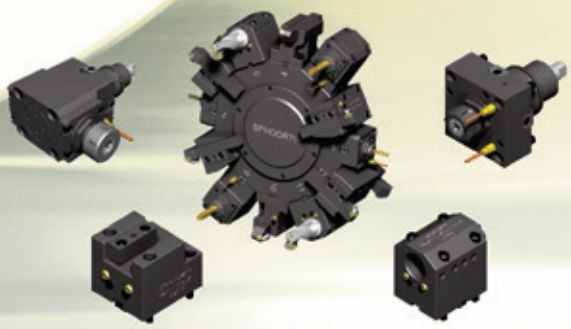

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advancements achieved, and the vision for India's energy transition.

"Cummins India is among the first in the country to implement the most stringent CPCB IV+ emission norms across major applications, covering a range from 7.5 kVA to 750 kVA. This accomplishment, certified by ARAI, positions us as a game changer in the power generation segment," Mendonca explained. He emphasised that Cummins' 60-year legacy in India has been instrumental in adapting to dynamic market needs and emerging technologies. Despite challenges like the COVID-19 pandemic, the company's dedicated team maintained high safety standards while delivering innovative solutions tailored to local markets.

The CPCB IV+ gensets significantly reduce particulate matter and nitrogen oxide emissions by approximately 90 per cent marking a critical step toward sustainability. "Beyond emission reductions, these gensets integrate advanced after-treatment systems, enhancing fuel efficiency and system durability. Real-time remote monitoring ensures optimal performance, enabling customers to minimise downtime and operational costs," said Mendonca. The use of Diesel Exhaust Fluid (DEF) sensors further optimises efficiency, ensuring compliance with environmental regulations while reducing expenses.

Affordability remains a priority, especially for small and medium enterprises. "We designed these gensets in India, focusing on market-specific needs to optimise initial costs. Coupled with extended service intervals and flexible financing options, we aim to make these solutions accessible to a broader customer base," Mendonca added.

Technological advancements have transformed these gensets into sophisticated systems with intelligent controls, remote diagnostics, and predictive maintenance features. Highlighting real-world benefits, Mendonca recounted how a high-utilisation customer achieved significant savings over 2,000–3,000 operational hours, thanks to enhanced fuel efficiency and reduced downtime.

Addressing India's net-zero emissions target by 2070, Mendonca articulated Cummins' broader vision: "Our PLANET 2050 strategy underscores our commitment to decarbonisation and a cleaner, greener future. We are exploring alternative fuels like biodiesel, methanol blends, and hydrogen, alongside developing microgrid technologies to maximise green energy utilisation."

In balancing traditional diesel offerings with sustainable energy solutions, Cummins is actively investing in technologies such as Hydrogen Internal Combustion Engines and Hydrogen Fuel Cells. "Our innovative approach combines advanced engineering with environmental stewardship, reinforcing our leadership in India's evolving energy landscape," Mendonca concluded.

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Ambarish Raj and Amandeep Munial, Partners at BMGI, delivering their special address

An auspicious kickstart to the event with ceremonial lamp lighting

A glimpse of audience engaging in a discussion

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The ET NOW Machinist Best Brands in Metal Cutting & Metal Forming 2024 felicitation ceremony was a remarkable evening that brought together the brightest minds, innovators, and leaders of the manufacturing industry. Held in Pune, the vibrant hub of Indian manufacturing, the event spotlighted the immense contributions of the metal cutting and forming industry in driving the nation's progress.

The ceremony opened with a warm welcome to the distinguished guests, industry leaders, and honourees. As the backbone of the manufacturing sector, this industry has undergone a remarkable transformation, evolving from dependence on imports to becoming a pioneer in indigenous innovation. The event, organised by ET NOW Machinist, a Times Group initiative, in collaboration with knowledge partner Breakthrough Management Group India Private Limited (BMGI), aimed to honour the exceptional contributions of brands that have set benchmarks in innovation, sustainability, and excellence.

The proceedings began with the traditional lamp lighting ceremony, symbolising the illumination of knowledge and inspiration. The lamp was lit by Shailendra Goswami, Chairman & Managing Director, Pushkaraj Group, Dr. Shailendra Shukla, Managing Director, Vehicle Group, Eaton, Neelam Pandey Pathak, Founder & CEO, Social Bay & Rozgar Dhaba, Mahadev B, Assistant Vice President, Worldwide Media and Amit Shanbaug, Editor, B2B Division, Worldwide Media (The Times Group)

In his welcome address, Amit Shanbaug delivered a speech that captured the essence of the industry. Sharing a heartfelt story, he emphasised how machine tools shape not just materials but also dreams and possibilities. Highlighting the sector's role across industries such as aerospace, healthcare, and automotive, he highlighted Pune's significance as a manufacturing powerhouse and the ideal host for these prestigious awards. He applauded the honourees for their relentless pursuit of excellence, which has inspired the entire manufacturing ecosystem to scale new heights.

RECOGNISING INNOVATION THROUGH COLLABORATION

Adding to the momentum, Ambarish Raj and Amandeep Munial, Partners at BMGI, delivered a special address. They reflected on the industry's decade-long strides in innovation, collaboration, and sustainability, stating how these pillars have transformed Indian manufacturing into a globally competitive force. Their insights highlighted the sector's readiness to address future challenges while continuing to lead with precision and excellence. A token of appreciation was presented to BMGI by Ranjan Haldar, Deputy General Manager, Worldwide Media, in acknowledgment of their valuable contributions.

INSIGHTS FROM INDUSTRY STALWARTS

The evening's highlight was a thought-provoking panel discussion on "The 10-Year Evolution of the Metal Cutting and Forming Industry in India and Its Impact on the Manufacturing Sector." Moderated by Nisha Shukla, Senior Assistant Editor, B2B Division, Worldwide Media, the panel featured an illustrious lineup of speakers which included Neelam Pandey Pathak, Founder & CEO, Social Bay & Rozgar Dhaba, Shailendra Goswami, Chairman & Managing Director,

Lto R: Nisha Shukla, Senior Assistant Editor at Worldwide Media, The Times Group; Bireswar Mitra, Former Executive Director, Sharda Motor Industries Ltd; Neelam Pandey Pathak, Founder & CEO Social Bay & Rozgar Dhaba; Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune, Chairman & Managing Director, Octarange Technologies Pvt Ltd & Upcoming OEV & REP Octarange EV and renewable energy park in Orissa; Shailendra Goswami, Chairman and Managing Director, Pushkaraj Group and Dr. Shailendra Shukla, Managing Director for Vehicle Group, Eaton

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Pushkaraj Group, Bireswar Mitra, Former Executive Director, Sharda Motor Industries Ltd, Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune & Chairman, Octa-range Technologies Pvt Ltd and Dr. Shailendra Shukla, Managing Director, Vehicle Group, Eaton

The discussion provided valuable insights into how the sector has embraced innovation, sustainability, and digital transformation. The panelists spoke on the importance of skill development, technology adoption, and fostering global competitiveness, inspiring attendees to envision a future of shared success.

HONOURING EXCELLENCE

The most awaited segment of the evening, the felicitation ceremony, recognised the Best Brands in Metal Cutting and Metal Forming. The awards were based on market research conducted by BMGI and editorial conceptualisation by ET NOW Machinist. Presented in alphabetical order, the honourees represented the pinnacle of excellence across the industry.

The first set of awards was presented by Neelam Pandey Pathak, Bireswar Mitra, and Dr. Shailendra Shukla followed by the second set presented by Shailendra Goswami and Dr. Dhananjay Kumar. Some of the celebrated brands included:

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3 AceMicromatic Manufacturing Intelligence Technologies Pvt.Ltd.
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5 APAR Industries Limited
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THE POWER OF SOCIAL MEDIA

Attendees were encouraged to share their achievements and the event's spirit on social media platforms using hashtags such as #BestOfMetalWorking, #ETNowBestBrands, #MetalCutting, and #MetalForming, tagging @ETNowMachinist. This integration amplified the celebration, reaching a wider audience and reinforcing the industry's collaborative ethos.

LOOKING AHEAD

The event wrapped up with a heartfelt reflection on the incredible journey of the metal cutting and forming industry—a journey built on innovation, resilience, and an unwavering commitment to excellence. More than just an awards ceremony, it became a celebration of the transformative impact of bold ideas, cutting-edge technology, and the power of collaboration.

As the evening drew to a close, the atmosphere was one of inspiration and camaraderie. The event left a lasting impression on everyone present, highlighting the industry's crucial role in shaping the future of manufacturing. From driving precision to championing sustainability, the honourees showcased the relentless spirit of progress and innovation, igniting hope and setting the stage for a brighter, more promising tomorrow.

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CELEBRATING A DECADE OF INDIA'S METAL CUTTING AND FORMING INDUSTRY

The discussion delved into how the metal cutting and forming industry has embraced cutting-edge technologies, championed skill development, and prioritised sustainability, paving the way for enhanced global competitiveness in the past decade.

The panel discussion titled "10-Year Evolution of the Metal Cutting and Forming Industry in India and Its Impact on Manufacturing sector" kicked off with a strong sense of anticipation as industry veterans and visionaries convened to explore the remarkable transformation of this crucial sector. Moderated by Nisha Shukla, Senior Assistant Editor at Worldwide Media, The Times Group, the discussion featured an esteemed panel that included Bireswar Mitra, Former Executive Director, Sharda Motor Industries Ltd; Neelam Pandey Pathak, Founder & CEO Social Bay & Rozgar Dhaba; Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune, Chairman & Managing Director, Octarange Technologies Pvt Ltd & Upcoming OEV & REP Octarange EV and renewable energy park in Orissa; Shailendra Goswami, Chairman and Managing Director, Pushkaraj Group and Dr. Shailendra Shukla, Managing Director for Vehicle Group, Eaton.

Nisha Shukla opened the discussion by posing a thought-provoking question about the evolution of the metal cutting and forming industry. She asked the panelists to compare the advancements of the past decade with those of earlier decades. She highlighted how the exponential growth in technology and operations has positioned this industry as a foundation of India's manufacturing revolution.

Bireswar Mitra, drawing on his extensive experience in the automotive sector, characterised this transformation as a "revolution" rather than a simple evolution. He reflected on the transition from traditional machining methods to advanced CNC systems, robotics, and artificial intelligence. "The transformation we've witnessed is phenomenal," he remarked. "We are on the brink of a future that promises even greater innovations."

Neelam Pandey Pathak, with her dual expertise in business and societal impact, emphasised the need for lighter and stronger materials, especially in the context of electric and hybrid vehicles. She highlighted the

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Bireswar Mitra, Former Executive Director, Sharda Motor Industries Ltd

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Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune, Chairman & Managing Director, Octarange Technologies Pvt Ltd

rise of IoT-enabled systems and AI-powered predictive maintenance, stressing that these advancements were as much about technological innovation as they were about sustainability. "Technology, market trends, and sustainability have converged to redefine how we perceive and utilise resources," she noted.

Dr. Dhananjay Kumar offered an insightful overview of the industry's evolution from single-material products to multi-material, customised solutions. He introduced the concept of "material genomics," which describes how materials are now synthesised based on specific product requirements. This shift is moving manufacturing closer to the ideals of Industry 4.0. "It's a paradigm shift where manufacturing processes and customer feedback drive material innovation," he explained.

Shailendra Goswami, drawing from nearly five decades of experience, took the audience on a historical journey through the industrial revolutions, ultimately advocating for Industry 5.0. He emphasised the need to reintroduce human creativity and intuition into manufacturing processes that have become heavily reliant on cyber-physical systems. "Innovation thrives at the intersection of human ingenuity and technological advancement," he stated.

Dr. Shailendra Shukla contributed to the discussion with insights from his extensive research on Industry 4.0. He compared its adoption to customising a pizza: "You don't have to use all the toppings at once—just choose what fits your needs." He highlighted India's potential as a manufacturing powerhouse, especially in light-weighting and cost optimisation, and celebrated the localisation of previously imported materials. "India has the talent, the resources, and the drive to lead the global manufacturing renaissance," he affirmed.

Bireswar Mitra highlighted the automotive industry's catalytic role in driving advancements in metal cutting and forming. He observed, "The auto industry has seen exponential growth this century. As demand for vehicles—from bicycles to high-end four-wheelers—has surged, the need for precision parts has escalated."

Mitra explained that this demand necessitated a shift from traditional manufacturing methods to advanced technologies like CNC machining, which has evolved to incorporate five-axis and even seven-axis capabilities. He further elaborated on transformative processes like laser, plasma, and water jet cutting, which have revolutionised precision and efficiency.

Reflecting on future trends, Mitra stated, "With the rise of EVs and technologies like giga casting, which Tesla is championing, we are witnessing a paradigm shift. By 2030, India is poised for remarkable growth in this sector, supported by emerging technologies like AI, IoT, and 3D printing," he added.

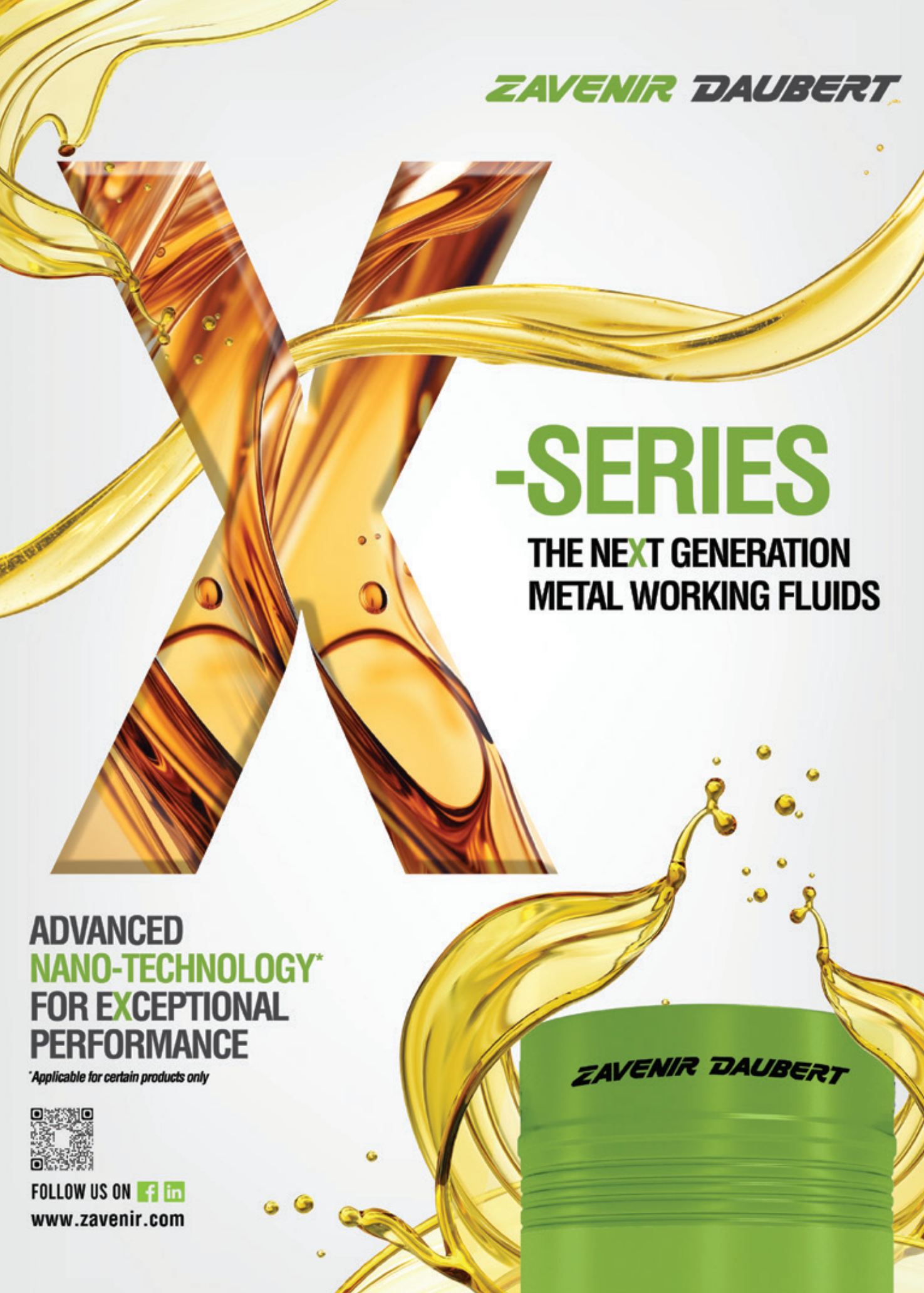
The conversation then shifted to the renewable energy sector, with Dr. Dhananjay Kumar discussing its impact on the metal cutting and forming industries. He stated, "Manufacturing processes, especially in high-energy areas like press shops, are now focused on reducing carbon footprints. The transition to renewable energy sources, such as solar and wind, is essential."

Kumar elaborated on innovative developments in solar cell technology, highlighting the creation of 3D solar cells that can power vehicles with minimal sunlight exposure. He envisioned sustainable factories equipped with micro wind turbines, emphasising, "This shift not only supports green manufacturing but also aligns with India's goal of achieving 500 GW of renewable energy by 2030."

Shailendra Goswami addressed India's position on the global stage in adopting advanced manufacturing technologies, comparing it with industrial giants like China and Germany. "China remains unparalleled in smart manufacturing and volume production," Goswami remarked, recounting his visits to Chinese factories where he witnessed 1,000 CNC machines under one roof, producing millions of components daily. However, he noted a post-COVID decline in China's dominance, presenting opportunities for India.

He also lauded Germany's expertise in Industry 4.0 and design engineering. Goswami underscored India's potential, stating, "To compete globally, India needs robust government support and a steadfast commitment to innovation. The foundation is being laid, but achieving global parity will require sustained efforts over the next decade."

Nisha posed a vital question regarding the industry's struggles with cost efficiency and sustainability: What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Left to Right: Dr. Shailendra Shukla, Managing Director for Vehicle Group, Eaton receiving token of from Amit Shanbaug, Editor - B2B Division, The Times Group

Extreme Left: Shailendra Goswami, Chairman and Managing Director, Pushkaraj Group honoured with token of appreciation

Neelam Pandey Pathak, Founder & CEO Social Bay & Rozgar Dhaba presented with token of appreciation

Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune, Chairman & Managing Director, Octarange Technologies Pvt Ltd receives token of appreciation

opportunities arise from these challenges, and how can SMEs effectively manage costs while remaining competitive?

Shailendra Shukla took the opportunity to delve into the topic with an insightful example. "I recently visited two factories producing the same complex product—one in India and one in Xi'an, China. The Indian factory had 350 workers, while the Chinese one, producing double the capacity, had only 14, seven of whom were in a computer room. This difference highlights how Industry 4.0 can transform efficiency. However, many companies are hesitant to adopt these technologies due to existing investments and financial constraints."

He identified geopolitics, technological resistance, material innovation, and high machinery costs as significant challenges. "Take geopolitics, for example," he said. "The looming threat of tariff wars means businesses need to prepare for scalable operations under 'China plus one' strategies or brace for higher tariffs. Meanwhile, alternative materials like advanced polymers pose another disruption. Finally, the cost of upgrading machinery, like the $1.5 million grinding machine I recently purchased, is daunting. Yet, challenges also create opportunities. India's auto component market, valued at $81 billion, will see its $21 billion export segment grow in the coming years," added Shukla.

Nisha then shifted the discussion towards diversity and inclusion. She highlighted that diversity and inclusion are key themes across industries today, however, the representation is still low, especially for women and disabled individuals. How can industry encourage participation and inclusivity?

Neelam responded with passion, drawing from her journey in manufacturing. "When I shifted to mechanical engineering, everyone doubted my choice. Yet, I became a director in the automotive and renewable sectors before founding my organisation. Women comprise just 7-10 per cent of the manufacturing workforce, and labour force participation has declined from 30 per cent in 2010 to 23 per cent today. That's why I launched WIMA (Women in Manufacturing), an initiative to empower one million women in manufacturing by 2030. It's not just about celebrating Women's Day; it's about upskilling, mentorship, and creating inclusive workplaces."

She highlighted her grassroots initiative, Rojgar Dhaba, which trains rural women for blue-collar roles in the automotive sector. "We must make shop floors gender neutral. Equality can only begin when representation reaches 50-50. Until then, diversity remains aspirational."

Turning to the European Union's Carbon Border Adjustment Mechanism (CBAM), Nisha asked Neelam about its implications for the Indian manufacturing industry. Neelam, a sustainability expert, elaborated: "CBAM, expected by 2026, aims to prevent carbon

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Lto R: Nisha Shukla, Senior Assistant Editor at Worldwide Media, The Times Group; Bireswar Mitra, Former Executive Director, Sharda Motor Industries Ltd; Neelam Pandey Pathak, Founder & CEO Social Bay & Rozgar Dhaba; Dr. Dhananjay Kumar, Emeritus Professor, College of Engineering Pune, Chairman & Managing Director, Octarange Technologies Pvt Ltd; Shailendra Goswami, Chairman and Managing Director, Pushkaraj Group and Dr. Shailendra Shukla, Managing Director for Vehicle Group, Eaton.

leakage into Europe by taxing imports with high carbon footprints. If your components exceed defined carbon units, you'll face heavy taxes. For Indian manufacturers, this means recalibrating supply chains and adopting greener technologies. It's not just a challenge but a call to align with global sustainability standards."

The past decade has seen remarkable strides in policies that have positively influenced the metal cutting and forming industry. Shailendra Goswami observed, "The government has been very proactive over the last 10 to 12 years as far as manufacturing is concerned. Manufacturing contributes almost 20 per cent to our GDP, with 55 per cent of that coming from MSMEs. Recognising this, the government started focusing on MSMEs, understanding their pivotal role in driving manufacturing and the economy." He emphasised how initiatives like Make in India transformed the landscape, explaining, "It gave Indigenous manufacturers the confidence to compete despite challenges like unfair imports. Moreover, the introduction of production-linked incentive (PLI) schemes further boosted productivity, encouraging the adoption of Industry 4.0 and smart manufacturing."

Adding to this, Shailendra Shukla highlighted specific programs such as the Samarth Bharat Programme, saying, "This initiative has been instrumental in driving automation and Industry 4.0 deployment, particularly for SMEs." He also pointed out the government's protective measures, such as stricter BIS standards, which curb the influx of low-quality imports. "This approach, though contested internationally, gives us a head start to strengthen our domestic capabilities," he noted.

The discussion then shifted to the vision for the industry. Bireswar Mitra remarked, "Today, the groundwork has been laid. Now, we are poised for takeoff. The global market demands high-quality products at competitive costs, with cutting-edge technologies like AI and IoT transforming manufacturing cycles. Techniques such as hydroforming, hot forming, and roll forming are evolving rapidly, and by 2030, we expect these advancements to redefine the industry. The future is exceedingly bright, particularly for Indian manufacturers like Tata Motors, who are setting benchmarks globally."

Neelam emphasised the critical role of skill development in this transformation. "We're entering an era where technology is advancing exponentially," she noted. "AI, predictive maintenance, and intelligent software are no longer optional; they are essential. There is a significant skill gap in India, and we must address it by upskilling our workforce." She stressed the importance of interdisciplinary knowledge, stating, "It's no longer about being purely mechanical or electronic. The workforce needs to adapt to hybrid roles that encompass advanced technologies."

When asked about reducing import dependency, Dhanajay Kumar advocated for hybrid manufacturing processes. "Technologies like laser cutting are revolutionising the industry," he explained.

"A single laser can perform multiple functions, from cutting and welding to texturing and surface treatment, all at incredible speeds. The focus should shift to product-oriented processes, where materials are synthesised in situ for specific applications," added Kumar.

In conclusion, Shailendra Goswami and Shailendra Shukla emphasised the government's ambitious goals for the manufacturing sector. Goswami stated, "The aim is to increase the manufacturing contribution to GDP from 15 per cent to 25 per cent over the next decade. This 10 per cent growth reflects the transformative potential of the sector. The future of the industry depends on our collective efforts to embrace innovation, adopt advanced technologies, and ensure ongoing skill development." Shukla too echoed similar sentiments.

The panel concluded on a positive note, with each panellist emphasising the significance of supportive policies, technological advancements, and workforce development as crucial drivers of the industry's growth, creating an optimistic outlook for its trajectory toward 2030.

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WALTER

LOGIQUICK INNOVATIONS:

ISCAR'S CUTTING-EDGE LEAP FORWARD

Figure 1

ISCAR's latest LOGIQUICK campaign redefines efficiency in machining, introducing advanced cutting tools with a focus on performance, sustainability, and smart manufacturing.

By Team ET Now Machinist

> "The LOGIQUICK campaign reflects ISCAR's commitment to innovation, offering cutting-edge tools designed to enhance machining efficiency and profitability.

ISCAR has once again proven its commitment to innovation with the unveiling of its LOGIQUICK campaign, a comprehensive update to its already impressive portfolio of cutting tools. From turning and threading to milling and hole-making, the new range is designed to meet the evolving needs of modern machine shops while driving cost-efficiency and precision.

EXPANDING TRADITIONAL BOUNDARIES

ISCAR has enhanced its existing product families with strategic upgrades. For instance, the SUMOCHAM drilling heads now include 0.1 mm diameter increments, replacing the traditional 0.5 mm steps. This optimisation ensures reduced inventory needs and improved flexibility for steel and cast-iron machining. Similarly, the T-SLOT family of slot milling cutters has introduced smaller head diameters, enabling efficient narrow slot machining across various materials.

The CHATTERFREE end mills, tailored for machining hardened steel, have been upgraded with new corner radii, further broadening their application potential. These seemingly small yet impactful changes

Figure 2

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Figure 3

reflect ISCAR's focus on optimising performance and boosting machining efficiency.

REDEFINING THREAD MILLING

In thread milling, ISCAR's innovations have significantly reduced machining time. The QUICK-M-THREAD series, featuring triangular inserts and a step-release design, delivers enhanced productivity through reduced cutting forces and improved dynamic stability. Solid carbide thread endmills now feature up to eight flutes, ensuring faster operations and superior surface finishes, supported by an internal coolant system that improves chip flow and lubricity.

MULTI-MASTER: A CLASSIC REIMAGINED

The MULTI-MASTER family, a cornerstone of ISCAR's offerings, has evolved with cutting-edge additions. New six-flute heads designed for high-feed milling excel in quick metal removal, while three-flute heads cater to shallow drilling operations with remarkable efficiency. The introduction of a dual-pocket shank design ensures better material utilization and reduced costs, aligning with sustainable manufacturing goals.

QUICK-D-MILL: INNOVATION MEETS VERSATILITY

The QUICK-D-MILL, a compact indexable cutter, takes multifunctionality to the next level. Its design allows for square shoulder, slot, and contour milling, as well as drilling. Featuring two-toothed cutters with rectangular carbide inserts, the tool optimises cutting efficiency while minimizing replacement frequency. A robust dovetail clamping mechanism enhances reliability, making this tool an ideal choice for cost-conscious manufacturers.

AI-DRIVEN ADVANCEMENTS WITH NEOITA

ISCAR's NEOITA Tool Adviser has been enhanced with new AI capabilities. Engineers can now customise cutting parameters and simulate machining cycles, empowering them to achieve optimal results tailored to their specific requirements. Additionally, a smart search function provides detailed material specifications, further enriching ISCAR's material library and facilitating data-driven decision-making.


Figure 4

> "Even the smallest design improvements in ISCAR's new range are focused on boosting cutting performance and cost-effectiveness.

ISCAR's LOGIQUICK campaign extends beyond these advancements. Upcoming updates in turning, grooving, and parting applications promise to further cement the company's leadership in the metalworking industry. ISCAR continues to elevate machining standards, combining tradition with groundbreaking innovation.

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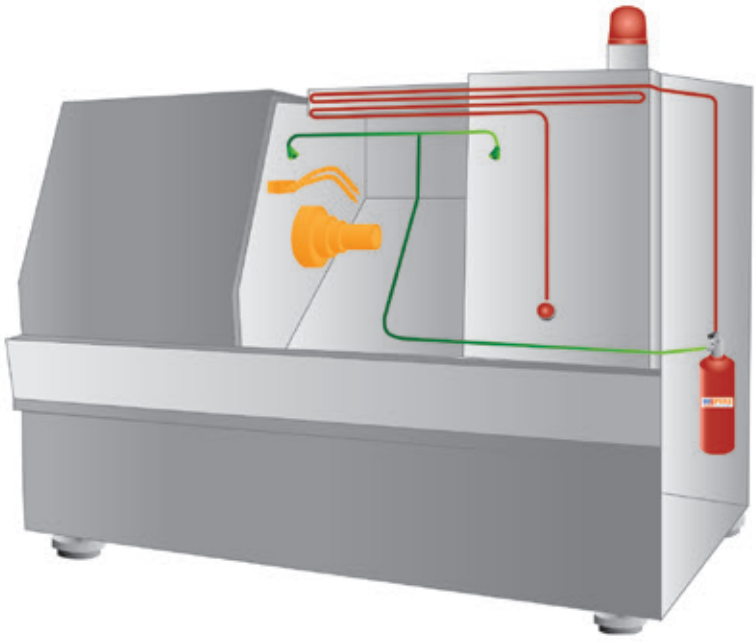

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DRIVING INNOVATION AND SUSTAINABILITY IN MACHINING

Rajesh Ghashi, Managing Director of Chiron Group reflects on a decade of evolution in machining and shares his vision for the future of the industry.

By Team ET Now Machinist

The machining centres and processing solutions industry has witnessed remarkable advancements over the past decade, transforming how businesses operate across sectors.

Reflecting on the most transformative shifts in the industry, Rajesh Ghashi, Managing Director of the Chiron Group pointed to advancements in metal-cutting technology. "The ability to reduce machine mass while maintaining high rigidity and stiffness has been a game-changer. It has significantly improved efficiency and precision by optimising tool performance. Machines today can achieve faster spindle acceleration and deceleration, which not only improves cycle times but also reduces wear and tear on components. This results in better surface finishes and tighter tolerances, making the entire process more reliable and productive," Ghashi explained.

These advancements have laid the foundation for innovations that are reshaping industries like aerospace, automotive, and medical technology, where precision and speed are critical. Ghashi elaborated that the quest for excellence in these industries has driven the demand for machining solutions that can consistently deliver high-quality results while being robust enough to withstand the rigours of modern manufacturing.

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The conversation naturally shifted to the growing role of technology, particularly the rise of automation, robotics, and Industry 4.0. Ghashi emphasised how digitalisation has revolutionised manufacturing and how companies like Chiron have embraced this shift to stay ahead of the curve.

"Today, skills like CAD/CAM programming, CNC operation, and IoT integration are indispensable. These tools are the backbone of modern manufacturing, allowing us to simulate, optimise, and innovate. At the same time, cybersecurity has become a priority. In an era of interconnected systems, protecting sensitive data and ensuring operational continuity is critical. This requires not just technical expertise but also a proactive approach to staying ahead of potential threats," Ghashi noted.

The rapid integration of digital technologies has also required businesses to upskill their workforce. He highlighted the importance of investing in training and development programs to bridge the skills gap and ensure that employees can harness the full potential of modern machining systems.

Ghashi highlighted the industry's commitment to energy efficiency and eco-friendly solutions, which have become integral to business strategies.

"The focus on developing energy-efficient machinery has been a significant step forward. These machines are designed to consume less power while maximising output, which not only reduces costs but also aligns with global sustainability goals. It's about finding a balance—meeting production demands without compromising on environmental responsibility," he said.

He shared how these initiatives are not just about adhering to regulations but about making a meaningful impact. He noted that industries across the board are increasingly adopting practices like minimum quantity lubrication (MQL) and dry cutting to reduce waste and conserve resources. This shift not only contributes to sustainability but also sets new benchmarks for operational efficiency.

Customer demand, according to Ghashi, has played a central role in driving innovation. He explained how shifting market needs and challenges have shaped Chiron Group's approach. "The rising cost of raw materials, especially steel and aluminium, continues to be a challenge. Coupled with the skills gap created by rapid technological advancements, this has pushed us to innovate in how we design and deliver solutions. Sustainability is another key driver, as customers increasingly expect compliance with environmental standards while maintaining affordability. By staying focused on innovation and collaboration, we have managed to meet these evolving expectations," he shared.

Ghashi also reflected on how the company has consistently focused on helping industries overcome challenges related to precision, speed, and flexibility. "Over the years, we have worked to develop solutions that address these critical needs, enabling our customers to achieve their goals. Our ability to listen to their requirements, anticipate industry trends, and innovate accordingly has been a cornerstone of our success," he said.

As the conversation drew to a close, Ghashi offered a glimpse into the future of machining. "Moving forward, we will continue to prioritise innovation and sustainability to not just adapt to change but to shape the future of machining," he concluded.

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REVOLUTIONISING PHARMA SUPPLY CHAINS: ADVANCED SOLUTIONS FOR SAFE AND SECURE TRANSIT

Pharmaceutical supply chains are crucial for delivering life-saving medications globally. Challenges like globalisation, temperature control, and theft necessitate innovative solutions. The article explores advanced technologies transforming pharma logistics, ensuring safe, secure, and efficient transit.

By Sriram Nagaswamy, Senior Vice President-Engineering, FourKites

With a projected global value of $1,156 billion in 2024, the pharmaceutical industry is responsible for manufacturing and distributing vaccines and life-saving drugs to individuals worldwide. However, behind the scenes, pharmaceutical supply chains are often comprised of complex networks that handle interconnected processes to ensure that medicines reach numerous stakeholders like healthcare providers, distributors, patients and pharmacies on time and without any damage. The past two decades have witnessed the industry undergo increased globalisation that added even more complexity to supply chains, making communication among stakeholders and distribution more challenging.

Sriram Nagaswamy, Senior Vice President-Engineering, FourKites

The significance of the items in transit, both in monetary terms and in its potential to save lives, underscores the critical nature of the medical supply chain, which demands precision. For instance, several reports according to the CDC reveal that during the global COVID pandemic, 20 per cent of COVID vaccines were lost due to issues in cold-chain storage. It was also during the same time that hospitals and pharmacies had to preserve vaccinations in sub-freezing temperatures until the patient was administered, and several experts noted that the pandemic had increased the number of medical commodities requiring cold / ultra-cold storage, affecting the workflows and design of the system itself. Additionally, the World Health Organisation (WHO) also released a report highlighting that nearly 50 per cent of vaccines were wasted worldwide owing to issues in temperature control during transit.

Therefore, it is essential to ensure a rigorous and secure chain of custody for medical products from their origin with raw material suppliers, through distribution, to the final recipient. It is crucial to guarantee the integrity of every step in the supply chain and implement robust measures and plans to mitigate risks such as contamination, exposure, theft, and other potential threats.

THE CURRENT SCENARIO

Starting initially from a crippled zone with end-to-end complexity, today India stands as the third largest producer of pharma products, having undergone a substantial transformation, driven by globalisation, rising healthcare product demand, regulatory shifts and technological advancements through AI and automation. However, there are still miles to go as the segment is dominated by excessive dependency on road freight, harsh geographical conditions, inadequate infrastructure


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for cold chains and the absence of a reliable network despite the mitigation methods underway.

MOVING AWAY FROM THE BAND-AID APPROACH

What India and other countries need today is not a quick fix that is superficial, but a solution to mitigate the underlying problem in pharma supply chains. Companies and policy bodies must work together to solve three critical areas: accelerating advanced manufacturing technologies with a key focus on digitisation and automation; commitment to quality and enhancing credibility in the global market; and adopting sustainable practices.

Visibility is essential for maintaining uninterrupted oversight of the chain of custody, providing control across the entirety of a product's journey. It allows stakeholders to meticulously track items such as totes and packages, continuously monitoring the location, status, and environmental conditions of shipments in real-time. This capability facilitates prompt and efficient communication of any changes as they happen, effectively establishing a secure, comprehensive record of an order's status from departure to delivery.

NAVIGATING SUPPLY CHAIN CHALLENGES THROUGH AI AND ML

The ratification of AI in the past few years has strengthened digital healthcare since the technology has offered prompt oversight and seamless deliveries by monitoring the supply chain in real-time through machine learning algorithms. This helps navigate around potential disruptions, manage inventory levels and optimise routing effectively and efficiently. The AI-powered platforms coupled with IoT devices also provide alerts for deviations from the planned route or altered temperature frequencies. This on-time feedback aids quick corrective measures, reduces the risk of product spoilage and further analyses historical data to identify previous patterns and suggest improvements, building supply chain resilience.

Another powerful tool accompanied by AI is predictive analytics, which analyses vast amounts of data to identify potential bottlenecks, anticipate demand fluctuations, and optimise inventory levels, enabling supply chain companies in the pharma industry to forecast challenges and offer a stable supply of medical products.

Considering the substantial value of the pharmaceutical products being transported by parcel, courier, air freight, and trucking, it is crucial to implement effective monitoring processes to track the status of each package during transit. Various companies emphasise physical security measures to achieve this goal. These approaches range from employing third-party security services to monitor shipment progress, deploying decoy shipments, and enforcing policies that prohibit drivers from stopping their vehicles within the initial and final 250 miles of the route, as these are high-risk zones for theft.

IoT-enabled sensor technology can also augment these measures, enhancing operational protocols by providing continuous, real-time data and notifications. This capability significantly enhances companies' visibility into the security and condition of critical shipments. By constantly monitoring the precise whereabouts of cargo, organisations can promptly receive alerts for any deviations or halt in transit routes. Additionally, this system facilitates proactive measures such as defining "Red Zones" — areas prone to potential issues — and triggering alerts when shipments approach these designated high-risk zones.

Besides this, temperature control is a facet that supply chain companies need to master. Other than enabling AI and IoT sensors, companies can also deploy temperature-controlled packaging solutions with insulated containers and phase change materials (PCM). This will help maintain temperatures and protect products from external product fluctuations.

In essence, the crux of the matter revolves around the concept of quality management. Many sectors lack comprehensive quality assurance across the entire supply chain at the transactional level, unlike the stringent standards observed in pharmaceuticals, life sciences, and healthcare. These sectors cannot afford to rely on chance, given that lives depend on the flawless, timely, and secure delivery of goods.

A crucial belief shared is that successful supply chain professionals embody grit, resilience, and agility—the capacity to react swiftly to evolving circumstances. Adaptability forms the foundation of these traits, with visibility serving as its cornerstone. If these attributes are critical across the pharmaceutical supply chain, so is the need for robust, precise data and immediate insight into realities on the ground. Disruptions are inevitable in any field, necessitating a prepared mindset and effective tools among supply chain experts to manage such occurrences effectively.

As the industry continues to innovate and expand its capabilities, government support is proving invaluable. Initiatives such as the PM Gati Shakti National Master Plan aim to enhance multimodal infrastructure by integrating roadways, waterways, railways, and more into a unified platform. Projects like Bharatmala and Sagarmala are designed to reduce transit times across land and water. Additionally, Production Linked Incentive schemes incentivise companies to meet predefined production targets. The National Logistics Policy and other measures further promise a brighter future with improved infrastructure and safer, more secure transit for pharmaceutical companies.

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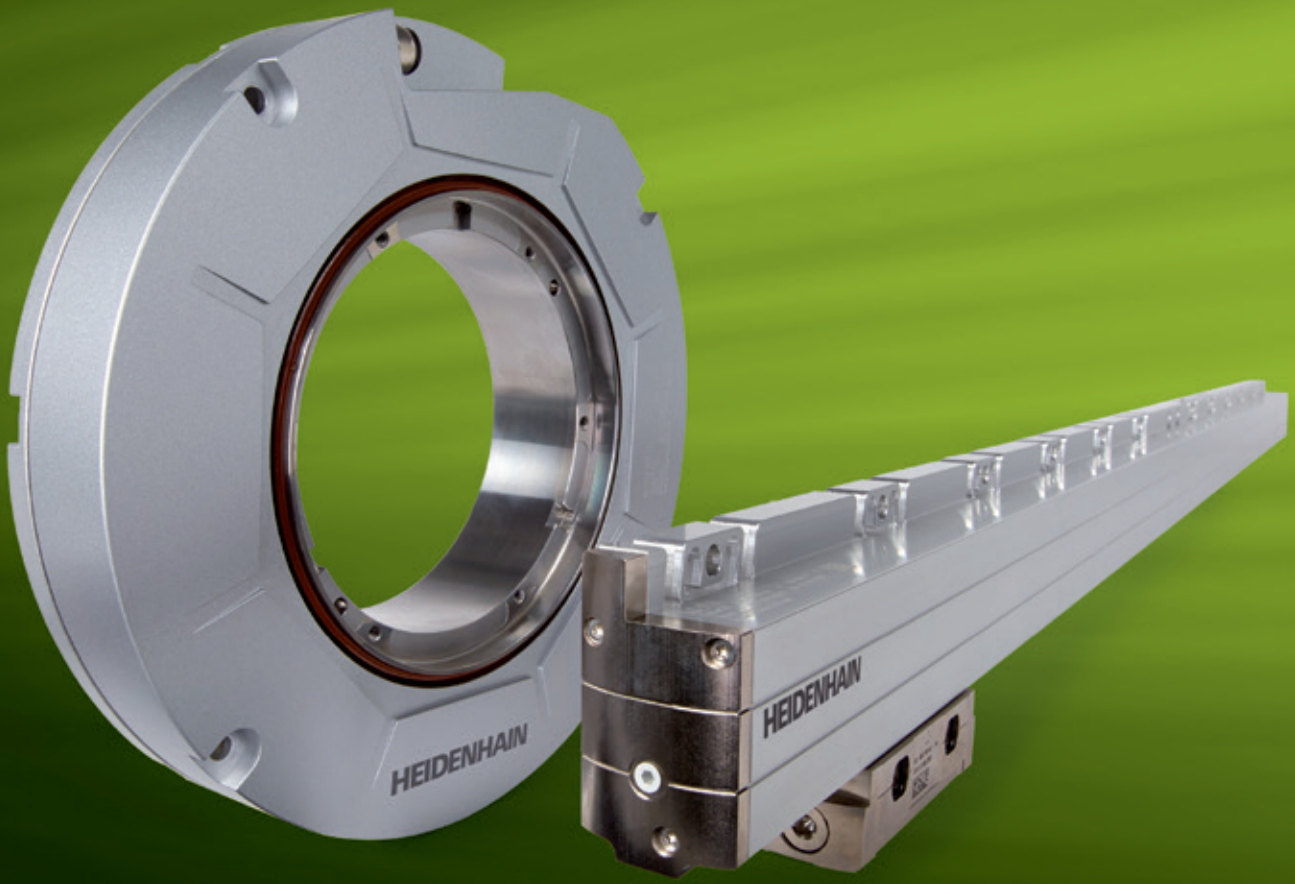

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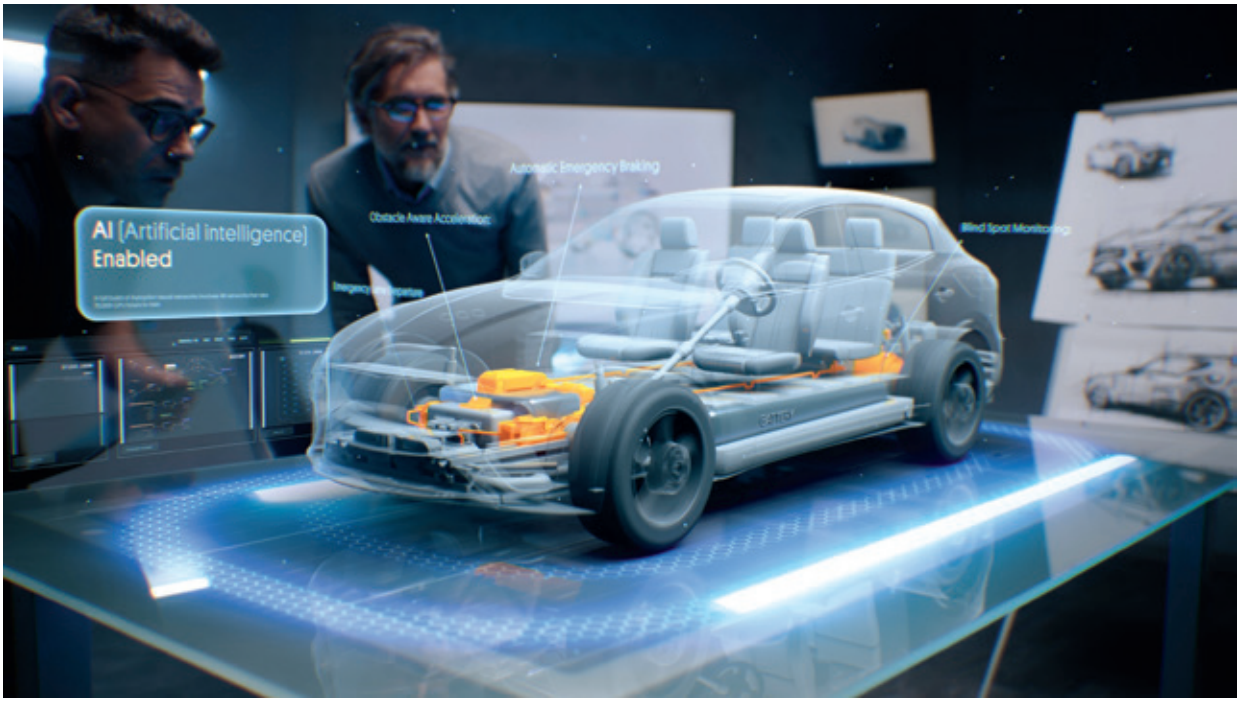

REIMAGINING VEHICLE ARCHITECTURE FOR A DYNAMIC FUTURE

The article explores how advanced technologies are transforming vehicle architectures, transitioning from traditional platforms to integrated ecosystems that create intelligent, user-centric, and future-ready transportation solutions.

By Mohan Savarkar, Vice President and Chief Product Officer, Tata Motors Passenger Vehicles (TMPV)

The global automotive industry is undergoing a significant transformation, driven by evolving consumer demands, sustainability imperatives, and rapid technological advancements. Traditional vehicle designs are being reimagined to create platforms that prioritise connectivity, efficiency, and environmental responsibility. This shift highlights how technological integration and environmental concerns are reshaping the core of vehicle development, paving the way for innovative and sustainable mobility solutions. This evolution marks a new chapter in mobility, where engineering innovation converges with digital ecosystems to redefine transportation.


Mohan Savarkar, Vice President and Chief Product Officer, TMPV

In the past, car platforms played a crucial role in distinguishing brands and were utilised for extended periods. Today, the focus has shifted from the mechanical platform itself to user interface (UI) and user experience (UX) as the primary differentiators. This transition underscores the growing importance of digital design in creating distinct brand identities. Modern vehicles now encompass multiple layers of platforms, including the vehicle base platform, electrical architecture, software architecture, and UI/UX, reflecting the complexity and integration of contemporary automotive design.

KEY DRIVERS OF INNOVATION

Several factors are propelling the transformation of vehicle design and architecture. Consumers are increasingly seeking vehicles equipped with advanced connectivity and autonomous features, reflecting a

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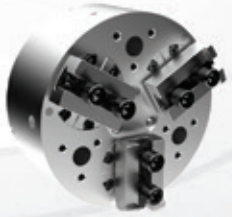

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broader move towards integrating vehicles seamlessly into the digital lives of users and enhancing convenience and safety. This evolution demonstrates how user-centric designs are becoming pivotal in the automotive sector. Enhanced safety features and compliance with stringent regulatory standards are also becoming paramount. Programs like the BNCAP emphasise the need for robust safety architectures in modern vehicles, highlighting the industry's commitment to prioritising passenger protection.

ADVANCEMENTS IN VEHICLE ARCHITECTURE

Several advancements are reshaping vehicle architecture. Centralised electrical and electronic (E/E) architectures are replacing traditional distributed systems, offering improved efficiency while supporting complex functionalities like advanced driver-assistance systems (ADAS) and over-the-air updates. These innovations are streamlining operations while accommodating future technological growth. Modular platforms are becoming a cornerstone of modern automotive design, providing flexibility and scalability to develop diverse vehicle types efficiently.

These platforms enable next-generation connectivity and performance enhancements, meeting the evolving demands of the market. Lightweight and sustainable materials are also gaining traction, helping reduce vehicle weight without compromising safety. This integration of lightweight solutions highlights the dual focus on performance and environmental impact. This not only improves fuel efficiency but also reduces emissions, addressing global sustainability goals.

Additionally, the emergence of software-defined vehicles is transforming the industry by integrating advanced electronics and software. These vehicles offer real-time customisation and feature updates, enhancing user experience and vehicle longevity. This development underscores the potential of software to redefine the ownership and operational experience of vehicles.

BALANCING STANDARDISATION AND CUSTOMISATION

Automakers face the challenge of balancing standardised platforms, which offer cost efficiencies, with the need for customisation to meet diverse consumer preferences. Achieving this balance is crucial for delivering personalised experiences while maintaining operational feasibility. This duality reflects the industry's ongoing effort to harmonise economic and consumer-driven goals. Despite the promise of innovation, challenges persist. Significant investment and time are required to develop new vehicle architectures, potentially delaying market entry. Moreover, combining advanced software and hardware systems seamlessly into vehicle designs presents technical challenges that require sophisticated solutions.

THE ROAD AHEAD

The future of automotive architecture will be shaped by collaborative innovation. Partnerships between traditional automakers, technology companies, and suppliers are essential for driving ground-breaking advancements and sharing expertise. This collaboration signifies a shared vision to achieve transformative progress. AI-driven design tools are optimising vehicle architectures, enhancing efficiency, and ensuring designs meet both consumer and regulatory requirements. Embracing circular economy principles, such as using recyclable materials and remanufacturing processes, reinforces the industry's commitment to environmental stewardship. These efforts highlight the interplay of innovation and sustainability in shaping the industry's future.

ENVISIONING TOMORROW'S MOBILITY

As automakers reimagine vehicle architecture and design, they are crafting a future where vehicles transcend traditional roles. By embracing innovation, collaboration, and sustainability, the industry is set to redefine mobility, creating integrated, intelligent ecosystems that reflect the evolving aspirations of consumers and society. This forward-thinking approach emphasises a commitment to shaping mobility solutions that resonate with modern demands and values.

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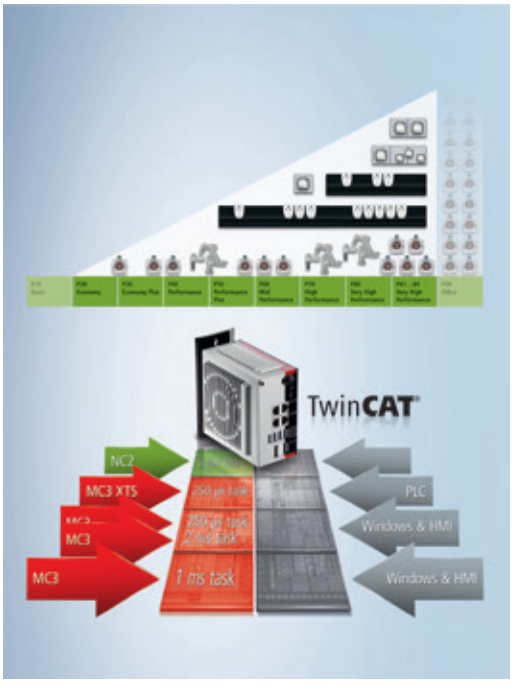
TWINCAT MC3: REDEFINING MOTION CONTROL FOR THE FUTURE

Beckhoff's new-generation motion control system offers a modular architecture, multi-core and multi-task support, and seamless integration, ensuring future-proof solutions for diverse motion applications.

By Team ET Now Machinist

Beckhoff has introduced TwinCAT MC3, a next-generation motion control system designed to push the boundaries of automation. With its modular architecture and cutting-edge features like multi-core and multi-task support, TwinCAT MC3 builds on the success of its predecessor, TwinCAT NC2, and promises seamless integration with future motion requirements.



Motion control has been a cornerstone of Beckhoff's automation solutions since the launch of TwinCAT in 1996. TwinCAT NC2, known for its robust design and reliability, laid the groundwork by abstracting axes into programmable objects. This abstraction allowed users to simulate and program axes independently of hardware while supporting a wide range of functionalities, from basic single-axis movements to complex path planning.

A MODULAR AND ADVANCED ARCHITECTURE

TwinCAT MC3 retains the strengths of its predecessor while introducing a range of advancements. Its modular architecture enables multi-core and multi-task support, allowing synchronised movements across processor cores and eliminating previous limitations on the number of axes. This scalability empowers users to handle more complex applications efficiently.

Integration is another key strength of TwinCAT MC3. The system operates seamlessly alongside existing TwinCAT functions, facilitating parallel operations and smooth interaction. For instance, MC3 axes can be coupled with NC2 axes already in use, allowing businesses to upgrade machine components incrementally without overhauling the entire system.

To further streamline operations, TwinCAT Drive Manager simplifies the commissioning of Beckhoff drive solutions, automatically generating configurations and standard parameters for MC3 axes. Additionally, TwinCAT Scope, a powerful diagnostic tool, records and analyses movement dynamics, enhancing troubleshooting and performance optimization.

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TwinCAT MC3's modular architecture ensures seamless integration, scalable performance, and future-proof capabilities for diverse motion control applications.

MAXIMIZING CPU POTENTIAL WITH MULTI-CORE AND MULTI-TASK SUPPORT

TwinCAT MC3 is designed to make the most of the control computer's CPU capabilities. Multi-core support allows motion control tasks to be distributed across several processor cores, ensuring synchronised movements across all axes. Meanwhile, multi-task support lets users operate axes with different cycle times on a single core.

This flexibility optimizes CPU utilization by matching tasks to specific axis requirements. For example, axes controlling a delta picker can operate with a 1-millisecond cycle time for precision and speed, while conveyor belt adjustments can run at a 4-millisecond cycle time on the same core. This tailored approach ensures efficient resource use without compromising performance.

HARDWARE INDEPENDENCE AND VERSATILITY

As with NC2, TwinCAT MC3 abstracts axes into axis objects, decoupling programming from hardware. This creates significant advantages:

- Users can simulate axes without physical hardware, reducing commissioning time. Switching between real and simulated axes is as simple as a single click.
- TwinCAT supports EtherCAT and other common fieldbus systems, ensuring compatibility with various hardware setups.
- The system accommodates diverse drive systems, including servo, stepper, and DC motors, as well as Beckhoff's XTS product transport system.

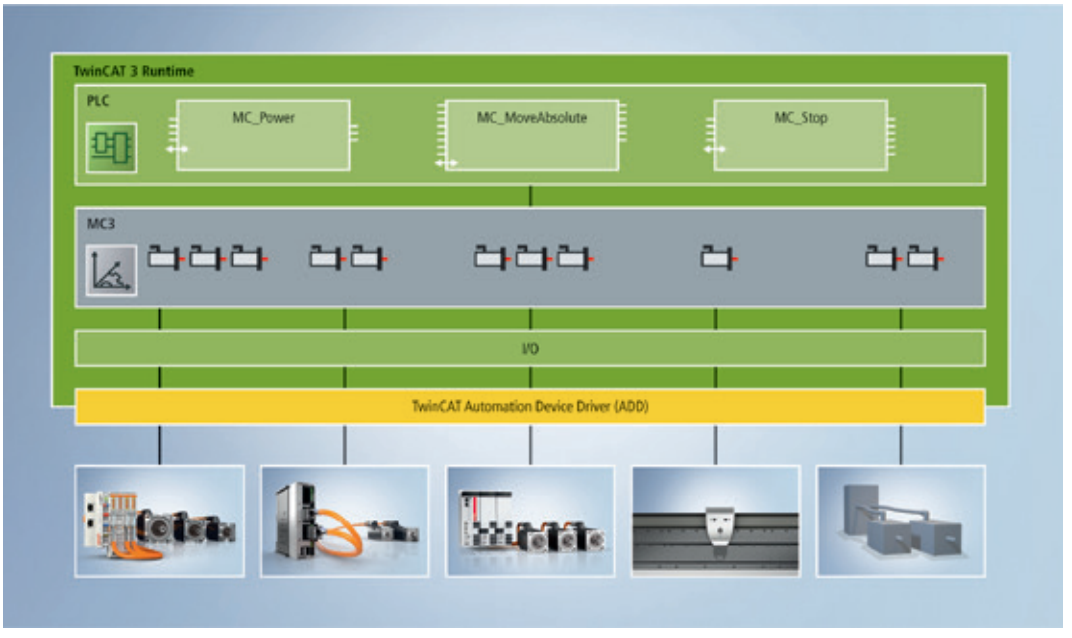
TwinCAT MC3 also introduces support for hydraulic axes, integrating them seamlessly into the platform. Programming these axes is simplified through PLCopen-compliant function blocks, with additional libraries available for specialised fluid power applications.

FUTURE-PROOF AND CUSTOMIZABLE

The modular architecture of TwinCAT MC3 positions it as a future-ready solution. Features like multi-core and multi-task support provide a strong foundation for advanced capabilities, such as customisable profile generators, drivers, and filters.

The system incorporates proven NC2 functionalities, ensuring a familiar user experience while expanding possibilities. The initial release of TwinCAT MC3 supports point-to-point (PTP) movements and various axis couplings, from simple linear configurations to non-linear motion.

TwinCAT MC3 offers a powerful, scalable, and flexible motion control solution. By combining the strengths of its predecessor with next-generation advancements, it sets a new standard for automation systems and ensures readiness for evolving industry needs.



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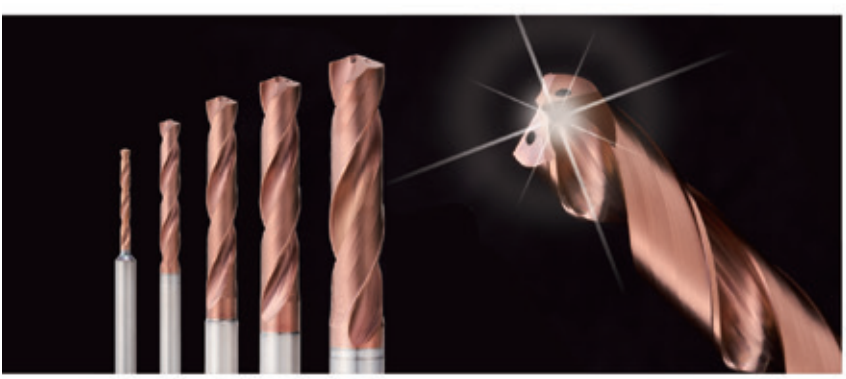

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Tools Terrace

Dynalog India is a solutions provider specialising in electronics, communication, and electromechanical technologies. The company is redefining automation across defence, smart cities, and industrial sectors. At the forefront of this revolution is Akshay Adhalrao, the Managing Director of Dynalog India. Sharing his vision for the future of automation in defence, smart

> "Our global partnerships and deep collaboration with customers ensure our solutions are cutting-edge and tailored to specific needs.

TRANSFORMING AUTOMATION

Under Managing Director **Akshay Adhalrao,** Dynalog India is advancing sustainable solutions to boost global competitiveness. In an interview with Nisha Shukla, he outlines the company's technological advancements, customised automation solutions, and commitment to sustainability, along with key trends in automation and defence, strategic partnerships, and future plans.

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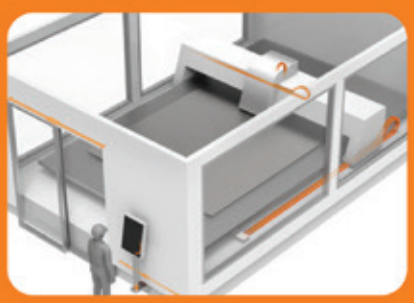
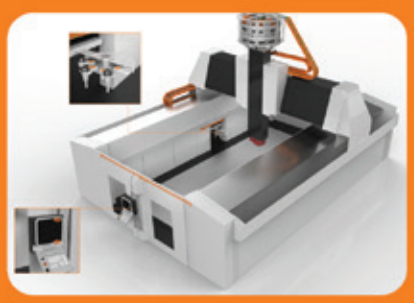


Cutting machines



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> Our vision is deeply aligned with creating shared value by integrating advanced technologies with human oversight. We prioritise scalable, open-source solutions that democratise automation, especially for MSMEs and SMEs, empowering them to compete globally.

cities, and industrial sectors, Adhalrao emphasises his commitment to delivering vertically integrated solutions that enable seamless data capture, secure transmission, and actionable intelligence, ultimately enhancing precision and efficiency.

"Our vision is deeply aligned with creating shared value by integrating advanced technologies with human oversight. We prioritise scalable, open-source solutions that democratise automation, especially for MSMEs and SMEs, empowering them to compete globally," he explains.

In the defence sector, the company focuses on reliability and security, adapting nimbly to the technological landscape while maintaining high-performance standards. For smart cities and industrial automation, their core emphasis is on precision, security, and operational efficiency, reflecting the company's innovative approach.

Reflecting on technological advancements, Adhalrao credits Dynalog's four-decade legacy for providing a vantage point to anticipate trends and address challenges proactively. "Our global partnerships and deep collaboration with customers ensure our solutions are cutting-edge and tailored to specific needs," he says. The company heavily invests in R&D, with a focus on AI, IoT, and machine learning, leveraging these technologies to deliver value-driven solutions.

Customisation is integral to Dynalog's operations. Adhalrao notes, "We see ourselves as an extension of our clients' teams, co-creating solutions tailored to their operational needs." Dynalog ensures adaptability by embedding scalability into systems, keeping investments relevant amid evolving technological demands.

Another core principle of their operations is sustainability. A reflection of this principle is deeply embedded in their offerings such as advanced sensors and real-time monitoring systems which are designed to reduce waste and optimise energy management. "We align with global standards, ensuring our clients stay competitive in an eco-conscious market," Adhalrao highlights.

In discussing trends, Adhalrao identifies AI-driven predictive maintenance, system-level intelligence, and cybersecurity as critical areas. "In defence, cybersecurity and indigenisation are key. Our robust, secure solutions enhance efficiency while addressing local needs," he states.

Regulatory compliance is another cornerstone for the company, with adherence to standards such as BIS and ISO embedded throughout the product lifecycle. "Our rigorous testing processes ensure our solutions meet evolving safety and regulatory requirements," he adds.

Dynalog's R&D focus includes high-speed computing in small form factors, AI-enabled systems, and precision mechanical products for defence and aerospace. Strategic communication systems and upgrades through Manufacturing Execution Systems further underscore their innovation-driven growth.

Reflecting on milestones, Adhalrao recounts contributions to national projects, including the Akash missile program, and collaborations with Bharat Electronics Limited (BEL) and DRDO. "Our partnerships have allowed us to deliver innovative, defence-specific solutions that align with India's modernisation goals," he shares.

Global collaborations, such as with Advantech, have played a pivotal role for Dynalog. "These partnerships enable us to co-create scalable solutions tailored to the Indian market," Adhalrao added.

In discussing Dynalog India's future roadmap for innovation and growth, Adhalrao emphasised their focus on expanding design capabilities and maintaining full control over the product lifecycle—ranging from design and manufacturing to testing, validation, and long-term support. The company is investing significantly in research and development (R&D) and forming strategic collaborations with both global players and Indian startups. They aim to lead the way in providing solutions that turn data into intelligent, actionable insights.

When asked about their strategy to navigate the evolving electronics sector and help achieve the National Policy on Electronics (NPE) 2019's ambitious target of $300 billion in manufacturing by 2026, Adhalrao mentioned that their roadmap closely aligns with the national goals. They are dedicated to playing a key role in realising this target. He also highlighted the importance of nurturing homegrown technical talent, which he believes is crucial for success. “Our commitment to creating future-proof systems and upskilling India’s workforce positions us to meet the changing demands of the electronics sector and contribute to India’s long-term vision of becoming a global electronics hub,” he concluded.

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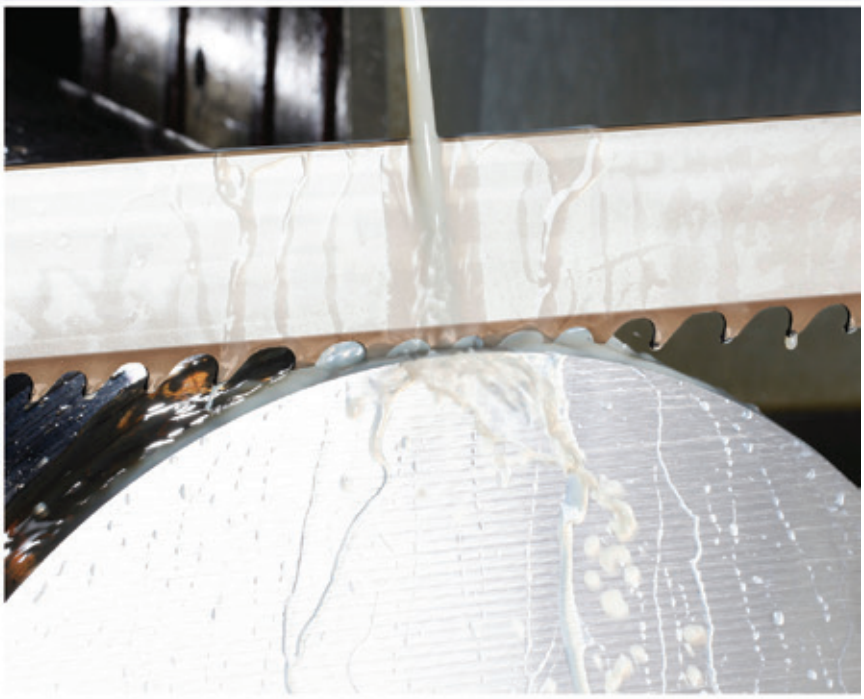

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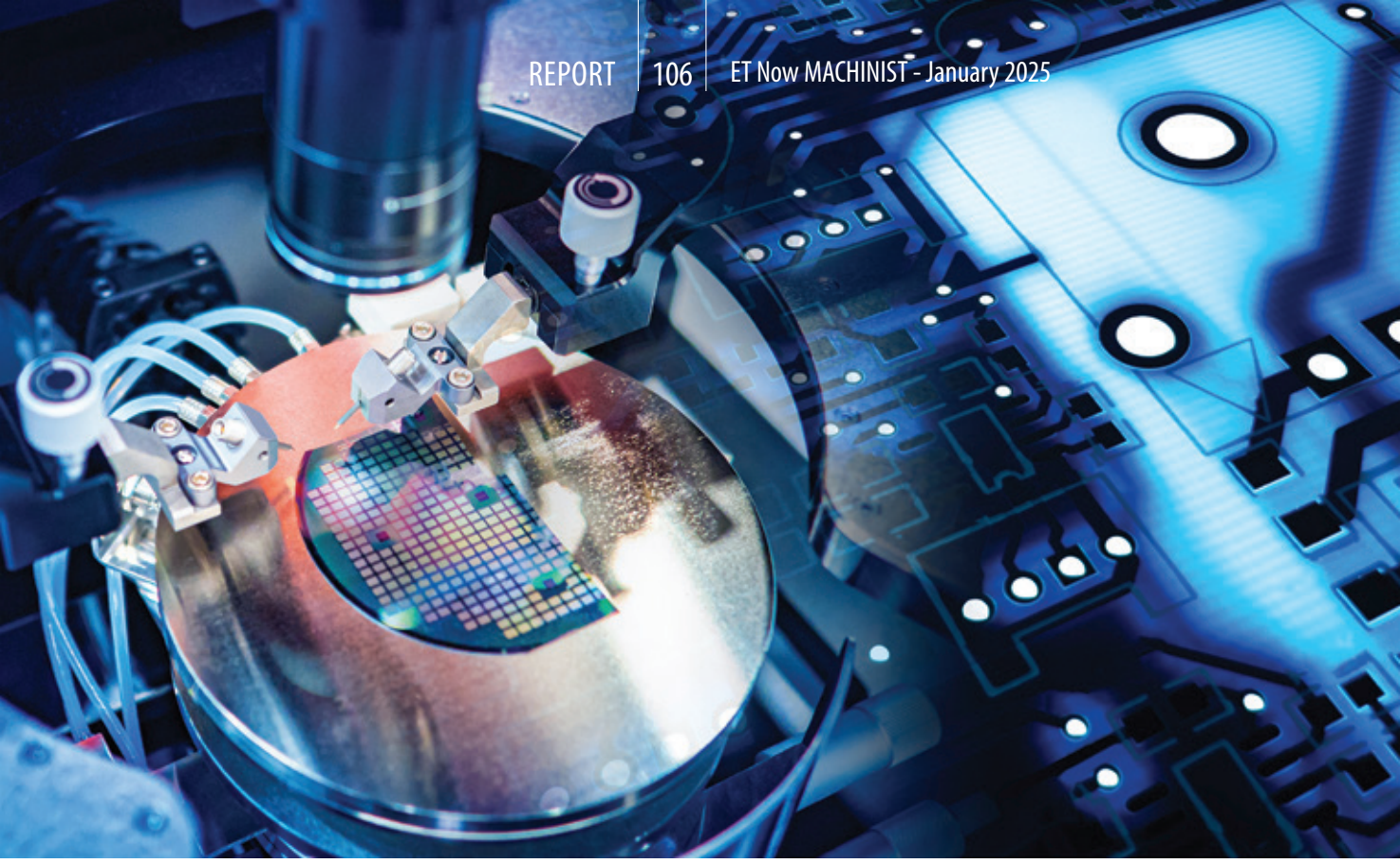

SEMICONDUCTOR SECTOR TO CREATE 1 MILLION JOBS IN INDIA BY 2026: REPORT

India aims to become a global semiconductor hub, creating 1 million jobs by 2026 in fabrication, design, and supply chain management. A report by NLB Services highlights the country's focus on developing a skilled workforce to support this growth.

As India endeavours to solidify its position as a semiconductor manufacturing hub, the industry is poised to generate a demand for 1 million jobs spanning across varied sectors by 2026. This demand is expected to be seen in various categories, including an estimated 300,000 jobs in chip semiconductor fabrication, around 200,000 positions in ATMP (Assembly, Testing, Marking, and Packaging), and additional roles in chip design, software development, system circuits, and manufacturing supply chain management.

The need for a skilled workforce spans roles like engineers, operators, technicians, and specialists in quality control, procurement, and materials engineering, emphasising India's strategy to build a robust semiconductor talent pipeline by 2026.

India's semiconductor market size was valued at US$29.84 billion in FY2023, and it is anticipated to reach US$79.20 billion by FY2031, with a compound annual growth rate (CAGR) of 13.55 per cent throughout the forecast period from FY2024 to FY2031. To strengthen the India Semiconductor Mission (ISM), the Budget allocated Rs 1,500 crore for electronic chip manufacturing plants, Rs100 crore for electronic display production, and Rs 900 crore for upgrading the semiconductor laboratory in Mohali.

The government has approved the Semicon India program with a total outlay of Rs 76,000 crore to establish a robust semiconductor and display manufacturing ecosystem in the country. The initiative is designed to offer financial assistance to companies investing in semiconductor production, display manufacturing, and design infrastructure. It supports India's goal of becoming a major force in the global electronics manufacturing sector. These chips are crucial for powering key technologies such as artificial intelligence (AI), quantum computing, and renewable energy.

In addition to the government backing the semiconductor industry, numerous private companies have disclosed intentions to invest in building new semiconductor assembly and testing facilities in India. This action is set to trigger a significant revolution in India's semiconductor sector, creating a plethora of high-tech and construction job openings in tandem. Some of the key jobs in the semiconductor industry are Process Integration Engineer, Semiconductor Wafer Inspector, Technical Specialist, Preventative

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Job Profiles	Skill Set Required	Potential Job Creation by 2026
Chip Semiconductor Fabrication	Fabrication process, equipment maintenance, cleanroom protocols	300,000
Chip Design	Semiconductor design, electronics engineering, CAD tools	200,000
ATMP (Assembly, Testing, Marking and Packaging).	Process engineering, quality assurance, operational knowledge	200,000
Software Development	Embedded systems, firmware development, circuit analysis	120,000
System Circuit	Circuit design, integration, testing, troubleshooting	80,000
Manufacturing supply chain management	Problem solving, Data Analytics, Project Management	1,00,000

Maintenance (PM) Technician, Design Engineer, Process Engineer, Quality Control Specialist, etc.

However, as the industry aims to broaden manufacturing to sustain projected growth, it grapples with a talent deficit. Looking ahead, workforce development programs and skill training will prove pivotal in addressing this challenge.

Commenting on this skill gap challenge, Sachin Alug, CEO, NLB Services added 'India recognises the significance of cultivating world-class talent to foster a strong semiconductor ecosystem, understanding that high-quality education forms the bedrock of this endeavour. To ensure a sufficient talent pipeline for the semiconductor, industry reskilling and upskilling becomes crucial. To reach the target of having 1 million skilled employees by 2026 for India to become the semiconductor hub, India will need to upskill 500,000 talent every year. Lastly, offering students real hands-on training through internships is crucial to ensure a steady flow of skilled local talent into India's nascent semiconductor industry. These internships provide invaluable practical experience, enhancing students' skills and ultimately strengthening India's semiconductor talent pool. Overall, in the next 2-3 years, we expect the investment in skilling and re-skilling to go up by 25 per cent.'

Given the persistent increase in the need for semiconductors, India, boasting a population of over 1.44 billion and a strong education system, stands poised to emerge as a major talent hub in the semiconductor industry. The country is committed to reinforcing the semiconductor sector, a move expected to address the shortage of skilled professionals. This commitment aligns with the broader goal of fostering growth in India's burgeoning electronics manufacturing and innovation ecosystem.

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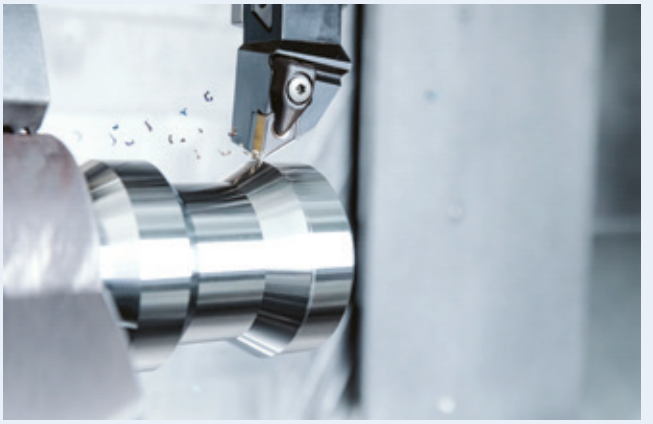
THE NEW CTEP110-P GRADE FROM CERATIZIT

One of the most effective ways of optimising unit costs is to utilise cermet inserts when finishing steel. Delivering more heat resistance than their carbide counterparts, they provide increased cutting data and therefore shorter processes. They also add value with their dimensional accuracy and long tool life—especially when outfitted with high-performance DRAGONSKIN coating including wear detection, such as the new CTEP110-P grade from CERATIZIT.



Cermet, a portmanteau of "ceramic" and "metal," is, as the name suggests, a composite material combining ceramic materials in a metallic matrix. The primary aim in the development of Cermet was to meld the oxidation and heat resistance of ceramics with the durability and impact strength of metals to create an optimal cutting material. The first cermet was invented back in 1931 by Paul Schwarzkopf and J. Hirschl and patented by PLANSEE. Over the years, the toughness of cermets has been further enhanced, while maintaining their positive wear properties.

Cermets: the go-to for dry machining

Cermets boast several advantages over carbides in several applications. For example, they perform at very high cutting speeds without compromising tool life. "Some processes are not compatible with cooling lubricants. And it's precisely here in dry machining applications where cermets really shine," says Stefan Karl, Technical Product Manager at CERATIZIT. "Cermets also excel in delivering especially smooth workpiece surfaces, as they produce an exceptional shine, while simultaneously satisfying tight tolerances."

DRAGONSKIN coating via the CVD process

To deliver customers even more flexibility in steel finishing, CERATIZIT has revamped its portfolio of coatings solutions. Instead of solely relying on PVD coatings, CERATIZIT is one of the few manufacturers to offer CVD-coated cermet inserts. "The reason we decided to apply CVD coatings to cermet—a notoriously tricky undertaking—is because they offer enormous advantages over PVD coatings for the finishing of steels, including higher temperature resistance and improved wear resistance in the turning process," says Stefan Karl. Furthermore, CVD-coated cermet inserts also cover a wider range of applications and are ideal for dry machining.

For its part, CERATIZIT made several optimisations in the development of the new multi-layer DRAGONSKIN coating for cermet grade CTEP110-P. These range from significantly reduced surface roughness, thanks to a special post-treatment process, to a clearly pronounced texture of the TiCN and Al2O3 layers that ensures improved wear resistance and toughness.

Overall, CERATIZIT reduced the grain sizes within the individual coating systems and reinforced bonding layers of the new DRAGOSKIN coating to help prevent chipping. "Another cool feature of our CTEP110-P is the insert detection, which empowers machine operators to easily identify wear and tear at a glance on the cutting edges. This, in turn, has the added advantage that every single cutting edge on the indexable insert is utilised," says Karl.

Four chip grooves for machining steel

Thanks to four chip grooves, the new Cermet grade CTEP110-P is a veritable all-rounder for medium and finishing operations, while ensuring optimum chip control—no matter how fine the cutting depth. Moreover, the range includes two negative indexable inserts, the CF20 and the TFQ. While the CF20 provides precise finishing with sharp finishing geometries at low cutting forces, the TFQ delivers the master finish geometry with very high feed rates and high surface finishes.

There are also two positive indexable inserts available. First, the peripherally ground sharp finishing geometry CF05 delivers high surface qualities in all common steel materials, stainless steels and GGG even with low cutting forces. Rounding out the range is the CF55, which combines excellent chip control with low cutting forces on all surfaces—even stainless steels.

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HIGH PRODUCTIVITY MULTI-TASKING MACHINE MT100/T3 – 3 TURRETS BY MURATEC

MT100 is an ultimate multi-tasker with opposed two in-line spindles. MT100 comes with turning and milling capabilities, all combined in one machine. Machine can be configured with 2 or 3 turrets each with 15 stations. Machine comes with "Y" axis on all Turrets and has live tool function on all stations. This offers flexible automation with bar work and chuck capabilities. Both spindles can operate simultaneously, and two turrets (two tools) can be used in single chucking.

> MT100 comes with turning and milling capabilities, all combined in one machine. Machine can be configured with 2 or 3 turrets each with 15 stations. Machine comes with "Y" axis on all Turrets and has live tool function on all stations.

The programmer can use different cutting variations available to use 2 turrets or 3 turrets with Y Axis for the best cutting process in turning and milling simultaneously. MT100 offers process integration to complete the work in one set up. Small and large work pieces up to 150 mm can be accommodated.

Large sized bar feeder up to 65mm is an option. Both 7.5kw / 11kw – 15kw (option) spindle drive motors are available. High speed 3 axes CNC Gantry loader available as option will be an additional advantage for non-stop production. Loader can help in handling heavier parts.

Suitable applications vary from automotive to non-automotive, and covers hydraulics, pneumatic, aerospace, medical, oil & gas, precision engineering, die & moulds, etc. Some typical components include shaft, AC compressor cylinder block, parts for CNG fittings, differential case etc.

THE G350 FROM GROB

The G350 is a proven 5-axis universal machine from GROB that combines flexibility, efficiency, and compactness, making it a standout solution in the machining industry. Set to be showcased at IMTEX 2025, this versatile machine delivers exceptional performance while optimising space usage.

One of the most notable features of the G350 is its reduced width, which has been decreased from 2,450 mm to a compact 2,000 mm thanks to an innovative tool magazine design. Despite its smaller footprint, this machine enhances efficiency by offering increased tool capacity and operational flexibility. Its double disk-type tool magazine can hold up to 117 tools, compared to the standard 60, allowing for a broader range of machining tasks with fewer tool changes. Additionally, it accommodates tool lengths of up to 550 mm, making it suitable for complex, high-precision operations in industries such as aerospace, automotive, and medical technology.

High dynamics and rapid operational speeds distinguish the G350. With minimised secondary and chip-to-chip times, the machine boosts productivity, enabling quicker cycle times and reduced operational costs. Its precision and efficiency make it ideal for meeting tight production schedules without compromising quality.

Designed with user-friendliness in mind, the G350 offers excellent accessibility and visibility into its work area. This feature ensures that operators can easily monitor processes, perform maintenance, and adjust, thereby improving workflow and reducing downtime. The spacious work area enhances safety and simplifies interaction during setup and operation.

The combination of a compact design, high tool capacity, speed, and precision makes the G350 an excellent choice for manufacturers seeking efficiency and versatility. Whether producing small, intricate parts or large, complex components, the G350 delivers reliable, high-performance machining. Its ability to save space while meeting diverse production demands positions it as an asset for companies navigating a fast-paced, competitive manufacturing landscape.

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BECKHOFF ADDS TWO NEW FUNCTIONS AND TECHNOLOGY PACKAGES TO TWINCAT 3 CNC (TF5200) SOFTWARE

With two new functions and two additional technology packages, Beckhoff has streamlined the specific application of TwinCAT 3 CNC (TF5200) for EDM and additive manufacturing. These latest features include online adaptation and extended interpolation, plus a technology package for additive processes and another for wire-erosion and die-sinking EDM machines.

TwinCAT 3 CNC Online Adaption (TF5262) offers TcCOM interfaces for integrating customer-specific modules for the online control of interpolation functions: Dynamic contour control (DCC) compensates for contour errors caused by physical deformation of the toolbox by modifying the tool centre point path based on the current and previous contour elements. The normalisation factor, compensation direction, and compensation factor are all calculated within the TcCOM object.

The tool radius compensation function offers online tool radius compensation based on factors such as the current tool radius, path position, and path tangent. Two-path interpolation is also supported here. The geometric feed rate adjustment is used to calculate a feed override factor to achieve a constant surface feed.

TwinCAT 3 CNC Extended Interpolation (TF5263) enables two-path interpolation, allowing two independent contours to be described in a single NC channel, which is particularly advantageous for EDM wire erosion. With conical coupling, the synchronisation of path 1 and path 2 can also be used to compensate for additional blocks inserted by the tool radius compensation. The originally programmed connection between the two paths remains unchanged.

TwinCAT 3 CNC AM Plus (TF5291) is a technology package for additive processes. Its extended contour preview makes programmed contour elements available to the PLC in advance and can be activated in the NC program or via the PLC interface. The TF5291 also makes it possible to access future dynamic data, such as axis positions, velocities, and accelerations, at configurable intervals.

TwinCAT 3 CNC EDM Plus (TF5292) is a special technology package for wire-erosion and die-sinking EDM machines. It combines functions from the TF5262, TF5263, and TF5292 with cylindrical compensation for EDM wire erosion, a single real-time cycle per channel, and retraction strategies for die-sinking EDM.

TWIN SPINDLE TWIN GANTRY CNC CHUCKER MW80HGT BY MURATEC

Muratec MW80HGT is a compact twin spindle turning machine with Gang tooling (Linear) concept. Machine offers high precision with direct spindle drive construction. MW80HGT is suitable for hard part turning with short cycle times. This small machine comes with a 6” chuck and can accommodate up to 4 gang tools. MW80HGT has a spindle power of 7.5kw and speeds up to 6000 RPM are available. It can turn parts up to 80mm diameter and length of up to 50mm.

Linear Tooling eliminates turret indexing time for significant cycle time reduction. Both swivel and horizontal type loaders are available.

With standard loading/ unloading time as low as 2.9 secs, MW80HGT is an optimal solution for high-speed turning and for simple parts such as Small Bearings, Rings, Gears and Hard Part Turning. Most widely used applications are: Bearing Outer and Inner, Differential Pinion and Side Gear, Compressor Wheel etc. Machine can be supplied with either single or twin gantry loaders. Muratec is a global leader in providing fully integrated built-in automation for variety of applications.

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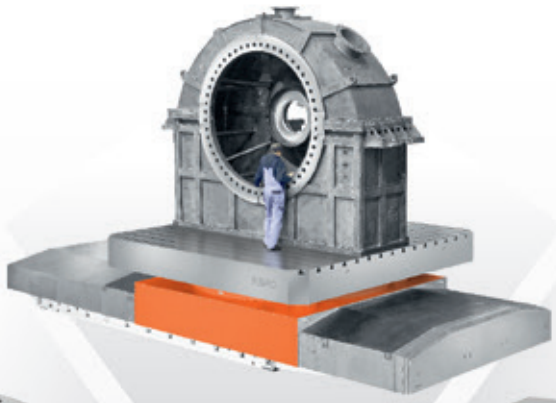

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MARPOSS INTRODUCES ULTRA-WIDEBAND TECHNOLOGY

The main objective of the touch probing systems is to optimise the production process of the machine tools, increasing both quality and quantity: the automatic detection of the machine axes' position offers advantages in terms of positioning and control of the workpieces, directly in the machining centre and the milling machines. For this reason, the probes are mounted directly on the machine spindle, that's why a wireless signal transmission is necessary, typically based on the 2.4 GHz frequency band.

In recent years, there has been an exponential increase in Wi-Fi devices within production plants, not only smartphones, tablets and modems but also automatic elevators and other material handling systems. This leads to saturation of the 2.4 GHz band with the inevitable presence of noise and interference, affecting the reliability of wireless probing systems, causing downtime and, more generally, decreasing the quality of the production process.

Marposs, always looking for new technologies to meet the growing market demands, can offer more. Marposs Ultra Probing System is the latest touch probing system with Ultra-Wideband technology, a real revolution for the machine tool industry. Thanks to the Ultra-Wideband technology, Marposs can place itself at a higher level of transmission than the standard, offering a new solution unmatched in terms of performance and reliability.

The most important feature, which is the main advantage introduced by the Marposs Ultra Probing system, is the use of a different transmission range: in Ultra Wideband, no other physical signal can interfere with the Marposs device, which means no interference and no machine downtime.

In addition, the system also features many improvements in its design. The anchor is the receiving antenna with an

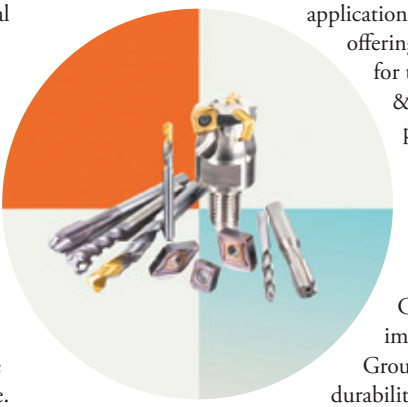
ultra-compact design that makes installation easier and faster. It also has 3 LED indicators. The anchor is connected to the machine's CNC by a wired cable. In all systems, the connection is a weak point due to the sealing in a wet area which depends on proper mounting and then directly on the ability of the operator.

Marposs Ultra Probing System introduces a new generation of wireless connectors with an extreme level of sealing due to its design, which does not depend on external operations.

In addition, the new Marposs APP - which allows system setup and real-time monitoring, combined with diagnostic and service operations - makes the system fast and easy to use.

DORMER PRAMET TO SHOWCASE CUTTING-EDGE SOLUTIONS AT IMTEX 2025

Dormer Pramet, a prominent global manufacturer, and supplier of metal cutting tools, and a part of the Sandvik Group, has announced its participation as the Gold Sponsor at IMTEX 2025, one of the India's premier machine tool and manufacturing technology exhibitions. The company is set to present its latest range of metal cutting products and offer innovative experiences to visitors at booth number B103, Hall 4A, from 23rd January to 29th January 2024, at the Bangalore International Exhibition Centre.



Dormer Pramet, along with Miranda, will showcase an extensive selection of advanced products ranging from milling cutters, taps, and drills. Organised by industry application, the display will feature standout offerings such as the High-Feed Milling Cutter for the indexable insert, SNGX 11, BNGX10 & SOHT 12, engineered for high productivity in die and mold and other segment applications, the 43 degree Face Milling ONMX 06, designed to deliver exceptional surface finish, versatile use in wide range of workpiece materials and the T9415 new generation MT - CVD turning grade, ideal for productivity improvement and first choice grade for P Group materials machining with enhanced durability. In addition to this, visitors will also have the opportunity to experience live demonstrations of select products that would be remotely controlled from Dormer Pramet's Czech Republic production unit.

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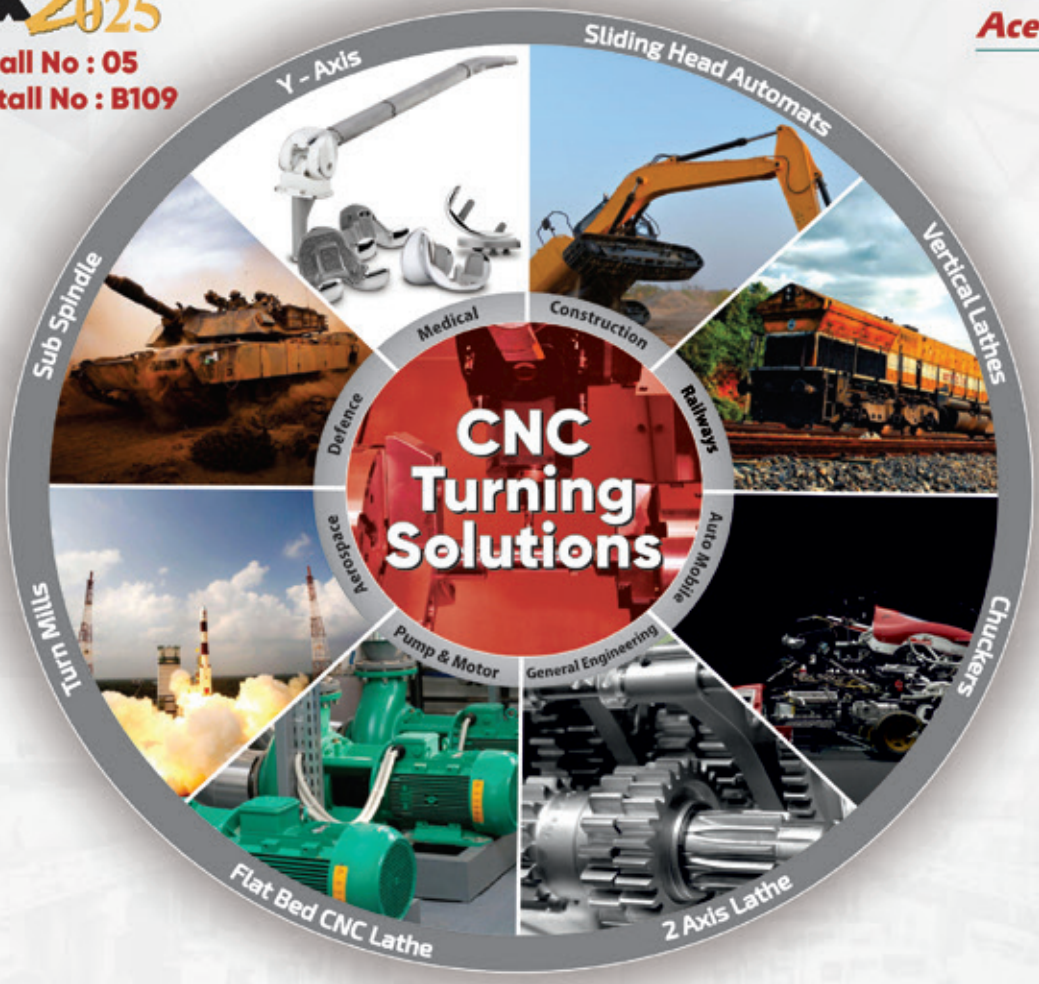

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