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ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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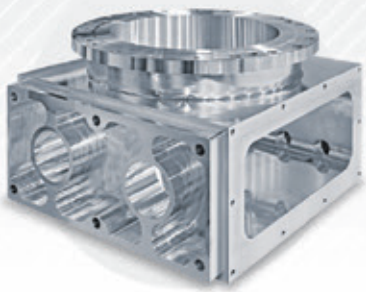

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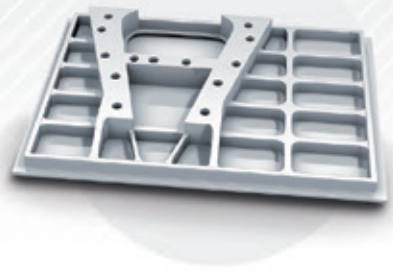

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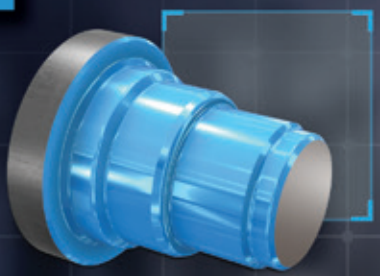

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FINDING RHYTHM, BUILDING FOR THE LONG TERM

Photography: Vaibhav Nadgaonkar

There is something quietly reassuring about the way India's manufacturing story is unfolding right now. It is not loud or dramatic, but it is steady. And in today's environment, that steadiness matters more than speed.

Recent industrial data reflects this shift. Manufacturing is regaining momentum with growth becoming more broad based across sectors such as automobiles, metals and machinery. At the same time, capital goods and infrastructure segments are seeing strong expansion, signalling that investment activity is beginning to return. This is not a breakout moment, but it is an important one. It points to an economy that is stabilising and slowly building confidence again.

But beyond the numbers, there is a deeper shift underway. The conversation around manufacturing is evolving from one of urgency to one of endurance.

This is precisely why this month's cover story on Vicco Laboratories feels both relevant and timely. In a business environment that often celebrates speed and constant reinvention, Vicco represents a very different approach. As Sanjeev Pendharkar reflects, the company was not built by chasing markets, but by staying anchored to a belief and consistently delivering on it.

That distinction matters.

Because manufacturing, at its core, is not very different. It is built on trust. On the ability to deliver the same quality, the same performance, over long periods of time. Vicco's journey, rooted in consistency, patience and consumer trust, mirrors the kind of discipline that defines strong manufacturing businesses.

There is also another reason why this story stands out today. As markets become more crowded and competition intensifies, differentiation is no longer just about scale or visibility. It is about authenticity. Vicco's ability to stay relevant across generations, while holding on to its core identity, offers a valuable lesson for manufacturers navigating change.

This becomes even more important in the current global context. Supply chains are being reshaped, geopolitical uncertainties persist and input costs remain volatile. For Indian manufacturers, this creates both opportunity and complexity. Growth is possible, but it must be built on resilience rather than speed alone.

At the same time, the recovery on the ground remains uneven. While several sectors are showing strength, parts of the consumption economy continue to face pressure. This makes it essential for businesses to take a more balanced view, combining optimism with caution.

What is emerging, then, is a more grounded manufacturing narrative. One that values consistency as much as growth. One that recognises that long term relevance cannot be built through short term decisions alone.

In that sense, Vicco's story is not just about one company. It is a reflection of a larger idea. That businesses built on clarity of purpose and sustained over time often outlast those built for immediacy.

As India's manufacturing sector finds its rhythm again, that idea feels particularly important.

Because the real test ahead is not just growth, but the ability to sustain it with discipline, resilience and a clear sense of direction.

Amit Shanbaug
Editor.

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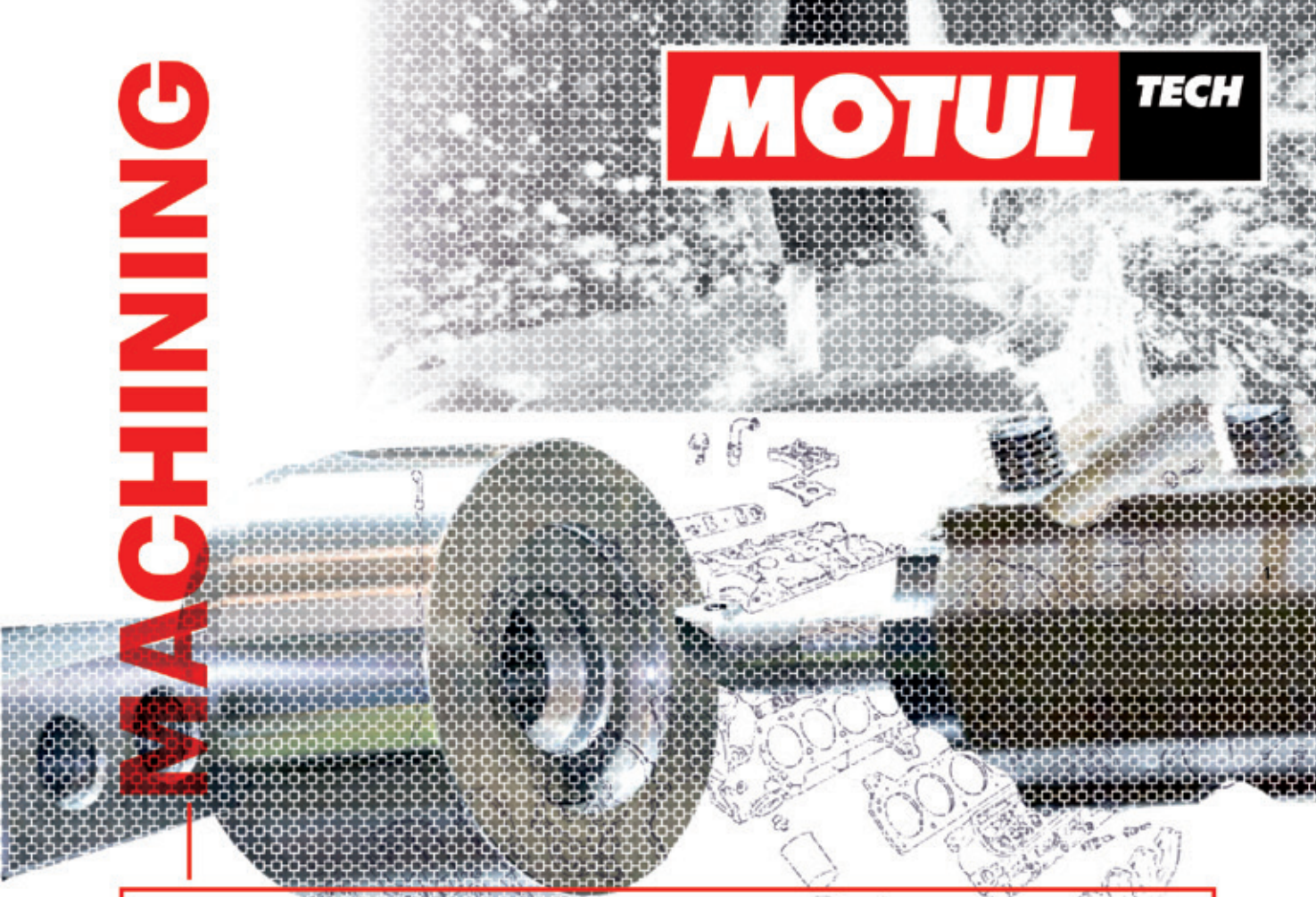

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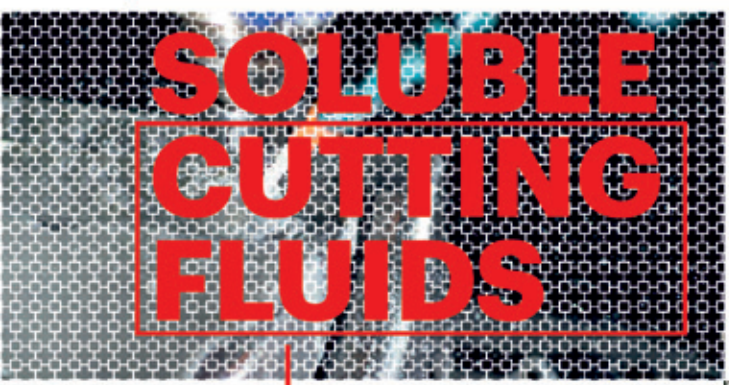

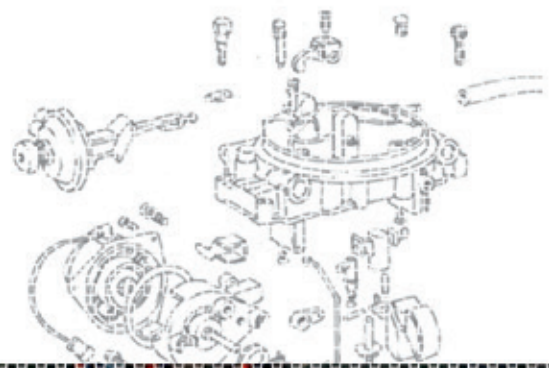

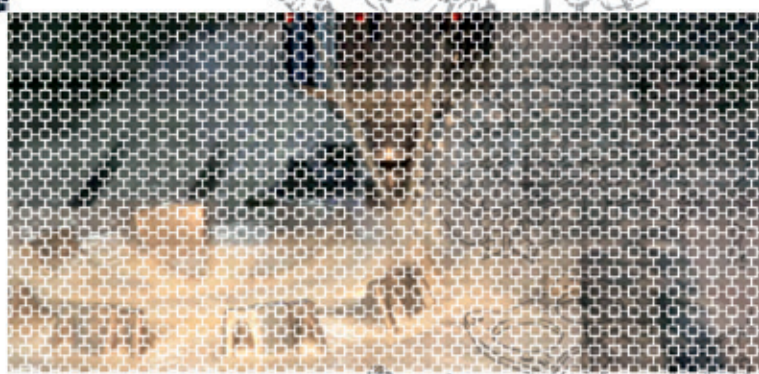

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CONTENTS

COVER STORY
We Didn't Build for Quarters We Built for Decades.. 32

IN FOCUS
The Hidden Engine of Manufacturing Growth 24

SKILL CAPITAL
Engineering Talent for a New Manufacturing Era -------- 20

TRENDS
Manufacturing Finds Its Rhythm Again ---------- 22

TRENDS
Rise of the Intelligent Machine---------- 26

INNOVATION
Smarter Sizing for Sustainable Mining---------- 28

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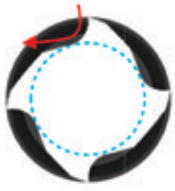

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SED TO POWER WATER RECYCLING AT GUJARAT'S MASSIVE NEW SOLAR HUB

New Partnership with Boston-based Gradiant India to Save 3.4 Lakh Litres of Water Daily Through Cutting-Edge 'Zero Waste' Tech

By Team ET Now Machinist

Spray Engineering Devices Limited (SED) has secured a significant order from Gradiant India, the local subsidiary of Boston-based Gradiant, to deploy an advanced water recovery system at a large solar PV manufacturing facility in Gujarat.

The partnership comes at a time when India's rapidly expanding solar manufacturing sector is facing an often-overlooked challenge of high water consumption. The project aims to address this by integrating sustainable water management into one of the country's key renewable energy hubs.

As part of the order, SED will install a **340 KLD Zero Liquid Discharge (ZLD) system,** designed to ensure that no industrial wastewater is discharged from the plant. The system will operate at an inlet Total Dissolved Solids (TDS) level of 170,000 ppm and is expected to deliver **up to 94% volumetric recovery and 78% mass recovery,** enabling extensive reuse of treated water.

At the core of the solution is SED's proprietary **Low-Temperature Evaporation (LTE®)** technology, which enables efficient water recovery while minimising energy consumption. Unlike conventional systems that rely heavily on external steam, the LTE-based system recycles its own energy, reducing both operational costs and carbon emissions.

The recovered water treated to **TDS levels below 250 ppm** will be reused across utilities and process applications within the facility. This is particularly relevant for Gujarat, a region where industrial water usage is under increasing regulatory and environmental scrutiny.

Commenting on the development, Vimarsh Verma, Director at SED, said that industrial water reuse has become a critical requirement rather than an optional sustainability measure. He noted that the company's technology enables manufacturing units to achieve zero liquid discharge without significantly increasing energy costs, while also meeting stringent environmental standards.

SED will execute the project on a turnkey basis, covering design, engineering, supply, installation, and commissioning, with a focus on timely delivery and operational efficiency.

The order also aligns with tightening environmental regulations in India, where 'Red Category' industries are increasingly being mandated to adopt ZLD systems for new large-scale projects. Against this backdrop, the partnership positions SED as a key player in enabling sustainable infrastructure for the renewable energy supply chain.

With India's solar manufacturing sector expected to grow at over 30% annually under national initiatives such as "Make in India," the project highlights the growing importance of integrating resource efficiency into industrial expansion.

By combining Gradiant's global expertise with SED's indigenous technology, the initiative sets a precedent for sustainable manufacturing practices in solar PV production, particularly in water-stressed regions.

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WOMEN AT THE WHEEL OF TAMIL NADU'S $1 TRILLION ECONOMY

Backed by policy, partnerships and political will, Tamil Nadu positions women not as beneficiaries but as central drivers of its growth story.

By Team ET Now Machinist

Tamil Nadu has placed women at the centre of its economic ambitions, with the launch of the TNWESafe project and the She Leads campaign signalling a shift from intent to implementation. The initiative, unveiled at the Global Women Summit in Chennai in the presence of **Chief Minister M. K. Stalin and Deputy Chief Minister Udhayanidhi Stalin,** reflects a governance approach where women's empowerment is directly tied to economic growth.

Unlike traditional welfare-driven narratives, the state's strategy frames women as a workforce and leadership asset. This positioning builds on decades of policy continuity in Tamil Nadu, where investments in education, health and social protection have steadily improved women's access to opportunity.

Several initiatives have contributed to this shift in measurable ways. Free bus travel for women has expanded access to jobs by reducing commuting costs and increasing mobility. The Pudhumai Penn scheme has encouraged girls to stay in education longer, strengthening their entry into formal employment. The development of Thozhi Hostels has addressed safety and accommodation challenges for working women, particularly in urban and industrial clusters. At the same time, nutrition programmes and direct benefit transfers have improved household stability and reduced barriers to workforce participation.

These interventions, while implemented across sectors, have collectively functioned as an enabling framework for women's economic

inclusion. The results are already visible. Female workforce participation in Tamil Nadu remains higher than the national average, with strong representation in manufacturing, agriculture and services. Women from the state account for a significant share of India's workforce in registered manufacturing units, reinforcing their role in industrial growth.

The She Leads campaign attempts to build on this foundation with a more structured and outcome-driven approach. Under TNWESafe, women's employment, entrepreneurship and leadership are being pursued through defined targets and institutional mechanisms. Partnerships with industry, financial institutions and knowledge organisations, formalised through agreements at the summit, are expected to play a key role in delivering skilling, job creation and safer workplaces.

The political backing of the initiative is significant. Visible leadership from the top is expected to ensure coordination across departments and sustained financing, both of which have historically been critical to Tamil Nadu's policy execution.

The state's broader ambition to become a one trillion-dollar economy by 2030 is closely tied to this strategy. By referring to Tamil Nadu as Magalir Nadu, the government has underscored a long-standing policy direction that prioritises women's agency and participation. The current phase seeks to move beyond access and participation towards leadership and decision-making roles.

As the state scales its economic ambitions, the focus is shifting to how effectively women can be integrated into growth sectors and leadership pipelines. The success of this approach will depend on whether the existing policy ecosystem can translate into sustained employment, entrepreneurship and upward mobility.

Tamil Nadu's model suggests that women's empowerment, when embedded within economic planning and backed by institutional commitment, can move from being a social objective to a growth imperative.

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BUILDING FUTURE-READY, ENTERPRISES

At **Schneider Electric, Vice President Services Damini Chaudhary** highlights how lifecycle thinking and digital readiness are redefining efficiency in the AI era.

By Team ET Now Machinist

Artificial intelligence is rewriting the rulebook for industrial and energy operations, and few understand this transformation better than **Damini Chaudhary, Vice President Services at Schneider Electric.** From shifting load patterns in data centres to the growing focus on lifecycle asset management, she believes the future belongs to organisations that can combine technology with long term thinking.

Data centres today are undergoing a structural reset. "AI led power consumption, which is just around 5% today, is expected to reach 15 to 20% by 2029," says Chaudhary. More AI means higher density, more heat, and tougher uptime demands, forcing operators to rethink design, cooling, and lifecycle management strategies. Achieving up to 99.9% uptime and improving power usage effectiveness (PUE) to around 1.3 are becoming the new benchmarks.

Whether building a new data centre or retrofitting an existing one, the approach must be future ready. As Chaudhary notes in her role at Schneider Electric, this is where end to end asset lifecycle management plays a critical role, spanning design, maintenance, optimisation, and digital monitoring through solutions like **EcoConsult, EcoCare, and EcoFit.** These enable operators to optimise power consumption, extend equipment life, and prevent issues before they escalate.

However, the operational shift is only part of the story. The larger challenge lies in mindset. Despite significant investments in digital transformation, many organisations struggle to scale beyond pilot projects. "Only about 30% are able to truly scale," notes Chaudhary. The missing link is a digital first culture and workforce readiness. Sales teams, technicians, and facility managers all need to operate with a shared digital understanding. "There is a skill gap in the ecosystem," she explains, "and continuous digital training is essential to bridge it."

The emerging industrial playbook is not just about adopting technology but about shifting to predictive, service led models. Instead of reacting to failures, companies are increasingly relying on condition-based maintenance and predictive insights. Solutions such as EcoCare, a key service offering from Schneider Electric, provide round the clock monitoring, triggering alerts within minutes and reducing unplanned downtime by up to 70%. The result is safer, leaner, and more sustainable operations.

India's manufacturing and energy sectors are at a crucial inflection point. As industries adopt renewable energy and aim to increase manufacturing's contribution to GDP to 20%, lifecycle partnerships rather than standalone technology providers will become key drivers of progress. Chaudhary emphasises that organisations working with partners like Schneider Electric are better positioned to break organisational silos, integrate systems, and view performance holistically. The impact is already visible, with one organisation achieving 29% energy savings across 23 campuses after implementing a lifecycle approach.

Chaudhary's vision of a future ready enterprise is clear. It is reliable, efficient, sustainable, and powered by AI and data. "We need to stop looking at assets in isolation," she concludes. "Sustainability and performance will only improve when systems are viewed holistically, driven by data, focused on outcomes, and designed for long term value."

The era of reactive maintenance and isolated digital initiatives is rapidly fading. The next decade will belong to organisations that can connect people, technology, and purpose to build intelligent, resilient systems that support a more sustainable world, she says.

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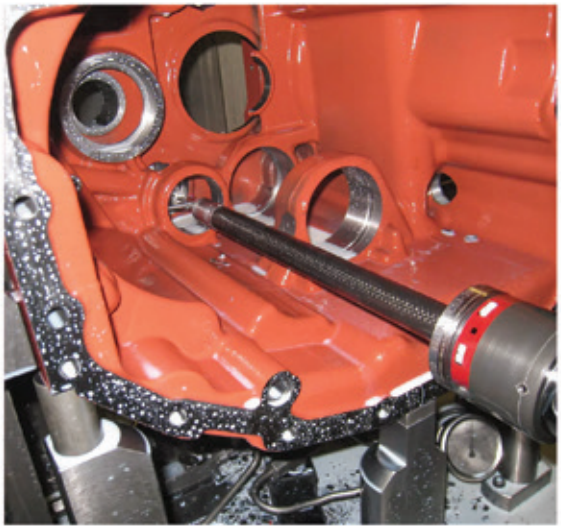

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INDIA'S AUTOMATION MOMENT

Arvind Kakru, Vice President Industrial Automation, shares how data, connectivity and mindset shifts are reshaping India's manufacturing growth story

By Team ET Now Machinist

India's manufacturing story is quietly but decisively changing and industrial automation is at the centre of it.

For **Arvind Kakru, Vice President Industrial Automation,** the shift is already visible on the ground. While manufacturing's share of GDP has remained relatively steady, the nature of growth has evolved significantly.

"India is no longer just serving developing markets," he says. "We are increasingly becoming an export hub for global economies like the US and Europe." The pandemic accelerated this transition, pushing global companies to diversify supply chains and expand manufacturing in India. The rapid growth of Apple's manufacturing footprint is one such example.

Yet, the bigger opportunity lies ahead.

Compared to developed economies, India still spends less on automation. For Kakru, this gap signals strong potential, especially with the rise of sectors like renewables, electronics manufacturing and new energy ecosystems.

At the core of this transformation is a simple idea. Connect everything.

The journey begins with bringing machines and assets onto a connected network. Once that happens, systems start generating reliable, real-time data without human intervention. This data then feeds into advanced software systems that go beyond monitoring to enable predictive insights.

"The real value comes when you move from control to optimisation," Kakru explains. "When systems can predict what might go wrong, you reduce downtime and improve efficiency. That directly impacts business outcomes."

However, adoption is not without its hurdles.

For many MSMEs, automation is still seen as a costly investment rather than a scalable solution. There is also a cultural hesitation, where automation is often linked to job losses. In reality, Kakru points out, automation and job creation go hand in hand as industries scale.

Another major challenge is integrating shop floor operations with enterprise systems. While IT provides business insights, operational technology reflects real-time production realities. Connecting the two is essential to unlock full visibility and smarter decision-making.

This becomes even more critical in industries like automotive, where even a single missing component can disrupt production. Without connected systems, managing such complexity becomes difficult.

POWERING INDIA'S INDUSTRIAL GROWTH

Future-ready industrial and logistics parks, built with precision, sustainability, and long-term vision, thus enabling India's manufacturing and supply chains to scale confidently and responsibly.

By Team ET Now Machinist

KSH INFRA has emerged as one of India's leading homegrown developers of Grade A industrial and logistics infrastructure, shaping the backbone of modern manufacturing ecosystems. With a clear vision to deliver future-ready spaces, the company offers an integrated, end-to-end approach spanning land acquisition, planning, design, development, and leasing—ensuring that every park is built with precision, purpose, and long-term value in mind.

Over the years, KSH INFRA has expanded its footprint strategically across key industrial corridors, creating a robust portfolio of high-performance infrastructure. Its presence spans six INFRA Parks namely at **Talegaon I*, Chakan I*, Chakan II*, Chakan III, Chakan IV, and Hosur Park I, Chennai Park I** — each thoughtfully located to leverage strong connectivity, skilled talent pools, and proximity to major industrial hubs. This growing expanse reflects not only scale, but also a deep understanding of location intelligence and evolving industry requirements.

At the core of KSH INFRA's philosophy is its commitment to Grade A infrastructure defined by quality, efficiency, sustainability, and compliance. Each KSH INFRA Park is designed to global standards with optimized layouts, efficient movement, advanced utilities, and scalability, enabling operational efficiency across industries.

The organization stands out through its meticulous, client-first execution right from strategic land acquisition to customized built-to-suit facilities. With a strong focus on compliance and safety, every development meets regulatory and environmental standards, ensuring high-performing, future-ready spaces.

KSH INFRA embeds ESG principles into its operations, aligned with the GRI framework and supported by regular disclosures. Sustainability guides every stage of development, with a focus on reducing environmental impact, optimizing resources, and creating future-ready infrastructure.

All KSH INFRA Parks are IGBC (Indian Green Building Council) Platinum Certified and are designed for sustainability through energy and water efficiency, waste management, green building standards, and integration of renewable energy and climate-resilient practices, while promoting environmental awareness across stakeholders.

The company maintains strong social and governance standards, focusing on health and safety, responsible employment, and community impact, with a track record of zero privacy breaches, data loss, discrimination, or labour issues.

With a strong focus on quality construction and sustainable practices, KSH INFRA delivers resilient, compliant, and future-ready industrial infrastructure.

As India's industrial and logistics landscape evolves, KSH INFRA supports initiatives like Make in India and the China +1 strategy by enabling companies to set up operations without the complexities of land acquisition and infrastructure development. Through plug-and-play, Grade A industrial facilities on long-term lease, it allows businesses to scale efficiently within a reliable, future-ready ecosystem.

ADVANCED MACHINING FOR LIGHTWEIGHT MATERIALS

As industries shift toward lightweight engineering materials, advanced tooling and machining strategies are becoming essential to balance performance, precision, and productivity in complex manufacturing environments.

By Team ET Now Machinist

In today's evolving manufacturing industry, the growing emphasis on efficiency and performance has accelerated the adoption of lightweight engineering materials across various sectors. Materials like aluminium alloys, titanium, and advanced composites are increasingly preferred due to their superior strength-to-weight ratios, corrosion resistance, and thermal stability. However, their inherent properties also introduce a unique set of machining challenges that demand equally advanced solutions.

Figure 1

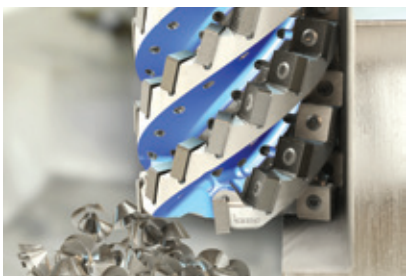

Figure 2

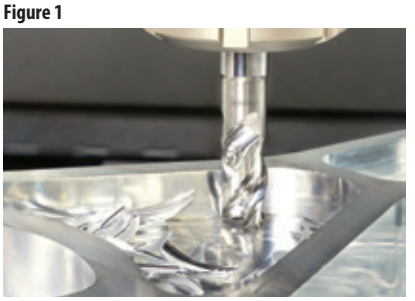

Figure 3

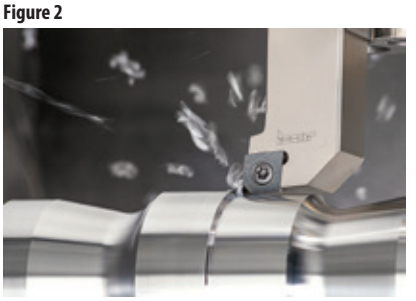

Figure 4

Lightweight materials often exhibit characteristics such as high ductility, toughness, or thermal conductivity, all of which can complicate machining processes. Titanium, for instance, is known for its toughness and tendency to cause rapid tool wear, while aluminium's high thermal conductivity can result in excessive heat concentration at the cutting interface. Composite materials further intensify these challenges due to their abrasive reinforcements, increasing the risk of tool degradation and issues such as delamination. Even polymer-based lightweight structures, designed to reduce weight, often lack stiffness and require reinforcements that make machining more complex.

To address these challenges, ISCAR has developed a comprehensive range of tooling solutions tailored for high-performance machining of lightweight materials. By focusing on tool geometry, material composition, and coating technologies, the company enhances both productivity and precision. Specialized tool geometries are engineered to reduce cutting forces and improve chip evacuation, ensuring smoother machining even in demanding applications such as titanium milling. Advanced coatings like TiAlN and diamond-like carbon significantly improve tool hardness and resistance to abrasion, extending tool life under high-temperature and high-stress conditions.

In milling applications, ISCAR's high-performance cutters are designed to operate efficiently at high speeds while minimizing vibration, a critical factor when machining thin-walled or delicate components. Similarly, optimized inserts for turning operations enable better chip control and reduced heat generation, contributing to improved surface finish and operational efficiency. These tooling advancements are further supported by modern machining techniques such as high-speed machining, minimum quantity lubrication, and adaptive machining strategies, all of which help maintain consistent cutting conditions and reduce cycle times.

The aerospace and space industries highlight the importance of such innovations. These sectors rely heavily on lightweight materials to improve fuel efficiency, performance, and sustainability while maintaining strict requirements for precision and reliability. Machining components for these applications demands exceptional accuracy and durability, as even minor deviations can impact overall performance.

As manufacturing continues to evolve, the ability to effectively machine lightweight materials will remain a critical differentiator. Through continuous innovation in tooling and process optimization, ISCAR enables industries to overcome these challenges, ensuring high-quality outcomes while maintaining efficiency and cost-effectiveness.

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ENGINEERING TALENT FOR A NEW MANUFACTURING ERA

How industry-aligned learning and real-world exposure are helping students become job-ready, future-focused professionals in a rapidly evolving manufacturing industry

By Team ET Now Machinist

India's ambition to strengthen its position as a global manufacturing hub will depend as much on its talent as on its policies and investments. As industries evolve with automation, artificial intelligence and smart systems, the expectations from young engineers are changing just as rapidly. The question is no longer just about what students know, but what they can actually do. This is where institutions have a critical role to play in shaping outcomes that are both relevant and practical.

At Sairam Institutions, the approach to education reflects this shift. The curriculum is not treated as something fixed. Instead, it is seen as a living system that evolves with industry needs. Inputs from industry advisory boards, regular feedback from recruiters and a strong focus on outcome-based education help ensure that what students learn stays aligned with real-world expectations. The emphasis is on how that knowledge can be applied.

> "We align education with industry needs through a dynamic curriculum, outcome-based learning, and the PGPA framework. By integrating emerging technologies, hands-on training, and real-world projects, they ensure students develop practical skills, digital expertise, and the confidence to contribute effectively in a rapidly evolving manufacturing ecosystem.

A key part of this approach is the PGPA framework, which looks beyond academic scores. Students are evaluated on skills, internships, certifications and their ability to solve real-world problems. This creates a more complete picture of their readiness and ensures that learning is not limited to classrooms. The idea is simple. Students should graduate not just with degrees, but with the confidence and ability to contribute from the very beginning of their careers.

The rise of Industry 4.0 has made it essential for students to be familiar with emerging technologies. At Sairam Institutions, areas such as artificial intelligence, IoT, robotics and data-driven manufacturing are integrated into the learning experience. These are not treated as optional subjects but as essential exposure for students across disciplines.

This learning is supported by hands-on experience. Students work in labs focused on automation and smart systems, and benefit from industry-supported Centres of Excellence. There is also a strong push towards digital skills, with structured pathways that ensure every student builds a foundation in these areas. Live projects linked to real manufacturing challenges further strengthen this learning, helping students connect

theory with practice in meaningful ways.

One of the longstanding challenges in education has been the gap between what students learn and what industries expect. This gap often comes from a system that prioritises theoretical knowledge, while employers look for practical competence. Bridging this requires consistent effort and a structured approach.

At Sairam Institutions, this is addressed through continuous assessment and industry exposure. Platforms like **Skillrack and AMCAT** are used to track student progress and highlight areas for improvement. Internships are not optional but a necessary part of the learning journey, giving students a chance to experience real work environments. Certifications aligned with global standards add another layer of credibility, while participation in hackathons and innovation challenges encourages problem-solving and adaptability.

Industry collaboration plays a central role in making all of this work. Partnerships with manufacturing companies are built not as one-time engagements, but as ongoing relationships. These include joint curriculum design, industry-led training sessions, live project collaborations and structured internship opportunities. Such interactions ensure that learning remains grounded in real industry practices and does not become disconnected from reality.

> "Sairam Institutions bridge the education–industry gap through continuous assessment, mandatory internships, and strong industry partnerships. By integrating practical learning & global certifications, they equip students with real-world skills, entrepreneurial thinking, and adaptability—preparing them to contribute effectively to India's evolving manufacturing industry.

These collaborations also make the transition from campus to workplace smoother for students. When they step into professional roles, they are already familiar with the expectations and challenges of the industry.

At the same time, there is a growing effort to encourage students to think beyond traditional career paths. Manufacturing needs not only skilled professionals, but also entrepreneurs who can create new solutions and opportunities. Sairam Institutions support this through an ecosystem that promotes innovation and experimentation.

Students are encouraged to work on projects linked to real-world challenges, including those aligned with global sustainability goals. Support for prototyping and product development allows ideas to move beyond theory. Events and competitions help build confidence, while mentorship provides guidance on turning ideas into viable ventures. This approach helps students develop resilience and a practical mindset, both of which are essential for entrepreneurship.

Looking ahead, the role of educational institutions will be central to India's manufacturing growth. The country's progress will depend on the availability of skilled talent, the ability to innovate and the strength of collaboration between academia and industry. Institutions that can bring these elements together will help shape the future of manufacturing in India.

At Sairam Institutions, the focus remains on preparing students for this future. By aligning learning with industry needs, integrating technology into education and encouraging innovation, the institution aims to create graduates who are ready to adapt and contribute. In the end, it is this **combination of skill, mindset and experience** that will determine how effectively India can build its manufacturing capabilities.

The journey to becoming a global manufacturing hub is not only about scale. It is about readiness. And that readiness begins in the classroom, shaped by how well students are prepared for the world they are about to enter.

MANUFACTURING FINDS ITS RHYTHM AGAIN

India's industrial growth is showing renewed strength, led by manufacturing and investment, but sustaining momentum will depend on demand, global stability and policy consistency.

By Team ET Now Machinist

India's industrial story is beginning to sound more confident again. The latest data from the **Ministry of Statistics and Programme Implementation** shows that industrial output, measured by the Index of Industrial Production, grew **5.2 percent in February 2026,** up from 4.8 percent in January.

On the surface, this looks like a modest uptick. But beneath that number lies a more important signal. Manufacturing, long seen as the backbone of India's economic ambitions, is quietly regaining momentum.

THE MANUFACTURING ENGINE IS DOING THE HEAVY LIFTING

The biggest contributor to this growth is manufacturing, which expanded by **6 percent in February,** significantly outpacing mining and electricity.

What makes this more meaningful is the spread of growth. A majority of manufacturing segments reported positive expansion, with sectors like automobiles, basic metals, and machinery leading the charge.

This tells us something important. Growth is not being driven by one or two outliers. Instead, it is becoming more broad-based, reflecting stronger underlying demand across industries.

There are visible signs of this on the ground. Rising output in steel products and machinery points to continued infrastructure activity. Strong performance in automobiles suggests both domestic demand and supply chain stability are holding up. These are not just isolated data points. They are indicators of a system that is slowly finding balance after years of disruption.

INVESTMENT IS BEGINNING TO SHOW UP

Another encouraging aspect of the data is the performance of capital goods

and infrastructure-related segments. Capital goods grew by over 12 percent, while infrastructure and construction goods saw double-digit expansion.

These numbers matter because they reflect investment activity. When companies start buying machinery and building capacity, it signals confidence in future demand. It also suggests that the private sector, which had been cautious for some time, may be slowly stepping back into the investment cycle.

For an economy like India, this shift is critical. Consumption can drive growth for a while, but sustained expansion requires investment. And investment, in turn, feeds manufacturing.

A STORY OF MOMENTUM, NOT A BREAKOUT

At the same time, it is important to keep the bigger picture in mind. A growth rate of 5.2 percent is solid, but not extraordinary. It points to stability rather than a breakout.

In fact, some parts of the economy are still under pressure. Consumer non-durables, which include everyday goods, have shown weak or even negative growth in some segments.

This reflects a more uneven recovery, where demand at the lower end of the consumption spectrum remains fragile. It is a reminder that while the headline numbers are improving, the recovery is not yet fully inclusive.

GLOBAL WINDS STILL MATTER

India's industrial momentum is also unfolding in a complex global environment. Supply chains are being reshaped, geopolitical tensions remain elevated, and input costs continue to fluctuate.

Recent reports have flagged potential risks from global conflicts and disruptions, particularly in regions that influence energy prices and trade flows.

For Indian manufacturers, this creates both opportunity and uncertainty. On one hand, companies are looking to diversify supply chains and reduce dependence on single geographies, which could benefit India. On the other hand, volatility in global markets can quickly affect costs, exports, and production planning.

THE REAL QUESTION IS SUSTAINABILITY

So where does this leave India's industrial story?

The current data suggests resilience. Manufacturing is holding up, investment is showing early signs of revival, and industrial output is maintaining a steady pace. Compared to a year ago, when growth had slowed sharply to below 3 percent, the improvement is notable.

But the more important question is whether this momentum can be sustained.

For that to happen, a few things need to align. Demand, both domestic and global, has to remain stable. Investment needs to deepen beyond early signals. And productivity gains, driven by technology and efficiency, must continue to improve.

There is also a structural layer to this conversation. India's ambition to become a global manufacturing hub depends not just on growth numbers, but on consistency. Businesses need predictability, supply chains need reliability, and policy support needs to be steady.

A QUIET TURNING POINT

What February's data really represents is not a dramatic surge, but something more subtle. It signals a gradual strengthening of the industrial base.

Manufacturing is not booming, but it is no longer struggling. Investment is not surging, but it is beginning to return. Growth is not spectacular, but it is steady.

In many ways, this is what a healthy recovery looks like. Not a spike, but a rhythm.

And if that rhythm holds, India's manufacturing story may finally begin to move from potential to performance.

THE HIDDEN ENGINE OF MANUFACTURING GROWTH

From auto factories to smartphones, every product begins with a mould. As India pushes toward becoming a global manufacturing hub, its die and mould industry is quietly stepping into the spotlight.

By Team ET Now Machinist

Every car panel, smartphone casing, medical device, or plastic container begins the same way, with a die or a mould. Yet, despite being the backbone of manufacturing, India's die and mould industry has long operated in the shadows. That is beginning to change.

As India positions itself as a global manufacturing hub, this "mother industry" is quietly moving to centre stage, driven by policy push, shifting global supply chains, and rising domestic demand.

A SECTOR GAINING SCALE AND ATTENTION

India's die and mould sector sits within a broader tooling ecosystem that is expanding steadily. According to the Tool and Gauge Manufacturers Association of India, the domestic tooling industry is currently valued at around **Rs. 23,000–26,000 crore.**

Growth projections suggest this is only the beginning. A report by Technavio estimates that the **dies and moulds market in India** will grow by **$2.84 billion between 2024 and 2029,** at a **compound annual growth rate of 11.4%.**

At a wider level, the tooling ecosystem itself is already sizeable. Estimates from IMARC Group place India's tooling market at **about $20.1 billion in 2025.**

These numbers reflect a deeper shift, that the first demand created in the maufacturing industry is not for the finished goods, but for the tools that make them.

WHAT'S DRIVING THE MOMENTUM

The sector's growth is closely tied to India's broader industrial ambitions.

One of the biggest drivers is localisation. As companies reduce import dependence and build supply chains within India, demand for domestic tooling has surged. Every new production line requires precision dies and moulds, creating a multiplier effect across industries.

The automotive sector continues to anchor demand, but it is also evolving rapidly. The transition to electric vehicles is changing the nature of tooling itself, with increased need for lightweight materials, complex designs, and high-precision components.

At the same time, newer sectors are adding momentum. Electronics manufacturing, aerospace, medical devices, and packaging are all expanding, each bringing its own set of tooling requirements. India's

growing role in these industries is translating directly into demand for more sophisticated moulds and dies.

Technology is also reshaping the sector. Advanced machining, simulation software, and additive manufacturing are reducing lead times and improving accuracy. Tool rooms that once relied heavily on manual processes are becoming increasingly digital.

THE STRUCTURAL CHALLENGES

Despite its potential, the industry faces persistent challenges that limit its ability to scale.

One of the most pressing issues is the shortage of skilled labour. Toolmaking requires precision and expertise, and the transition to advanced technologies has widened the skill gap. Without a steady pipeline of trained professionals, growth could slow.

The industry is also highly fragmented. A large number of players are small and medium enterprises, often operating with limited capital. This makes it difficult to invest in high-end machinery, research, and automation.

Import dependence remains another concern. A significant share of high-precision tooling is still sourced from countries like China, Japan, and South Korea. This not only affects domestic competitiveness but also exposes manufacturers to supply chain risks.

Cost pressures add to the strain. High raw material costs, coupled with duty structures that industry players often describe as unfavourable, make it harder for Indian toolmakers to compete globally.

POLICY PUSH AND THE ROAD TO SELF-RELIANCE

Recognising these gaps, policymakers have begun to focus more closely on the tooling ecosystem.

Initiatives aimed at boosting manufacturing, including localisation efforts and incentive schemes, are indirectly benefiting the die and mould sector. Tool rooms and training centres are being strengthened, and cluster-based development in cities such as Pune, Chennai, and Bengaluru is helping build scale.

However, industry voices continue to call for more targeted interventions. These include easier access to finance for MSMEs, rationalisation of duties, and stronger vocational training systems tailored to tooling technologies.

GEOPOLITICS: A WINDOW OF OPPORTUNITY

If domestic policy is one part of the story, geopolitics is the other.

Global supply chains are undergoing a significant reset. The China+1 strategy, adopted by many multinational companies, is pushing manufacturing diversification. This creates a unique opportunity for India, not just in finished goods but in the tooling that supports them.

As companies look for reliable and cost-effective alternatives, Indian toolmakers are increasingly entering global supply chains. The combination of competitive costs and improving quality is making the country an attractive destination.

At the same time, disruptions in global trade have highlighted the risks of overdependence on a single geography. This has strengthened the case for building domestic capabilities, particularly in critical sectors like tooling.

THE NEXT PHASE: MOVING UP THE VALUE CHAIN

The real test for India's die and mould industry lies ahead.

To fully capitalise on the opportunity, the sector will need to move beyond cost advantage and focus on capability. This means investing in advanced technologies, building a skilled workforce, and integrating more deeply with global manufacturing networks.

The shift is already visible in parts of the industry, where companies are adopting automation, experimenting with hybrid manufacturing, and delivering higher precision products.

A QUIET TRANSFORMATION UNDERWAY

For decades, the die and mould sector has remained largely invisible, even as it powered visible industries. Today, that is beginning to change.

Its growth is no longer incidental. It is directly linked to India's ambition to become a global manufacturing powerhouse.

In many ways, the future of manufacturing in India will be shaped long before a product reaches the assembly line. It will be shaped in tool rooms, design labs, and precision workshops, where the first mould is cast.

And as that happens, India's die and mould industry may finally get the recognition it has long deserved, not just as a support function, but as a strategic pillar of industrial growth.

RISE OF THE INTELLIGENT MACHINE

From factory floors to hospitals and homes, robots powered by AI are redefining work, productivity, and the future of global economies.

By Team ET Now Machinist

Not long ago, robots belonged behind glass walls on factory floors, performing repetitive tasks out of sight. Today, they are stepping out into the real world, moving through warehouses, assisting in surgeries, delivering packages, and even helping care for the elderly.

The shift is happening faster than most people realise.

The most recent global data shows that around **542,000 industrial robots were installed in a single year,** marking the fourth straight year that installations have crossed half a million. Industry estimates suggest this number is set to rise further, with annual installations expected to approach **575,000 in the near term.** The total number of robots now in operation worldwide has reached **about 4.66 million,** steadily rising over the past decade.

What was once a specialised tool for large manufacturers is now becoming part of everyday business.

But the bigger change is not how many robots there are. It is what they can do.

SMARTER, NOT JUST FASTER

For years, robots were valued for precision and speed. They did the same task again and again, without deviation. That is no longer enough.

Advances in artificial intelligence are giving robots the ability to "see", interpret, and respond. In warehouses, machines now navigate complex layouts, avoid obstacles, and optimise routes in real time. In hospitals, robotic systems assist surgeons with procedures that demand extreme precision. In logistics, fleets of autonomous machines sort, lift, and move goods with minimal human intervention.

This new generation of robots is not just following instructions. It is making decisions, within defined limits, and learning from data.

That shift is opening the door to entirely new uses.

BEYOND THE FACTORY FLOOR

One of the most noticeable changes is where robots are showing up.

Warehousing and logistics have become major growth areas, driven by e-commerce and the need for faster deliveries. Autonomous mobile robots are now a common sight in large fulfilment centres, quietly moving goods from one point to another.

Healthcare is another fast-growing space. Robots are being used in surgery,

rehabilitation, and elder care. In ageing societies, machines are beginning to support caregivers, helping patients with mobility, monitoring vital signs, or simply providing assistance with daily routines.

Even hospitality and retail are experimenting with robotics, from automated check-ins to service assistants.

This expansion beyond manufacturing is changing the public's relationship with machines. Robots are no longer distant or invisible. They are becoming part of daily life.

ASIA LEADS, BUT OTHERS ARE CATCHING UP

The growth of robotics is not evenly spread.

Asia dominates the landscape, accounting for about 74% of all new robot installations, with China leading by a wide margin.

At the same time, countries like Japan and South Korea remain leaders in industrial automation, while the United States is pushing ahead in AI-driven robotics.

India is still a smaller player, but it is growing quickly. Installations have been rising steadily, especially in automotive and electronics. More importantly, adoption is spreading to new sectors, reflecting a broader shift in how businesses think about automation.

THE MONEY IS FOLLOWING THE SHIFT

Investment patterns tell their own story.

Instead of chasing futuristic, human-like robots, investors are putting money into machines that solve specific problems. Startups building warehouse robots, delivery systems, and healthcare devices are attracting significant funding.

In recent years, billions of dollars have flowed into robotics companies, much of it focused on practical, scalable solutions rather than headline-grabbing prototypes.

> "Robotics is steadily expanding beyond factory floors into logistics, healthcare, and everyday services, reshaping how industries operate. While Asia leads adoption, global investment is shifting toward practical applications. Despite cost and skill challenges, robots are becoming collaborative tools, quietly transforming productivity, efficiency, and the future of work.

This signals a maturing industry. The focus is moving from what robots could be to what they can already do.

A NEW KIND OF COMPETITION

Robotics is also becoming a strategic priority for governments.

Control over key technologies such as sensors, chips, and AI software is increasingly seen as critical. Countries are investing to secure their position, not just in manufacturing, but in the technologies that power intelligent machines.

This has led to a subtle but important shift. Robotics is no longer just an industrial story. It is tied to national competitiveness, supply chain resilience, and long-term economic strength.

WHAT'S HOLDING THINGS BACK

Despite the momentum, there are real constraints.

Cost remains a hurdle, especially for smaller businesses. While prices are coming down, deploying advanced robotic systems still requires significant investment.

There is also a growing gap in skills. As robots become more capable, the need for people who can program, maintain, and manage them is rising. Many industries are struggling to keep up.

And then there are questions that go beyond technology. As robots move into public and personal spaces, concerns around safety, trust, and accountability are becoming more pressing.

A QUIET SHIFT, WITH LASTING IMPACT

The rise of robotics is not happening with the kind of drama often associated with technological change. There are no sudden disruptions or overnight transformations. Instead, it is unfolding steadily, almost quietly.

A warehouse becomes more efficient. A hospital adopts a new surgical system. A logistics network speeds up deliveries. Each change is small on its own, but together they add up to something much larger.

What is emerging is a world where machines are not just tools, but collaborators. They handle repetitive work, assist in complex tasks, and free up human effort for more creative and strategic roles.

The idea of robots as distant, futuristic entities is fading. In its place is something more immediate and far more practical.

They are here, they are working, and they are becoming part of how the world runs.

SMARTER SIZING FOR SUSTAINABLE MINING

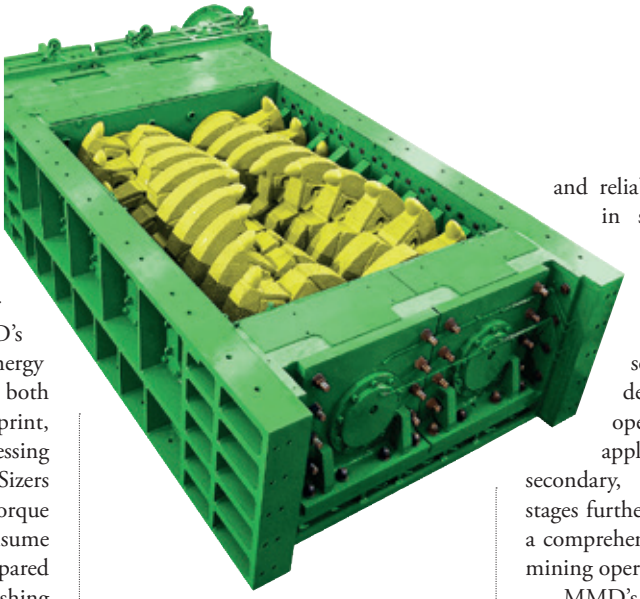
Innovative mineral sizing technologies are transforming mining efficiency by reducing energy consumption, optimizing material processing, and enabling environmentally responsible operations across diverse mining applications.

By Subhajit Chaudhuri, CEng, FIE, IIM Cal Alumni (Managing Director)

In the rapidly evolving mining and mineral processing sector, the demand for sustainable, efficient, and high-performance solutions has become more critical than ever. As operations scale and environmental considerations take center stage, the industry is increasingly turning toward technologies that not only enhance productivity but also significantly reduce ecological impact. In this context, MMD has emerged as a key enabler of transformation, delivering tailored material processing solutions that address the complex challenges faced by mining, quarrying, and recycling industries worldwide.

At the core of MMD's approach lies its commitment to innovation, underpinned by decades of expertise and continuous research and development. Since the invention of the Mineral Sizer™ over 40 years ago, the company has consistently set new benchmarks in material handling and processing. This pioneering technology has redefined how materials are reduced and prepared from mine to mill, offering a fundamentally different approach compared to conventional crushing systems.

Central to this transformation is MMD's patented twin-shaft Mineral Sizer, engineered to deliver controlled, efficient, and accurate material reduction. Unlike traditional crushers that rely primarily on compression, the Mineral Sizer employs a combination of shear, tensile, and bending forces. This unique mechanism enables precise control over product size in all three dimensions, ensuring a consistent and uniform output. By minimizing the generation of fines and reducing dust, the technology enhances downstream processing efficiency while maximizing material yield. This concept of "smarter sizing"



not only improves operational performance but also ensures optimal utilization of resources.

Energy efficiency is another defining aspect of MMD's solutions. In an industry where energy consumption directly impacts both cost and environmental footprint, the need for low-energy processing systems is paramount. MMD Sizers are designed as low-speed, high-torque machines, which inherently consume significantly less energy compared to conventional high-speed crushing equipment. This design reduces the overall comminution energy required for material breakage, while also lowering power demand across the entire processing chain. Furthermore, the integration of In-Pit Sizing and Conveying (IPSC) systems allows for a reduction in haulage distances, enabling a shift from traditional truck-based transport to more energy-efficient conveyor systems. This transition not only reduces diesel consumption but also lowers emissions and operational costs.

Beyond efficiency, MMD's solutions are closely aligned with the broader goals of sustainability and environmental stewardship. The impact of its Mineral Sizer technology extends far beyond productivity gains, contributing significantly to responsible mining practices. Lower energy consumption directly translates into a reduced carbon footprint, while precise sizing minimizes waste generation by ensuring that only the required material is processed. The ability to integrate bulk ore sorting technologies further enhances this advantage, enabling early rejection of waste material and reducing the burden on downstream processes. This leads to substantial savings in water usage, energy consumption, and tailings generation.

In addition, the compact and mobile nature of MMD installations helps reduce the overall infrastructure footprint, minimizing environmental disturbance at mining sites. The incorporation of automation and remote-controlled operations enhances safety by reducing the need for human intervention in hazardous environments, thereby creating safer and more efficient working conditions.

Versatility remains a defining characteristic of MMD's Mineral Sizers. Designed to handle a wide range of materials, from soft and wet clays to hard and abrasive ores, the technology demonstrates remarkable adaptability across diverse mining conditions. Its ability to process over 80 different materials underscores its robustness and reliability. Whether deployed in surface or underground mining operations, or configured as fixed, semi-mobile, or fully mobile systems, MMD solutions consistently deliver high throughput and operational flexibility. Their applicability across primary, secondary, and tertiary processing stages further reinforces their value as a comprehensive solution for modern mining operations.

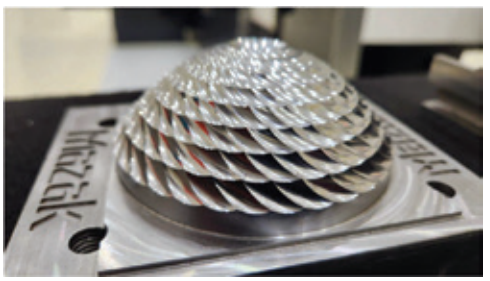
MMD's role extends beyond equipment supply, positioning itself as a trusted partner to its customers. The company offers end-to-end support, encompassing conceptual planning, detailed engineering, manufacturing, installation, and aftersales services, including training and maintenance. With a global network of offices, workshops, and manufacturing facilities, customers benefit from ready access to technical expertise, service teams, and spare parts, ensuring seamless project execution and long-term operational reliability.

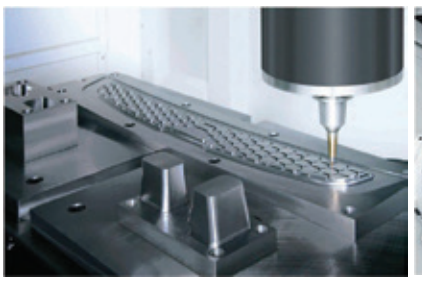
As the mining industry continues to embrace digitalization and sustainability, MMD remains at the forefront of innovation. By integrating advanced technologies, automation, and data-driven approaches into its solutions, the company is shaping the future of mineral processing. Its ongoing investment in research and development reflects a commitment to enhancing efficiency, supporting environmental, social, and governance goals, and delivering solutions that are both future-ready and adaptable to evolving industry demands.

Ultimately, the philosophy of "smarter sizing, lower energy, greater impact" encapsulates the transformative potential of MMD's approach. By combining precision engineering with sustainable design principles, MMD enables mining operations to achieve higher productivity while significantly reducing their environmental footprint, paving the way for a more responsible and efficient future for the industry.

ADVANCING INDIA'S DIE & MOLD INDUSTRY WITH MAZAK'S HIGH-PERFORMANCE MACHINING SOLUTIONS

By Team ET Now Machinist





The die and mold industry is the backbone of manufacturing, enabling mass production of components used in automotive, electronics, aerospace, and consumer goods sectors. In India, this industry has witnessed rapid growth due to increasing industrialization, government initiatives, and rising demand for high-precision components. The market is expected to grow at a CAGR of around 11–12%, with significant investments in advanced tooling technologies. Mazak proposes VC-Ez Series machines, 5-axis machines and multi-tasking machines with optimal machine performance for die & mold processing and adaptation to the latest materials. Mazak machines contribute to cost reduction by achieving high productivity and process consolidation.

THE SHIFT INDIAN MANUFACTURING

Historically, India relied heavily on imported high-precision molds. However, localized supply chains are now a priority. Indian manufacturers are moving away from traditional & conventional methods towards modern technology driven solutions to meet the market demands.

Modern die and mold manufacturing requires:

- Tight tolerances (micron-level accuracy)
- Complex 3D geometries
- High surface finish quality
- Reduced lead time

WHY MAZAK IS THE PREFERRED PARTNER

Mazak's reputation in India isn't just built on the number of machines installed across tool rooms and manufacturing plants—it is rooted in the company's ability to combine advanced technology with strong, reliable customer support. Mazak Corporation has consistently focused on delivering high-performance CNC solutions tailored to the needs of Indian manufacturers, especially in demanding sectors like die and mold. What truly differentiates Mazak in the Indian market is its end-to-end ecosystem. This includes not only cutting-edge machines with Smooth CNC controls and multi-axis capabilities, but also comprehensive after-sales service, application support, and operator training. In industries where downtime directly impacts delivery schedules, Mazak's prompt service response and technical assistance play a critical role in maintaining productivity.

Additionally, Mazak's local presence in India—with technology centers, service engineers, and training facilities—ensures that customers are not just buying a machine, but gaining a long-term manufacturing partner. This combination of innovation, reliability, and customer-centric approach has helped Mazak build strong trust among Indian die and mold manufacturers, enabling them to compete with global standards.

KEY MACHINE SERIES FOR DIE & MOLD INDUSTRY:

VC-Ez Series: High-Performance Compact Vertical Machining Center, Simple to Operate, Powerful in Performance

The VC-Ez series is a compact vertical machining center made in India. It has the largest table size and machining area in its class, allowing it to accommodate large workpieces and fixtures. It also comes standard with a high-performance 12,000

min-1 spindle, which enables not only heavy cutting but also high-speed machining using small-diameter tools, resulting in shorter machining times.

Linear roller guides provide stable machining over extended periods of operation

The Thermal Shield technology ensures stable continuous machining accuracy

VC-Ez machines are optimized for simple operation as well as fast and easy installation, enhanced ergonomics, and stable and reliable part processing with long-term reliability. Mazak is having 3 models under this series, **VC-Ez410 IP, VC-Ez 510IP and VC-Ez 660IP.**

VARIAXIS SERIES: PRECISION WITHOUT LIMITS, PERFORMANCE WITHOUT COMPROMISE

These simultaneous 5-axis vertical machining centers serve as the backbone for machining complex, curved surfaces typical in die and mold applications. By enabling shorter tool protrusion, they enhance rigidity, improve cutting stability, and deliver superior surface finish.

The Mazak Variaxis series is offered in three families—i-Series, j-Series, and C-Series—each designed to meet specific customer requirements ranging from high-precision complex machining to cost-effective and compact 5-axis solutions.

The VARIAXIS lineup from Yamazaki Mazak offers a wide range of spindle options and automation solutions, enabling highly productive, flexible, and efficient 5-axis machining tailored to diverse manufacturing requirements.

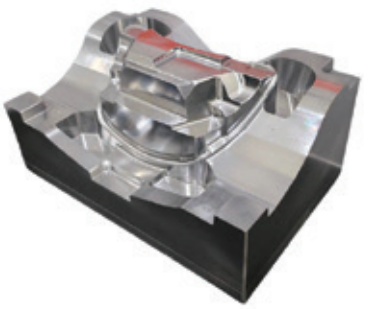
BEST PRACTICES FOR EFFICIENT AND PRODUCTIVE MACHINING

Effective machining begins with a deep understanding of your equipment and process. Operators should be familiar with machine capabilities and refer

to the power–torque diagram when selecting cutting parameters to extract maximum performance from the spindle. A clear distinction between high-feed milling and high-speed machining is essential, as the choice depends on spindle characteristics and the material being machined. Equally important is selecting a suitable work holding system that ensures rigidity and stability throughout the operation. The choice of cutting tools, along with proper tool holding mechanisms, directly influences accuracy, surface finish, and tool life. Leveraging advanced machine features—such as SMC (Smooth Machining Configuration) available in controllers from Mazak can further enhance machining efficiency and precision. Additionally, deciding between dry and wet cutting methods based on the application and material plays a key role in process optimization. When all these factors are carefully aligned, they collectively help improve productivity, achieve better surface quality, and ensure consistent machining performance.

IN CONCLUSION

The die and mold industry in India is rapidly evolving, driven by increasing demand for precision, efficien-cy, and reduced lead times. Advanced machining solutions from Mazak, including the VC-Ez and VARIAX-IS series, are enabling manufacturers to meet these challenges with confidence. By combining high-performance machine capabilities, flexible configurations, and strong customer support, Mazak is helping Indian tool rooms achieve global standards. Furthermore, the adoption of best machining practices—ranging from optimized cutting parameters to effective utilization of machine features—plays a crucial role in maximizing productivity and ensuring consistent quality. Together, technology and process excellence will continue to shape the future of India's die and mold manufacturing industry.



WE DIDN'T BUILD FOR QUARTERS. WE BUILT FOR DECADES.

Sanjeev Pendharkar, Managing Director, Vicco Laboratories, on staying true to Ayurveda, retaining customer trust and building for generations

By Amit Shanbaug

There is something quietly powerful about building without urgency.

In a world that celebrates speed, scale and constant reinvention, Sanjeev Pendharkar approaches business with a very different lens. For him, Vicco Laboratories has never been about chasing the next quarter. It has always been about standing the test of time.

"Longevity is not a grand philosophy," he says. "It is much simpler than that. You just ask yourself if what you are doing today will still make sense twenty years from now."

That question, he admits, slows things down. It removes the temptation of quick wins. But it also brings a certain clarity. Decisions become less reactive and more deliberate. In many ways, it is not about what to do, but what not to do.

"The moment you start chasing short term validation, you begin diluting something that took decades to build," he says.

And so, restraint becomes a strategy. Quiet, consistent, and often invisible.

BUILT ON BELIEF, NOT OPPORTUNITY

Vicco's origins are often told as a story of struggle. A man going door to door, selling toothpowder, building a business

from scratch.

But for Pendharkar, what matters is not the hardship. It is the directness.

"There was no layer between the product and the person using it," he says. "No campaign, no agency. Just an honest conversation about whether it worked."

That simplicity continues to guide the company even today. Despite decades of growth, the idea of staying close to the consumer remains central.

It also answers a deeper question. **Why does Vicco exist?**

"We did not start as a business looking for a market," he says. "We started as a belief."

A belief in formulations. In their ability to serve ordinary Indian families. The business came after that belief, not before it.

And when decisions become difficult, that belief still acts as a compass.

"What would an honest man, standing at a stranger's door with nothing but his product and his word, be comfortable saying?" he asks.

It is a question that continues to shape the company's choices.

HOLDING GROUND WHEN THE MARKET MOVED ON

There were times when staying rooted in Ayurveda felt like swimming against the tide.

Chemical formulations dominated shelves. Multinational brands brought in strong scientific narratives. Consumers were drawn to what felt new and modern.

> "Vicco's story proves that belief-led businesses built on honesty and consumer trust can quietly outlast faster, louder competitors today.

Internally, the debate was real.

"Were we being stubborn or were we being principled?" Pendharkar recalls.

From the outside, the two can look the same.

What kept Vicco steady was not ideology, but the consumer. A large group of people who had not moved away. Not out of nostalgia, but because the product worked for them.

"They knew exactly what was in it," he says. "That is a different kind of loyalty."

It is not driven by branding. It is built on trust.

Years later, as the global conversation shifted toward clean beauty and ingredient transparency, Vicco found itself in familiar territory.

"What surprised us was how long it took others to arrive there," he says.

A DIFFERENT WAY OF BUILDING

The modern business narrative is dominated by speed.

Funding rounds, valuations and exits have become the markers of success. For many, that is the only way to build.

Vicco has never subscribed to that model.

"We have never raised external capital," Pendharkar says. "Every decision is made by people who have to live with its consequences for decades."

That changes the way you think.

Without the pressure of an exit, the focus shifts. From looking good in the short term to lasting in the long term. From chasing attention to building substance.

"Patience is not something I chose," he says. "It is something I arrived at after seeing what impatience costs."

Over time, that patience has allowed Vicco to outlast competitors who were once considered stronger. Better funded. Better marketed. More visible.

But visibility fades. What remains is consistency.

HOW TRUST IS REALLY BUILT

For Pendharkar, the idea of a "cult brand" is often misunderstood.

It is not something that can be created deliberately. It is something

> Built on consistency and a belief across generations, Vicco proves that trust earned over decades, is what truly turns products into enduring brands.

that accumulates.

"Consistency, mostly," he says when asked what builds emotional connection.

Not consistency in messaging, but in performance. The product doing the same thing, the same way, every single time.

"It shows up every morning, on the same shelf, for decades," he says. "And somewhere in that repetition, people begin to trust it."

There is also a quiet honesty in knowing exactly what goes into a product. No complex terminology. No hidden ingredients.

"That creates a different kind of trust," he explains. "Almost personal."

Over time, these small, consistent experiences build something much larger. Not through campaigns, but through everyday interactions.

BETWEEN INTEGRITY AND INERTIA

Not every decision has been perfect.

Pendharkar is candid about the moments where holding on to tradition slowed progress. Where what felt like protecting the brand may have actually limited it.

"Some things we chose not to do deliberately," he says. "But some things were simply too slow."

Packaging is one example. For a long time, any change was seen as a risk.

But over time, it became clear that visibility matters. A consumer should not have to search for a product.

"Accessibility is not a compromise of values," he says.

Modernisation, he believes, is not a single decision. It is a series of small choices made over time.

Some were right. Some could have been faster.

Recognising the difference is important.

WHEN COMPETITION BECOMES VALIDATION

The Ayurvedic and natural products space today is more crowded than ever.

New brands enter with strong marketing, large budgets and wide distribution. For many, this would feel like a threat.

Pendharkar sees it differently.

"When we were one of the few voices, we spent a lot of energy just convincing people the category was worth trusting," he says.

Today, that work has already been done.

Every new entrant brings more consumers into the category. It normalises the choice.

But once consumers enter, they begin to ask deeper questions.

What is actually in the product?

Does the brand truly believe in what it is saying?

How long has it been doing this?

That is where experience matters.

"Seventy years is not a claim," he says. "It is a track record."

And that is something that cannot be created overnight.

TAKING AYURVEDA GLOBAL, WITHOUT DILUTION

As Vicco expands internationally, the challenge shifts.

In India, Ayurveda does not need explanation. It is part of everyday life. It exists in memory, in habits, in familiarity.

Globally, the context is different.

Consumers approach Ayurveda through wellness trends and ingredient awareness. They are curious, but unfamiliar.

This requires context.

"Not justification," Pendharkar clarifies. "But grounding."

At the same time, there is a clear line.

"We are not interested in sanding off what makes us specific," he says.

Taking an Indian brand global does not mean making it generic. It means carrying its identity with confidence.

The goal is not to appeal to everyone. It is to connect with those who value authenticity.

EMBRACING ACCESS, QUESTIONING NOISE

Digital platforms have transformed how brands reach consumers.

For Vicco, this has opened up new possibilities. Reaching smaller towns. Engaging directly. Understanding feedback in real time.

"I embrace the access," Pendharkar says.

But he remains cautious about the noise.

"Distribution often gets mistaken for brand building," he explains.

Just because a product can reach consumers quickly does not mean it has built trust.

That trust, he believes, still comes from performance over time.

The approach has been to adopt what is useful, while staying grounded in fundamentals.

Better reach. Faster feedback. Stronger relationships.

But always anchored in consistency.

STAYING RELEVANT WITHOUT LOSING IDENTITY

Vicco carries strong recall. Generations have grown up with its products.

But nostalgia, Pendharkar believes, can be both an asset and a limitation.

"The moment a brand starts living only in memory, it stops building," he says.

The key is to separate the core from the expression.

The core remains unchanged. The formulation. The honesty. The promise.

But the expression must evolve.

A younger consumer discovers brands differently. Through different platforms, voices and experiences.

"Our job is to be present there without pretending to be something we are not," he says.

That balance is not easy. But it is necessary.

> "Brand trust isn't built overnight. It compounds through consistency, authenticity, and time. As competition grows and markets evolve, staying true to core values remains the strongest differentiator.

THE DECADE AHEAD

When asked to define Vicco's future, Pendharkar does not speak of revenue or expansion.

Instead, he offers a simple thought.

"The next decade will be when the world catches up to what one man with a toothpowder already knew."

It is a quiet statement. But it carries the weight of everything the company stands for.

In a world that is constantly chasing what is next, Vicco's story is a reminder of something else.

That sometimes, the most powerful way forward is to stay true to what has always worked.

FROM VISION TO VICTORY IN MANUFACTURING

T K Ramesh's address during the Festival of Manufacturing offered a compelling reflection on the evolution, current momentum, and future potential of India's manufacturing sector.

By Team ET Now Machinist

The fourth edition of the Festival of Manufacturing, 2026, also known as Udyog Utsav, was recently held in Chennai. The event brought together industry leaders, innovators, and stakeholders under a shared vision of "Viksit Bharat 2047: Building the Future Through Manufacturing." The gathering reflected a deeper shift in how the industry is perceived—no longer confined to production floors, but evolving into a vibrant, people-driven force that blends innovation, purpose, and national ambition.

Setting the tone for an inspiring event was a keynote address given by **T K Ramesh, Managing Director, Acetiromates Group,** a stalwart of the Indian machine tool industry. With over 36 years of his leadership experience, he is an influential contributor to the growth of the organisation and an active voice within the **Indian Machine Tool Manufacturers Association.** His presence at the Festival of Manufacturing brought both credibility and context to the proceedings, making it a fitting prelude to a day dedicated to celebrating and shaping the future of manufacturing in India.

Speaking to an audience of industry professionals, he began with humility, drawing from over four decades of experience, he recounted the origins of his organisation, which began modestly in 1979 in a garage as designers of machine tools. From those humble beginnings, the company has grown into the largest manufacturer of machine tools over the past 15 years, now producing **9,000 CNC machines annually** for the last three consecutive

years. This transformation, he noted, was not merely a result of ambition, but of a clear vision, persistence, and the ability to seize the immense opportunities that India's manufacturing industry has consistently offered. His journey underscored a key message: while one may not control their starting point, one can define a destination and work relentlessly towards it to yield extraordinary outcomes.

Positioning his narrative within the broader context of India's economic development, T K Ramesh also observed that nations conventionally begin with agriculture, as India did, before transitioning through phases of industrialisation and services-led growth. While the services sector has played a significant role in shaping India's global identity, he emphasised that the true moment for manufacturing has now arrived. Manufacturing, he asserted, is the engine of growth, but what fuels this engine is the power of ideas. Platforms such as the Festival of Manufacturing serve a crucial purpose in this regard, enabling the exchange of ideas that can collectively propel the sector forward.

Further, he also highlighted that manufacturing extends far beyond machines and production lines. It is, in essence, a comprehensive ecosystem driven by people, collaboration, and shared learning. Such gatherings are not only forums for intellectual exchange but also opportunities to celebrate achievements across the industry. This celebration is vital in transforming the perception of manufacturing from a traditionally "dull" or labour-intensive field into a vibrant, dynamic, and aspirational domain. He acknowledged that while the industry once conjured images of dimly lit factories and physically demanding environments, it has undergone a remarkable transformation.

Today, many manufacturing facilities in India across large corporations as well as small and medium enterprises are comparable to the best in the world. A significant part of this progress has been driven by customer expectations and continuous feedback. Customers have played an instrumental role in pushing manufacturers to improve, sometimes through encouragement and at other times through stringent demands. This constant push has helped elevate standards, reinforcing the idea that manufacturing today is about achieving global benchmarks. He stated, "In an increasingly interconnected world, there is no longer room for products that are "good enough" for a specific market. Quality must be universal, meeting the expectations of a global audience."

> "In an increasingly interconnected world, there is no longer room for products that are "good enough" for a specific market. Quality must be universal, meeting the expectations of a global audience.

T K Ramesh also addressed the current advancements in artificial intelligence and the growing emphasis on sustainability; the industry is being influenced by multiple forces. These changes, while challenging, also present new opportunities. He urged stakeholders to remain agile by continuously learning, unlearning, and relearning in response to these dynamic conditions. Aligning with global trends while adding value to customers will be essential for sustained success.

From a strategic standpoint, he expressed optimism about India's position in the global manufacturing industry. Amid debates around globalisation and regionalisation, he envisioned India's potential to act as a bridge due to its geopolitical stance and network of bilateral and multilateral relationships. Consequently, the world is increasingly looking towards India as a manufacturing hub and a strategic partner.

Despite these advantages, he stressed the importance of building greater confidence within the industry. India has already demonstrated its capabilities across diverse domains, from launching satellites to manufacturing automobiles and contributing to cutting-edge technologies. However, attracting the next generation of talent requires making manufacturing more appealing. This can only be achieved by showcasing its dynamism, recognising achievements, and creating platforms that celebrate the contributions of industry professionals, including those who often remain unsung.

In conclusion, he called for collective action to strengthen the manufacturing ecosystem. By fostering collaboration, encouraging innovation, and recognising excellence, the industry can move closer to realising the vision of a developed India. The Festival of Manufacturing is a step in that direction that inspires future manufacturing growth in India.

BUILDING RESILIENT MANUFACTURING ECOSYSTEMS

From geopolitics to sustainability, **Kamal Bali** outlines the critical shifts reshaping manufacturing and highlights the need for partnerships, technology, and ecosystem-driven growth.

By Team ET Now Machinist

The fourth edition of the Festival of Manufacturing, also known as Udyog Utsav, brought together some of the most influential voices shaping India's industrial future. Among the highlights of the event was a thought-provoking CEO panel discussion on "Leadership and Strategic Vision for India's Manufacturing Growth," which explored the transition from cost advantage to capability advantage and the evolving role of business leaders as ecosystem orchestrators.

Sharing his perspectives during the panel, **Kamal Bali, President and Managing Director, Volvo Group India,** outlined the broader global shifts that are fundamentally reshaping the manufacturing ecosystem. He identified four key transitions that demand attention from industry leaders. The first is the re-emergence of global power struggles, marking a significant shift in geopolitical dynamics. According to him, these developments are increasingly influencing geoeconomics, determining trade relationships and redefining how and where businesses operate.

The second major shift, he noted, is the growing complexity of economic globalization. The earlier era of standardized global trade frameworks is giving way to a more fragmented environment, where countries must actively negotiate bilateral and multilateral agreements. For India, this presents both a challenge and an opportunity, necessitating a more proactive approach to building trade partnerships and strengthening its position in global value chains.

> Kamal Bali highlighted how geopolitics, shifting trade dynamics, and emerging technologies like AI are reshaping manufacturing, urging Indian businesses to adopt strategic agility and strengthen global competitiveness.

In today's interconnected world, manufacturing is no longer insulated from geopolitical developments. Trade policies, regional conflicts, and shifting alliances are increasingly influencing supply chains, investment decisions, and market access. For manufacturers, navigating these uncertainties require both strategic foresight and operational flexibility.

In this regard, the reconfiguration of global supply chains is one of the most visible outcomes of geopolitical shifts. Companies are actively diversifying their sourcing and production bases to reduce dependence on any single region. This trend has created new opportunities for countries like India to attract investment and strengthen their position in global manufacturing networks.

The rapid advancement of artificial intelligence and machine learning forms the third critical shift. Mr Bali emphasized that technology is no longer a peripheral enabler but a central force influencing every aspect right from design and production to supply

chain management. Companies that fail to integrate these advancements risk losing competitiveness in an increasingly digital and data-driven world.

Equally significant is the fourth shift—the transition towards holistic sustainability and energy transformation. He reiterated Volvo Group's commitment to becoming a fossil-free and net-zero company by 2040, underscoring the industry's direction towards cleaner and more responsible operations.

Turning to India's manufacturing journey, Mr stressed the need for "plug-and-play" infrastructure to support MSMEs, enabling them to focus on operations rather than foundational setup challenges. He also highlighted the importance of partnerships, describing them as the cornerstone of modern manufacturing leadership. In an interconnected world, success depends on collaboration across value chains rather than isolated efforts.

Furthermore, modern manufacturing is increasingly defined by collaboration rather than competition. The complexity of today's industrial challenges requires organisations to work together across sectors, geographies, and value chains to drive innovation and growth.

Collaborative ecosystems bring together manufacturers, suppliers, technology providers, research institutions, and policymakers to create a shared platform for development. These partnerships enable the exchange of knowledge, resources, and expertise, accelerating the pace of innovation and improving overall efficiency.

One of the key advantages of such ecosystems is the ability to address challenges collectively. Whether it is developing new technologies, improving supply chain resilience, or enhancing workforce skills, collaboration allows stakeholders to pool their strengths and achieve outcomes that would be difficult to accomplish individually.

Speaking particularly about India, the emergence of industrial clusters, innovation hubs, and public-private partnerships is fostering a more collaborative manufacturing environment. These initiatives are helping to build stronger linkages between different segments of the ecosystem, driving both regional and national growth.

> He shared emphasis on sustainability, collaboration, and digital transformation as critical to India's manufacturing growth, highlighting partnerships, resilient ecosystems, and innovation as essential to achieving global competitiveness and long-term industrial leadership.

In conclusion, Mr Bali underscored that there are no shortcuts to building a world-class manufacturing organization. The overall transition to sustainability in manufacturing, however, requires a holistic approach. It involves rethinking product design, supply chain management, and operational processes. Collaboration across the value chain is essential to achieve meaningful impact, as sustainability cannot be addressed in isolation.

As global emphasis on climate action intensifies, manufacturers that integrate sustainability into their core strategy will be better equipped to thrive in the long term. This shift represents not just a challenge but an opportunity to redefine growth in a more responsible and resilient manner.

Achieving excellence requires sustained commitment across quality, technology, innovation, and market strategy. While the journey is demanding, it is equally rewarding, offering India a significant opportunity to establish itself as a global manufacturing powerhouse in the years to come.

PRO-ARC ON INDIA'S MANUFACTURING GROWTH STORY

Ajitkumar Nair highlights how domestic demand, global shifts, and sustainability-driven innovation are shaping India's manufacturing sector into a high-growth engine for the future.

By Team ET Now Machinist

The recently held Festival of Manufacturing, brought together industry leaders, innovators, and stakeholders under the unifying vision of "Viksit Bharat 2047: Building the Future Through Manufacturing." More than just a gathering, the event reflected the growing momentum within India's manufacturing ecosystem driven by innovation, collaboration, and a renewed sense of purpose.

Sharing his perspective at the event, **Ajitkumar Nair, Managing Director of Pro-Arc Welding & Cutting Systems,** expressed strong optimism about the trajectory of Indian manufacturing. He highlighted that the sector is currently witnessing a significant boost, driven by a combination of robust domestic consumption and evolving global dynamics. With international markets increasingly adopting a "China plus one" strategy, India stands to benefit as a preferred alternative manufacturing destination. This, coupled with supportive government initiatives, has strengthened the sector's foundation. Currently contributing nearly 15 percent to India's GDP, manufacturing is set for substantial growth, with a national vision to increase this share to approximately 25 percent over the next five to six years.

Mr Nair also highlighted the importance of industry platforms such as the Festival of Manufacturing in fostering meaningful engagement. He noted that such events bring together professionals from diverse segments of the manufacturing ecosystem, enabling cross-industry learning and collaboration. These interactions allow participants to gain insights into common challenges, exchange solutions, and identify synergies that can drive collective progress.

Addressing the growing emphasis on sustainability, Nair highlighted how companies are increasingly integrating environmentally responsible practices into their operations. At Pro-Arc Welding & Cutting Systems, sustainability is approached in conjunction with safety, reflecting a holistic commitment to responsible manufacturing. From minimising the use of plastics in both products and packaging to incorporating advanced fume extraction systems in machinery, the focus remains on creating safer and more sustainable working environments.

Further, reflecting on the recognition accorded at such industry forums, Nair acknowledged the importance of celebrating the efforts that go into building and advancing manufacturing capabilities. He noted that events like these serve as a form of appreciation for the hard work and dedication of entire teams, offering a sense of validation and motivation to continue striving for excellence.

While manufacturing may not always be perceived as a glamorous field, Nair emphasised its inherent potential. The challenges it presents, and the satisfaction derived from overcoming them make it a uniquely rewarding field. Looking ahead, he expressed confidence that the sector will continue to offer immense opportunities, particularly in India, over the next decade.

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NEXT LEAP IN MANUFACTURING EXCELLENCE

Vijaykrishnan Venkatesan highlights India's manufacturing potential, stressing innovation, fundamental research, and the rising importance of vocational skills in building global competitiveness.

By Team ET Now Machinist

The city of Chennai recently witnessed the 4th edition of the Festival of Manufacturing, which brought together some of the most influential voices shaping India's manufacturing future. The striking CEO panel discussion on "Leadership and Strategic Vision for India's Manufacturing Growth," examined the transition from cost advantage to capability advantage and the expanding role of leaders as ecosystem builders. Sharing his views with the other panellists, **Vijaykrishnan Venkatesan, Managing Director, Kennametal India Limited,** brought a distinctive perspective rooted in both legacy and forward-looking transformation.

He highlighted that the company's brands have collectively been shaping the manufacturing industry for decades, with one celebrating its centenary and the other marking 88 years of operations. This long-standing presence, he noted, has enabled the company to witness and navigate multiple global disruptions, reinforcing the resilience required in manufacturing.

Providing a macroeconomic lens, Mr Venkatesan pointed out that the global manufacturing and engineering industry currently stands at approximately **14.5 trillion dollars and is expected to grow to 21 trillion dollars by 2031.** In this context, India's contribution is estimated at around 650 to 700 billion dollars, with aspirations to expand to nearly 1.5 to 2 trillion dollars, accounting for approximately 15 percent of GDP and targeted to reach 23 percent in the coming years. These figures, he emphasized, underline the immense opportunity ahead for India, provided the right strategic shifts are made.

Central to his perspective was the need for a fundamental shift in mindset within the manufacturing sector. While acknowledging the progress made so far, he stressed that achieving global leadership requires moving beyond incremental improvements. Instead, there must be a stronger focus on fundamental science, research, and innovation. He highlighted the importance of transitioning ideas into inventions, and further into innovations that can be commercialized at a global scale. This progression, he argued, is essential for India to move from being a participant in global manufacturing to becoming a leader.

Mr Venkatesan also drew attention to the evolving perception of manufacturing careers and the critical role of vocational skills in shaping the future workforce. He observed a significant global shift in the value of skilled trades, noting that specialized roles such as qualified welders can command annual earnings of up to $200,000, comparable to leadership roles in certain organizations.

In conclusion, he underscored that India's manufacturing ambitions will depend on its ability to embrace deep innovation, invest in fundamental capabilities, and build a skilled workforce aligned with future needs. While the journey requires sustained effort and a shift in mindset, the opportunity to position India as a global manufacturing leader remains both tangible and compelling.

Picture a young woman fresh out of engineering college, with a passion to pursue her studies and choose a right career right career. Manufacturing was her first choice. It still carried the image of being tough, gritty, and somehow not meant for her. Aditi Sharma wants to change that perception.

With decades of experience on shop floors, and now as the **Co-Chair of ASSOCHAM's National Council on Manufacturing,** she has seen it all. The biases, the breakthroughs, the quiet struggles, and the big wins. Now, she is speaking openly about what needs to change to bring more women into this crucial sector driving India's growth.

BREAKING BARRIERS

Aditi Sharma, Co-Chairman of ASSOCHAM's National Council on Manufacturing, opens up about mindset shifts, policy bridges, and tech-driven equality to lift women into leadership roles.

By Amit Shanbaug

CRACKING THE MINDSET BARRIER

According to Aditi, the biggest hurdle starts in the mind. Manufacturing is simply not presented as a welcoming space for women in schools or career conversations. As a result, even the brightest students often choose different paths.

Those who do enter the field often find themselves on the outside looking in. Informal discussions and late-night decision-making circles can exclude them, making it harder to influence outcomes or feel fully included.

On the shop floor, biases show up quickly. Many still view manufacturing as physically demanding work suited only for men. Instead of asking women if they are willing to take on the challenge, assumptions are made for them. Aditi points out that capability is not the issue. Women consistently perform at the top academically. The real barrier is the outdated belief that certain roles belong to men.

WHEN LIFE EVENTS SHAPE PERCEPTION

As women move into phases like marriage and motherhood, perceptions become even more rigid. Companies often assume they will step back from their careers instead of exploring flexible solutions like remote work, part-time roles, or childcare support.

Aditi experienced this herself. With no extended family support and limited childcare options in India at the time, she had to take

career breaks. What made the difference was working with organizations that understood these challenges and built policies to support women during this phase of life.

In fact, some of these companies now have 50 to 60 percent women in leadership roles. The takeaway is simple: when organizations support women through life transitions, they do not lose talent, they strengthen it.

Even then, doubts persisted. Questions about whether she could handle leadership roles with young children followed her. What helped her push through was having a strong mentor who stood by her and organizations that valued her potential over her personal circumstances.

CLIMBING TO LEADERSHIP ROLES

For women aiming to move into plant head or CXO roles, Aditi highlights three essentials.

First is self-belief. You have to raise your hand and say you are ready, even if you feel only partially prepared.

Second is **having a mentor** who backs you and supports your growth.

Third is **organisational commitment.** Companies need to actively prioritise hiring and promoting capable women.

But it is not just about systems. Women also need to step forward, take on additional responsibilities, and participate in strategic conversations. Aditi encourages women to adopt a proactive approach, much like their male counterparts who often take initiative beyond their defined roles.

Basic infrastructure also matters. Gender-neutral workplaces, equal pay, and unbiased hiring practices are foundational. Once these are in place, opportunities begin to open up naturally.

ASSOCHAM'S ROLE IN DRIVING CHANGE

Aditi's journey at ASSOCHAM has shown her the importance of collaboration between industry and policymakers. Real change happens when both sides work together rather than in isolation.

ASSOCHAM acts as a bridge, helping overcome regulatory challenges that can enable global investment. By facilitating dialogue and aligning goals, it has helped make India a more attractive manufacturing destination.

For Aditi, this work is deeply personal. It is about turning ideas into real opportunities through inclusive policies and committed leadership.

TECHNOLOGY CHANGING THE GAME

Technology is quietly transforming manufacturing into a more inclusive space. Automation, AI, and digital systems are reducing the need for physical labor and shifting the focus toward problem-solving and creativity.

Tasks that once required intense manual effort are now handled by machines, allowing people to focus on innovation and decision-making. This shift is breaking down traditional gender barriers and making the industry more accessible to everyone.

Aditi sees modern manufacturing as a blend of science and creativity, where human intelligence works alongside machines.

SKILLS THAT MAKE A DIFFERENCE

For young women considering a career in manufacturing, Aditi emphasises a few key skills. A genuine interest in creating something tangible is important. There is a unique satisfaction in seeing individual components come together to form a finished product. Problem-solving is essential, as every day brings new challenges. Collaboration matters, since manufacturing involves working across multiple teams and functions. And finally, strong data skills can set you apart, helping drive precision and reliability. These abilities turn everyday challenges into opportunities for growth and innovation.

A VISION FOR THE FUTURE

Looking ahead, Aditi envisions a future where job postings simply ask for engineers, without specifying gender. She believes many of the perceived limitations are mental constructs. Women already perform physically demanding tasks in other sectors, proving they are more than capable.

> Aditi's journey highlights how supportive policies, mentorship, and evolving technology can help women overcome career barriers in manufacturing, enabling them to lead confidently while reshaping workplaces into more inclusive, opportunity-driven environments.

The goal is to create truly equal workplaces, from facilities to leadership roles, supported by fair policies and unbiased hiring practices. When organizations focus on talent alone, leadership diversity follows naturally.

Her own journey is proof of what is possible. With determination, the right support, and inclusive systems, women can not only enter manufacturing but lead it.

India's manufacturing future needs that leadership. The question now is how quickly we can build an environment where it thrives.

THE AGE OF INTELLIGENT MANUFACTURING

As manufacturing shifts from linear processes to connected intelligence, speed, scale and decision-making are being completely redefined.

By Team ET Now Machinist

Manufacturing is no longer just about making things. It is about thinking faster, deciding earlier and reducing risk before a single part is produced.

According to *Innovation in Manufacturing 2026,* a recent report by Protolabs, the industry is moving decisively from experimentation with digital tools to real, large-scale adoption. The results are already visible. Nearly 72 percent of manufacturers using machine learning report lower costs and improved operational efficiency.

At the heart of this shift is a simple idea. The earlier you make the right decisions, the less you pay for them later.

SPEED IS NO LONGER THE CONSTRAINT

For decades, product development followed a predictable sequence. Design, prototype, test, then manufacture. Each step waited for the previous one to finish.

That model is quietly disappearing.

Today, companies are collapsing timelines by running multiple processes at once. Design, validation and manufacturability are happening in parallel. AI-enabled digital threads are driving this shift, helping companies achieve up to 30 percent faster time to market while reducing development costs by as much as 50 percent.

Digital twins are accelerating this even further. By creating virtual replicas of products and processes, companies can simulate thousands of real-world conditions before committing to production. This can cut development time by 20 to 50 percent while improving performance and reducing costs.

The result is not just speed. It is confidence at speed.

THE REAL PROBLEM IS STILL SCALE

For all the progress in innovation, one problem continues to persist. Getting to production.

The Protolabs report highlights that 97 percent of companies still report delays or failure when scaling products to market. Many ideas work in theory and even in prototype form but break down when exposed to the realities of manufacturing, supply chains and cost pressures.

This is where early decisions matter most.

Applying design for manufacturability principles at the concept stage can reduce development time and material costs by 15 to 30 percent. It is not just a design philosophy anymore. It is a risk management strategy.

The companies that succeed are the ones that think about production while still in the idea stage.

AI IS CHANGING HOW IDEAS ARE BORN

The role of AI in manufacturing is no longer limited to optimisation. It is now actively shaping ideas.

Nearly 47 percent of product development teams plan to scale the use of generative AI, while 88 percent of organisations are already using AI in at least one function.

Generative systems can explore thousands of design possibilities at once, often arriving at solutions that human teams may not consider. Combined with rapid prototyping and additive manufacturing, this allows companies to move from concept to physical parts in dramatically shorter timelines.

In one instance cited in the report, a generative design system helped create and deliver a functional aerospace component in just 36 hours.

That is not iteration. That is compression of the entire innovation cycle.

FLEXIBILITY IS THE NEW EFFICIENCY

As products move closer to market, a different challenge emerges.

Uncertainty.

Supply chains are volatile, demand is unpredictable and global disruptions are constant. In fact, 94 percent of companies report revenue impact due to supply chain disruptions.

To deal with this, manufacturers are shifting from scale-driven efficiency to flexibility-driven efficiency.

About 72 percent of manufacturing leaders now rely on on-demand manufacturing to overcome barriers to innovation and scale. Instead of producing in bulk and storing inventory, companies are producing closer to demand.

At the same time, 58 percent are involving customers directly in the product development process through co-creation. This ensures that what gets built is far more aligned with what is actually needed.

The factory is no longer reacting to demand. It is learning from it in real time.

EVEN THE END IS BEING REIMAGINED

Perhaps the most interesting shift is happening at the very end of the product lifecycle.

Traditionally, this stage was about disposal. Now it is about recovery and regeneration.

Remanufacturing can save up to 85 percent of raw materials and 55 percent of the energy required to produce a new product. AI-driven recycling systems are expected to save the industry 10 billion dollars annually by 2030.

Products are being designed with their end in mind. Materials are tracked, reused and reintegrated into the system.

Waste is slowly being engineered out of the equation.

> AI is transforming manufacturing by accelerating innovation and reimagining product lifecycles through sustainability. With connected, data-driven workflows, companies are now shifting from scale to adaptability—where smarter design define competitive advantage.

THE REAL SHIFT IS INTEGRATION

What ties all of this together is not just AI, digital twins or automation.

It is integration.

As the Protolabs report makes clear, manufacturing is moving from isolated tools to connected workflows where data flows seamlessly from idea to design to production and even to end-of-life decisions. These connected systems are what allow companies to move faster, make better decisions and reduce risk across the board.

The future of manufacturing is not just automated. It is intelligent, adaptive and deeply interconnected.

And perhaps for the first time, the biggest advantage is not how fast you can build, but how early you can think.

ERGONOMIC INNOVATION
IN TEXTILE HANDLING

Advanced vacuum lifting technology is transforming yarn handling in textile mills, improving worker safety, boosting productivity, and enabling more efficient, reliable operations across processes.

By Mr. Niranjan Bhangale, Industry Segment Manager- Handling Systems

India's textile industry continues to serve as a cornerstone of the nation's economy, yet it faces persistent challenges in operational efficiency and workforce well-being. Among these, the manual handling of heavy yarn packages remains a critical concern. Workers in spinning mills routinely lift thousands of cones, bobbins, and packages each day, with individual weights ranging between 10 and 50 kilograms. This repetitive physical strain not only leads to fatigue and musculoskeletal injuries but also impacts productivity, accuracy, and overall product quality.

In an industry where precision and speed are essential, poor ergonomics can no longer be overlooked. Increasingly, manufacturers are recognizing that worker safety is directly linked to operational performance. A fatigued workforce inevitably leads to slower processes, higher error rates, and increased absenteeism. As a result, ergonomics is emerging as a strategic priority, enabling companies to enhance both employee well-being and business outcomes.

Addressing this challenge, **Schmalz** introduces the **Vacuum Tube Lifter Jumbo,** a solution designed to transform yarn handling processes through advanced vacuum technology combined with ergonomic design. The system operates on a simple yet effective principle: vacuum suction securely grips loads, while the tube itself acts as the lifting mechanism. Operators control the movement through an intuitive handle, adjusting the vacuum level to lift or lower materials smoothly. The absence of motors or hydraulics ensures reliability and low maintenance, making it particularly suited for textile environments.

One of the most significant advantages of the Jumbo lies in its impact on cycle time. Where manual handling allows a worker to lift only three to four cones per minute, the Jumbo enables handling of eight to ten cones within the same timeframe. For mills processing thousands of units daily, this improvement translates into substantial gains in productivity, reduced physical strain, and more streamlined workflows.

The system's versatility further enhances its value across various stages of textile production. From lifting yarn cones directly from winding machines in spinning mills to handling cartons during packing and palletizing and managing bobbins or rolls in weaving and knitting plants, the Jumbo integrates seamlessly into multiple processes. Its modular design allows customization for different load types, ensuring gentle handling that preserves yarn quality while minimizing damage.

Beyond efficiency, the broader impact is equally compelling. Improved ergonomics reduce workplace injuries and absenteeism, while consistent handling enhances product integrity. Operational costs decline as accidents decrease and throughput improves. At the same time, companies that invest in such technologies demonstrate a clear commitment to employee welfare, strengthening workforce loyalty and organizational reputation.

In essence, the adoption of ergonomic vacuum handling solutions like the Jumbo represents more than a technological upgrade. For India's textile sector, this approach is essential for maintaining competitiveness in an increasingly demanding global market.

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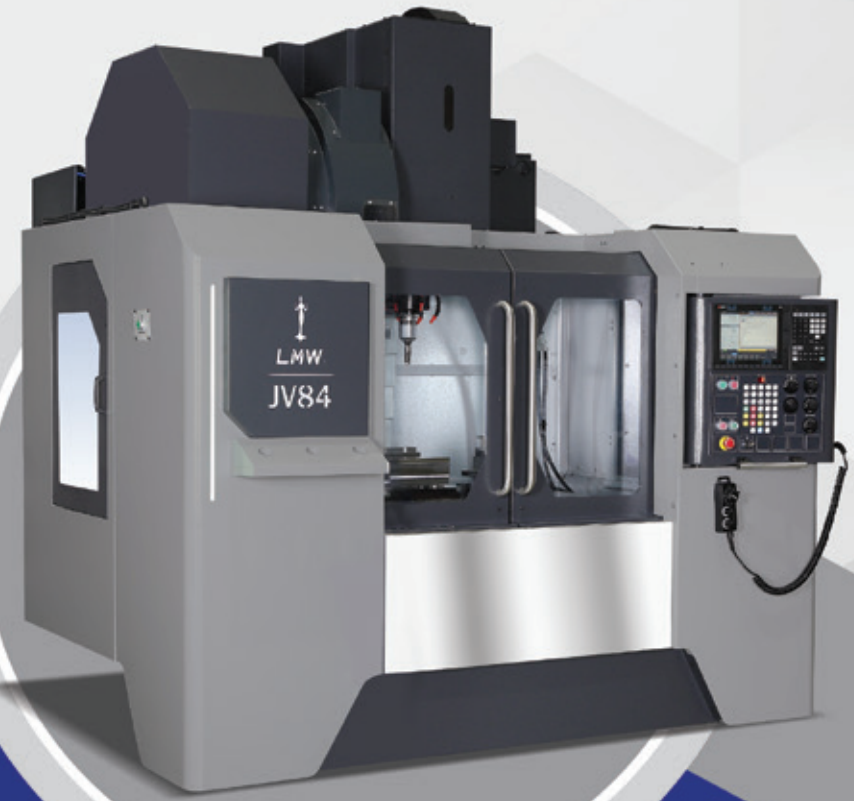

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