VOL 8, ISSUE 1 - MAY-JUNE 2024

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Indian Machine Tool Manufacturers' Association

In Association with

Modern Machine Shop

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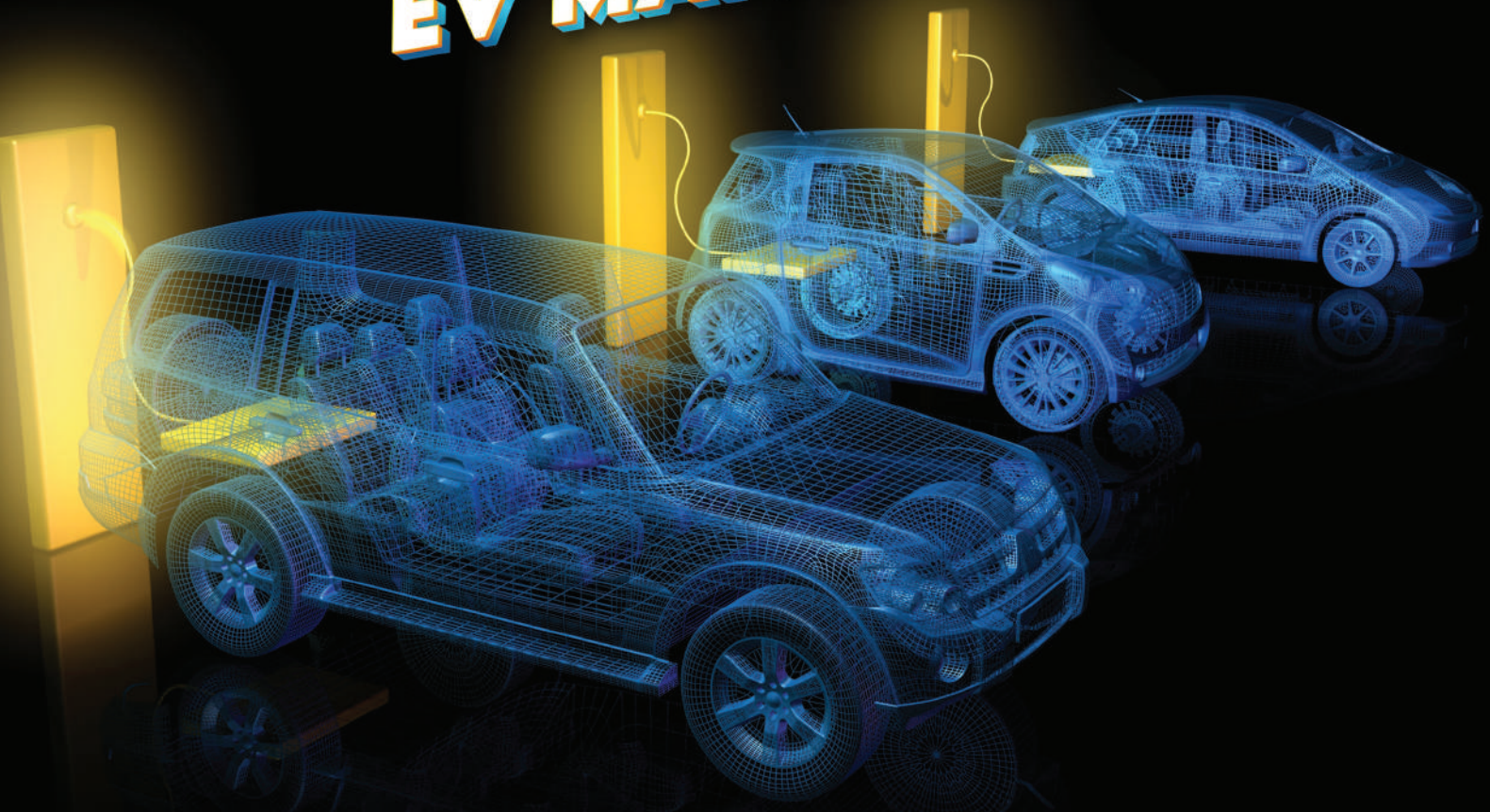





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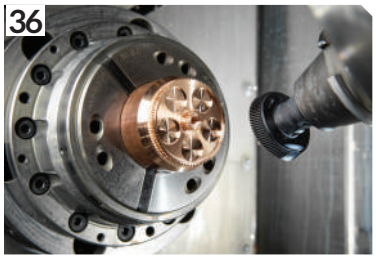









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# INDIA SET TO MAKE RAPID STRIDES IN MANUFACTURING

**RAJENDRA S RAJAMANE**
**PRESIDENT**
**IMTMA**

India began the financial year 2024-25 on an encouraging note with leading institutions including the International Monetary Fund (IMF) projecting a strong 6.8 percent growth despite the ongoing geopolitical scenario. Also, the Reserve Bank of India (RBI) projects a GDP growth of 7 percent for the current fiscal year that started from April 1, attributing it to consumption demand and private capex spending.

India's manufacturing PMI has continued to stay above the 50 mark, denoting expansion in factory activities. The manufacturing landscape is changing with PLI schemes, policies, and strategies, and sectors such as Renewable Energy, Electronics, Semiconductors, etc., in focus.

Meanwhile, the Indian Machine Tool industry in FY 2023-24 recorded an estimated growth of around 10 percent in production and 11 percent in consumption year-on-year. The growth story is continuing for the second successive year, and we expect to see new developments in the coming quarters.

*The Indian Machine Tool industry in FY 2023-24 recorded an estimated growth of around 10% in production and 11% in consumption year-on-year. The growth story is continuing for the second successive year, and we expect to see new developments in the coming quarters.*

Indian Machine Tool Manufacturers' Association (IMTMA) is organizing Pune Machine Tool Expo (PMTX) 2024 and co-located show, FACTEQ 2024 - a unique expo showcasing factory equipment, from May 23–26, 2024 at Pune International Exhibition and Convention Center (PIECC) in Moshi, Pune.

The manufacturing community has responded well to the expo which is being held in an exhibition space of around 12,500 sq mt with around 200 exhibitors showcasing their products. PMTX 2024 and FACTEQ 2024 offer networking opportunities for regional industries to access the latest technologies and solutions and I call upon industries to take benefit of the expo.


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Dear Readers,

With many industries shifting their base to India in recent years, the country has become a center point for manufacturing. Global giants like Apple (phone manufacturing), Tesla (automobile manufacturing), and Foxconn (electronics manufacturing) are prime examples.

Can the future of manufacturing be built in India? Possibly yes. With many new opportunities in battery cells, solar panels, semiconductors, defence and electronics, aerospace, etc., it is clear that businesses can capitalize on the opportunities.

India is growing as one of the world's largest manufacturing economies and deploying some of the most productive workers to manufacture high-quality goods. It is dawning upon businesses that they need to produce in India for a sustained, long-term economic growth.

With the formation of a new Government after the 2024 general elections, it is expected that India will embark on a new journey with more vigor in pursuing growth. Indian Machine Tool Manufacturers' Association (IMTMA) has always aligned its activities with the vision of India to propel manufacturing growth.

*India is growing as one of the world's largest manufacturing economies and deploying some of the most productive workers to manufacture high-quality goods. It is dawning upon businesses that they need to produce in India for a sustained, long-term economic growth.*

The May/June edition of Modern Manufacturing India (MMI) focuses on metal cutting. An article by IMTMA will give more insights into Pune Machine Tool Expo (PMTX) and Factory Equipment Expo (FACTEQ) to be held from May 23-26, 2024, at Moshi, Pune.

I hope to meet you in person at PMTX 2024.

Happy reading.

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Modern Manufacturing India
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# BEING UNSTOPPABLE...

A couple of decades ago, it was almost unthinkable for the Indian Manufacturing sector to rise as a global hub of production activities. Cut to the chase, today the sector is redefining the country's economic landscape. The nation's steadfast commitment to industrial growth is drawing global investments.

As per the Department for Promotion of Industry and Internal Trade (DPIIT), India attracted US$ 16.28 billion in Foreign Direct Investment equity inflows in the first quarter of 2023-24. Acknowledging India's immense potential, global industry titans are setting up their state-of-the-art facilities in India. The Indian Machine Tool sector is also witnessing a surge of investments from both home-grown and international players. Aside from injecting capital, these investments bring knowledge transfer of cutting-edge technologies and expertise, propelling Indian manufacturing onto the global stage.

In this context, we take pride in sharing that lately, we had the opportunity to be part of momentous inaugural ceremonies of the new factories of Zimmer Automation Pvt Ltd in Maharashtra, Bharat Fritz Werner Ltd in Tamil Nadu, and GROB Machine Tools India in Andhra Pradesh respectively.

India is firmly positioning itself as a manufacturing juggernaut on the global stage, aiming to be a US$ 5 trillion economy by 2027 and achieving the status of a developed economy by 2047. Hence, this is an opportune time for companies to showcase their technological bandwidth and capabilities in manufacturing-specific trade shows where quality attendees take precedence over just numbers.

> *Together, we have the power to inspire, connect, and deliver on new opportunities and rich experiences that can open doors to innovation and progress while growing global economies and increasing well-being.*
>
> ***– Tae Yoo***

Indian Machine Tool Manufacturers' Association (IMTMA) presents the most-awaited Pune Machine Tool Expo (PMTX) 2024, a premier event showcasing the latest innovations in manufacturing. Co-located with FACTEQ 2024, a factory equipment expo that aims to revolutionize factory environments with state-of-the-art solutions, the event will be held from May 23-26, 2024, at Pune International Exhibition and Convention Center, Moshi, Pune.

IMTMA trade events are not mere for showcasing engineering marvels; they are a celebration of our strength in the field and we being a highly coveted manufacturing hub. We look forward to meet you in-person at PMTX 2024.

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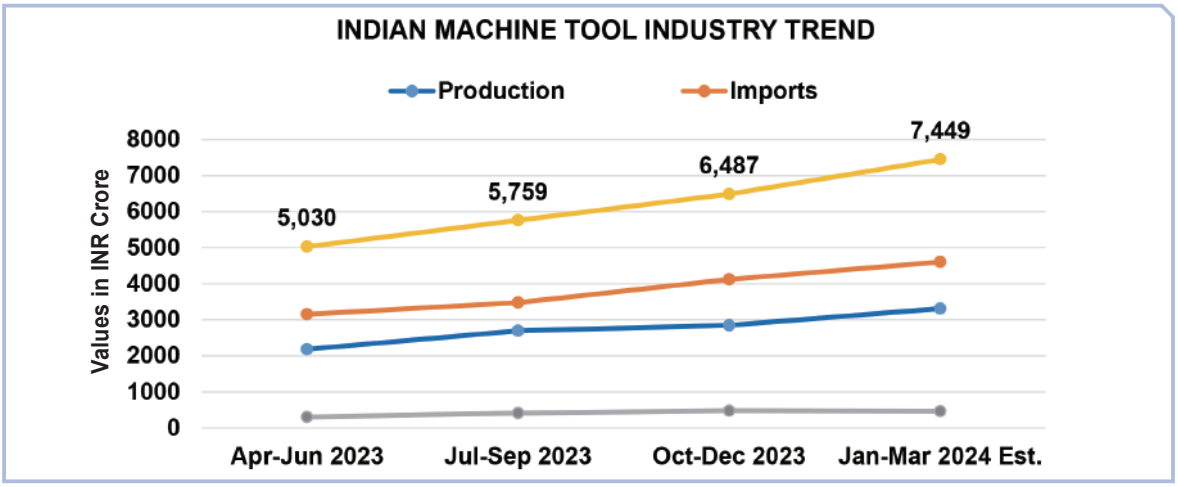
# CHARTING THE COURSE

India's macroeconomic landscape in March 2024 exhibited promising signs, with manufacturing PMI soaring to a 16-year high of 59.1 and services PMI maintaining a robust position at 61.2 for the third consecutive month.




Source: IMTMA

Table 1. Indian Machine Tool Industry Trend

**For the second successive year, the Indian Machine Tool industry has achieved double-digit growth. Indian Machine Tool industry production in FY24 is estimated to have increased by around 10% year-on-year, reaching about INR 13,610 Cr.**

This surge in economic activity was complemented by a notable increase in Industrial Production (IIP) growth to 5.7 percent in February, fuelled by growth across key sub-industries.

The Reserve Bank of India (RBI) opted to retain the repo rate at 6.5 percent, marking the seventh consecutive review with no changes. Meanwhile, inflationary pressures exhibited a mixed trend, with CPI inflation easing slightly to 4.9 percent in March 2024, while WPI inflation remained low at 0.5 percent.

On the fiscal front, the Government of India (GoI) witnessed growth in gross tax revenues (GTR) by 13.4 percent during April-February FY24, with direct taxes growing at 21.6 percent, and indirect taxes at 4.6 percent. However, fiscal and revenue deficits remained significant concerns, standing at 86.5 percent and 87.1 percent, respectively, of their annual Revised Estimates (RE).

The Banking sector witnessed a surge in gross bank credit growth to a 16-month high of 16.5 percent in February 2024, while the current account deficit narrowed to 1.2 percent of GDP in 3QFY24. Nonetheless, merchandise trade faced challenges, with both exports and imports contracting in March 2024, leading to a reduction in the merchandise trade deficit to US$ 245.3 billion in FY24.

FDI inflows experienced a sharp decline to US$ 0.3 B in February 2024, and global crude prices surged to a five-month high of US$ 83.5/bbl. in March 2024. Despite global growth projections remaining steady at 3 percent by the IMF, India's growth forecasts for FY25 and FY26 stand at 6.8 percent and 6.5 percent respectively, showcasing cautious optimism amidst global economic dynamics.

## Insights into Indian machine tool sector

Indian Machine Tool industry production in FY24 is estimated to have increased by around 10 percent year-on-year, reaching about INR 13,610 Cr (US$ 1.6 B). The industry's imports in FY24 saw a rise of 12 percent year-on-year, amounting to INR 15,352 Cr (US$ 1.8 B). Machine tool exports during FY24 from India reported a 13 percent growth, amounting to INR 1,659 Cr (US$ 200 M) and consumption is estimated to have increased by about 11 percent to reach INR 27,303 Cr (US$ 3.3 B) in FY24.

In FY24, China (29%), Japan (21%), and Germany (10%) emerged as the top countries for imports to India, contributing to 60 percent of the total machine tools imports. Presses (14%), VMCs (12%), and Turning Centers (11%) were the top machinery types imported, valued at INR 5,700 Cr (US$ 688 M), constituting approximately 37 percent of total machine tool imports during the period.

In exports, Russia (28%), the USA (9%), and China (8%) emerged as the major destinations, collectively representing 45 percent of total machine tool exports in FY24, amounting to a total export value of INR 1,659 Cr (US$ 200 M). Among the machinery types, Turning Centers (17%), VMCs (15%), and Presses (11%) stood out as the top three machinery types exported, with a combined value of INR 705 Cr (US$ 85 M), accounting for roughly 43 percent of total machine tool exports during FY24.

Source: Data & Policy Team, IMTMA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# PMTX AND FACTEQ 2024: A MULTI-SENSORY EXPERIENCE

Hailed as not-to-be-missed events, IMTMA-organized Pune Machine Tool Expo 2024 and Factory Equipment Expo 2024 are all set with the promise of offering significant opportunities to regional industries to network and access the latest technologies and solutions.

**PMTX 2024 and FACTEQ 2024 have elicited a warm response from a large proportion of regional industries across sectors like Aerospace, Auto Components, Automobiles, Capital Goods, Defence, Electrical, and Electronics industries, among others.**

Source: IMTMA

Technology, most would surely agree, is meant to be seen and experienced. Thus, the ideal platform is one where one can see a LIVE demonstration of technology to know how it works, and then arrive at a decision to procure for manufacturing processes. Aligning with this ethos, Indian Machine Tool Manufacturers' Association (IMTMA) is organizing Pune Machine Tool Expo (PMTX) 2024 and Factory Equipment Expo (FACTEQ) 2024 from May 23-26, 2024, at Pune International Exhibition and Convention Centre in Moshi, Pune.

PMTX 2024 and FACTEQ 2024 will feature around 200 exhibitors showcasing products that would support the growth of Indian manufacturing further. Visitors will have the opportunity to explore innovative products in metal cutting, metal forming, and factory solutions.

As a pioneering expo, FACTEQ 2024 will showcase the entire spectrum of factory equipment essential for designing, building, operating, and maintaining modern factories. The maiden edition aims to bring together key stakeholders to explore the latest solutions that would drive efficiency and productivity across factory operations.

Source: Magic Wand Media

## Driving technological innovations

According to Rajendra S Rajamane, President, IMTMA, PMTX 2024 and FACTEQ 2024 offer enormous networking opportunities for regional industries to access the latest technologies and solutions. Given IMTMA's commitment to empowering MSMEs and driving technological innovations, the Association is confident that the expos will pave the way for transformative advancements in the manufacturing landscape.

Highlighting the shows' significance, Jibak Dasgupta, Director General & CEO, IMTMA, points out that industry demands, especially the ones relating to technology, are evolving swiftly and expos like PMTX and FACTEQ are excellent enablers to address the manufacturing requirements.

Pune has emerged as a significant hub for engineering industries and, hence, serves as an ideal location for the events that are crucial for meeting their manufacturing needs. "We expect visitors not only from Pune but also from industrial towns of Maharashtra and neighboring states," he adds.

The expos have elicited a warm response from a large proportion of regional industries across sectors like Aerospace, Auto Components, Automobiles, Capital Goods, Defence, Electrical and Electronics industries, among others, shares Dasgupta.

IMTMA expects the presence of over 120 trade delegation companies representing various industries, the largest so far, at the expo. The Association is actively engaging with industry stakeholders and has received highly encouraging responses.

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# 'CUTTING'-EDGE INSIGHTS


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The Indian cutting tool industry is making significant strides forward owing to the country's economic growth and robust industrial production capabilities, particularly bolstered by sectors like automotive and aerospace. Industry leaders from the sector share their two cents on key factors, including the adoption of advanced technologies and exploring of carbide cutting tool trends, and suggest ways to get ahead of the curve.

In this fast-paced world, the only constant is change. The Cutting Tool industry is no different. As industries demand more precision and quality in their products, the demand for cutting tools has increased. The global metal cutting tool market was worth US$ 65.5 billion in 2020 and is projected to reach US$ 107.3 billion by 2032, expanding at a CAGR of 4.1 percent from 2023-2032, according to Allied Market Research.

Since, carbide cutting tools excel at precision machining, it is fast gaining prominence and is expected to continue to lead the pack of cutting and machining solutions, rising at a considerable rate during the forecast period, between 2024 and 2031, globally. The global carbide cutting tools market has risen steadily since 2023, and with the rising adoption of strategies by major players, the market is expected to rise over the projected horizon.

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### Popularity of high-efficiency CNC machines drives market growth

The growth of the metal cutting tools market is driven by the economic growth in developing countries like India. The Indian economy is experiencing rapid growth in the Manufacturing sector and increasing consumption among the population. Major industries like Aerospace, Automotive, Electronics, and Medical Devices are shifting their manufacturing base to India, which will give a big boost to our Manufacturing sector. Advancements in the metal cutting tools market are expected to drive market growth, such as tools with higher heat sustenance and greater precision. The increasing popularity of high-efficiency CNC machines is also a major factor in market growth.

### Industry 4.0 with cutting tools

The convergence of Industry 4.0 with cutting tools is a megatrend imposing opportunities for trade and adoption in the cutting tools market. CERATIZIT is paving the way for the digital future of machining. A central element of this is the Tool Scope monitoring and control system, which continuously records signals from the machine that are generated during the production process. This data is visually displayed and used to monitor and adjust the machine. The major benefits of Tool Scope are process control, machine protection, documentation, and digitization.

### Tungsten carbide driving growth

The global carbide cutting tools market is expected to grow at a CAGR of 5.2 percent from 2023 to 2028. The milling tools segment is expected to be the fastest-growing segment in the market in the near future, attributing high efficiency, rigidity, and hardness of the milling tools over the latter products. Due to its effectiveness, it is also utilized in the burgeoning Automotive and Construction industries. Hence, the market for milling tools is expected to be the largest. The Automotive segment is expected to be the fastest-growing segment in the global carbide cutting tools market, driven by the use of tungsten carbide in different components like ball joints, brakes, and crankshafts.

Furthermore, with the rising demand for e-vehicles and increasing manufacturing capacity, the growth of this market is foreseen, while the increasing use of coated tools in the Aerospace, Automotive, and other industries is expected to promote the segment's expansion.

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### Skill development also supports Indian cutting tools market

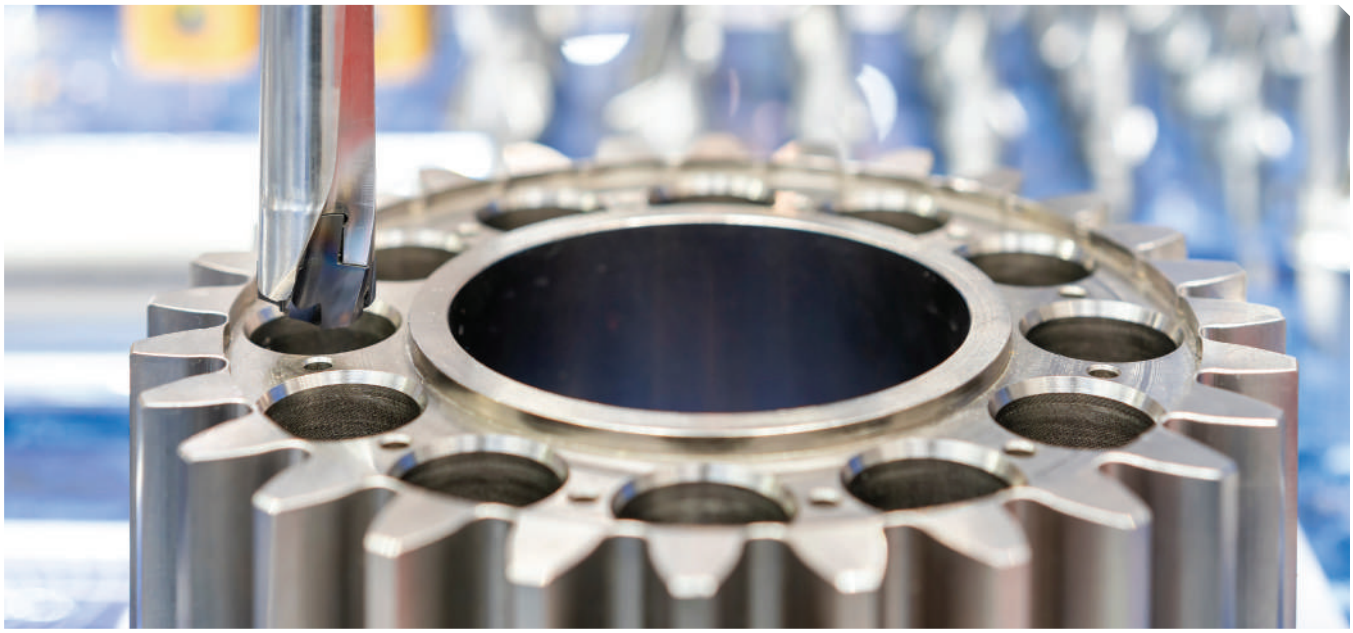
There are several key factors driving the growth of the cutting tools market in India. The rapid expansion of the Manufacturing sector, especially in Automotive, Aerospace, and Industrial Machinery, is a significant driver. Government initiatives like 'Make in India' promote domestic production and infrastructure development, boosting demand for cutting tools. Advancements in technology, such as the adoption of CNC machines and automation, enhance precision and efficiency, increasing the need for high-quality cutting tools. Additionally, the rise of small and medium-sized enterprises (SMEs) and increased foreign direct investment (FDI) contribute to market growth. The emphasis on skill development and training in advanced manufacturing techniques also supports the expanding cutting tools market in India.

### Advanced technologies collectively drive innovation

Technologies like additive manufacturing, digital twin, and Industry 4.0 significantly enhance cutting tool manufacturers' product performance and development. Additive manufacturing (AM) enables the production of complex, custom-designed tools with improved efficiency and material utilization. Digital twin technology allows for precise simulation and optimization of tool designs, predicting performance and reducing development time. Industry 4.0 integration facilitates real-time data analytics, predictive maintenance, and automation, leading to higher quality, consistent output, and reduced downtime. These technologies collectively drive innovation, improve product reliability, and enhance competitiveness in the market, ensuring manufacturers can meet the evolving demands of advanced manufacturing sectors.

### Precision manufacturing and CNC machines need high-quality carbide tools

It is worth it to highlight the increasing demand for high-performance and durable tools driven by the Automotive, Aerospace, and Industrial Machinery sectors. Advancements in coating technologies, such as PVD and CVD coatings, enhance tool lifespan and cutting efficiency. The shift towards precision manufacturing and the use of CNC machines necessitates high-quality carbide tools. Additionally, the integration of smart technologies and Internet-of-the-Things (IoT) for real-time monitoring and predictive maintenance is becoming prevalent. Sustainability trends are leading to the development of eco-friendly carbide tools with reduced environmental impact. The market is also witnessing growth due to the rise in automated manufacturing processes and the expansion of the Renewable Energy sector, which demands specialized cutting tools.



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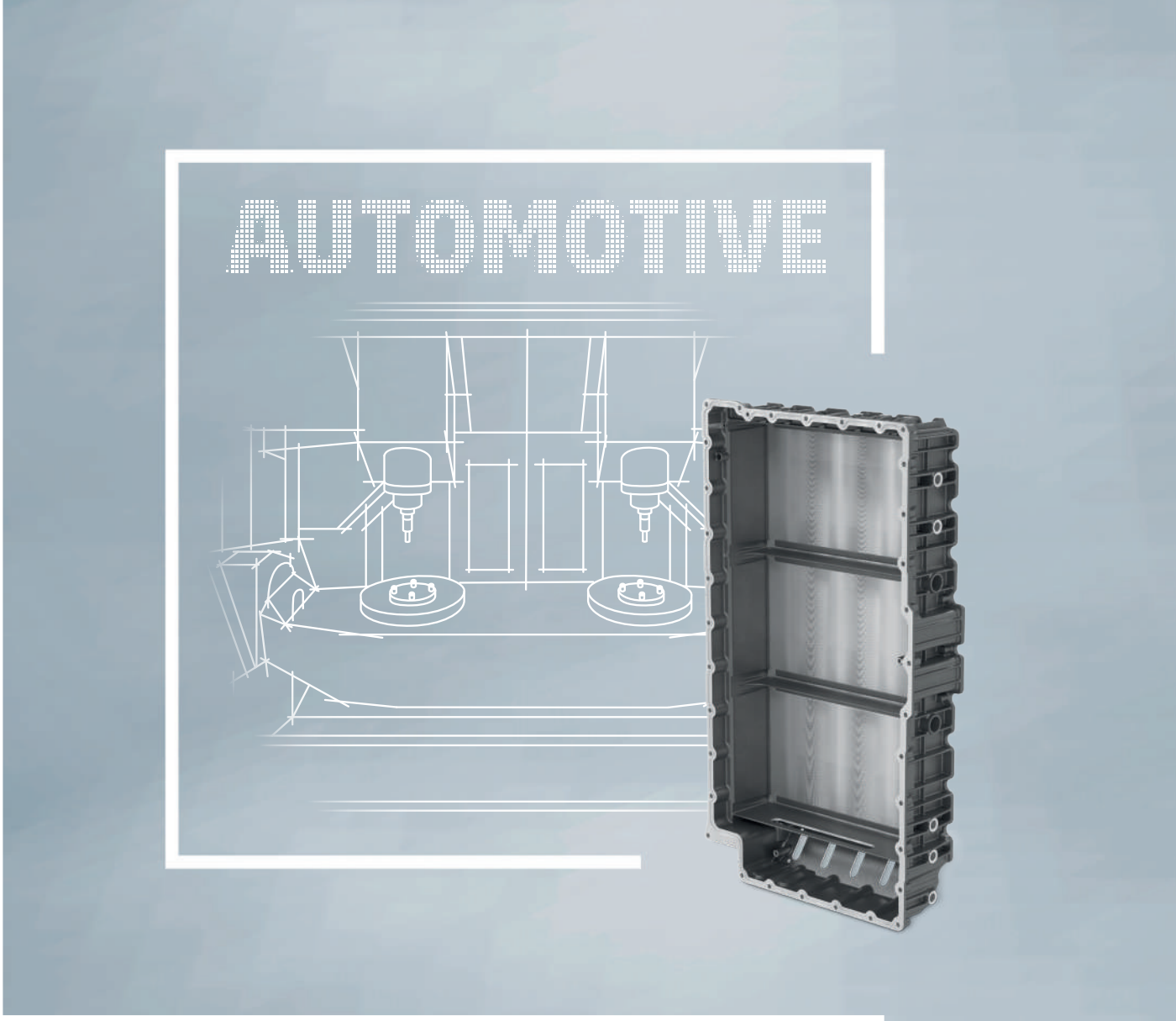


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**www.chiron-group.com**

## Guhring India Pvt Ltd

**GAUTAM AHUJA**
**Managing Director**
**Guhring India Pvt Ltd**

### Growth factors

India's industrial sector is experiencing significant growth, particularly in sectors like Automotive, Aerospace, Defence, Medical Implants & Devices, and Electronics, which require high-precision machining, leading to an increased demand for advanced cutting tools capable of delivering precision and productivity. In addition to the 'Make in India' initiative, encouraging domestic manufacturing and boosting foreign investments in the Manufacturing sector, export-oriented industries, such as components' manufacturing, rely heavily on cutting tools for manufacturing processes.

### Enhancing efficiency

Additive manufacturing enables the production of complex geometries and customized tool designs that are difficult to achieve with traditional manufacturing methods, using advanced materials with high strength, wear resistance, and thermal conductivity. Digital twins enable cutting tool manufacturers to analyze and optimize tool performance parameters, such as cutting forces, chip formation, and surface finish. Industry 4.0 enables autonomous tool storage and machining systems where cutting tools interact with machines and robots, streamlining workflows, reducing human intervention, and enhancing manufacturing efficiency.

### Global trends in carbide cutting tools

High-speed machining and high-performance cutting techniques are driving the demand for cutting tools capable of withstanding high cutting speeds and feeds while maintaining dimensional accuracy and surface finish. Advanced grades, tool geometries, chip management, and coatings are key enablers to achieve higher productivity and efficiency in machining operations. Industries are increasingly seeking customized cutting tools, promoting manufacturers to offer a wide range of specialized tool geometries, grades, and coatings to meet the diverse needs of end-users. Sustainability is also influencing the development of cutting tools for eco-friendly technologies like Minimum Quantity Lubrication (MQL), recycling carbide scrap, and sustainable material sourcing.

## G.U.S.T.I., Global Unified Source for Technology Integration Pvt Ltd

**TOSHER G HORMUSJEE**
**Managing Director**
**G.U.S.T.I., Global Unified Source for Technology Integration Pvt Ltd**

### India: The new manufacturing hotspot

The global focus is shifting to India for manufacturing. The factors collectively contributing to the growth of the cutting tools market in India, with opportunities for both domestic manufacturers and international players, are industrial expansion, technological advancements, Government initiatives like 'Make in India', the rising Automotive and Electronics sectors, increasing machining requirements, the growing construction sector, a focus on productivity and efficiency, rising disposable income, and globalization.

### Leveraging technology

We have incorporated Industry 4.0 and Digital Twin technology since inception and are also in the process of using 3D-printed bodies for some applications. By leveraging these technologies, cutting tool manufacturers can enhance product performance, increase efficiency, reduce costs, and maintain a competitive edge in the market. Additionally, these technologies facilitate the transition towards smart factories and digitized manufacturing ecosystems, enabling greater agility, flexibility, and responsiveness to customer needs. Productivity enhancement is a key factor in the selection of cutting tools.

### Focus on material science and sustainability

Several global trends are shaping the carbide cutting tools market, including advancements in material science for improved wear resistance and increased productivity, demand for high-performance tools for machining challenging materials like titanium alloys, hardened steels, and high-temperature alloys, a focus on sustainability, digitalization and Industry 4.0 integration, customization and personalization, the rise of additive manufacturing, a shift toward electric vehicles (EVs), and global supply chain dynamics. Understanding this trend, we use only the best-in-class material manufactured in Germany and Switzerland.

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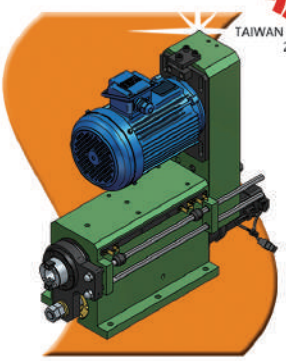


TAIWAN EXCELLENCE 2017

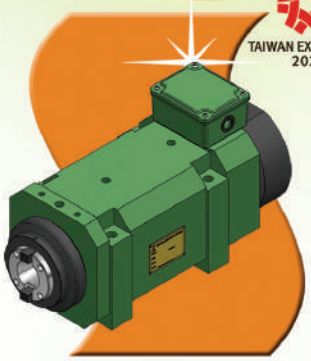
Servo Type Drilling / Tapping Spindle Head Unit

TAIWAN EXCELLENCE 2022

Built-in Motor Facing Head Unit - Flange Type

TAIWAN EXCELLENCE 2022

Boring/Milling Head Unit with ATC



TAIWAN EXCELLENCE 2020

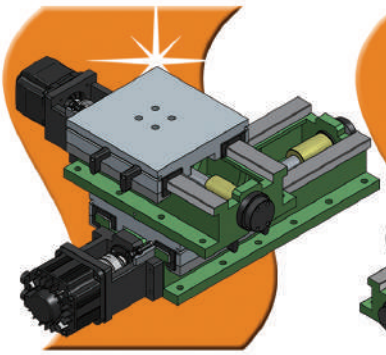
Built-in Motor Spindle Unit

Built-in Spindle

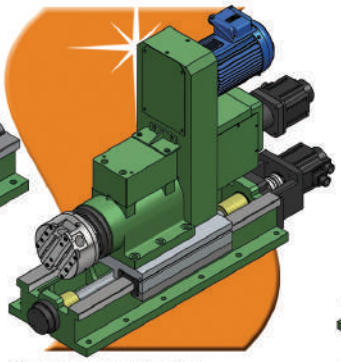
Belt Driven Spindle

Belt Driven Spindle Coolant

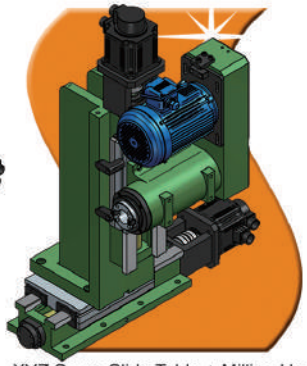
Direct Drive Spindle



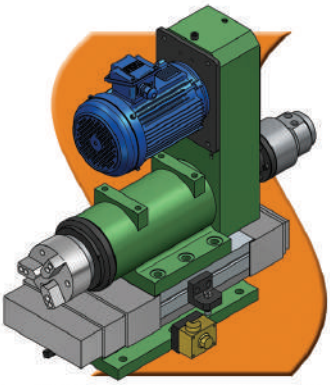
XY Servo Hardness Slide Unit



Servo Facing Head + Servo Ball Screw Slide Unit



XYZ Servo Slide Table + Milling Head



3-Jaw Chuck Spindle + Slide Unit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## Ind-Sphinx Precision Ltd

**SUNIL TANEJA**
**Managing Director**
**Ind-Sphinx Precision Ltd**

### New sectors driving growth

Geo-politics and Geo-Economics are driving the growth of the Indian Machining sector. As India takes its due place as a manufacturing superpower, machining is on an uptrend. New sectors like Electronics, 3C (Computers, Communications, and Consumer Electronics), Medical, Aerospace, etc. are driving the demand. Another growth catalyst is auto-component exports.

### Cutting-edge tech takes center stage

Technologies like Additive Manufacturing, Digital Twin, and Industry 4.0 are important for cutting tool manufacturing, and the Indian Cutting Tool industry is also adopting these new technologies. Indian cutting tool makers are very progressive, and they are sure to benefit from these technologies in order to stay competitive.

### Precision reigns supreme

The global trends in carbide cutting tools are very clear: precise tools, high-precision coatings, emerging materials, and demanding customers. We are very optimistic about high-precision manufacturing in India, which will drive cutting tool demand in India.

## TaeguTec India Pvt Ltd

**L KRISHNAN**
**Managing Director**
**TaeguTec India Pvt Ltd**

### Government initiatives support growth

India's Manufacturing sector is expanding rapidly, particularly Automotive and Aerospace, where cutting tools are indispensable, showcasing a manufacturing boom. The increasing need for high-quality, precise components across industries also drives the demand for advanced cutting tools that offer accuracy and efficiency. Government support such as 'Make in India' and similar initiatives prioritizes domestic manufacturing, boosting the demand for locally produced cutting tools, and the growth in infrastructure projects that require substantial construction machinery usage creates a larger market for durable cutting tools.

### 3D printing, digital twin, and Industry 4.0

Additive manufacturing/3D printing allows for complex tool designs with optimized geometries for specific applications, improving cutting performance while reducing material waste. Digital Twin creates virtual simulations of cutting tools to predict performance, identify wear areas, and optimize designs, facilitating faster and more cost-effective product development. Lastly, Industry 4.0 offers data-driven insights from connected machines, allowing for real-time monitoring, preventative maintenance, and reduced downtime, improving tool lifespan and productivity.

### Emphasizing eco-friendly cutting processes

Advanced coatings that enhance wear resistance, heat tolerance, and surface finish are becoming increasingly specialized, allowing higher cutting speeds and longer tool life. The need for precision machining in electronics and medical devices also fuels the demand for extremely small (miniaturization), high-performance carbide cutting tools.

Sustainability—another key trend—focuses on eco-friendly cutting processes, driving research into tool designs, reducing energy consumption, and supporting recycling, in addition to hybrid tools, i.e., combining carbide with other cutting materials for applications where specific properties (like diamond hardness) can enhance performance.

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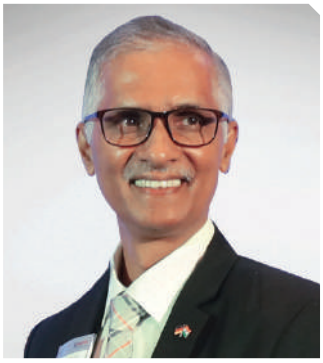
## Vollmer Technologies India Pvt Ltd



**RAVINDRA SD**
**Managing Director**
**Vollmer Technologies India Pvt Ltd**

### The 3C ripple effect

The demand for global carbide cutting tools is likely to go up due to the current investments happening in the 3C sectors globally. This would also, in a way, influence the demand for cutting tools in India as well. However, Vollmer being the Capital Goods industry and being in the secondary part of the supply chain, we may see increased demand for grinding machines as well. The cutting tool producers will first experience this demand-supply gap going forward. However, in geopolitical situations, interest rate cuts are also going to have a say in this demand-supply situation.

### Cutting tool market charts consistent growth course

The market is going to rise due to the demand for the 3C products. The demand will go up also for the cutting tools, owing to this reason. We are seeing the increased demand for tools and many customers are requesting new technology machines to invest in. In my opinion, the market is going to be on a steady pace in 2024-25 and will continue to grow steadily going forward.

## GIST AT A GLANCE

### Key Growth Drivers

- Rapid expansion of Manufacturing sectors like Automotive, Aerospace, and Industrial Machinery
- Government initiatives like 'Make in India' promoting domestic production
- Adoption of advanced technologies like CNC machines and automation
- Rise of SMEs and increased FDI in manufacturing
- Emphasis on skill development and training in advanced manufacturing techniques

### Cutting Tool Materials in Demand

- Tungsten Carbide Tools (Strength, Wear Resistance, High Temperatures)
- Diamond Coated Tools (Hardness, Low Friction)
- Ceramics (Heat Resistance, Hardness)
- Cubic Boron Nitride (CBN) (Hardness, Thermal Conductivity)

### Emerging Technology Trends

- Additive Manufacturing for Custom Tool Designs
- Digital Twins for Virtual Simulation and Optimization
- Industry 4.0 Integration (IIoT, Data Analytics, Predictive Maintenance)
- Advanced Coatings (PVD, CVD) for Longer Tool Life
- Miniaturization for Electronics and Medical Devices

### Sustainability Focus

- Eco-friendly Cutting Processes
- Tool Designs for Reduced Energy Consumption
- Support for Recycling and Material Reutilization
- Minimum Quantity Lubrication (MQL) Techniques
- Sustainable Material Sourcing

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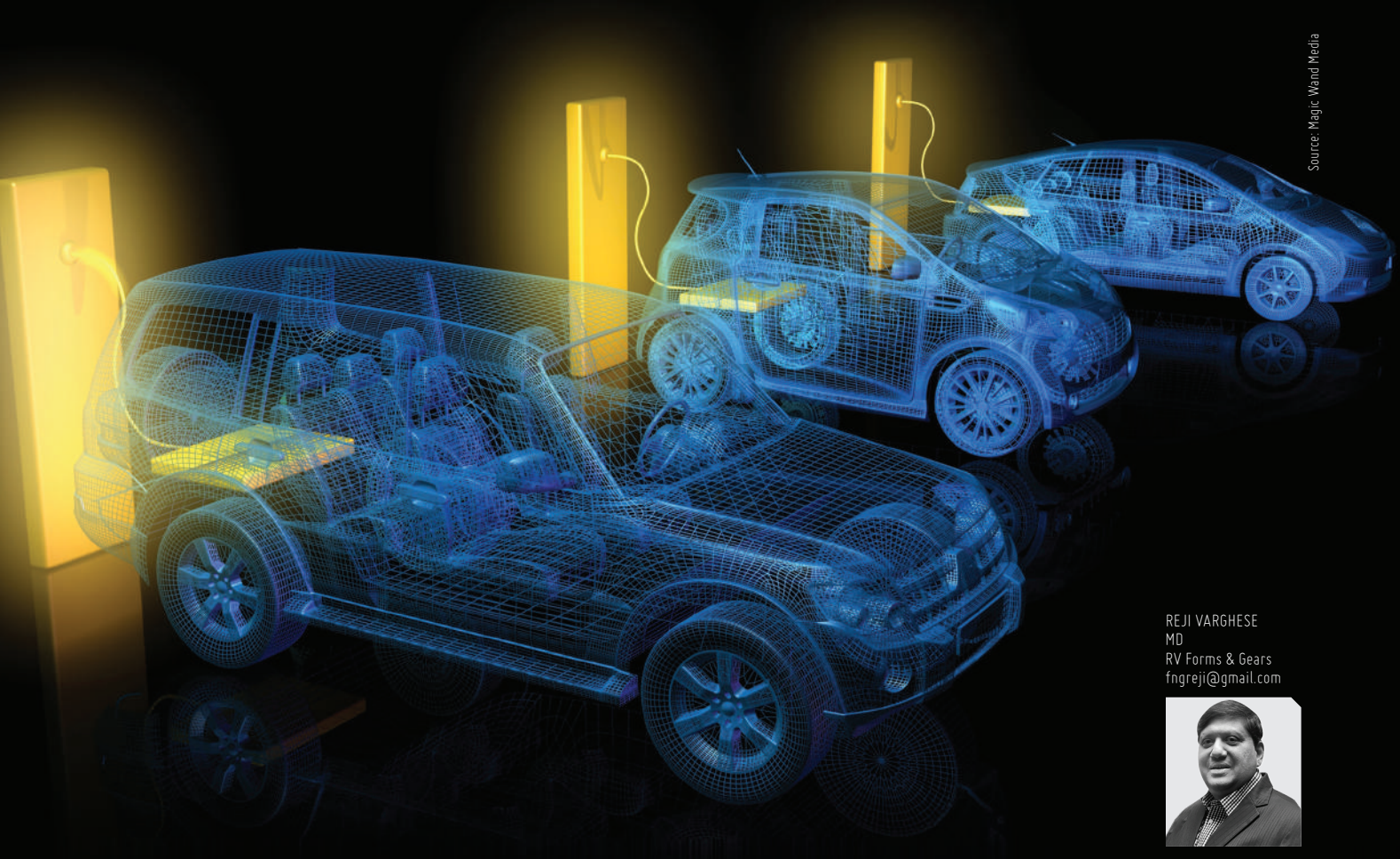
# Giga Casting Revolutionizing EV MANUFACTURING

**Beyond its snazzy designs and impressive performance, Tesla's manufacturing processes have been a key driver of its success. At the core of its success lies its unwavering commitment to innovation and disruption. One game-changing technology that stands out is the giga casting, which has revolutionized how car bodies are constructed.**



Source: Magic Wand Media

REJI VARGHESE
MD
RV Forms & Gears
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Die casting works by forcing molten metal alloy inside a reusable mold, and then opening the mold to remove the finished piece after it cools and solidifies.

Giga Casting involves creating large vehicle components from just a few main castings. Instead of assembling numerous smaller parts, Tesla's Giga Die Casting machines inject molten aluminum into casting molds, resulting in massive single pieces. These Giga Castings replace complex assemblies, streamlining production and significantly reducing costs.

For Tesla's Model Y, the company utilized two giant Giga Castings that serve as the front and rear underbody, thus revolutionizing traditional car body design and streamlining manufacturing. Underbody components typically comprise about 50 percent of a vehicle's body-in-white shell, and this soft underbelly is the target of Giga Casting's focus. Compared to Tesla's earlier Model 3, these two castings replaced 171 parts, most of which were sheet stampings along with some smaller castings. This eliminated 1,600 welds and removed 300 robots from the assembly line, significantly reducing capital investment and freeing up floor space.

Traditional body-in-white stampings may become outdated S&P's Global Mobility forecasts that 15 percent to 20 percent of traditional body-in-white stampings may be at risk of becoming obsolete by the year 2030 with automakers increasingly using Giga Castings.

These giant castings are manufactured on massive machines known as Giga Presses that can achieve 6,000 to 9,000 tonne of locking force and are capable of producing up to 45 castings per hour.

## The Giga Press

Before Tesla disrupted the auto market, companies had not seriously considered using Giga Castings due to the extreme challenges involved in developing them. A few years ago, a 4,500 tonne die casting machine was considered huge. Now 9,000 tonne die casting machines are being manufactured, and 12,000 to 15,000 tonne die casting machines are also in the pipeline.

The collaboration between Italian machine maker Idra, Tesla, and the Chinese machine maker LK Technology exemplifies the power of cross-industry partnerships. LK Technology, a Chinese group that acquired Idra in 2008, played a pivotal role in the Giga Press's development.

Liu Siong Song, Founder, LK Technology, revealed that Tesla was actively involved in the design and production of the Giga Press. For over a year, Tesla engineers worked side by side with Idra and LK Technology, refining the machine's specifications and functionality. Engineers from the three companies constantly exchanged ideas, pushing the boundaries of what was possible. With each revision, adjustments were made to the Giga Press, ensuring it met Tesla's exacting standards. The result was a machine capable of producing

**Dies for such Giga Castings are huge and can weigh up to 100 tonne. This makes die design and especially thermal management a challenge. The dies are also expensive and typically have a die life of around 1,00,000 shots when using structural alloys.**


Source: Magic Wand Media

massive aluminum parts with unparalleled precision.

### Key features of Tesla's Giga Presses

***Size and Weight:*** Each Giga Press machine weighs a staggering 410-430 tonne. These massive machines are approximately 19.5 m long, 5.9 m wide, and 5.3 m tall.

***Die-Casting Process:*** Molten aluminum, weighing around 80 kg, is injected into a cold-chamber casting mold at a velocity of 10 m per second. The entire cycle takes approximately 80-90 sec, resulting in an output of 40-45 completed castings per hour or around 1,000 castings per day.

***Aluminum Melting and Preparation:*** Ingots and aluminum off-cuts are melted in a natural gas-powered oven, and the molten aluminum is prepared for casting.

***Impurity Removal:*** Argon gas and a rotary degasser are used to remove impurities, ensuring high-quality castings.

***Soybean Oil Separation:*** Before each casting cycle, robots apply a thin layer of soybean oil inside the mold halves to allow for easy separation.

**The Giga Press has been a game-changer for Tesla's manufacturing costs. For the Model Y's rear underbody, experts estimate a remarkable 40 percent reduction in manufacturing expenses.**

### Dies and molds for Giga Castings

Dies for such giant castings are also huge and can weigh up to 100 tonne. This makes die design and especially thermal management a challenge. Giga Casting dies are also expensive and typically have a die life of around 1,00,000 shots when using structural alloys. By comparison, dies for stamping presses for sheet-based components can produce up to 6 million parts over their die life.

Handling shot weights of 80-100 kg for each cast also requires different furnaces, material handling and transfer concepts than typical die casting centers. Many other process aspects like vacuum and die lubrication also become a lot more complicated and complex when the size of the castings is increased to Giga Casting dimensions.

### 3D printing Giga Casting dies and molds

3D printing plays a pivotal role in advancing Giga Casting technology. It allows intricate die and mold creation for Giga Casting machines, enabling the production of complex-shaped components. Tesla collaborated with specialized firms in 3D printing dies and molds from industrial sand and binder metals. The binder jet printer deposits a liquid binding agent on thin sand layers, following a digital design file, layer by layer, to create dies for casting molten alloys.

Many die and mold companies are now pioneering the use of 3D printed dies for Giga Casting, offering solutions capable of producing Giga Casting parts for vehicles, aircraft, and large machinery. Each 3D print takes mere hours, which means prototypes can be tweaked as many times as needed, and the cost of the entire design validation cycle is just 3 percent that of the conventional method. It also cuts the overall development time from up to a year to two or three months. Tesla has also leveraged the strength of 3D printing dies to leave hollow voids in large structural sections to reduce weight and improve crash performance.

### Advantages of Giga Casting

***Cost Reduction:*** The Giga Press has been a game-changer for Tesla's manufacturing costs. For the Model Y's rear underbody, experts estimate a remarkable 40 percent reduction in manufacturing expenses. Similarly, the Model 3 assembly line saw the removal of 600 robots, thanks to the simplified production process enabled by Giga Castings.

***Lightweighting:*** Electric vehicle batteries are heavy, and manufacturers seek ways to offset this weight elsewhere. Giga Casting not only reduces the number of individual parts but also contributes to overall weight reduction. By eliminating dozens of smaller components, Tesla achieves a double benefit – cost savings and improved energy efficiency.

***Environmental Impact:*** Fewer parts mean fewer manufacturing steps, which translates to reduced energy consumption and lower carbon emissions. Tesla's commitment to sustainability aligns perfectly with the Giga Casting approach. As the Automotive industry transitions toward cleaner technologies, innovations like Giga Castings will play a crucial role in minimizing environmental impact.

### Potential downsides

Many in the Auto industry are of the view that despite the various advantages, there are also disadvantages to Giga Castings that need to be considered.

One of the big disadvantages is repairability. With an assembly involving multiple pieces, a mechanic can simply remove and replace the damaged or defective part. However, with a Giga Casting, the entire casting would have to be replaced, which would be prohibitively expensive.

The second downside is the challenge of maintaining the tight tolerances required during manufacturing. Giga Castings have different wall thicknesses throughout the part, each of which cools down differently within the die during the cooling and subsequent quenching phases. This leads to distortions that are


Source: Magic Wand Media

often difficult to simulate and predict precisely. Therefore, there are still several unknown elements in the deviations and variations of tolerances in Giga Castings compared to sheet metal assembly processes.

In addition, Giga Castings are not joined to other parts using standard spot-welding procedures but rather use other methods that can also cause unexpected or unknown geometrical variations.

## Other automakers follow suit

Despite the potential disadvantages, Tesla's success with Giga Casting has inspired other automakers to follow suit. A host of automakers like GM, Mercedes-Benz, Volkswagen, Toyota, Hyundai, Ford, Volvo, and Chinese electric vehicles companies like Geely, Nio, and Xpeng are now emulating Tesla's Giga Casting know-how to match its design and manufacturing efficiency and avoid being undercut in a competitive market.

China is looking to exert a substantial influence in Giga Castings globally. China is now the world's largest automotive and electric vehicle market. Sales of electric cars sold in China accounted for 60 percent of the global sales of EVs in 2023. According to S&P's Global Mobility report, the production of light electric vehicles in mainland China is expected to reach a total of 19 million units annually by 2030, firmly establishing the country as a global leader in the EV sector. According to Bloomberg, there are a staggering 129 EV brands in China, but just 20 have managed to achieve a domestic market share of one percent or more.

Tesla's relentless pursuit of innovation has reshaped the Automotive industry. The Giga Casting process exemplifies how bold ideas can lead to tangible benefits—lower costs, lighter vehicles, and a greener future. As other manufacturers embrace this technology, we can expect even more exciting developments in the world of electric mobility.

**According to S&P's Global Mobility report, the production of light electric vehicles in mainland China is expected to reach a total of 19 million units annually by 2030, firmly establishing the country as a global leader in the EV sector.**

# WITH CUSTOMER-CENTRICITY AT THE CORE

Ashish Chandra Varma, CEO, Prime Graphite Pvt Ltd, reflects on the company's journey to its current stature in this insightful conversation with MMI's Editor-in-Chief Soumi Mitra. He also sheds light on Prime Graphite's association with Tokai Carbon, its pioneering role in the introduction of machined graphite electrodes in the Indian market, commitment to minimally impacting the environment, and mantra to stay ahead of its competitors.

Source: Prime Graphite Pvt Ltd

Ashish Chandra Varma, CEO, Prime Graphite Pvt Ltd

SOUMI MITRA
Editor-in-Chief
Modern Manufacturing India
soumi.mitra@magicwandmedia.in

**The year 2024 is the 25th year since Prime Graphite Pvt Ltd, earlier known as Prime Industries, was incepted. Hence, it is a perfect time to go down memory lane and commemorate major milestones in the company's journey. How has the journey been until this juncture where you are renowned as the largest Graphite machine shop in the country and South East Asia?**

**Ashish Chandra Varma:** Prime Graphite Pvt Ltd was incepted as Prime Industries in the year 1998. As we celebrate our 25th year, we reflect on the major milestones that have helped us reach this stature where we are recognized as India's largest and oldest Graphite supplier.

We began as a conventional machine shop in 1999 with a few manual machines such as lathes and cutting and grinding machines with only 8-10 people. Today, we have 3 machine shops with 24 VMCs and a workforce of over 250 employees.

We started our specialized CNC machine shop in 2008 and were the pioneers in introducing commercially-made EDM Graphite electrodes that replaced the conventional Copper electrodes in the Tooling industry. Our third plant took off in 2018 with customer centricity as a guiding pillar that has helped us grow consistently over these 25 years.

We take pride in being not just the biggest Graphite machine shop in India and South East Asia but also the most preferred and trusted Graphite supplier in the Indian market. With a customer base of over 400 customers pan India, we get almost 90 percent repeat business every year. We are fortunate to have served some of our oldest customers for over 20 years in this journey, which is a considerable achievement, given the ever-evolving technological changes and the competitive environment we are in.

**You are also regarded as the premium quality Graphite supplier, offering the highest quality products in India. How does**

**Prime Graphite's partnership with Tokai Carbon Co. Ltd. Japan contribute to this reputation?**

We exclusively represent Tokai Carbon Co. Ltd Japan, since 1998, and have considerable experience in machining Graphite for all types of varied applications for the Indian market. Tokai Carbon is known for its commitment to research and development, ensuring that its products meet the highest standards of quality and performance.

Tokai Carbon has always been encouraging a culture where application support is the cornerstone of a successful strategy. We differentiate ourselves not only by our ability to consistently meet the 'Quality-Cost-Delivery' demands of our customers but also by our assistance through application support that can optimize their process, improve quality, and reduce waste.

**You were the pioneers of Graphite electrodes in the EDM market. What was the earlier trend in electrodes? What are the other applications and industries that Prime Graphite's expertise caters to?**

Prime Graphite has played a pioneering role in the introduction of machined Graphite electrodes in the Indian market. Previously, around 15 years ago, most tool rooms preferred Copper as the material for electrodes due to it being cheaper and for its ease of in-house machining.

It was in the year 2008 that Prime Graphite installed its first machine for manufacturing Graphite electrodes commercially. Our team started visiting tool rooms and sharing the benefits of graphite electrodes including cost-effectiveness, enhanced EDM speed, improved surface finish on molds, reduction in wear, and productivity improvement. This garnered initial interest in the product. We later raised awareness for the same by conducting trials at customer machine shops and generating case studies. This generated confidence in customers that Graphite is a superior material to Copper which can be re-machined as well.

Once the customers started to replace Copper with Graphite electrodes and experienced the benefits firsthand, there was no turning back for them.

> "We take pride in being not just the biggest Graphite machine shop in India and South East Asia but also the most preferred and trusted Graphite supplier in the Indian market. With a customer base of over 400 customers pan India, we get almost 90 percent repeat business every year."
>
> **Ashish Chandra Varma**
> **CEO**
> **Prime Graphite Pvt Ltd**

**Can you please elaborate on Prime Graphite's commitment to sustainability and environmental responsibility, particularly in the context of Graphite production?**

Being a Graphite machining company comes with its own set of responsibilities towards Environmental, Social, and Governance (ESG) principles. From the very beginning, our company has promoted business with partners like Tokai Carbon which encourages sustainable manufacturing in its factories in Japan. We emphasize energy efficiency and water conservation not just for our own gains but for the broader cause of the environment.

Primary in our sustainability efforts is ensuring emissions control which is done by using proper dust collection systems at suitable locations. Our goal is not just meeting but exceeding all compliance and regulation issues. We ensure that our people have the required personal protective equipment (PPE) and that they undergo regular medical tests for their well-being. All these efforts go a long way in building a sustainable company for the coming decades.

**How does the company innovate to stay ahead in the competitive Graphite market? What sets Prime Graphite apart from its competitors in terms of product quality, reliability, and customer service?**

Staying ahead in a competitive industry like Graphite production involves a combination of factors, including innovation, efficiency, quality control, and strategic partnerships.

Innovation is the key to staying ahead. We were the first ones to machine and market Graphite electrodes when the tool rooms were working with Copper. We take pride in offering premium and high-quality Graphite material.

Our strong team is adept at providing comprehensive technical support to our customers since we have not limited ourselves as a machine shop by being a complete solution provider for all Graphite needs. Along with offering Graphite electrodes, we are also into machined Graphite components for general applications, degassing, rotor shafts, etc.

Our core belief lies in forging strong relationships with our customers by understanding their requirements and providing them with the most efficient solutions. We acknowledge that it takes a team to successfully cater to them for which we invest in training and development programs to nurture talent within the or-

**The Government over the last decade has done a lot to boost manufacturing. Its monetary support during the COVID-19 emergency and initiatives like 'Make in India' and the PLI scheme have been instrumental in accelerating demand and the size of the Indian industry.**

ganization. A skilled and motivated workforce is crucial for innovation and growth.

These strategies have so far helped us in consistently optimizing our operations and enhancing our competitiveness, thereby positioning us as a leader in the Graphite industry.

**What have been your strategies for navigating diverse markets?**

Prime has always been well-diversified across many market segments. It is one of the reasons we have been able to easily navigate and survive the various turbulences along the way. Initially, we were focused on the high-temperature market for Graphite applications like furnace plates, sintering molds, casting dies, etc. Later, as the EDM market grew, our portfolio expanded to cover the Graphite electrode market for the Tooling industry. In the future, we see new-age businesses like Solar cells, Li-Ion batteries, and Semiconductors add to our product mix. Being able to create new businesses in diverse and upcoming markets is an essential skill to survive and thrive in today's fast-changing scenario.

**What is the ratio of Indian machines in your factory to the ones sourced from foreign manufacturers and how do you evaluate the performance and efficiency of both types of machines in your production processes?**

In the initial period from 2008 to 2020, the Tooling industry was dominated by foreign machine tool brands. We have been happy with the support we received from brands like Haas and Makino in the Indian market where Graphite machining was a new concept. We still run many of these imported machines even after a 10-15-year period through internal robust TPM processes.

Since 2020, we have started to develop indigenized and customized machines for Graphite machining with local Indian machine tool companies. Though it is still early stages, the local machines we have installed have shown remarkable quality and reliability. A combination of high-end imported machines along with high-quality and customized and indigenized SPMs made in India for Graphite electrode manufacturing is how I see the future.

We believe that the best way to get favorable outcomes from machines, whether imported or domestic, totally depends on the manufacturing process, periodical maintenance, and tools like TPM to retain the efficiency of the machines in their lifecycle.

**Post-elections, do you foresee policy changes or initiatives that could impact the Indian Manufacturing industry?**

The Government over the last decade has done a lot to boost manufacturing. Its monetary support during the COVID-19 emergency and initiatives like 'Make in India' and the PLI scheme have been instrumental in accelerating demand and the size of the Indian industry. This process, I believe, will continue even after the elections and in the times ahead.

> "Since 2020, we have started to develop indigenized and customized machines for Graphite machining with local Indian machine tool companies. Though it is still early stages, the local machines we have installed have shown remarkable quality and reliability. A combination of high-end imported machines along with high-quality customized and indigenized SPMs made in India for Graphite electrode manufacturing is how I see the future."
>
> **Ashish Chandra Varma**
> **CEO**
> **Prime Graphite Pvt Ltd**


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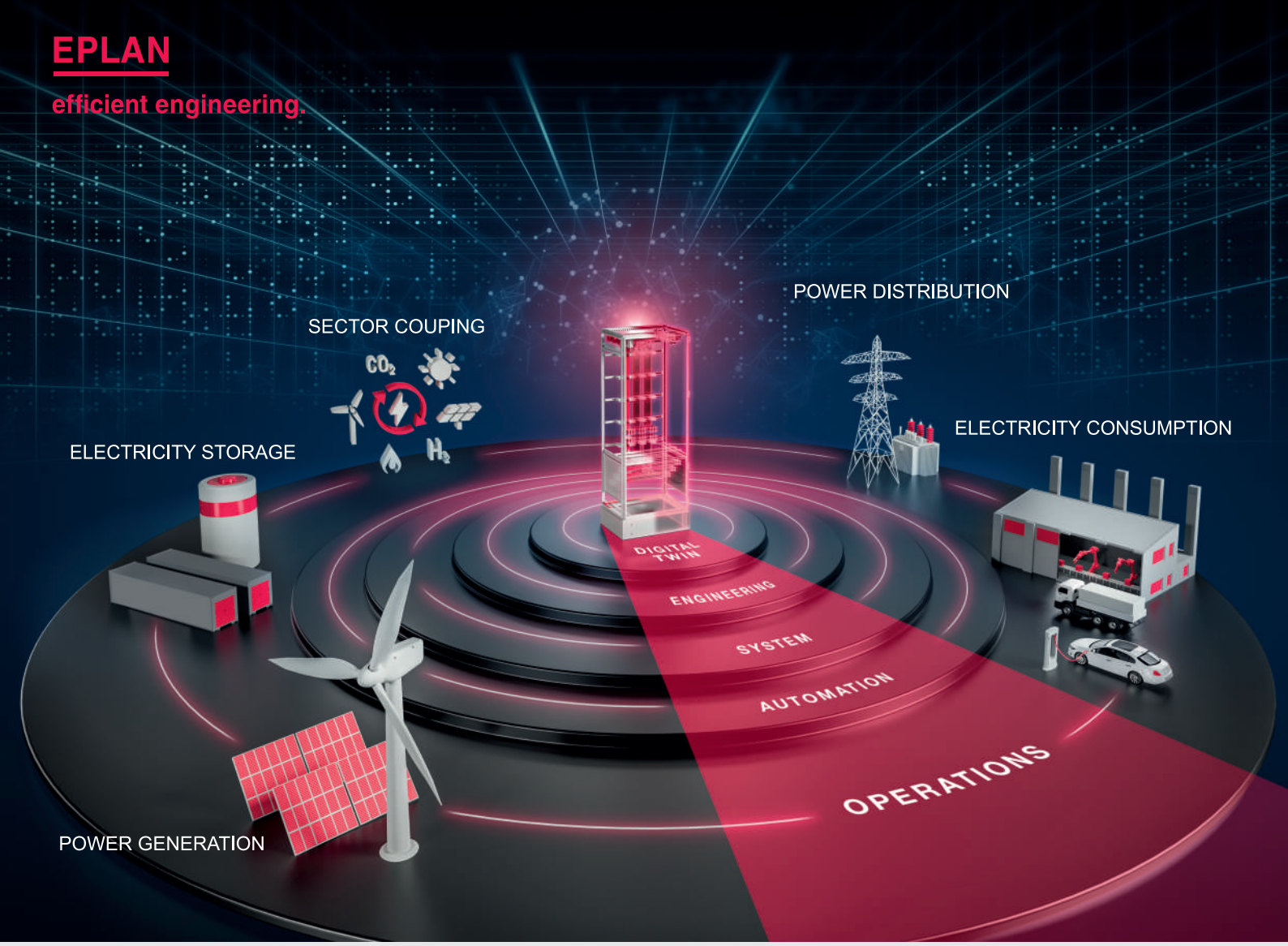


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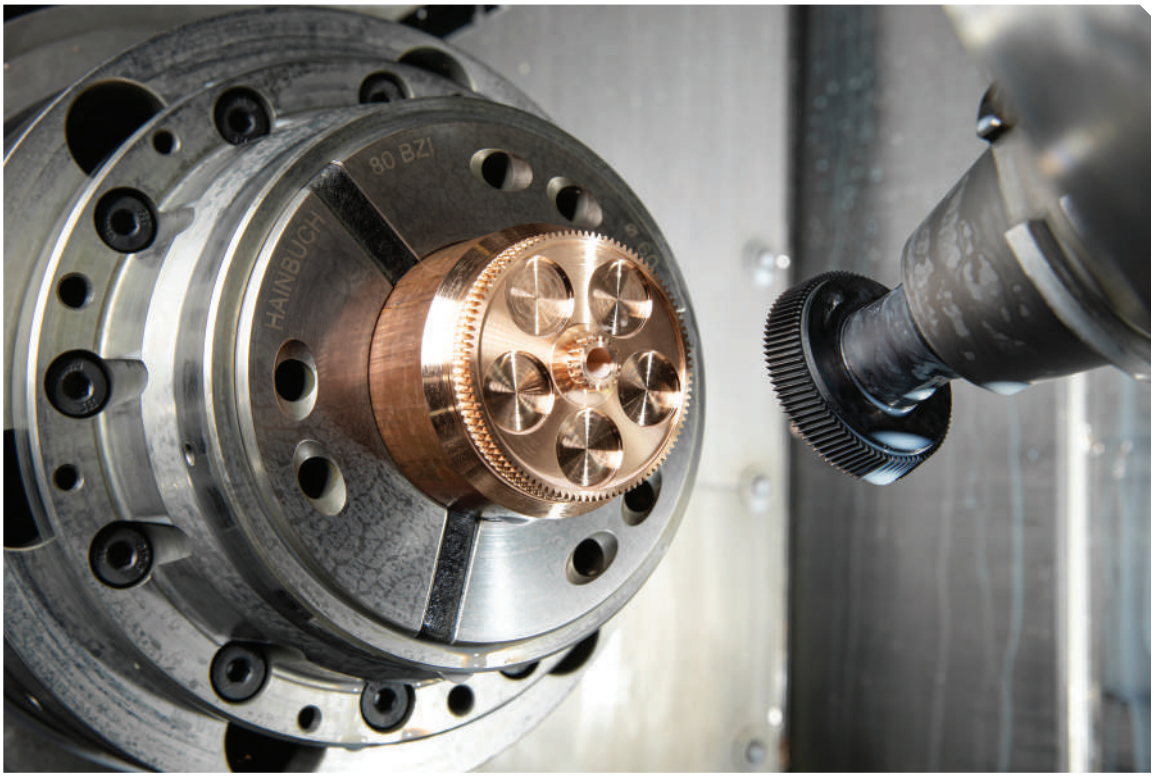
# ENHANCING PROCESS RELIABILITY AND ECONOMY

An insightful account of how aerospace component manufacturing specialist SAM GmbH invested in a turning/milling center from INDEX and new machinery and skiving tools from HORN to bring the gear skiving process in-house for the production of gear teeth. The move helped SAM achieve greater flexibility and independence in its supply chains, reducing production time and costs associated with outsourcing.




Source: Horn/NNCEA

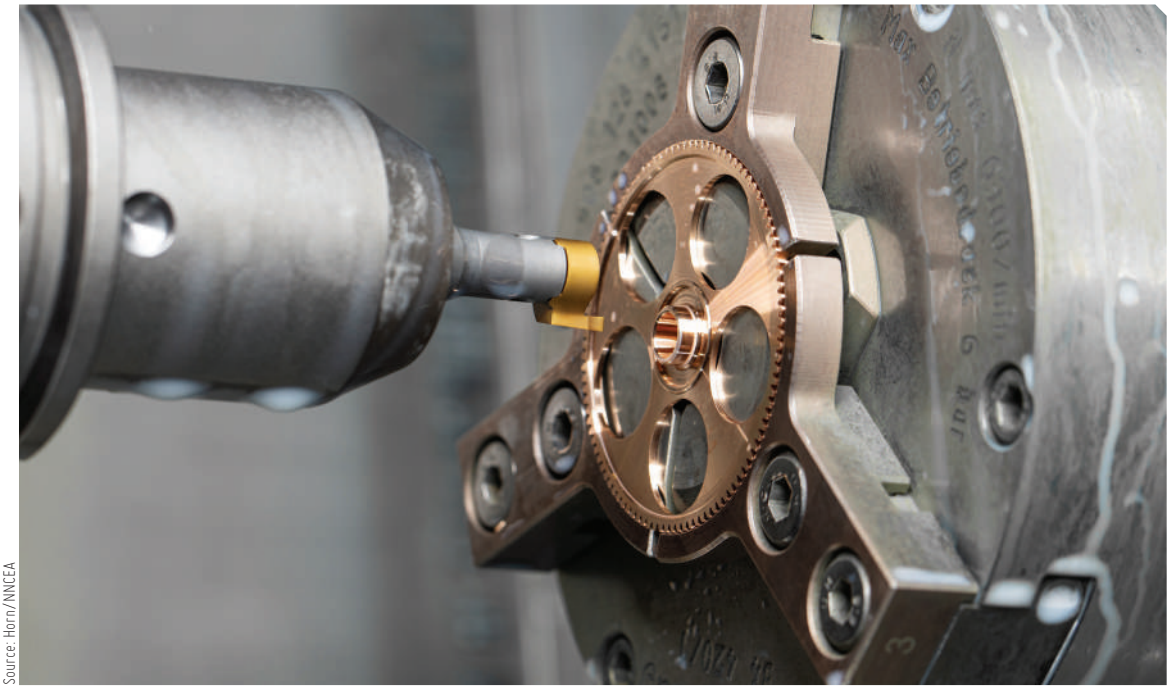
Gear skiving provides a high degree of process reliability, short machining cycles, and high-quality gear teeth.

NIKHIL NAYAK
Managing Director
NN Combined Engineering Agencies Pvt Ltd

"By switching to gear skiving and investing in a turning/milling center from INDEX, we have achieved maximum process reliability," says Erwin Wagner. Wagner is responsible for tool scheduling at SAM GmbH in Bad Tölz. The company is considered a specialist in the development and production of high-quality components for aircraft construction. For almost 40 years, SAM has relied on precision tools from Paul Horn GmbH for machining challenging components. In addition to tool solutions for groove turning, internal turning, and gear broaching, the gear skiving process has now also found its way into production at the Bavarian factory.

SAM is recognized in the Aerospace industry as a specialist in the development and production of actuators as well as other components. The actuators control valves used for temperature regulation and in oxygen, air, fuel, and water systems. SAM manufactures single- and double-acting as well as modulating actuators. The dual motorized actuators are used, for example, to shut off fuel flow valves where maximum fail-safety is required. A central component of each actuator is a bronze alloy gear measuring around 60 mm (2.362") in diameter.

"We mainly outsourced production of the gear," says Wagner. The demand for the delicate components is over 20,000 pieces per

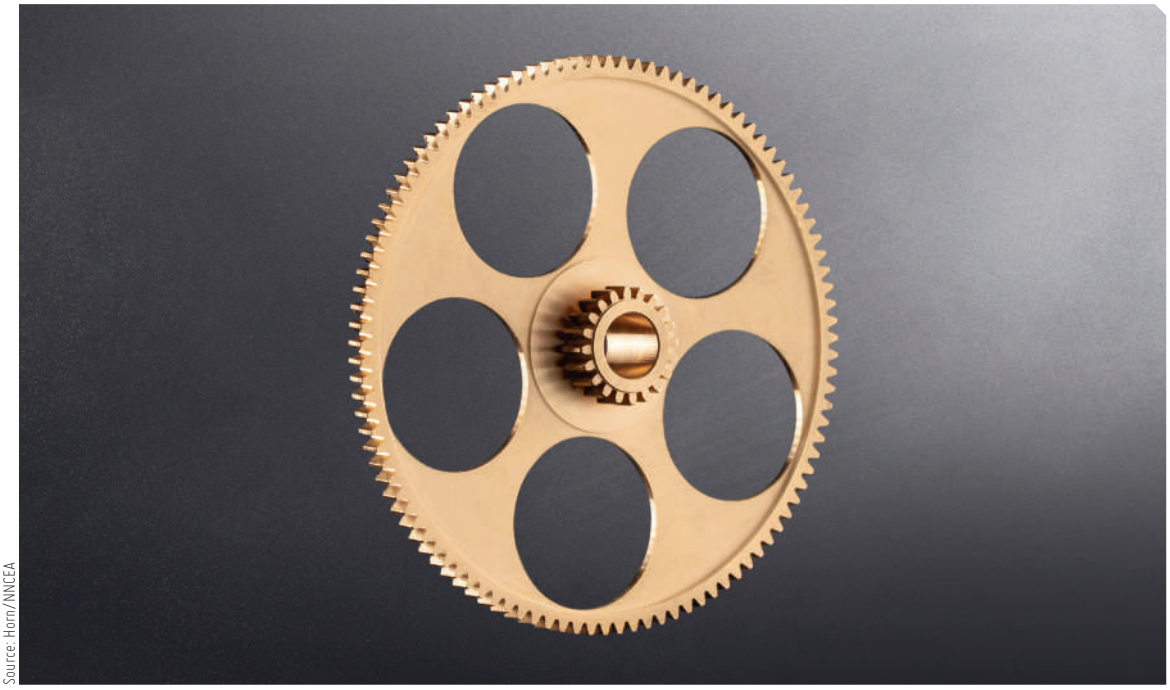


Source: Horn/NNCEA

Turning an axial groove with the Mini system.

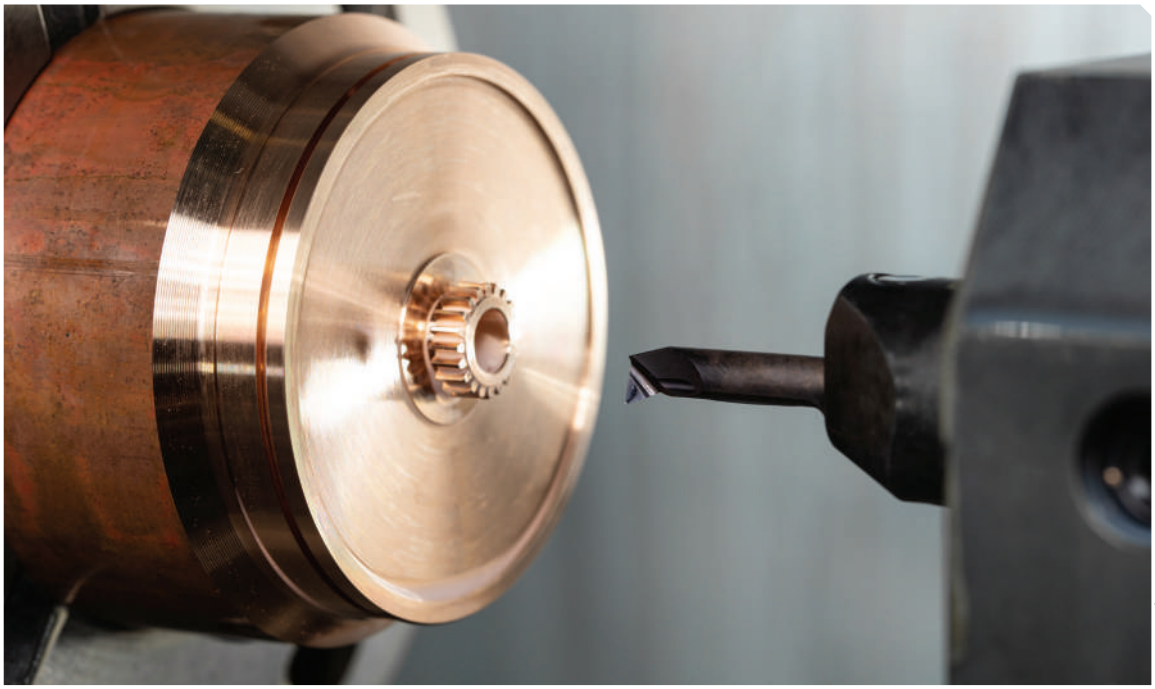
year. "In order to achieve greater flexibility and independence of supply chains, we decided to implement the production of the gears in-house," explains Herbert Krischkowski, the person responsible for special projects at SAM. To produce the external gear with a module of 0.5, the only process available with the existing machinery was gear broaching with a shaping unit. "For our large quantities, this process would not have been as expedient as external production. On one hand, the production time would have been too long and on the other, the maintenance costs of a shaping unit would have driven up the cost of the components even further," explains Krischkowski. Wagner adds: "The pusher units have to be serviced at least every six months during continuous operation. Here you are in the mid-four-figure region in terms of cost."

**The decision to invest in a new machine with HORN skiving tools quickly turned out to be the right one for SAM. It now saves several euros per component by producing gear teeth in-house.**



Source: Horn/NNCEA

The gear assumes a central role as a sun gear that meshes with the planetary gears in the actuator.



Source: Horn/NNCEA

Boring the inside of the central hole with a Horn Supermini.

**The HORN gear skiving system includes tools of cylindrical or conical shape for modules from 0.5 to 2. The solid carbide monobloc variant is available with a diameter of up to 20 mm (0.787") and in a slim design.**

### Investment in new turning/ milling center

SAM is always receptive to new and more economical technologies. To this end, the decision was made to invest in a new turning/ milling center to produce the gear teeth using the gear skiving process. "We did not have a lathe with a milling spindle in our factory," says Wagner. In the search for a suitable machine, two candidates were quickly shortlisted. "We decided to choose the INDEX G220. The flexibility of the turning-milling center, the advice, and the service from INDEX completely convinced us," says Krischkowski. The Bavarians bought the skiving cycle and the skiving tool with the machine. The tool design was carried out by HORN's original equipment department and Michael Götze, the sales representative responsible for SAM.

The decision to invest in a new machine with HORN skiving tools quickly turned out to be the right one. "We now save several euros per component by producing them in-house," says Krischkowski. The skiving tool is not of monobloc design, but a replaceable head system with a high-precision interface. In the process, the gear teeth are produced with four tool strokes. These are divided into three roughing strokes and one finishing stroke with a reduced feed rate. The cycle time for gear skiving is around 20 seconds. In addition to the short production time, those responsible were particularly impressed by the quality of the gear teeth. "We had our measurement results validated by an external service provider. He was amazed at the precision and said that he normally produces his master gauges to that level of quality," Wagner explains, jokingly.

The HORN gear skiving system includes tools of cylindrical or conical shape for modules from 0.5 to 2. The solid carbide monobloc variant is available with a diameter of up to 20 mm (0.787") and in a slim design. They are used for small modules and small components, preferably when a slim shaft is required due to the risk of collision. The grades and coatings matched to the application produce high surface quality on the workpiece. For tool diameters over 20 mm (0.787"), skiving tools with an interchangeable head system are used. The precise interface allows the cutting head to be easily changed in the machine without removing the holder. The carbide holder ensures high rigidity, wear resistance, and precision. For larger modules, HORN relies on the use of a tool holder with indexable inserts. Especially with the WSR tool type, HORN offers the option of placing the internal coolant supply in front of or behind the insert. This means that depending on the application, blind holes, through holes or stepped holes can be machined with appropriate cooling.

### Other HORN systems in use

Other HORN systems are used for the bronze gear. For example, an insert of type S117 takes over the broaching of external teeth


Source: Horn/NNCEA

A successful cooperation: Michael Götze, Herbert Krischkowski, the setter Andreas Neumann, and Erwin Wagner in front of the new INDEX G220.

on the face of the component. "Here, the use of gear skiving was not possible because the required clearance at the end of the teeth was absent. So we chose the gear broaching process using a special tool," explains HORN field representative Michael Götze. In the process, the tip diameter and the undercut at the end of the gear are pre-turned. The undercut provides clearance for the broaching tool. The broaching insert is precision-ground to a special shape and has two teeth. The first tooth serves as a pre-cutter and the profile of the second tooth is the same as the nominal profile of the required gear. In use, the tool broaches one finished tooth at a time in axial movements with an infeed of 0.1 mm (0.004") per stroke. Then the main spindle indexes by one tooth and the broaching process starts again until all the gear teeth are machined. The time to produce the gear teeth is about one minute.

SAM also relies on the HORN tool portfolio for complex turning operations. Two different Mini tools are used in producing the gear. The first tool, with a cutting width of 1 mm (0.039"), turns the undercut on the small gear teeth. The second Mini turns an axial groove on the back of the component. "A special feature of the groove is the tight tolerance fit across only 2 mm (0.079"). The tool has to provide high precision and process reliability," says Wagner. A Supermini tool is used for boring the inside of the central hole.

Engineers at SAM have been taking advantage of tool solutions from HORN for around 40 years. "The project using our new turning/milling center was a complete success. The joint implementation by INDEX and HORN convinced us. The tool solutions from HORN and the service that is always provided have shown us again why we have been relying on tools from Tübingen for decades," says Wagner.

## HORN in India

Precision Tooling Solutions for the Aerospace industry from Paul Horn GmbH are available in India via NN Combined Engineering Agencies Pvt Ltd (NNCEA) in cooperation with select OEM partners. NNCEA provides complete logistics and supply chain management solutions for all major Aerospace manufacturers in the Indian market.

## About SAM GmbH

The company was founded in 1974 as Sitec-Präzisionstechnik GmbH by Franz Sichart. It became part of the Westland Helicopters Group in mid-1978 and was acquired by Singapore Aerospace Manufacturing (SAM) in 2001. Having grown steadily over the course of more than 40 years, the company has always offered its business partners around the world a high level of stability, quality, and flexibility. The product range includes not only actuators and valves but also complete assemblies for hydraulic applications and flight controls for various types of aircraft.

**Precision Tooling Solutions for the Aerospace industry from Paul Horn GmbH are available in India via NN Combined Engineering Agencies Pvt Ltd (NNCEA) in cooperation with select OEM partners.**

# MAXIMIZING EFFICIENCY

Thermal imaging cameras require little training for an operator, and the investment in a camera, operator training, and associated reporting software may cost less than one may think. Read on to learn why using them is so crucial.

Source: Teledyne FLIR, LLC

Product quality is high on the priority list of any reputable manufacturer. Whether one's business manufactures finished articles or components for other businesses to incorporate into their products, the risks are the same. If one's production equipment fails, their business quickly transitions from a profitable organization to a loss-making company.

Many businesses are used to keeping a healthy level of reserve stock in the warehouse to ensure their customers are never let down in the event of an unplanned break in production. But as competition increases and margins erode, most businesses choose to tie up as little cash in stockholding as possible, making reserve stock a less efficient way to operate in today's highly competitive environment.

As businesses hold less stock, the effect of disruption to production is quickly compounded, deliveries are more likely to be missed, and customers are let down. This not only impacts revenue from lost business, but it also damages the reputation of a business.

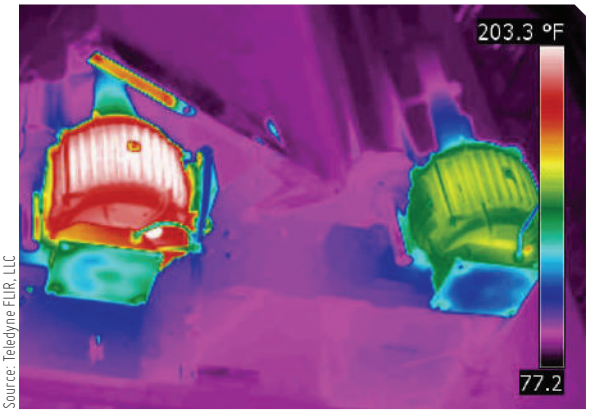
Industries, such as the Automotive industry, face severe supply fines if they fail to deliver on time. Many modern car production lines can produce a car every 90 seconds so a one-hour shut-down results in 40 cars not being produced. If the average price of a car is €35,000 then this type of incident would result in a lost revenue of €1.4 million. As a result, it is not difficult to understand the high fines associated with missed delivery deadlines.

But can these issues be avoided in the first place? We believe the answer is yes; carefully monitoring the condition of one's production equipment on a regular basis has shown that many supply chain problems can be eliminated.

For example, if one's business uses an electric motor at any stage during the production process, when was it last checked for cleanliness? Electric motors can overheat due to a buildup of dirt and debris blocking airflow holes that are designed to help cool the motor. The motor may not be old or have any obvious issues. In fact, it may appear to be working perfectly well until it suddenly fails.

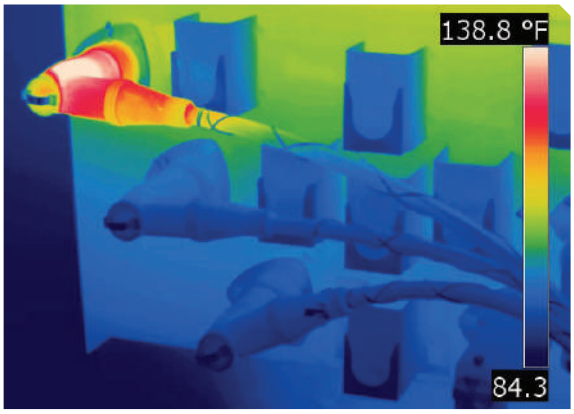
Other examples might be electrical connections, fuse boxes, contactor plates, or other components found in electrical cabinets. Over time, tiny vibrations and heat cycles can cause crimped connections to loosen, along with nuts and bolts on connective wiring which give rise to elevated temperature as the electrical resistance increases. This type of common fault has no visual clues and can happen at any time during

Source: Teledyne FLIR, LLC




Source: Teledyne FLIR, LLC

With thermal imaging, one can quickly tell the motor on the left is running hot and know to move in for further inspection.




Poor electrical connections can be easily identified before they cause production halts.

the production process, yet in most cases can be prevented using predictive condition monitoring techniques.

### Thermal imaging cameras: a key component in reducing unscheduled downtime

If regular thermal inspections are undertaken, thermal signatures can be identified for every electrical connection, electric motor, other electric component, or moving equipment in a facility. While equipment operates as intended, temperatures will remain reasonably consistent, and the insights gained will be no more than regular reassurance. However, if suddenly a temperature reading begins to unusually increase, then this may be indicative of a developing fault.


Source: Teledyne FLIR, LLC

FLIR offers a variety of both handheld and fixed-mount thermal cameras, as well as analysis software to fit one business's condition monitoring needs.

As mentioned earlier, correcting faults may be as simple as tightening a connection or cleaning cooling fins or airways but faults may be more severe and require more detailed maintenance or component replacement.

In the example of an electric motor exhibiting higher temperatures due to a build-up of dust and dirt, the fix may take 5 minutes when the motor has been turned off to clean it thoroughly. If the issue isn't identified early, the motor may fail from deterioration and require a replacement motor to be installed, potentially resulting in a shutdown over several days while waiting for a new motor to be delivered.

Thermal cameras require little training to use in the hands of an operator, and the investment in a camera, operator training, and associated reporting software may cost less than one may think. The one certainty is that the overall cost will be less than an unplanned production shutdown.

FLIR produces a range of thermal cameras, with products such as the FLIR E8 Pro having seamless cloud-based backup and file transfer through to FLIR Thermal Studio reporting software.

**FLIR produces a range of thermal cameras, with products such as the FLIR E8 Pro having seamless cloud-based backup and file transfer through to FLIR Thermal Studio reporting software.**

*To explore the entire range of FLIR thermal imaging products for condition monitoring visit www.flir.in.*

# ROBOTS MAKE THE FUTURE

The academia at Amrita Vishwa Vidyapeetham has developed a humanoid mobile robot for multi-purpose applications. With features such as autonomous navigation, voice control through Alexa, interactive capabilities, a robotic arm manipulator, electrically driven wheels, and AI-enabled functionalities, the robot Amrita represents a significant advancement in robotics, paving the way for future innovations in humanoid technology.

Source: Amrita Vishwa Vidyapeetham

Amrita Humanoid Mobile Robot

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VISHNU RAJ K
ABHIRAM TV
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Amrita Vishwa Vidyapeetham, Kollam, Kerala
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Our humanoid mobile robot has been developed for a wide range of applications, including industrial pick and place operations and challenging tasks and chores in healthcare and domestic environments. The proposed comprehensive solution – 'a 2-wheeled humanoid robot' – is controlled by Alexa and is accessible from anywhere as long as one has access to the internet.

The robot can deliver food and medicine to those with mobility impairment, including the elderly and small kids who require timely attention concerning their meals and medications.

Robotic Operating System (ROS) is leveraged here, which is an ideal platform for navigating autonomous robots. A map-based navigation system is used since the robot's area of work could mainly be a house or hospital. To obtain the map, the robot utilizes the lidar sensors and starts functioning as an autonomous robot thereafter. The simulation and real-world testing of the robot have been completed and prove that the navigation accuracy and performance of the robot agree with the simulation result.

## Robot design and features

The advanced robot is equipped with a robotic arm manipulator and electrically driven wheels, powered by on-board microcontrollers, servos, and other peripherals. It features a skull that can rotate and eyes that can move up and down, mimicking human-like movements. The eyes feature a webcam for tracking people and objects. The jaw of the robot can move up and down to mimic speaking actions, thereby enhancing its interactive capabilities.

The project also includes voice integration and visual interaction of the skull using a laptop or computer. The development of the robotic arm manipulator hardware and the software integration of the robotic hand are key aspects of this project. Voice integration has been carried out with the robotic arm to facilitate picking things such as food items, medicine, water bottles, etc.

The robot. includes hardware for

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mask detection, body temperature measurement, and checking vitals. It also features an entertainment module with an LCD for music, movies, video calling, health monitoring, etc. This advanced AI-enabled robot can detect people's facial expressions, talk with people, keep the doctor-patient communication way more effective, and provide more intense care and monitoring. Additionally, the development of the trunk, tray, and robotic wheels for navigation further contribute to the full integration of this humanoid robot. This project represents a significant advancement in robotics, paving the way for future innovations in humanoid technology.

## Simulation and testing

The robot is designed and manufactured as shown in the photographs. The head and robotic arm are manufactured using 3D printing. The body of the robot is manufactured using sheet metal welding. The simulation of the robot is done using ROS and tested in a virtual home environment. This will help to validate the design and operation of the robot.

The main purpose of the simulation is to validate the autonomous navigation of the robot. The first step of the autonomous navigation is mapping of the environment using the lidar sensor. Path planning is the second step of navigation wherein the robot starts moving autonomously by using the map. Adaptive Monto Carlo Localization is a method used in ROS for finding the current position of the robot. After the robot knows the current location, one can send the final position that the robot needs to go.

Source: Amrita Vishwa Vidyapeetham

**The robot is designed and manufactured as shown in the photographs. The head and robotic arm are manufactured using 3D printing. The body of the robot is manufactured using sheet metal welding. The simulation of the robot is done using ROS and tested in a virtual home environment.**

Source: Amrita Vishwa Vidyapeetham

One of the main features of the robot is that it can be controlled using Alexa, the voice assistant, from anywhere in the world. For integrating Alexa into the ROS-controlled robot, an app called Alexa Skill is required and the server is used for connecting Alexa with the robot. A communication protocol is used as a medium for communication between the robot and Alexa Skill. For the home application, the position the robot needs to take is conveyed through Alexa commands. The robot is tested using the Alexa Echo device.

## How it works

Once the robot reaches the kitchen for food, it searches for food items using a camera. The arm of the robot then places the food onto the robot's tray and heads to deliver it to the elderly in their bedrooms. The same can be replicated to provide healthcare support for elderly individuals and patients in hospitals for their meals and medication. Additionally, it can also be used to provide service in restaurants and offices. Using thermal camera imaging, the robot can be used to measure body temperature without any contact and also identify whether a person wears a mask or not. The weight of the robot is about 30 kg and the weight carrying capacity of the arm is about 0.5 kg. This can be improved by providing two humanoid arms in the future.

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- **Date**
  Nov.5 (Tue.) - Nov.10 (Sun.), 2024 (6 days)
- **Venue**
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- **Indoor Exhibition Space**
  118,540㎡
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# WITH LASER SHARP FOCUS

Suresh Indu Lasers Pvt Ltd (SIL) has been a leading player in the laser industry, seamlessly innovating and becoming a preferred partner for key entities, industries, and government bodies since its inception in 1990. With an unwavering commitment to excellence, the Pune-based company has been relentlessly striving to gain a global competitive advantage.

Source: Suresh Indu Lasers Pvt Ltd

SOVAN TUDU
Senior Sub-Editor
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Suresh Indu Lasers Pvt Ltd (SIL) began its journey in the early 90s by developing laser sources: He-Ne, Diode, $CO_2$, Argon Ion, Nd: YAG, and Research kits. Around the same time the company founded its first industrial unit at Jejuri - MIDC, Pune. Today, the company exports to countries like Italy, UAE, Austria, and Australia and is renowned for its Fiber Laser Cutting machines, $CO_2$ Laser Cutting & Engraving machines, Laser Welding machines, Laser Marking machines, Robotic Laser Solutions, and Laser Cladding/Hardening machines.

Strategically located in key cities of India—Pune, Mumbai, Bangalore, Ahmedabad, and Delhi—it caters to varied industries, showcasing a prominent industry reach. The sectors include Sheet Metal Fabrication, Machine Tools, Automotive & EV, Aerospace, Agricultural Equipment Manufacturing, Defence, Print & Packaging, Textiles, Construction, Architecture & Interior, Medical & Pharmaceuticals, Signage Manufacturing, Elevators, Railways, Heat Exchangers, and Electronic & Semiconductors.

## Consistent growth

As the 90s unfolded, the company expanded its horizons and explored new territories ranging from high-power Nd: YAG Lasers for welding to $CO_2$ Laser Metal Cutting Machines.

Along the way, it kept providing a variety of machines to established industry players. A 3kW Fiber Laser Metal Cutting Machine was developed Ordnance Factory Dum Dum (OFDC); a 20-watt picosecond Laser Machine to process Silicon Wafer Dicing for SITAR, Bangalore; a 150-watt QCW Laser Machine to process Ethanol Burner Welding for KOKO in South Africa; and, between 2016 and 2019, 6 kW Fiber Laser Welding Machines for Lithium - Ion Batteries used for indigenous satellite manufacturing for BHEL. By this time, SIL had established Units IV and V in

> "We understand the importance of raising industry standards domestically, so we're actively adapting and implementing these global standards to meet the unique needs of the Indian manufacturing sector."
>
> **Vardhaman Shah**
> **Director**
> **Suresh Indu Lasers Pvt Ltd**

Hadapsar, MIDC, Pune.

In recent years, the business established Unit VI at Handewadi, Pune, to mass-produce Fiber Laser Metal Cutting Machines. It also expanded its worldwide presence in the Vehicle Tyre Cleaning, EV (Li-ion Battery Welding), Automobile, and Defence Industries, as well as receiving the award of Best Metal Forming & Cutting Brand in India by the Times Group. In 2023, SIL established three new factories in the Chakan industrial area to manufacture its flagship product, the Fiber Laser Cutting Machine.

## Meeting government demands

SIL's journey has been marked with remarkable milestones. It supplied laser machines to the Mars Satellite Project with ISRO in 2015 and contributed to last year's Silkyara Tunnel Rescue Operation in Uttarkashi. Trusted by esteemed entities like Dyco, HAL, Bajaj, and Tata Electric, its machines have left a lasting impact across the globe.

Vardhaman Shah, Director, SIL, a supplier to some of the governmental institutions such as ISRO, DRDO, BARC, ordnance factories, and IITs, is certain that there is a demand for advanced laser machines with specific capabilities tailored to their needs. "These institutions require a diverse range of advanced laser machines tailored to specific applications, including laser firing, satellite component manufacturing, metal cutting, silicon wafer dicing, and battery welding," he says. "These machines should offer high precision, reliability, and efficiency to meet the stringent requirements of these institutions' projects and research endeavors."

## Cornerstone of SIL's success

SIL's success is backed by a strong ethos, as Vardhaman Shah, Director, SIL, explains, "Our philosophy revolves around the importance of fostering strong and enduring relationships with all our stakeholders."

The company prioritizes understanding and meeting the needs of its customers, which involves active listening, open communication, and a commitment to delivering high-quality products and services that exceed their expectations. "By consistently providing value and addressing their concerns promptly, we aim to build trust and loyalty with our customer base," he asserts.

SIL works closely with its customers to provide the necessary support, training, and resources to help them succeed. Building strong partnerships with its distributors enables the company to expand its reach and deliver products to a wider audience. "Collaboration with our vendors is key to ensuring the quality and reliability of the materials and services we use in our operations. We prioritize establishing mutually beneficial relationships based on trust, transparency, and fair dealing. By working closely with our vendors, we can optimize our supply chain, minimize risks, and drive innovation," he stresses.

Shah shares that the company has its employees at the heart of everything it does. "We believe in creating a positive and inclusive work environment where employees feel valued, empowered, and motivated to contribute their best. This involves investing in their development, providing opportunities for growth, and fostering a culture of teamwork and collaboration. By prioritizing the well-being and professional fulfillment of our employees, we aim to build a dedicated and high-performing team.

## Embracing technological advancements

SIL prioritizes adhering to international quality standards and ensures that its machines are built to meet stringent benchmarks. The company, therefore, continuously invests in R&D efforts that aim at staying updated with the latest advancements and best practices in the industry. "We understand the importance of raising industry standards domestically. Hence, we are actively adapting and implementing these global standards to meet the unique needs of the

**SIL adheres to several international standards, including ISO certification and CE certification by TUV Nord Group, ensuring that the machines meet the stringent requirements for safety, design, and performance set forth by the EU.**

Indian Manufacturing sector."

The company's collaboration with leading automotive and EV manufacturers like Ather Energy, OLA, and Tata Motors Ltd is instrumental in elevating its machines' capabilities in this domain. "Through joint R&D projects and partnerships, we gain invaluable insights into the specific requirements and challenges of automotive and EV manufacturing processes," he explains. "This allows us to tailor our machines' capabilities to address these needs effectively, ensuring compatibility, efficiency, and performance in their production environments."

**SIL's collaboration with leading automotive and EV manufacturers like Ather Energy, OLA, and Tata Motors Ltd. improves its machines' capabilities in this domain, and joint R&D projects and partnerships help it understand automotive and EV manufacturing processes and create custom machines.**

## Compliance and customer assurance

The machines at SIL adhere to several international standards, including ISO certification and CE certification by TUV Nord Group. As per Shah, ISO certification ensures that its machines meet globally recognized standards for quality management, environmental management, and other relevant criteria.

> "Our employees are at the heart of everything we do. We believe in creating a positive and inclusive work environment where employees feel valued, empowered, and motivated to contribute their best."
>
> **Vardhaman Shah**
> **Director**
> **Suresh Indu Lasers Pvt Ltd**

"This benefits our customers by providing them with assurance regarding the reliability, consistency, and performance of our machines," he adds.

Achieving CE certification from a reputable organization like TUV Nord Group ensures that SIL machines meet the stringent requirements for safety, design, and performance set forth by the EU. "This not only enhances the safety of our products but also facilitates their marketability within the EU and other regions that recognize CE certification," Shah states further. "As a result, our customers can trust that our machines meet the highest safety standards, reducing the risk of accidents or malfunctions during operation."

## Balancing cost-effectiveness and quality

As a Micro, Small, and Medium-sized Enterprise (MSME), SIL strikes a balance between cost-effectiveness and providing high-quality, dependable machinery to its clients.

SIL optimizes its manufacturing processes to minimize waste, reduce production time, and enhance efficiency without compromising on quality, allowing it to lower production costs while maintaining the integrity of its products. "We carefully select suppliers and negotiate favorable terms to obtain high-quality raw materials and components at competitive prices," he states. "By building strong relationships with our vendors and leveraging economies of scale, we can se-

Source: Suresh Indu Lasers Pvt Ltd

Source: Suresh Indu Lasers Pvt Ltd

cure cost-effective inputs without sacrificing quality."

The company also focuses on streamlining its operations and eliminating inefficiencies wherever possible. This includes optimizing inventory management, reducing overhead costs, and enhancing productivity through automation and technology adoption. "By delivering value-added solutions and excellent customer service, we enhance customer satisfaction and loyalty, which in turn contributes to long-term profitability," shares Shah.

Furthermore, while maintaining cost-effectiveness, SIL ensures compliance with relevant industry standards and regulations to uphold the quality, safety, and reliability of its machines. He concludes, "This not only enhances the marketability of our products but also protects our customers and reinforces their trust in our brand."

**SIL optimizes its manufacturing processes to minimize waste, reduce production time, and enhance efficiency without compromising on quality, allowing it to lower production costs while maintaining the integrity of its products.**

Source: Suresh Indu Lasers Pvt Ltd

# EMBRACING ADAPTIVE AUTOMATION

The evolution of industrial robots towards adaptive automation represents a paradigm shift in manufacturing. It heralds a future where robots are not just tools but intelligent collaborators and contributors, capable of navigating the complexities of modern industry with agility and efficiency.

Source: Mitsubishi Electric India Pvt Ltd

In the vast landscape of modern industry, a quiet revolution has been unfolding. It's a revolution not led by flesh and blood but by metal and code. Once confined to repetitive tasks within structured environments, industrial robots are now evolving into adaptive automation systems and reshaping the very fabric of manufacturing. This drastic transition not only assures increased efficiency and productivity but also flexibility and resilience that can cater to dynamic demands.

During the early 90s, the rise of industrial robots was triggered by the advancement and technological progress needed to meet the requirements of the Manufacturing industry. Today, industrial robots continue to play an integral role in production lines. Designed for fast and precise position control, these systems are ideal for tasks that require repeated trajectory following, for example, picking and placing an object from a known position to another known position, cutting a particular section of a metal sheet or spray painting a workpiece. For these repetitive tasks, these robots can support humans for better efficiency, accuracy, and lesser time consumption, thanks to their well-developed hardware and control systems.

With the fusion of advanced robotics, artificial intelligence, and sensor technologies, industrial robots are no longer confined to repetitive tasks; they are increasingly becoming intelligent agents capable of responding to dynamic production environments. They are becoming adaptive and capable of responding to real-time data and adjusting their actions accordingly.

## Overview of what defines an Adaptive Robot

Adaptive manufacturing represents a departure from traditional mass production methods where static assembly lines churn out standardized products. Instead, it embraces flexibility, agility, and customization, catering to the demands of an increasingly diverse market. At the heart of adaptive manufacturing lies the ability to quickly adapt and reconfigure production processes in response to changing requirements, market trends, and customer preferences. Industrial robots, equipped with adaptive capabilities, play a pivotal role in enabling this paradigm shift.

One of the key features of adaptive manufacturing is the ability to handle variability in product design and production volume. Thanks to their inherent flexibility and reprogramming ability, industrial robots excel in this regard. Unlike dedicated machinery designed for specific tasks, robots can be easily reconfigured to perform a wide range of operations. Whether it's welding, painting, assembly, or inspection, robots can seamlessly transition between tasks, allowing manufacturers to adapt to changing production needs with minimal downtime.

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Product Manager
Servo, Motion and Robotic Solutions
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**The evolution of industrial robots towards adaptive automation represents a paradigm shift in manufacturing. It heralds a future where robots are not just tools but intelligent collaborators and contributors, capable of navigating the complexities of modern industry with agility and efficiency.**

The following three main characteristics make the modern robots adaptive:

- Intrinsic safety without compromising on the performance;
- Ability to learn and accomplish new tasks like a fresh trainee engineer;
- Flexibility.

To achieve the goal of adaptivity, the following key features become crucial:

- Force control technology with high accuracy and rapid response;
- Hierarchical intelligence based on vision and force-sensing technology.

## MELFA-FR from Mitsubishi

Mitsubishi Electric is a leading maker of factory automation systems and has abundant experience in areas including automotive parts, electronic and electric components, liquid crystal displays, semiconductors, food products, medicines, cosmetic products, potteries, education, and research. The company proudly offers intelligent solutions of superior quality with highly rigid arms that enable high-speed and high-precision operations to support factories, arrange optimization, and be one step ahead of other manufacturers.

The 'MELFA-FR' series provides new, more intelligent solutions that underpin 'next-generation adaptive manufacturing' and offers a simpler approach to advanced and flexible production. With these key features – 'intelligence', 'integration', and 'safety' – the MELFA-FR Series of robots can handle all automation needs virtually.

From design to start-up, operation, and maintenance, the MELFA-Smart Plus delivers advanced intelligent functionality. Inserting a MELFA-Smart Plus card into a robot controller enables a multitude of intelligent functions. Temperature compensation, calibration assistance, coordinated control, and predictive maintenance are just some of the features that the MELFA-Smart Plus offers.

## Maisart AI technology

Mitsubishi Electric has developed a fast force-feedback control algorithm for industrial robots using its Maisart (Mitsubishi Electric's AI that creates state-of-the-art technologies) proprietary artificial intelligence (AI) technology, resulting in low-tolerance precision tasks to be performed with fewer trials and in less time compared to human-supported robot assembly. In company-conducted tests, this algorithm shortened assembly insertion times by around 65 percent without requiring the robots to move violently. Mitsubishi Electric India foresees that this algorithm can improve the efficiency of robotic tasks for assembling electric components such as printed circuit boards and connectors and inserting mechanical parts.


Source: Mitsubishi Electric India Pvt Ltd

At this time, when interest in human-implemented cell-production systems is increasing, automatic-production systems that use industrial robots are also showing great promise in the developed and the developing countries where we see that humans are being promoted to the planning and ideation part, and repetitive tasks are efficiently being managed by industrial robots that are proving to be a good combination for humans. Until now, however, automatic systems for precision assembly and insertion operations have required programming and parameter adjustments by skilled personnel to achieve the flexibility of human-implemented assembly processes. Such requirements add to assembly costs and time, which manufacturers have been looking to reduce.

Mitsubishi Electric's Maisart AI technology, the new fast force-feedback control algorithm, shortens assembly time and eliminates violent movements by assembly robots. The technology allows parameters for tasks such as velocity to be adjusted quickly and precisely. In particular, high-precision force-sensor data can be incorporated without stopping the robots. Conventionally, robots are stopped prior to introducing force-feedback control, but Mitsubishi Electric India's new algorithm eliminates this step.

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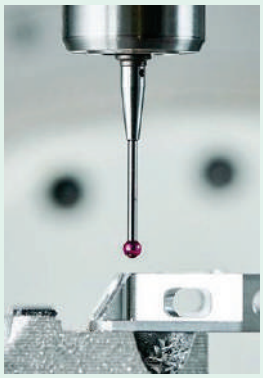






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**Collaborative Robot ASSISTA**

One of the most prominent applications of adaptive automation is in collaborative robotics. Traditionally, robots used to be operated within fenced enclosures, separated from human workers due to safety concerns. However, collaborative robots or cobots are designed to work alongside humans in shared workspaces. The modern cobots do not require any complex programming languages. For example, Mitsubishi Electric's Collaborative Robot 'ASSISTA' can be programmed with a simple tablet supporting the advanced automated and digitalized era.

In conclusion, the evolution of industrial robots towards adaptive automation represents a paradigm shift in manufacturing. It heralds a future where robots are not just tools but intelligent collaborators and contributors, capable of navigating the complexities of modern industry with agility and efficiency. While challenges remain, many potential benefits like increased productivity, flexibility, and safety are compelling enough to amplify adaptive automation. This new era of adaptive automation is beneficial for the Manufacturing industry as it modifies the interaction and allocation of tasks between humans and robots, and the human decides the level of automation as and when required. As we stand on the verge of this transformative era, one thing is clear: The robots of tomorrow will be anything but rigid. They will be adaptive, autonomous, and poised to shape the future of industry in ways we are only beginning to imagine.

Source: Mitsubishi Electric India Pvt Ltd


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# A GIANT LEAP IN AUTOMATION

Zimmer Group, a leading provider of automation and robotics solutions, inaugurated its game-changing production facility on April 16, 2024, in Kikvi, near Pune. This decisive step in the company's internationalization strategy reflects its commitment to innovation and excellence in the Indian and Asian markets.

Source: Magic Wand Media

L-R: Achim Gauss, Managing Director, Zimmer Group; Sunil Raibagi, Managing Director Asia and Vice President, Business Development and Strategy, Zimmer Group; Hrishikesh Kulkarni, Chief Operating Officer, Zimmer Automation Pvt Ltd; Martin Zimmer, Founder & President, Zimmer Group and Suchitra Raibagi, Managing Director, Zimmer Group India at the new production facility in India.

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The Indian subsidiary, which has been operating in Pune since 2017, is now a fundamental part of the global network and an integral pillar of Zimmer Group's global initiative. The new 'THE KNOW-HOW FACTORY' will play a key role in the production and development of highly specialized automation solutions, using the latest manufacturing technologies and Industry 4.0 standards to increase efficiency and ensure sustainable production.

The inaugural ceremony witnessed the presence of industry heavy weights such as Martin Zimmer, Founder & President, Zimmer Group; Achim Gauss, Managing Director, Zimmer Group; Sunil Raibagi, Managing Director Asia and Vice President, Business Development and Strategy, Zimmer Group; along with Suchitra Raibagi, Managing Director, Zimmer Group India; and esteemed guest Rajesh Nath, Managing Director, German Engineering Federation (VDMA India).

Other key leaders from Zimmer Group included Ankuresh Pandey, Sales Director Asia Pacific, Zimmer Group Asia Ltd; Joreg Schleicher, Head of Technical Support and Services, Zimmer Group Asia Ltd; Alex Maeng, General Manager-Sales & Marketing, Zimmer Group, South Korea; and Anuj Prasad, Head Technical Sales and Business Development, Zimmer Automation Pvt Ltd.

## Committed to the Indian market

By solidifying its presence in India, the Group remains true to its core principle of delivering innovations that drive the industry forward. The move underscores its commitment to creating jobs and contributing to the economic development of the region.

Owing to its resources and a growing market, India instills a sense of optimism, as Gauss remarked, "India today is the most popular country with rich resources, and also it is a growing market. Hence, it was our obvious choice for a new facility. Here, the facility will be making standard and system solutions not just for India but for the Asian market as well."

Zimmer and Sunil Raibagi hailed the occasion as a definitive move in Zimmer Group's global expansion strategy, propelling it towards unparalleled heights of technological innovation and excellence.

## Crafting innovation in Pune

The facility boasts a state-of-the-art quality control room, a fully equipped training and demonstration area, and a design studio. Sunil Raibagi cited a 'systematic approach' to upholding quality standards. He also highlighted that the facility's highly-trained team collaborates with its German counterparts for coordination with Zimmer headquarters.

## Customer proximity and collaboration

Initially focusing on automotive and components for IC engines, the company has now expanded into the EV industry, catering to a varied spectrum of industries where systems like quality, IT, process, and monitoring are crucial, and 'The Know-How Factory' will further bridge customer demands with tailored solutions. From flat swivel units aiding orientation changes to shock absorbers enhancing safety, Zimmer's offerings address diverse requirements. With a focus on automation, the facility highlights automatic tool-changing units and tailor-made solutions.

"The facility underscores Zimmer Group's commitment to providing advanced solutions for diverse applications, including manufacturing, assembly, and automation," added Hrishikesh Kulkarni, Chief Operating Officer, Zimmer Automation Pvt Ltd. "Leveraging the company's global presence and extensive portfolio of over 10,000 system grippers and a focus on precision, reliability, and Industry 4.0 compliance, Zimmer Group aims to revolutionize the manufacturing landscape."

## Associates speak

Citing Zimmer Group's association spanning 15 years and importing Zimmer products to India initially, Pradeep V Katti, EBU India-Manufacturing Engineering, Cummins Technologies India Pvt Ltd, noted, "Zimmer has always provided great service, even outside of India. Now that it's in India, it is more advantageous for us in terms of cost, service, and product delivery."

Likewise, Shirish Dixit, Founder & Director of R2A Automation Pvt Ltd, a company specializing in automation systems, affirmed, "We have had Zimmer India's support since 2018. Its round-the-clock availability and exceptional application solutions align with our requirements. Zimmer's exhaustive range of products and extensive experience in this field is commendable."

## Future forward

As India paves the way for new avenues and opportunities, accelerating sectoral reforms through policies and other Government initiatives, Zimmer Group's 'THE KNOW-HOW FACTORY' is sure to contribute towards development and growth in the country's manufacturing landscape.

**The new plant comprises a modern infrastructure with 17,000 sq ft of production space and an additional 10,000 sq ft of office space, built to the highest standards of environmental friendliness and sustainability, and offers customized solutions and automation technology.**


Source: Magic Wand Media

'THE KNOW-HOW FACTORY' is slated to contribute hugely to the production of specialized automation solutions.

# DIGITALLY DRIVEN, GLOBALLY INSPIRED

The inauguration and open house ceremony of Bharat Fritz Werner Ltd's new digitally connected manufacturing facility was held on April 20, 2024, at Devaganapalli near Hosur, Tamil Nadu. The world-class facility symbolizes innovation, efficiency, and a commitment to excellence in the machine tool industry.


Source: Magic Wand Media

L-R: Vipin Sondhi, Chairman, Confederation of Indian Industry, National Forum for Industry-Academia Partnership, Chairman National Board for Quality Promotion, Member, Board of Directors / Trustees, Former, MD & CEO Ashok Leyland & JCB India Ltd. India; Ravi Raghavan, Managing Director, Bharat Fritz Werner Ltd. (BFW); Akihiro Teramachi, Representative Director, Chairman and CEO, THK Co., Ltd; Geetanjali Kirloskar, Chairperson and MD, Kirloskar Systems Pvt Ltd & Chairperson, Toyota Tsusho Insurance Broker India Pvt Ltd; Dr Yoshiharu Inaba, Chairman, FANUC Corporation; Arun Kumar Kothari, Chairman & Promoter, Bharat Fritz Werner Ltd (BFW) and Praful Shende, President-Strategy, Bharat Fritz Werner Ltd (BFW).

Leading Indian advanced manufacturing company, Bharat Fritz Werner Ltd (BFW) has set up a state-of-the-art facility with an investment of INR 200 crore. The company has achieved a remarkable growth rate of 20 percent, positioning it as an industry leader in the growing Machine Tool industry. According to Arun Kumar Kothari, Chairman, BFW, the company aims to establish a facility of global standards to increase efficiency and productivity.

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## A strategic leap forward

During the inauguration, Ravi Raghavan, Managing Director, BFW, highlighted the global collaboration that made the project successful. He expressed gratitude to international experts and Government support for their invaluable contributions.

He outlined the company's journey, highlighting the challenges and innovations over 63 years. He also took the opportunity to introduce the company's initiative, 'LEAP - Leadership through Ethical practices, Agile processes, and Partnerships.' This initiative aims to increase capacity, adopt best automotive industry practices, and embrace technology for a digitally connected ecosystem.

With two manufacturing plants in operation and exceptional engineering capabilities, the company meets the performance, reliability, and productivity requirements across industries like Aerospace, Automotive, Defence, Die & Mold, Forging, Valves, and Railways. Its extensive experience is evi-

dent with over 65,000 installations across 15 countries.

### Makings of a world-class facility

The new facility has two assembly halls covering 20,000 sq mt each, showcasing a 3X expansion in capacity to produce over 10,000 CNC machines annually. Beyond this, the company has plans to dedicate the total land area spanning 54 acre to building a Vendor Ecosystem.

A notable feature is its completely digitalized manufacturing processes, including a conveyorized assembly of machines for streamlined efficiency. The facility also features a fully integrated Spindle Technology Center that entails engineering, manufacturing, assembly, servicing high-quality machine tool spindles, and integral motor technology.

### Long-standing partnerships

Over the many years in the industry, the company has established strategic partnerships that have progressed. Dr Yoshiharu Inaba, Chairman & CEO, Fanuc Ltd, and Chairman, Japan Machine Tool Builders' Association, commended BFW's legacy and the company's significant role in the Machine Tool industry. He reminisced about the long-standing partnership of over three decades, highlighting their shared commitment to innovation and reliability.

He noted FANUC's support to the company since 1993 by providing BFW with its first CNC system, which still runs to this day. He emphasized that this collaboration not only bolstered ties between the two companies but also fostered cooperation within the Machine Tool industries of India and Japan.

In sync, Akihiro Teramachi, Representative Director, Chairman, and CEO, THK Co., Ltd, spoke about the partnership between THK and BFW, lasting about four decades. Beyond business, the bond is rooted in trust, camaraderie, and shared values, evolving from suppliers to trusted allies.

Looking ahead, Teramachi expressed confidence in the continued success, driven by collaboration, integrity, and customer focus. He emphasized that the new facility signifies a new era of possibilities and opportunities for all involved, promising exceptional products and services that will enhance businesses and livelihoods.

Source: Magic Wand Media

The new BFW state-of-the-art facility equipped with latest automation technologies.

### Inclusivity: The new norm

The new facility was also lauded for its initiative to conform with the Government of India's efforts to boost skill development and encourage 'Nari Shakti', meaning women empowerment.

Geetanjali Kirloskar, Chairperson & Managing Director, Kirloskar Systems Pvt Ltd, and Chairperson, Toyota Tsusho Insurance Broker India Pvt Ltd, emphasized the significance of women in STEM fields and 'Atma Nirbhar' Bharat, a self-reliant India. She further discussed the rising importance of induction and retraining programs aimed at empowering women in the Manufacturing sector.

Additionally, the new facility has set a personal goal of achieving a 30 percent gender diversity target, focusing on promoting local talent which is a significant step forward in the global Machine Tool industry. In light of this, she commended the company's inclusive strategies, expressing confidence in its progressive approach.

### Achieving global recognition

The vision for the new facility is to redefine the Machine Tool industry's standards. On that note, Vipin Sondhi, Chairman, Confederation of Indian Industry, National Forum for Industry-Academia Partnership; Chairman, National Board for Quality Promotion (NBQP); Member, Board of Directors/Trustees, and Former MD & CEO, Ashok Leyland and JCB India Ltd, appreciated the facility's eco-friendly infrastructure, an initiative to reduce its carbon footprint and align with global sustainability goals.

Highlighting India's ambitious manufacturing goals, Sondhi stressed the critical role of the Machine Tool industry in achieving these targets and outlined five key areas to create a successful Manufacturing sector. This includes adapting to disruptive technologies, embracing global standards, reducing reliance on imports, focusing on innovation, and integrating Industry 4.0 practices.

Furthermore, he urged machine tool builders to prioritize long-term thinking, quality management, sustainability, research & development, Industry 4.0 adoption, and diversity. To this end, Sondhi commended BFW's commitment to these principles and expressed confidence in the industry's potential for global recognition.

**The new digitally connected manufacturing facility is an eco-friendly infrastructure that boasts two assembly halls, each 20,000 sq mt, with a combined capacity to produce over 10,000 CNC machines annually. It is also a fully digitalized facility with an interconnected manufacturing process and a fully integrated Spindle Technology Center.**

# STRENGTHENING GLOBAL PRESENCE

Leveraging and committing to supporting India's growth, GROB Group, a leading global supplier of production and automation solutions, inaugurated its 6th production plant in India on May 7, 2024, at Gudipalli, Andhra Pradesh, India. Continuing its tradition of relentless innovation, the family-managed German company expands its plan for India and evolves in the dynamic auto sector.

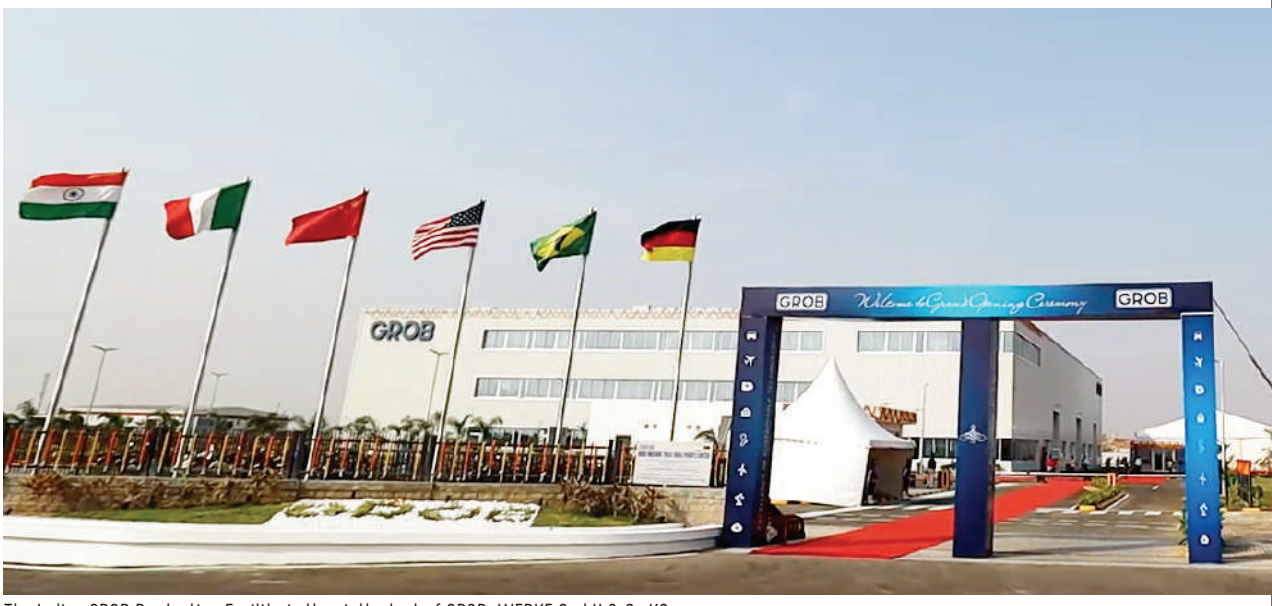
On May 4, 2022, the mechanical engineering player, GROB Group, laid the groundwork for the multi-million euro project, and almost two years later, it is celebrating the official opening of the new plant. With the inauguration of its new plant as GROB Machine Tools India Pvt Ltd, the Group reaffirms its long-term commitment to India and its objective of capitalizing on the region's dynamic economic potential while driving technological advancement.

## Building for tomorrow

Reflecting on the company's journey and outlining its growth mission, LJ Naidu, Managing Director, GROB Machine Tools India Pvt Ltd, noted, "With an initial investment of INR 135 crore, covering 8,500 sq mt in the first phase, the plant demonstrates GROB's commitment to long-term presence and technological advancement in India."

Plans for future expansion include an additional 45,000 sq mt of construction with an investment of INR 400 crore. Reiterating the projections, and eying 'India as a huge opportunity for the future', German Wankmiller, Chairman of the Board & CEO, GROB-WERKE GmbH & Co KG, hinted at overall expansion in India and worldwide, citing the company's projected continual growth to € 2 billion. Underscoring India's growing potential and the country's conducive environment for development, Christian Müller, Member of the Board & CSO, GROB-WERKE GmbH & Co KG, highlighted the diverse target segments for GROB machines in India, including Automotive, Aerospace, Medical, Die & Mold, and more. He mentioned plans to assemble various models initially, beginning with CNC machines, later venturing into the assembly business for e-mobility, and gradually localizing production within two years.

"At the new facility, we will assemble the complete product line from GROB, including the G150, G350, G550, and G750 models. Initially, we will support our basic machines imported from Germany. Gradually, we will localize our CNC machine production more and




The Indian GROB Production Facility is the sixth plant of GROB-WERKE GmbH & Co KG.

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"We have all the vertical integration from engineering up to assembly and want to grow in floor space and the number of employees. Therefore, we will extend our plans, and this is only the beginning in India."

**GERMAN WANKMILLER**
**Chairman of the Board & CEO**
**GROB-WERKE GmbH & Co KG**

"Our diverse target segments for GROB machines in India include Automotive, Aerospace, Medical, Die & Mold, and more. At our new facility, we will be assembling the complete product line from GROB, including the G150, G350, G550, and G750 models. Initially, we will support our basic machines imported from Germany. Gradually, we will localize our CNC machine production more and more. Within the next two years, we aim to have 100 percent 'Made in India' machines to cater to the Indian market."

**CHRISTIAN MÜLLER**
**Member of the Board & CSO**
**GROB-WERKE GmbH & Co KG**

"With an initial investment of INR 135 crore, covering 8,500 sq mt in the first phase, the plant demonstrates GROB's commitment to long-term presence and technological advancement in India."

**LJ NAIDU**
**Managing Director**
**GROB Machine Tools India Pvt Ltd**

more. Within the next two years, we aim to have 100 percent 'Made in India' machines to cater to the Indian market," he shared.

## Engineering excellence and driving innovation

GROB's customers include the world's leading automotive manufacturers, component suppliers, and other renowned companies from diverse sectors. Wankmiller elaborated on e-drive technology for electric vehicles and shared, "We have all the vertical integration from engineering to assembly. We now want to grow our floor space and increase the number of employees. Therefore, we will extend our plans, and this is only the beginning in India."

The company has allocated approximately INR 22 crore out of INR 135 crore for its spindle refurbishment facility, making it the first facility in India to offer professional spindle repair and refurbishment services.

**With an initial investment of INR 135 crore, covering 8,500 sq mt in the first phase, the plant demonstrates GROB's commitment to long-term presence and technological advancement in India.**

Source: Magic Wand Media

## Precision in practice

Speaking on the significance of German precision in manufacturing, Dr S Devarajan, Senior Vice President, Advance Mfg Engineering, TVS Motor Company Ltd, a key GROB customer, mentioned the presence of machining centers and multi-axis machines at TVS' Hosur plant, highlighting the improved


Source: Magic Wand Media

GROB Machine Tools India New Facility at Gudipalli, Andhra Pradesh, India.

**The company has allocated approximately INR 22 crore out of INR 135 crore for its spindle refurbishment facility, making it the first facility in India to offer professional spindle repair and refurbishment services.**

quality, dimensional consistency, and spindle stability that GROB machines offer.

Regarding GROB sales and service, Dr Devarajan expressed confidence in the company's ability to support the dynamic Indian Automobile industry, especially with the introduction of new models and the advent of EVs. He acknowledged GROB's continuous growth journey and expressed confidence that its technical center would further enhance their support capabilities, thereby instilling confidence among stakeholders.

Discussing the relevance of GROB's setup in India, Sachin S Vora, Managing Director, Kranti Industries Ltd, a well-known name in auto component manufacturing, emphasized the importance of faster delivery times for tier two suppliers in auto sector. He expressed optimism about GROB's role in enhancing infrastructure planning and resource allocation, as well as easier access, faster deliveries, and streamlined technical support with its presence in India.

## Towards a sustainable future

Amidst the developing worldwide economy, especially in India, the expansion reflects the increasing need to invest in India's future. With the idea of collaborative growth, GROB intends to expand production alongside stakeholders, maintaining an unwavering commitment to innovation, quality, and customer satisfaction.


Source: Magic Wand Media

Universal Machining Centers placed in the newly built tech center of GROB Machine Tools India.

Indian Machine Tool Manufacturers' Association

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# FORGING THE FUTURE OF MANUFACTURING

Organized by Indian Machine Tool Manufacturers' Association (IMTMA), Pune Machine Tool Exhibition, a leading machine tool and manufacturing technology exhibition in the western region of the country, is making a successful return after a five-year hiatus. To be held from May 23-26, 2024 at Pune International Exhibition and Convention Centre, in Moshi, Pune, the highly-awaited event will showcase transformative solutions that are taking the manufacturing industry by storm.

Source: Magic Wand Media

Pune Machine Tool Exhibition (PMTX), now in its third edition, is set to unveil the latest advancements in metal cutting, metal forming machinery, metrology, automation, robotics, quality control systems, consumables, accessories, software, material handling, and more.

The event anticipates the participation of nearly 200 exhibitors, offering an exclusive glimpse into the technological innovations that are shaping the production of industrial goods across regional industries.

Highlighting the significance of the event, Jibak Dasgupta, Director General & CEO, IMTMA and Bengaluru International Exhibition Centre (BIEC), shares, "The exhibition space has increased by a record 100 percent with a total space of over 12,000 sq mt."

"Every development in the metal cutting and metal forming industries will be showcased across the aisles," he adds underlining the exhibition's commitment to presenting the forefront of industrial advancements.

## Doubling down on innovation

The event will have FACTEQ, a factory equipment expo, as a co-located show offering a spectrum of offerings, from energy-saving products and logistics equipment to maintenance and safety solutions. It promises visitors a holistic experience of a modern factory environment.

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"Through the regional exhibitions, Indian Machine Tool Manufacturers' Association is trying to enable Medium and Small enterprises to participate and adopt the latest technologies to enhance their manufacturing capabilities."

**RAJENDRA RAJAMANE**
**President**
**IMTMA**

The show offers an additional avenue to be explored in concurrent shows – Metrology Expo, Weld Expo, and Digital Manufacturing. While Weld Expo is an exhibition for welding, cutting, and joining, Metrology Expo is an exclusive exhibition on Metrology. Digital Manufacturing will showcase evolving Industry 4.0 hardware, software and solutions, additive manufacturing, and other prominent technologies.

## A melting pot of stakeholders and industries

Regardless of prevailing global challenges such as economic headwinds, inflationary pressures, and geopolitical uncertainties, India's investment climate maintains a promising outlook. He highlights the resilience of the country's Manufacturing sector and anticipates a continued positive trajectory supported by product-linked incentive (PLI) schemes catered to industries.

As the favorable economic climate encourages the development of new industries, the expo is expected to draw in a massive visitor footfall of industry stakeholders eager to explore various avenues. Dasgupta elaborates, "The expo has elicited a warm response from a large proportion of regional industries across sectors like Aerospace, Auto Components, Automobiles, Capital Goods, Defence, Electrical, and Electronics industries, among others."

This medley of industries creates a dynamic atmosphere brimming with networking and business venture opportunities for the anticipated presence of more than 100 trade delegation companies and an estimated 15,000 visitors. To achieve this remarkable response from the industry, IMTMA has extended efforts to collaborate with local industry associations in Maharashtra and Gujarat. "We are also actively engaging with industry stakeholders through various online and offline platforms, which is creating a buzz for the event," he adds.

## Connecting the dots: MSMEs and regional expos

The co-located shows will set the standard while emphasizing the importance of regional shows in facilitating industry growth. Rajendra Rajamane, President, IMTMA, explains, "Regional machine tool expos have created great synergy by bringing manufacturing technologies to the doorsteps of user industries in various locations."

By organizing regional exhibitions, IMTMA is focusing its efforts on empowering Micro, Small, and Medium Enterprises (MSMEs) to participate. This initiative encourages them to adopt the latest technological innovations to enhance their manufacturing capabilities, thus providing companies with increased efficiency and a competitive edge.

As part of this initiative, the association hosts exhibitions in key hubs like Delhi and Pune, renowned for their significant presence in machine tools and various manufacturing sectors. "IMTMA seeks government assistance through various schemes and supports MSMEs participation in expos which benefits them," Rajamane adds.

"Pune Machine Tool Expo 2024 (PMTX) is being organized in a new exhibition venue with Factory Equipment Expo (FACTEQ) as a co-located show. These events will give visitors a glimpse into the technological future for mass-produced industrial goods that regional industries can bank on."

**JIBAK DASGUPTA**
**Director General & CEO**
**IMTMA and BIEC**

## More shows, more growth

In concerted efforts to establish the importance of regional shows, the association is preparing for an expanded roster of regional shows aimed at fostering industry connectivity and technological innovation.

Rajamane lists events that will revolutionize the industry, "MTX Connect, a smart and short expo on machine tools will be held in October, later this year, at Rudrapur and the next edition of Delhi Machine Tool Expo (DMTX) along with the Factory Equipment expo (FACTEQ) in May 2025 in Delhi."

**The new plant comprises a modern infrastructure with 17,000 sq ft of production space and an additional 10,000 sq ft of office space, built to the highest standards of environmental friendliness and sustainability, and offers customized solutions and automation technology.**

# REDEFINING MANUFACTURING STANDARDS

PMTX 2024 promises to showcase a diverse array of groundbreaking innovations that are poised to redefine manufacturing standards. Exhibitors will unveil cutting-edge automation solutions and precision engineering advancements, offering attendees a firsthand look at the latest technologies set to revolutionize production processes. From enhancing efficiency to boosting accuracy and productivity, the next generation of machine tools showcased at PMTX 2024 will have a profound impact across various industrial sectors.

VERTICAL MACHINING CENTERS

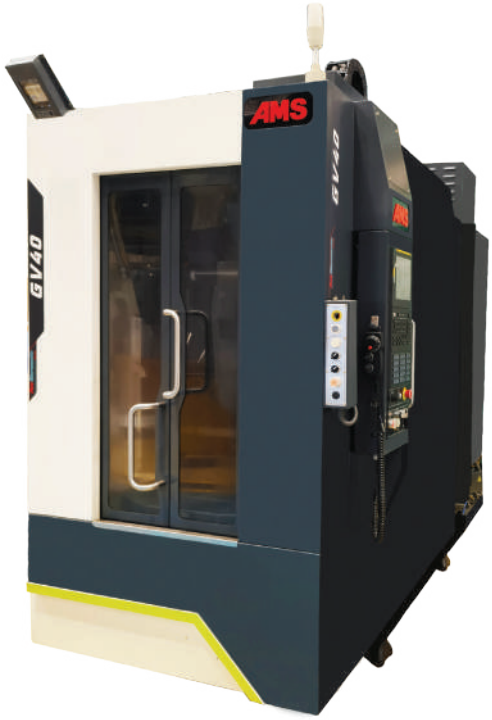
## COMPACT VMC GV40 FOR ENHANCED PRODUCTIVITY

High-performance Drill Tap Center with a small footprint is always a challenge. The solution has emerged as AMS GV 40, a high-performance and high-production Drill Tap Centre. It is a compact gantry-type machine, with a high-speed, high-torque BBT-30 spindle or Direct Drive HSK A 50 spindle with 20,000 rpm as an option. The machine features a Turn Table interface with 5 sec changing time, AI servo tuning, feed-forward function, and smart spindle load control to ensure high productivity and machining accuracies.

The GV40 features a table size of 760 mm x 400 mm, with a load-carrying capacity of 400 kg. Its strokes measure at 500 mm and 400 mm. It features rapid rates of 50 m/min for each axis. Additionally, it boasts a higher spindle power, with 18.5 kW, 15 kW, and 11 kW.

Its other features include a compact design (1,280 mm in width x 3,400 mm in depth); a fully enclosed 26-tool servo-driven ATC; a coolant thru spindle; and a looping system with 4 lines per pallet.

The machine is ideally suited for a wide array of component machining applications in the Automotive, Aerospace, and General Engineering industries.




**Ace Designers Ltd – Machining Centre Division**
**www.acemicromatic.net**
**Hall & Stall: 1/C-109**

### Why AMS?

AMS is the largest manufacturer of machining centers in India. The company offers a comprehensive range of products for machining components on a Drill Tap Centre (DTC). From Spark to GV40 and DTC-400XL to TCV-540, it provides solutions for machining varied sizes of components.

At PMTX 2024, the company is displaying its all-new GV 40 DTC that promises high performance and high production for a wide array of component machining applications. The focus is on maximizing the machining process, increasing flexibility, achieving smooth workflow and various types of automation.


**Electronica Mechatronics (I) Pvt Ltd**
**www.electronicaems.com**
**Hall & Stall: L-102**

COORDINATE MEASURING MACHINES

# EMERALD SERIES FOR PRECISION ENGINEERING

The Emerald Series is an innovative solution designed to address the most pressing challenges in machining while emphasizing its crucial importance.

Traditional machining methods often fall short when it comes to maintaining precision amidst fluctuating temperatures and complex workpiece geometries. Compatibility issues with probing systems and software further exacerbate the problem, leading to inefficiencies and costly errors. The Emerald Series offers a comprehensive approach to precision engineering that tackles these challenges head-on. Here's how:

**Adaptive technology:** With active temperature compensation, the Emerald Series adapts dynamically to environmental changes, ensuring consistent accuracy regardless of conditions.

**Seamless integration:** Compatible with any combination of Renishaw probing systems and boasting |++ connectivity, these machines effortlessly integrate into existing workflows, minimizing disruptions, and maximizing productivity.

**Stability and precision:** Featuring a granite bed with integrated Y-axis and high-precision ruby jet air bearings, the Emerald Series provides a rock-solid foundation for precise machining operations, eliminating vibrations and maintaining accuracy.

CNC CHUCKER MACHINES

# ZEBRA CNC CHUCKER

Jyoti CNC Automation has come up with a revolutionary CNC chucker machine, the Zebra. Its standout features include a compact design coupled with unparalleled productivity. With a travel of 300 mm on the Z-axis and 175 mm on the X-axis, the machine boasts a footprint of just 1900 x 1330 mm. This compact size optimizes floor space, offering a footprint approximately 25 percent smaller than other machines in this segment.

The machine is equipped with a high-performance electro spindle capable of delivering high torque precision turning operations. It offers a maximum spindle speed of 5,000 rpm and features a 12-station heavy-duty servo turret designed for heavy stock removal, fine surface finish, and extended tool life. The unique diamond-shaped tool disc enables the turning of larger-diameter jobs.

Despite Zebra being a compact CNC chucker, it offers a greater machining range with a maximum turning diameter of 320 mm. Designed with a TPM-friendly concept, it includes features such as automatic part loading windows, lube filling, and ease of chip evacuation. Engineered for optimal operator ease and boasting the ability to deliver impeccable surface finishes, Zebra stands at the forefront of precision turning technology. The series finds its wide successful applications for small to medium-sized components and is suitable for complex jobs with high productivity as well as better tool life.


**Jyoti CNC Automation Ltd**
**www.jyoti.co.in**
**Hall & Stall: G-107**


**Lakshmi Machine Works Ltd**
**www.lmwcnc.com**
**Hall & Stall: B-107**

HORIZONTAL TURNING CENTERS

## LMW'S S TURN I

S Turn I, a next-generation turning center, comes with an 8-inch chuck, a maximum diameter of 320 mm, and a maximum length of 300 mm. It has an 8-station hydraulic turret, a spindle speed of 4,500 rpm, and a spindle power of 5.5/7.5 kW.

This makes the machine suitable for a wide range of applications, from high-volume production runs to precision machining. S Turn I is an excellent choice for high quality, reliable turning capabilities and caters to industries, including Automobile, Fittings, Pumps & Valves, Oil & Gas, Foundry & Forging, General Engineering, etc.

CNC COORDINATE MEASURING MACHINES

## CRYSTA APEX V SERIES FROM MITUTOYO

Mitutoyo's 'Made In Japan' high-speed, high-accuracy CNC Coordinate Measuring Machine CRYSTA Apex V Series offers unmatched precision in achieving faster, more accurate inspection and quality assurance. The company's CMMs are suited for up to five-axis measuring and three-dimensional tolerances in a wide array of contact and non-contact applications. For applications like factory intelligence and advanced manufacturing, Mitutoyo coordinate measuring machines seamlessly integrate while delivering the reliable precision required.

Mitutoyo South Asia's customizable suite of MiCAT®, MCOSMOS®, and MSURF® integrated software solutions easily create measurement plans and generate reports for a variety of applications, from basic geometry measurement to the digitizing of complex profiles and 3D surfaces.

**Mitutoyo South Asia Pvt Ltd**
**www.mitutoyoindia.com**
**Hall & Stall: A-108**

**FlexGrip™**
**(Adept ProSign Pvt Ltd)**
**www.flexgrip.in**
**Hall & Stall: C-115**

WORKHOLDING SYSTEMS

## OFFERING SUPERIOR PERFORMANCE

FlexGrip™ high-precision Workholding System is exclusively designed and manufactured in India by Adept ProSign Pvt Ltd. This range of products is based primarily on Segmented Rubber Vulcanized Collets and Expanding Sleeves and the corresponding Collet Chucks and Expansion Mandrels. The range covers an extensive portfolio of products for ID and OD clamping in stationary/rotating as well as pull back/dead length configurations. The products find application in CNC Turning/VMC/HMC/Grinding/Gear Machining/other Special Purpose machine tools. The FlexGrip™ System offers superior performance in mass production as well as batch production environments owing to following distinctive features: • superior geometrical tolerances • quick setup change • pull back action against stationary end stop • true parallel/ line contact clamping • highly rigid clamping • alloy steel segments for clamping instead of spring steel •possibility of non-round/irregular shapes clamping • no clamping marks on machined surface • long working life.

Due to these features, FlexGrip system offers quick ROI not only for itself, but it also accelerates the ROI of the machine on which it is used.

# FACTEQ 2024: A FACTORY REVOLUTION

Organized by Indian Machine Tool Manufacturers' Association (IMTMA), the one-of-a-kind factory equipment expo FACTEQ 2024 is poised to push boundaries and revolutionize factory operations. Co-located with Pune Machine Tool Expo (PMTX), the event is scheduled from May 23-26, 2024, at Pune International Exhibition and Convention Centre, in Moshi, Pune.

Source: Magic Wand Media

With enhancing productivity and efficiency as the key goal, this future-forward expo will witness several industry leaders gathering to explore the latest advancements poised to transform the industry. The event will focus on supporting the factories of tomorrow in construction, maintenance, and modernization plans by showcasing an array of solutions for improving technology and factory environments.

NITYASREE KUMARASWAMY
Staff writer
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### Boosting demand and efficiency

The necessity of integrating advanced technology to boost plant and factory efficiency is the event's overarching vision. It emphasizes the use of cutting-edge technology to achieve energy efficiency and encourage localized manufacturing processes. This, in turn, will reduce the reliance on imports and promote domestic machine tools and factory equipment, while ensuring a sustainable future.

Additionally, India has taken the front seat as a global hub in achieving a sustainable and resilient Manufacturing sector. With a favorable business climate, extensive infrastructural development, and government initiatives like produc-

"We have been a regular participant and patron of IMTEX for the last 15 years and we have done several exhibitions under the IMTMA banner."

**PS GANESAN**
**General Manager**
**Kabelschlepp India Pvt Ltd**

**Energy-saving products, logistics equipment, maintenance products, safety products, and various other solutions for factories will be showcased at FACTEQ 2024.**

tion-linked incentives (PLI), the country has drawn in significant foreign investments and the entry of large firms into the sector. The expo will feature how the country's Manufacturing industry is in sync with global trends and transforming to meet future demands.

### Delivering solutions down to the T

Exhibitors will showcase a variety of products and services to raise operational standards, commission higher-efficiency factories, and promote sustainability within the Manufacturing sector. "Energy-saving products, logistics equipment, maintenance products, safety products, and various other solutions for factories will be showcased in this co-located event," shares Jibak Dasgupta, Director General & CEO, IMTMA and Bengaluru International Exhibition Centre (BIEC). Also displayed at the event are air and water systems, security solutions, sustainable technologies, factory furniture, electrical lighting solutions, information systems, and hardware.

Additionally, Rajendra Rajamane, President, IMTMA, states, "The event will also have its focus on metrology equipment."

### Cable drag chain systems

Tsubaki Kabelschlepp GmbH is a company known for inventing cable carriers or cable drag chain systems in 1954. With seven decades of expertise in designing, manufacturing, and applying these systems, the company is at the forefront with 13 subsidiary companies and 40 representations around the globe.

According to PS Ganesan, General Manager, Kabelschlepp India Pvt Ltd, "We have been a regular participant and patron of IMTEX for the last 15 years and, we have done several exhibitions under the IMTMA banner."

He further outlines the benefits of participating in the event, "We are looking to tap industries in manufacturing such as the original equipment manufacturers/special purpose machine manufacturers/manufacturers of cranes/manufacturers of packaging machines/electrical panels, etc."

The exhibition will display a range of new products from the company's cable drag chain systems lineup, including steel, plastic, and hybrid materials. Of particular interest are the drag chains designed for robots and flexible cables for drag chain applications.

### IIoT solutions

With the renowned company, Wipro Linecraft AI participating in the event, visitors are bound for a treat. Attendees

"We have a plug-and-play solution for manufacturing businesses starting their digitization journey. It gives instant access to the state of the entire enterprise at one glance. Features like Part Tracing and Condition Monitoring (Alerts) are also available off the shelf."

**JYOTIRMOY RAY**
**Marketing Head**
**Wipro Linecraft AI**

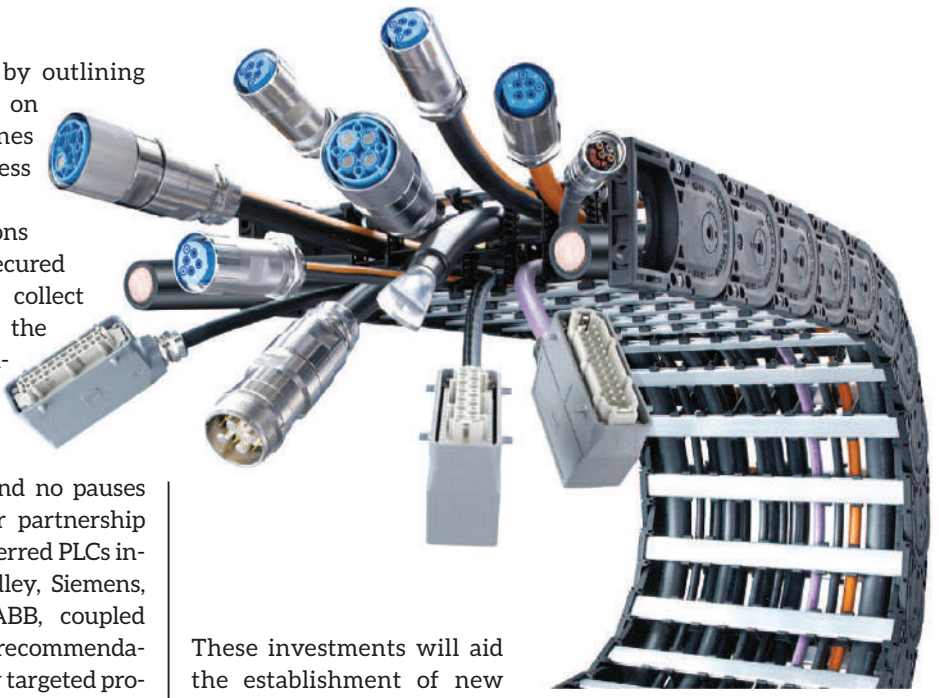
can immerse themselves in the company's live demonstrations and case studies that will showcase how its Industrial Internet of Things (IIoT) solutions can be applied to the real world. The solutions will help pinpoint productivity issues, identify problematic areas, and suggest improvements based on machine data.

Jyotirmoy Ray, Marketing Head, Wipro Linecraft AI, states, "We also have a plug-and-play solution for manufacturing businesses starting their digitization journey. It gives instant access to the state of the entire enterprise at one glance. Features like Part Tracing and Condition Monitoring (Alerts) are also available off the shelf."

The innovation and unique selling point (USP) of the products lie in their optimization opportunities that are often overlooked by human observation. Powered by AI, it elim-

inates guesswork by outlining critical machines on manufacturing lines for targeted process optimization.

Ray outlines reasons the company has secured global trust, "We collect data directly from the machines without any manual intervention. There are no changes in PLCs and no pauses in production. Our partnership with industry-preferred PLCs including Allen Bradley, Siemens, Mitsubishi, and ABB, coupled with AI-driven recommendations, enable highly targeted productivity improvement efforts."



Source: Kabelschlepp India Pvt Ltd

## A global platform

As the country's Manufacturing industry targets a US$ 1 trillion contribution to the economy by 2030, the growth will boost the demand for new factories and upgrades to existing facilities.

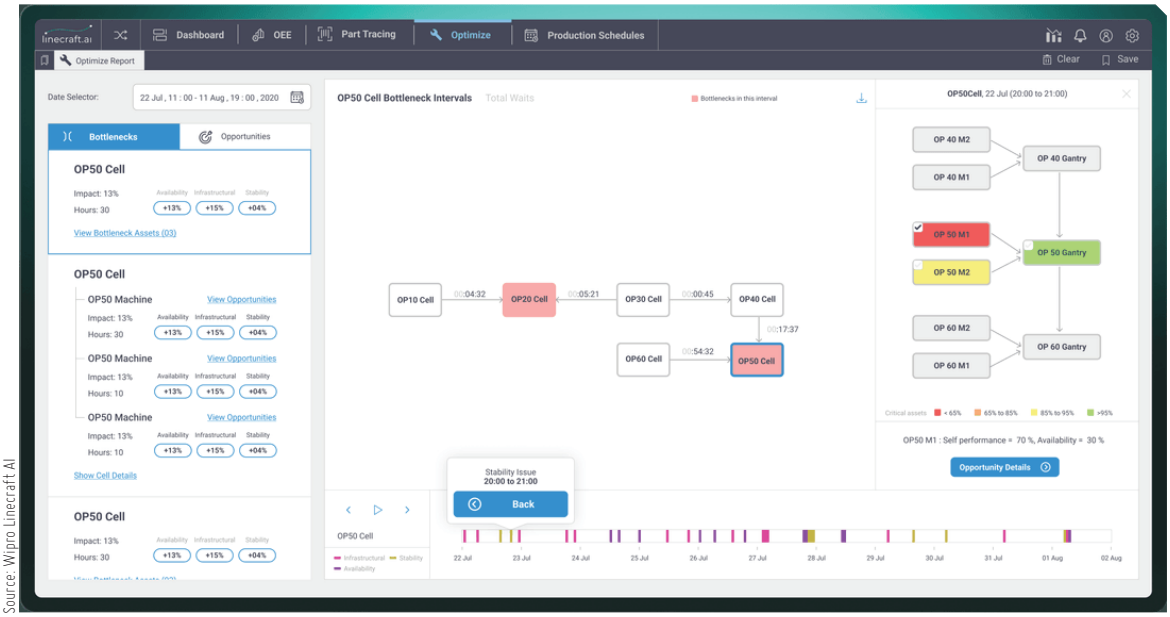
The expo expects increased investments in sectors like Energy Storage, Green Technology, Biotechnology, Semiconductor Manufacturing, and more. These investments will aid the establishment of new factories by international firms, therefore, strengthening the country's growth trajectory and export goals.

With a massive industry impact expected, the event will witness an extensive visitor profile including chief executives, factory owners, government officials, quality assurance heads, service engineers, and other key roles within the Manufacturing sector. This diverse mix reflects the industry's interest in sustainable and pioneering solutions that will be showcased at the expo.

## The future starts here

The event is expected to change the course of the Manufacturing industry by offering valuable networking opportunities and the latest insights into the sector. The event promises to dissect the endless opportunities and avenues for innovation in Aerospace, Automobiles, Defence, Pharma, and other sectors.

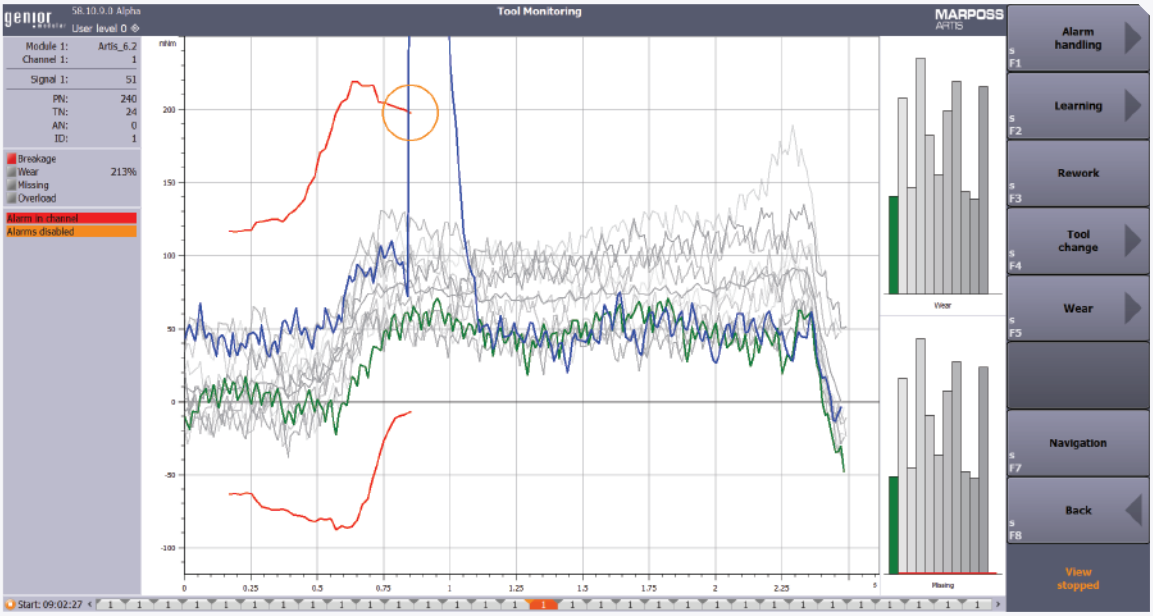
**As the country's Manufacturing industry targets a US$ 1 trillion contribution to the economy by 2030, the growth will boost the demand for new factories and upgrades to existing facilities.**




Source: Wipro Linecraft AI

# FOR RESPONSIBLE PRODUCTION

Marposs' New Smart Factory SW is intuitive, web-based, and equipped with new features. It consists of five modules, each specializing in one aspect of a factory.




Source: Marposs

C-THRU4.0: a completely new suite by Marpos with five modules for responsible production processes.

To provide data evidence for decisions and assist in the optimization of a factory, Marposs has introduced its new Smart Factory SW. For over 10 years, Marposs' C-THRU4.0 has shown its capabilities to improve the machining process, avoid scrap, and provide quality evidence for the components.

The new suite maintains the C-THRU4.0 name but is otherwise completely new. It is intuitive, web-based, and equipped with new features. It consists of a suite of modules, with each specializing in one aspect of a factory.

## The five modules

There are five modules, each oriented to help make the production process responsible:

- **C-Analyze** is designed to optimize the work of the machines (process, setup, lines, quality problems), to provide traceability of the process and for predictive maintenance.
- **C-Tooling** is to optimize the tooling, including the tool life, usage, and choice.
- **C-OEE** is meant to prioritize and analyze the causes of production loss, mostly productivity and machine uptime.
- **C-Energy** is the tool used to monitor and optimize the energy consumption of all equipment in a factory. It is also designed for the fulfilment of ISO 50001:2018.
- **C-Probe** facilitates centralized reading of touch probe measurements and establishes limits to verify the machining results across the entire shop floor.

This unique suite of SW tools for the technical personnel of a factory is designed to highlight process anomalies. It uses a friendly graphic interface to identify and choose ways to optimize. This reiterative process leads to an increase in the efficiency of a factory in each of the module areas.

Other advantages of the software suite include offering insights into factory operations and verifying the effectiveness of improvement measures, as well as benchmarking against past performance or between different lines, machines, and shifts.

Source: Marposs

# MACHINE, MINDS, AND MOMENTUM

Ending on a successful note, Taiwan International Machine Tool Show (TMTS), organized by Taiwan Machine Tool & Accessory Builders' Association (TMBA), provided a one-of-a-kind experience for the machine tool industry with the latest technological advancements in sustainability. The event was held at Taipei Nangang Exhibition Center (TaiNEX), Taiwan, from March 27-31, 2024.


Source: TMBA

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Taiwan International Machine Tool Show (TMTS) served as a well-rounded platform that facilitated connections between manufacturers and over 4,000 international buyers from 47 countries, with a clear goal of leveraging business opportunities and fostering strategic partnerships. Furthermore, this year's event attracted more than 55,000 visitors, who explored the event's vast offerings.

## Diverse solutions, global gathering

The exhibition witnessed the participation of more than 631 exhibitors, occupying 3,350 booths. Exhibitors displayed a wide range of offerings, from hardware to software, thus offering integrated services and comprehensive solutions that catered to diverse procurement needs.

The event featured renowned domestic manufacturers and 17 cross-industry associations. Patrick Chen, Chairman, TMBA, acknowledged that despite challenges from geopolitical factors and below-expectation global economic recovery in recent years, Taiwanese exhibitors showcased exceptional performance in digitization and green energy conservation.

Moreover, leading companies from countries like Germany and Switzerland exhibited and shared the latest industry trends along


Source: TMBA

"For the first time, TMBA has collaborated with VDW and VDMA to establish the umati Zone in Taiwan. With enthusiastic participation from domestic manufacturers and R&D units, 26 companies and over 50 machines are connected, demonstrating a cross-domain intelligent ecosystem. This not only showcases the digital transformation capabilities of Taiwanese companies but also reflects TMBA's efforts in aligning industry standards with international norms."

**Second from Left: PATRICK P CHEN, Chairman, Taiwan Machine Tool & Accessory Builders' Association (TMBA)**

**Display categories included metal cutting machines, metal forming machines, machine tool accessories, components and parts, hydraulic and pneumatic components, electronic control, and drive systems.**

with global perspectives on technological developments. Key exhibitors included Goodway Group, Hiwin Group, YCM Alliance, Takisawa Machine Tool Co Ltd, Victor Taichung, Tongtai Group, Quaser Machine Tools Inc, TPI, Fair Friend Group (FFG), Buffalo Machine Co Ltd, Siemens, Heidenhain, and FANUC Ltd, among others.

Display categories included metal cutting machines, metal forming machines, machine tool accessories, components and parts, hydraulic and pneumatic components, electronic control, and drive systems. It also showcased auxiliary equipment, tool holding & work holding devices, cutting tools, measuring systems, smart manufacturing systems, quality assurance, industrial robots, controllers, related software such as computer-aided design (CAD), and other associated equipment and technologies.

## Riding the trends wave

Exhibitors at the event highlighted five major trends that outlined the industry's direction. Firstly, there was a strong emphasis on tailoring extensive solutions to meet specific market demands. Secondly, exhibitors integrated green energy-saving technologies into their designs, leveraging smart technologies for sustainability. Thirdly, smart energy management practices were adopted for more efficient and sustainable processes.

The implementation of a dual-axis transformation in Product Lifecycle Management (PLM), spanning from product design to eco-friendly packaging and transportation was evidently seen. Lastly, exhibitors were committed to international energy-saving standards like


Source: TMBA

ISO 14955, ISO 14064-1/-2, and ISO 14067. Overall, the event reflected a shift towards a more sustainable and environmentally conscious approach in the Machine Tool industry.

## Green schemes, digital screens

The overarching theme of 'DX and GX for a Sustainable Future' permeated every aspect of the exhibition and stressed on the industry's commitment to a dual-axis transformation; digital and green.

For several years, TMBA has led efforts in carbon reduction within the industry. In 2022, the association released Taiwan's inaugural carbon reduction handbook for the Machine Tool sector. Following this, in 2023, it set up Taiwan's first carbon reduction supply chain. Its latest initiative included the introduction of Product Category Rules (PCR) for six key product categories from 2024, which paved the way for a carbon footprint database in the industry.

To urge machine tool manufacturers to engage with the green economy trend, the event introduced the Machine Tool Energy Saving Label Evaluation. This initiative aimed to promote the development and exhibition of energy-saving equipment or components to showcase its potential in fostering green transformation. A total of 28 companies presented 49 products for evaluation, out of which 18 products, including 3 components, received the Golden Energy Saving Label and 29 products earned the Silver Energy Saving Label.

"We received an unprecedented number of business visitors at TMTS 2024. More and more Indian customers are asking for and purchasing machines from Taiwan instead of China. Therefore, the Indian market is one of our main focus markets, and we are looking for dealers and distributors for our products."

**JOSEPH WU**
**Vice President**
**Benign Enterprise Co Ltd**

Regarding digital transformation, the event launched the TMTS app as its core offering, which provided visitors with customized services. The app integrated forum activities, buyer registration systems for business-to-business matchmaking, offered reservations for Michelin-starred restaurants, and shuttle services within the exhibition venue. Real-time booth mapping and navigation also enhanced visitors' ability to navigate the venue.

## Eco-chains: Interconnecting industries

The thematic emphasis of the event was translated into an integrated exhibition space concept designed around an 'ecosystem' concept. The concept connected machine equipment, components, and end-user markets in various roles and scenarios throughout the supply chain.

These themes were integrated into 10 key elements and 9 thematic exhibition zones. Through collaboration with cross-industry associations, specialized exhibition zones like the Metal Cutting Tool Pavilion, Bearing Pavilion, 3D Printing Pavilion, German Pavilion, Swiss Pavilion, and others were created.

Additionally, the organizers collaborated with German Machine Tool Builders' Association (VDW) and German Mechanical Engineering Industry Association (VDMA) to introduce the Universal Machine Technology Interface (umati) zone at the event. This initiative displayed more than 50 interconnected machines during the exhibition,

**The event marked the beginning of a budding relationship between Taiwan and India, with a significant presence of Indian visitors at numerous booths looking to finalize deals.**


Source: Benign Enterprise Co Ltd


Source: TMBA

"The 2024 TMTS exhibition was our third major exhibition after COVID-19 pandemic. Compared to the previous two exhibitions, we could see many buyers from different countries, indicating that many countries have already resumed their commercial activities to their previous levels. This year, there has been an increase in Indian buyers compared to last year."

**ZACHARY TSAI**
**General Manager**
**Campro Precision Machinery Co Ltd**

"Visitors from India were particularly interested in our latest Wire Cut EDM products, the UA432L, the NV643L, and automatic solutions of Sinker EDM for various industries. We are open to exploring partnerships with suitable partners who can effectively represent CHMER brand products and support our customers in India."

**BRAD WANG**
**General Manager**
**CHMER (Ching Hung Machinery & Electric Industrial Co Ltd)**

"Technologies like artificial intelligence (AI), industrial automation, IoT, smart factories, and robotics are being increasingly adopted to meet competition from global giants. Machine tool companies, being heavily dependent on technologies, need to harness the benefits of the evolving new technologies that are designed to make manufacturing easier and quicker."

**D SHANMUGASUNDARAM**
**Managing Director**
**S&T Group of Companies**

**The app integrated forum activities, buyer registration systems for business-to-business matchmaking, offered reservations for Michelin-starred restaurants, and shuttle services within the exhibition venue.**

creating an immersive experience for visitors.

## Minds in motion: Expert dialogues

Several forums were organized that featured domestic and international experts, including Jack Cheng, CEO, Mobility In Harmony Consortium; Andy Tsai, Vice Chairman, Yeong Guan Energy Technology Group Co Ltd; and Prof Dr-Ing Christian Brecher, Laboratory for Machine Tools and Production Engineering WZL, RWTH Aachen University.

It also included Dr Alexander Broos, Head, Research and Technology, VDW; Kevin Wu, CEO, Nice Garden Industrial; Jenny Yao, Consultant, Development Dimensions International, Inc; and Yi-Te Zhu, Founder Skycrown Co Ltd.

## Foot in the door

The event marked the beginning of a budding relationship between Taiwan and India, with a significant presence of Indian visitors at numerous booths looking to finalize deals. This indicated a valuable opportunity for Taiwanese

Source: TMBA

"The visitors from India were impressed with our products, including chip conveyor with filtering system and lamella bellows. We believe establishing a strong partnership with a local distributor will help us effectively reach and serve customers in India."

**CHLOE WANG**
**Sales Section Manager**
**Keyarrow (Taiwan) Co Ltd**

"Taiwan has been good with technical expertise in various fields. We discovered a few technologies related to workholding and advanced machining. The exhibition offered a wide spectrum of innovations to be explored."

**SIDDHU JOLAD**
**Managing Director**
**RadCAM Technologies Pvt Ltd**

companies to enter and establish a foothold in the Indian market. Additionally, many exhibitors shared a common interest in seeking dealers and distributors to aid their entry and enhance their services in the market.

Joseph Wu, Vice President, Benign Enterprise Co Ltd, observed that several visitors from India were specifically interested in higher-quality and customized machines, which reflected a growing demand for Taiwanese products. "The Indian market is one of our main focus markets, and we are looking for dealers and distributors for our products," he added.

Zachary Tsai, General Manager, Campro Precision Machinery Co Ltd, shared, "This time there is an increased interest in Vertical Machining Centers, with some seeking partnerships."

Brad Wang, General Manager, CHMER (CHING HUNG MACHINERY), mentioned that their booth attracted a considerable number of business visitors from over 10 countries, including India. "They were particularly interested in our latest Wire Cut EDM products, UA432L and NV643L, and automatic solutions of Sinker EDM for various industries," he explained.

Chloe Wang, Sales Section Manager at Keyarrow (Taiwan) Co Ltd, disclosed that the company welcomed enthusiastic visitors eager to explore its chip conveyor featuring a filtering system and lamella bellows.


Source: S&T Group of Companies

## The other end of the spectrum

Exploring the opportunity for a strategic partnership between the countries from a different perspective, D Shanmugasundaram, Managing Director, S&T Group of Companies, noted that the Indian machine tool market is on a steady growth trajectory toward becoming a global manufacturing hub.

"Technologies like artificial intelligence (AI), industrial automation, Internet of Things (IoT), smart factories, and robotics are being increasingly adopted to meet competition from global giants," he added. According to him, companies in the sector must leverage these progressive technologies for streamlined and efficient manufacturing processes. "Smart factories are an integration of all the above technologies and integrating them into operations will help the invested company deliver meaningful results," he explained.

With that in mind, Siddhu Jolad, Managing Director, RadCAM Technologies Pvt Ltd, highlighted Taiwan's strong technical expertise across various fields. He shared that they engaged in discussions with three Taiwanese companies specializing in workholding, advanced machining, grinding machines, and tool manufacturing at the event.

**Exhibitors at the event highlighted five major trends: tailoring solutions to market demands, integrating green energy-saving technologies, adopting smart energy management practices, implementing dual-axis transformation in PLM, and adhering to international energy-saving standards.**

# Company Index



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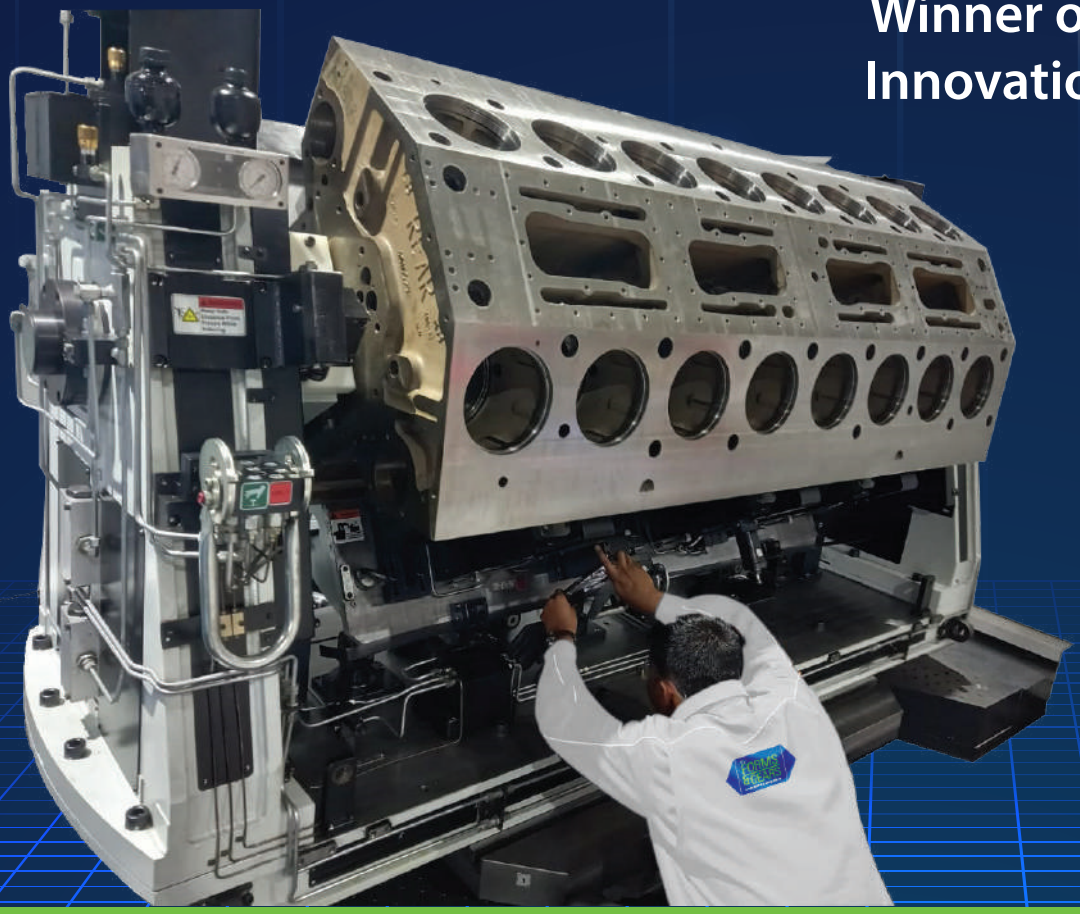

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