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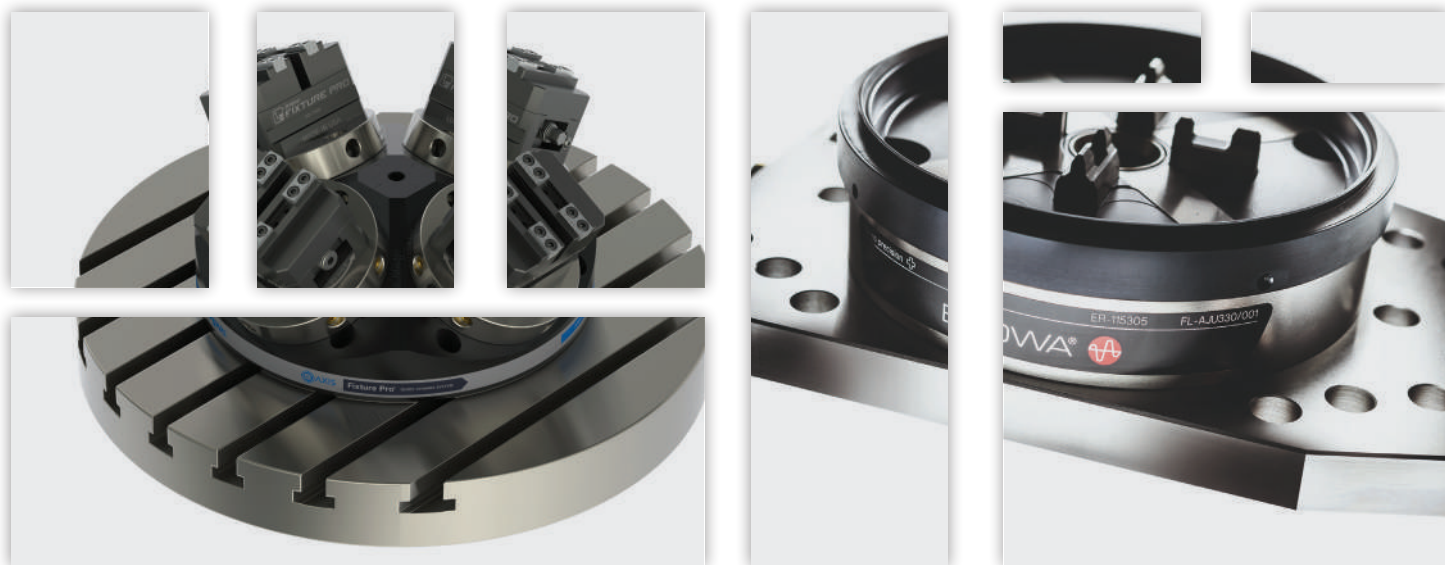


Indian Machine Tool
Manufacturers' Association

In Association with

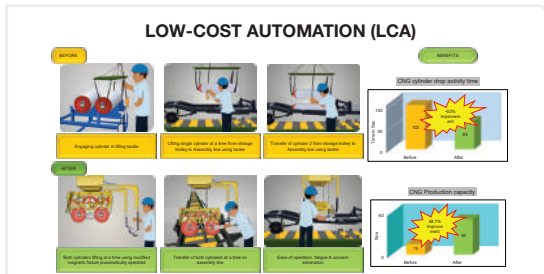


ADDRESSING MACHINING CHALLENGES



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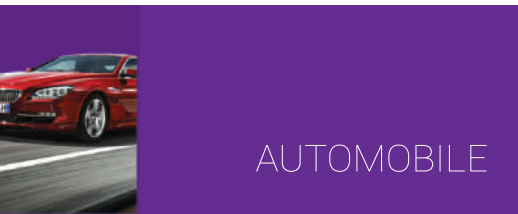
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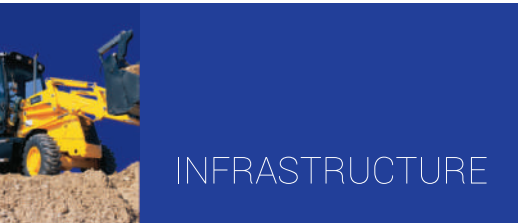
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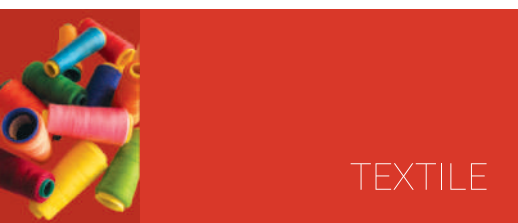
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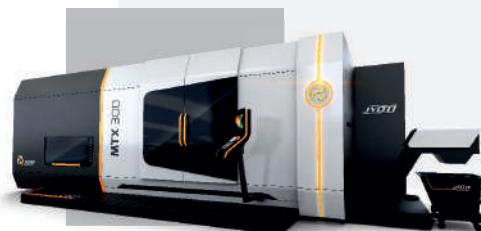
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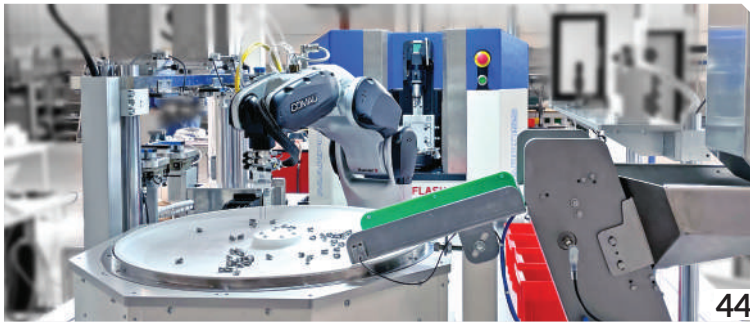
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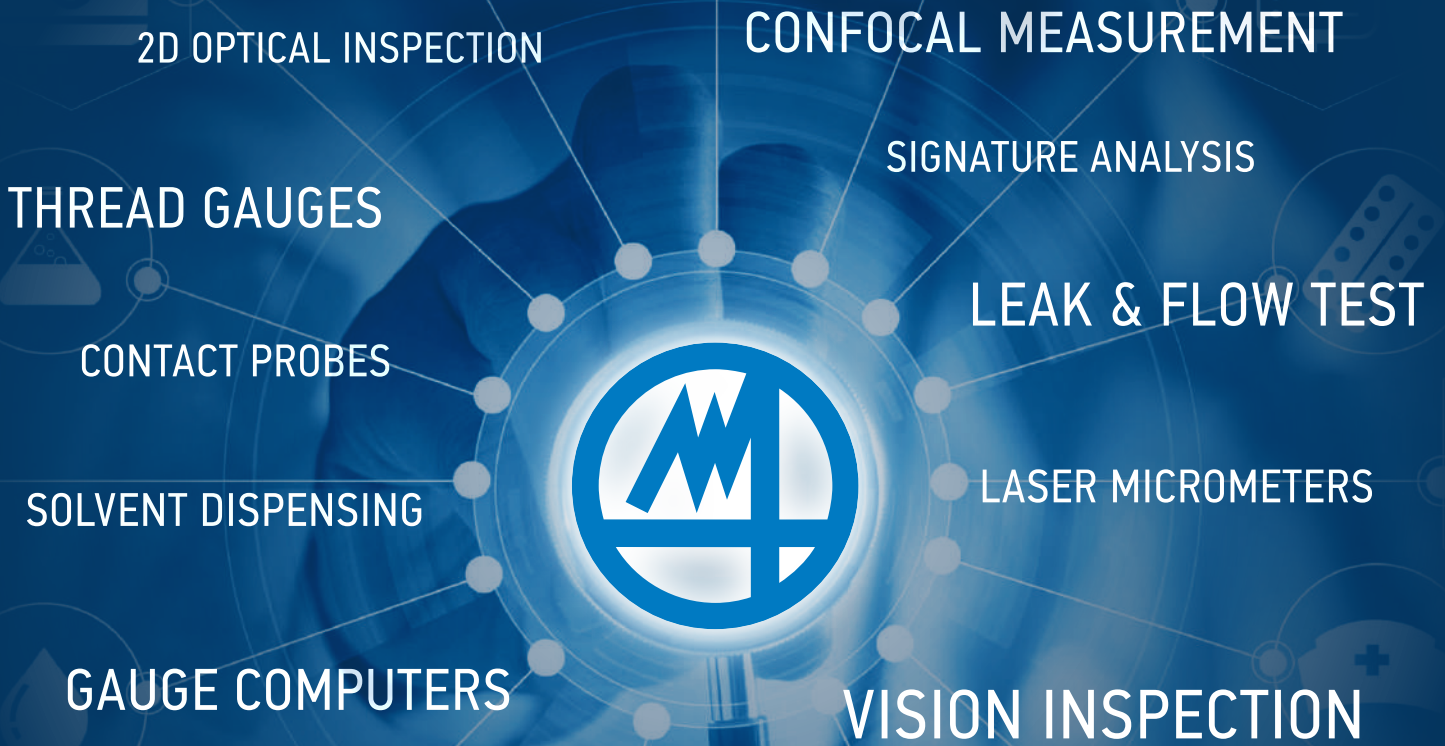
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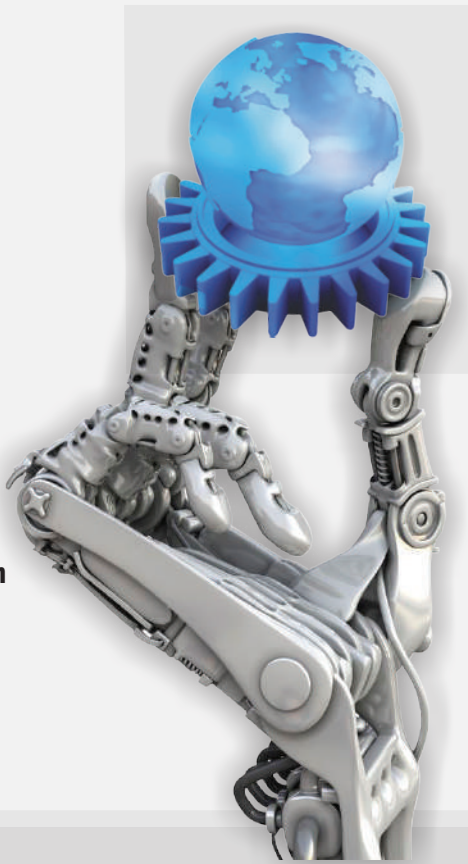
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RAVI RAGHAVAN
PRESIDENT
INDIAN MACHINE TOOL
MANUFACTURERS' ASSOCIATION
(IMTMA)

Dear Reader,

India's Manufacturing industry has seen expansion at its quickest pace in the last four months, driven by growth in new orders and output, signaling robust demand and an encouraging outlook.

India continues to be one of the fastest-growing economies across the globe. With G-20 Presidency, it is positioning itself on a strong footing to be independent, futuristic, prosperous, and inclusive.

The Indian Machine Tool industry performed well during FY 2022-23. The industry was able to export presses, lathes, vertical machining centers, horizontal machining centers, and cylindrical grinding machines.

A larger demand from user industries and emerging sectors, promotion of infrastructure, transportation, and mobility, as well as an increase in the exports of Indian manufactured goods, were factors that contributed to the increase in the consumption of machine tools in the domestic market.

Looking forward, I urge our industry to look at the prospects in the new and emerging sectors. I am glad to state that our industry is aligning itself with the needs of the Medical industry and Manufacturing sector-specific machines.

Indian Machine Tool Manufacturers' Association (IMTMA) is organizing Delhi Machine Tool Expo from August 24-27, 2023, at Pragati Maidan, New Delhi.

The Indian Machine Tool industry performed well during FY 2022-23. The industry was able to export presses, lathes, vertical machining centers, horizontal machining centers, and cylindrical grinding machines.

A new initiative this year would be Machine Tool Connect, a 2-day B2B expo for machine tool and manufacturing technologies in Kolhapur on October 8 and 9, 2023.

Happy reading.

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JIBAK DASGUPTA
DIRECTOR GENERAL & CEO
INDIAN MACHINE TOOL MANUFACTURERS' ASSOCIATION

Dear Readers,

Indian Machine Tool Manufacturers' Association (IMTMA) is delighted to inform you about an important decision that the Association has taken for the benefit of the readers of Modern Manufacturing India (MMI) magazine from this edition onwards.

Advanced Machine Tool Testing Facility (AMTTF) at Central Manufacturing Technology Institute (CMTI), Bengaluru, and Advanced Manufacturing Technology Development Centre (AMTDC) at Indian Institute of Technology (IIT) Madras are two premier institutions doing pathbreaking work in the manufacturing technology space.

MMI would publish the research that is happening in these institutions. This edition contains an article from AMTTF which is serving the Machine Tool and Manufacturing industries by testing the machine tools and equipment as per Indian and international standards.

This edition contains an article from AMTTF which is serving the Machine Tool and Manufacturing industries by testing the machine tools and equipment as per Indian and international standards.

The present issue also presents an article from IIT Madras on the ongoing research in the development of new-generation abrasive tools and advanced grinding technologies.

We also have an informative article on sustainable manufacturing with rich insights from industry experts on their sustainability journey in manufacturing. I hope the readers can connect with it.

IMTMA also publishes data reports for the Manufacturing industry, which can be accessed digitally. I urge you to share your valuable insights which will help us in understanding your needs and improvizing accordingly.

Happy reading!

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Soumi Mitra

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TODAY'S ACTIONS SHAPE TOMORROW'S FUTURE

In the present day's fast-paced technological landscape, Artificial Intelligence (AI) being a boon or bane continues to fuel debates. It could take a long time to arrive at a final verdict.

For the moment, it is overwhelming to see the global technology community acting in unison to harness AI's potential while mitigating its risks. With the stakeholders of AI - creators and end-users, coming together, it is clear that the emphasis is to ensure safer and sustainable use of AI in the future.

As per Stanford University's 2023 AI Index report, 37 bills were passed into law to regulate the use of AI worldwide in 2022. To begin with, the United States enacted nine laws, followed by Spain with five and the Philippines with four. There is a worldwide ongoing collective commitment towards addressing the responsible deployment of AI technologies.

In sync with its global counterparts, the Indian Institute of Technology Madras (IIT Madras) has established an interdisciplinary research center - Centre for Responsible AI (CeRAI) to ensure the ethical and responsible

development of AI-based solutions. Tech giant Google became the first platinum member of this consortium and contributed US\$1 million to the center.

Having said that, the potential AI holds to revolutionize research and development and foster innovation in the manufacturing sector cannot be underplayed.

The Indian manufacturing sector is spearheading technological advancements like never before.

As a conduit, we are honored to curate this MMI issue, featuring pathbreaking technologies and inspiring stories that will propel the manufacturing sector to the next level.

As always, we eagerly seek your invaluable feedback to deliver content that is exclusive and sought after in the industry.

"Robots are not going to replace humans; they are going to make their jobs much more humane. Difficult, demeaning, demanding, dangerous, dull - these are the jobs robots will be taking."

- Sabine Hauert



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THE LUMINARIES BEHIND IMTMA

Indian Machine Tool Manufacturers' Association's (IMTMA) dedicated team has been tirelessly working for the Indian machine tools industry to attain a reputed global stature. It's important to recognize the unsung heroes behind the scenes whose contributions have been essential for the industry's success. This is a tribute to their invaluable efforts. The second in the series has its focus on Shantanurao Laxmanrao Kirloskar, one of India's iconic industrialists who established the Kirloskar Group and the township of Kirloskarwadi.



Late Shantanurao Laxmanrao Kirloskar

Kirloskar, one of India's iconic industrialists who established the Kirloskar Group and the township of Kirloskarwadi. His company, The Mysore Kirloskar Ltd, was one of the earliest machine tool companies in India to join IMTMA represented through MB Jambhekar who became the President of IMTMA, following the unfortunate demise of Sir Dhunjishaw Bomanji Cooper. His valuable guidance and efforts enabled the Association to be established on sound lines with recognition from the Government of India and the machine tool fraternity.

SL Kirloskar was the President of IMTMA between 1956 and 1963. It was the period when India embarked on its nation-building journey and IMTMA was making its presence felt in industry circles. The Association, still in its formative years, was working with a three-pronged vision - to develop the Indian Machine Tool industry, scale down reliance on imports, and enable India to become one of the top five machine tool-building nations.

He actively worked closely with the Government of India to safeguard and promote the interests of the Indian Machine Tool industry. IMTMA made several representations to the Government of the day for restricting the imports of machine tools for

Right from its formation in the year 1946, the Indian Machine Tool Manufacturers' Association (IMTMA) has endeavored to strengthen the Indian Machine Tool industry. Several leading visionaries have steered a rather young IMTMA onto the path of modernizing India's manufacturing industry and achieving self-reliance in machine tools.

Modern Manufacturing India (MMI), in a series of columns, is recognizing the contributions of the eminent industry stalwarts who have played a scientific role in advancing the Machine Tool industry, the Manufacturing industries, and the Association.

An ode to SL Kirloskar

This column is dedicated to Shantanurao Laxmanrao (SL)

Source: IMTMA

which indigenous capability was available. Additionally, they requested the release of raw materials and import licenses.

Initiation of technical seminars

Kirloskar, along with DS Mulla, represented IMTMA on the Machine Tool Committee appointed by the Government in 1956. As a result of his efforts, the Government continued the policy to restrict imports for which indigenous alternatives were available which helped to stabilize the industry and foster its growth.

The Association launched the first composite brochure with pictures and technical details and specifications of the various types of machine tools manufactured by leading member firms. This was shared extensively with user industries and foreign embassies. The first-of-its-kind Technical Seminar was initiated during Kirloskar's presidency. Papers on technical subjects pertaining to the Machine Tool industry were read and discussed. Interestingly, it was during Kirloskar's tenure that the seeds for setting up training centers for imparting skill sets to workers of the Machine Tool industry were sown. IMTMA, keeping in


view the paramount interests of the country, involved itself in setting up training facilities on the lines of the one set up at Hindustan Machine Tools. This, in due course, helped in churning out high-skilled professionals, including tool makers for various industries.

Navigating challenges with ease

The year 1962 is etched in the annals of Indian history. It was the year when the country had to defend itself against China. The war had created an emergency and the Indian Machine Tool industry was called upon to play a significant role. Machine tool builders were directed by the Government to increase production by at least 30 percent at a quick rate. Kirloskar met the then Union Minister for Steel and Heavy Industries, Shri C Subramaniam, and while presenting the contribution of the Association towards the National Defence Fund, enumerated the various intricacies faced by the industry.

It is pertinent to note that both the production and the demand for machine tools recorded substantial increases when Kirloskar helmed IMTMA. Many of

the member companies stepped up their production to meet the rapid rise in demand for machine tools which happened due to the increasing emphasis on industrial development. Indian machine tool makers also began exporting to countries like West Germany, New Zealand, the Persian Gulf, Ceylon, Burma, and Malaya. The development work on new and more advanced types of machine tools continued which advanced the nascent Machine Tool industry to greater heights.

A global thinker and an enterprising individual, Kirloskar had a self-belief in India's potential and worked towards making the industry competitive. He was awarded the Padma Bhushan in 1965 for his contributions to trade and industry. In 2003, Shri Atal Bihari Vajpayee, the former Prime Minister of India, released a commemorative postage stamp on SL Kirloskar, marking the 100th anniversary of his birth. IMTMA considers itself extremely fortunate to have been guided by luminaries such as SL Kirloskar in its growth path. 

Much of the information taken from IMTMA Annual Reports, 1946 - 1963

A global thinker and an enterprising individual, Kirloskar had a self-belief in India's potential and worked towards making the industry competitive.



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INDIA STANDS FIRM AMONG UNCERTAINTIES

In the Indian economic outlook, the manufacturing sector shows signs of growth while the GDP growth rate has moderated.

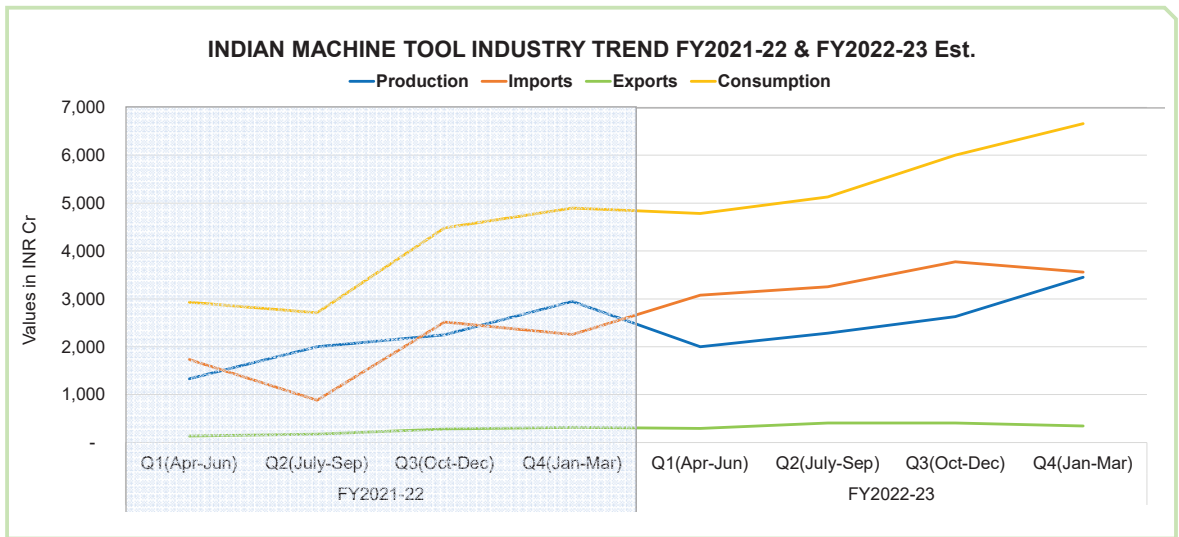


Table 1. Indian Machine Tool Industry Trend

The Indian Machine Tool industry's performance is an encouraging sign for the country's economy, which is showing signs of persistent growth despite global uncertainties and challenges.

India's Manufacturing sector saw a growth rate of 14.8 percent and a capacity utilization ratio of 73.5 percent in the first half of the fiscal year (FY2023), according to data from National Statistical Office (NSO). The economy is showing signs of recovery, with purchasing managers' index (PMI) for manufacturing and services increasing and credit growth remaining high. In the Automobile industry, retail sales grew by 15.9 percent during April-January FY23.

The country's real GDP growth in Q3 2022-23 moderated at 4.4 percent YoY, which is lower than the previous quarter's 6.3 percent YoY growth, due to the global slowdown and sluggish domestic demand. Despite this, India's GDP growth has surpassed pre-pandemic levels by 11.5 percent. Analysts' forecasts indicate GDP growth of 5.5-6.4 percent YoY for FY2023-24.

In February 2023, high-frequency indicators showed mixed results, with some improvements while others contracted. The easing of supply chain pressures combined with inflationary pressures and monetary tightening contribut-

ed to this trend. The average CPI inflation for FY23 came at 6.6 percent as compared to 5.5 percent in FY22. While the IIP continued to inch upward due to monthly improvements in manufacturing and electricity, auto sales declined across all segments except electric vehicles (EV).

Indian Machine Tool Industry Outlook: Strong Growth with Increased Imports and Exports

The Indian Machine Tool industry has been performing well, with the latest data indicating that total production in FY2022-23 surpassed ₹10,300 crore (US\$ 1.3 billion), a 11 percent growth from the previous year. The total orders booked for FY2022-23 are estimated to have surpassed ₹12,200 crore (US\$ 1.4 billion), showing a 20 percent growth from the previous year.

The machine tool imports for FY2022-23 were estimated to have increased by over 85 percent reaching ₹13,671 crore (US\$ 1.1 billion) compared to low-based imports in FY 2021-22. The top five machine tool types imported in FY2022-23 were press-

es, vertical machining centers, lathes, laser cutting machines, and horizontal machining centers, with presses being the highest accounting for 13 percent of the total imports.

On the other hand, total machine tool exports in FY2022-23 were valued at ₹1,463 crore (US\$ 186 million), showing a considerable increase from the previous year. The top five machine tool types exported in FY2022-23 were presses, lathes, vertical machining centers, horizontal machining centers, and cylindrical grinding machines and presses contributed 23 percent of the total exports.

Overall, the consumption of machine tools in India is estimated to have increased by over 43 percent, reaching ₹22,582 crore (US\$ 2.9 billion) in FY2022-23 compared to FY 2021-22. Higher demand from user industries and emerging sectors, promotion of infrastructure, transportation, and mobility, and increase in exports of Indian manufactured goods are the key factors that have contributed to the increase in consumption of machine tools in the domestic market.

Source: Data Analytics & Policy Group IMTMA

Source: IMTMA



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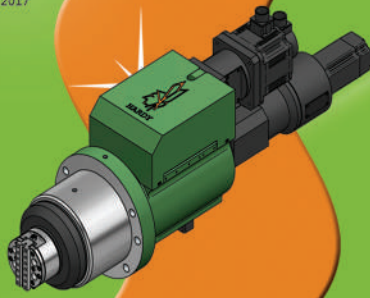
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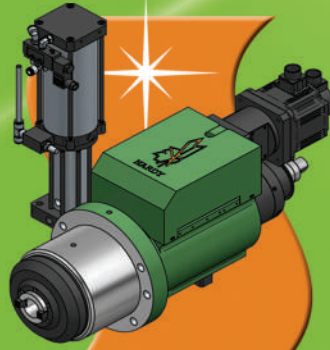
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Servo Type Drilling / Tapping Spindle Head Unit



Built-in Motor Facing Head Unit - Flange Type



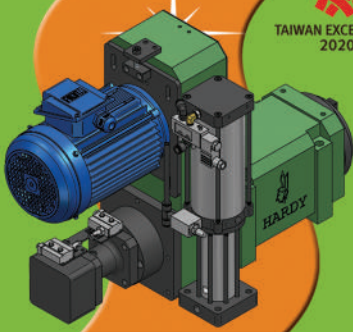
Built-in Motor Drilling/Tapping Spindle with ATC and Center Coolant



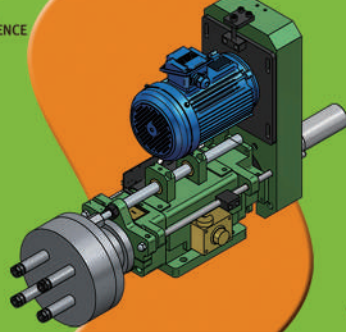
Built-in Motor Spindle Unit



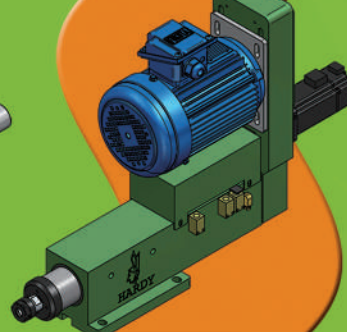
TAIWAN EXCELLENCE 2020



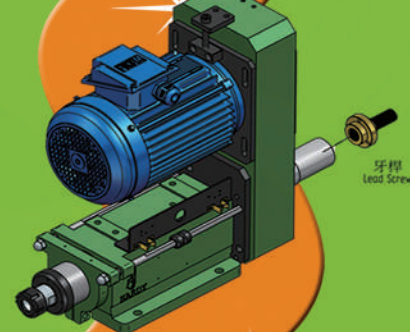
Boring/Milling Head Unit with ATC



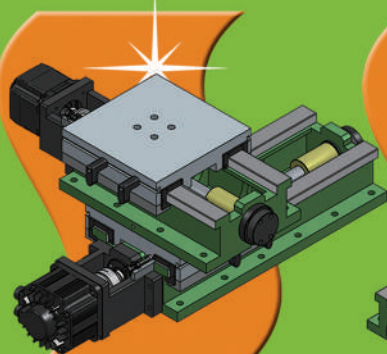
Multi-Spindle Head



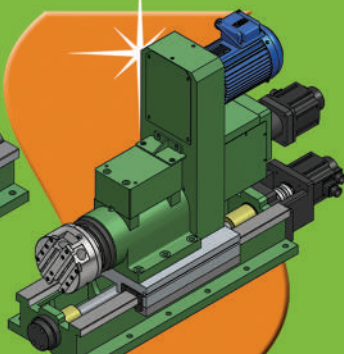
Servo Type Drilling / Tapping Spindle Head



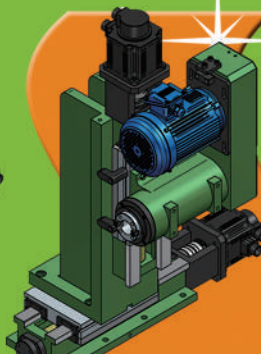
Tapping Spindle Head



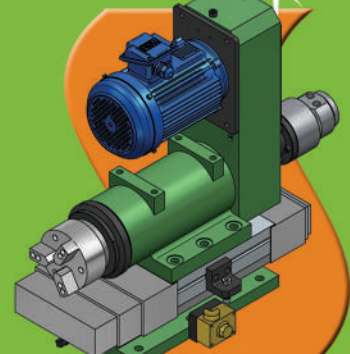
XY Servo Hardness Slide Unit



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SUSTAINABILITY IN MANUFACTURING: PRESERVING OUR WORLD

Cognizant of the crucial role sustainability plays in manufacturing, industry players are implementing necessary practices to reduce environmental impact. However, while some companies are setting high standards in this pursuit, challenges hinder widespread adoption, requiring a closer look at the industry's commitment to sustainability. Here's a roundup of industry insiders presenting their perspectives on the topic.



Source: Magic Wand Media

This article explores sustainability in Indian manufacturing, highlighting what the industry insiders think about this pressing issue and the measures being taken by them to promote environmental stewardship, foster innovation, and contribute to a greener future.

Sustainability at all levels of manufacturing - product, process, and system
Rahul Sharma, CEO, Vedanta Ltd, Aluminium Business, one

of the world's leading producers of aluminum, believes that sustainability of products, processes, and systems is no more a trend, but rather a business imperative, inevitable in the face of changing consumer preferences and emerging needs of the market.

Similarly, in process and systems, Indian manufacturers are increasingly investing in leading-edge technologies, including digital solutions and analytics, to make their plants more resource and energy efficient, he adds.

Vedanta Aluminium plans to be Net Zero Carbon by 2050 and be Net Water Positive by 2030. "We have also struck partnerships and supply agreements for sourcing over 1300 MW of renewable power supply to our aluminum smelters," he informs.

"Sustainability is not a one-off box that can be ticked post a job is done; it is a habit and thought process that has to be ingrained into every process and system, right from seller verification to after-sales servicing," notes

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Gaurav Bawa, Senior Vice President, WIKA India.

WIKA just does not device tooling for alternate energy solutions, it is 100 percent energy positive itself. "Our facilities are fully covered by solar power and we provide energy back to the grid, he stresses.

In the same spirit, Micromatic Grinding Technologies Pvt Ltd (MGT) is actively employing sustainability metrics to gauge its carbon footprint comprehensively. "This entails measuring emissions associated with our products, processes, and systems, encompassing scope-1 emissions within our organization, scope-2 emissions outside our organization, and scope-3 emissions from all upstream and downstream activities," reveals company COO, RK Mahajan.

Towards lasting impact

According to Hitesh Patel, General Manager - Plant, Jyoti CNC Automation Ltd, businesses that prioritize sustainability cannot only help protect the environment but also appeal to consumers who are looking for environmentally responsible products. The company has successfully implemented an Environmental Management System in accordance with ISO 14001:2015 for its campus and processes. "For several years, our campus has embraced the practice of rainwater harvesting. We also have ETP and STP plants to treat the wastewater and reuse it for the green belt area. Our industrial wastes get re-treated and neutralized before they are disposed of."

Vedanta Aluminium has a robust approach to this which includes a laser focus on environmental parameters such as carbon reduction, energy conservation, air quality, water sustainability, circular waste management, and biodiversity. Building on this momentum,



"The transition to a sustainable economy requires significant changes in how we produce and consume goods and services, and it will require collaboration and cooperation among all stakeholders, including the industry, the Government, civil society organizations, and consumers."

Hitesh Patel
General Manager - Plant
Jyoti CNC Automation Ltd

takes proactive measures to conserve energy, water, and other materials. Its commitment to environmental responsibility includes using renewable energy sources, with 45 percent of its energy needs being met through the company's captive solar plant. "We also comply with all Government norms and take steps to minimize air pollution in our area. In addition, we aim for zero discharge of water in municipal drains and implement water recycling in all areas. To better understand our carbon footprint, we conduct regular mapping exercises. Rainwater is captured and harvested, and our energy and water consumption is continuously monitored in real-time. Furthermore, we are planning for rejuvenation and revitalization projects in line with the Indian Building Code norms to further promote sustainability," shares Mahajan.

Striking a balance

The industry is assiduously striving to strike an equilibrium between energy utilization and environmental consequences, ensuring sustainable practices in their operations.

Patel tells us that the '3R' - reduce, reuse, recycle, and if possible, regenerate has been the motto for his company. "Jyoti CNC is consciously taking steps to improve its plant energy efficiency by using efficient types of equipment, optimizing processes, and reducing waste," he shares.

MGT is relying on using renewable energy sources for its energy requirements and biodegradable plastic. The company is also working with all suppliers on extended producer responsibility for e-waste and rigid plastic to ensure proper disposal and recycling practices.

Working towards the same goal, WIKA's all four factories across India are solar power enabled. "The solar system would not only help in reducing the company's carbon footprint but also significantly lower its energy costs. Recently, WIKA has announced a transformation to 'Smart in Sensing' reflecting a reliable partnership that addresses environment-friendly processes across the industry," says Bawa.

Together we can

Conserving the environment while striving to be a global manufacturing hub is indeed a challenge that must be dealt with together. The sustainability journey needs well-coordinated efforts by all stakeholders including the industry and the Government for the implementation of all the needed measures.

The Indian Government has set a target to cut the coun-

Sustainability is not an end-state, but rather a continuous process of improvements to ensure judicious resource utilization in a manner that leaves the planet richer than before. So, the problem statements surrounding sustainability are not so much challenges, as they are innovative engineering and robust management.

Perform, Achieve and Trade (PAT) Scheme is a regulatory instrument by the Bureau of Energy Efficiency, Ministry of Power, to encourage energy-intensive industries to reduce their energy consumption with an associated market-based mechanism whereby companies can trade certificates earned on the basis of excess energy savings.



“We are actively employing sustainability metrics to gauge our carbon footprint comprehensively. This entails measuring emissions associated with our products, processes, and systems, encompassing scope-1 emissions within our organization, scope-2 emissions outside our organization, and scope-3 emissions from all upstream and downstream activities.”

RK Mahajan
COO
Micromatic Grinding Technologies Pvt Ltd

try’s emissions to net zero by 2070, with 500 GW of renewable energy capacity by 2030. Aligned with this vision, it has rolled out several schemes and policies to incentivize decarbonization.

The Government is encouraging domestic manufacturing and local sourcing of products, as part of its strategy to end import dependency. “Imbibing this philosophy, Vedanta Aluminium is deeply focused on research & development for producing high-end alloys and value-added products for catering to the needs of India’s industries. We are the first in the country to supply Primary Foundry Alloys (PFA) for the Automotive industry, aluminium-silicon (AlSi) alloy for the steel industry, and more,” reveals Sharma.

“India is leading the ESG (Environmental, Social, and Gov-



“We have a robust approach to sustainability which includes a laser focus on environmental parameters such as carbon reduction, energy conservation, air quality, water sustainability, circular waste management, and biodiversity. We set targets against each of these parameters and demonstrate our progress in each vertical, which is then encapsulated in our annual sustainability reporting.”

Rahul Sharma
CEO
Vedanta Ltd - Aluminium Business

ernance) journey through the Government push with the industry reconciling with the demands. The global industry is anyway well aware, as they have to follow ESG protocols in some form or other. The way the environmental ecosystem and industrial giants are creating their policies, the Indian industry, right down to MSMEs will follow suit with the ESG guidelines to ensure to remain a part of the supply chain and grow,” opines Bawa.

According to Patel, the transition to a sustainable economy requires significant changes in how we produce and consume goods and services, and it will require collaboration and cooperation among all stakeholders, including the industry, the Government, civil society organizations, and consumers.

Mahajan agrees that meeting



“Sustainability is not a one-off box that can be ticked post a job is done. It is a habit and thought process that has to be ingrained into every process and system, right from seller verification to after-sales servicing.”

Gaurav Bawa
Senior Vice President
WIKI India

sustainability goals requires all the stakeholders to be working towards it. “This cannot be done alone. We are in touch with local administration, Government officials, and NGOs along with our employees, customers, and suppliers,” he adds.

Getting future-ready with ESG

ESG is a framework for evaluating the sustainability and ethical impact of a company based on the Environmental, Social, and Governance factors.

ESG is gaining increased traction with investors, customers, and regulators demanding more transparency and accountability around environmental and social issues. Companies that integrate ESG factors into their decision-making processes are seen as more responsible and better positioned to manage risks and seize new opportunities.

According to Patel, in recent years, ESG has gained signif-

icant momentum in India. “Forward-looking organizations have started reporting their ESG performances, complying with globally accredited frameworks such as Global Reporting Initiative (GRI), Task Force on Climate-related Financial Disclosures (TCFD), and Integrated Reporting (IR). Even unlisted companies voluntarily disclose their ESG exercises such as adopting renewable energy, reducing their carbon footprint, and promoting diversity and inclusion.”

Speaking about the ESG journey of MGT, Mahajan shares that the company is in the process of understanding the GRI standard, and how it impacts the economy, environment, people, and human rights. They are also learning to identify financial risks and opportunities that they may face.

Bawa also identifies ESG as a buzzword in industry circles

for investment decisions. Stressing on an EY report, he shares that 90 percent of international investors looked for a company’s ESG performance and 86 percent prioritized corporate decarbonization in their checklists.

Encountering challenges

Cost, awareness, and willingness are major challenges during transition. Most business activities are profit-centric. Any added cost would face rejection and resistance initially, however, through awareness a sustainable approach could be adopted, feels Patel.

Mahajan explains that a few challenges exist that the company is striving to overcome. “Replacing normal plastic with biodegradable alternatives can be costly, but we believe it is a worthwhile investment. The lack of net metering regulations also prevents us from sending

excess power from our solar plant to the grid, leading to a waste of installed capacity,” he points out.

Sharma believes that sustainability is not an end-state, but rather a continuous process of improvements to ensure judicious resource utilization in a manner that leaves the planet richer than before. So, the problem statements surrounding sustainability are not so much challenges, as they are innovative engineering and robust management.

Rounding up

The presented viewpoints reflect that the industry is resolute in its commitment to preserving the environment and its finite resources. It is poised to create a secure world through its readiness to embrace sustainability initiatives and go the extra mile to ensure we have a greener world to live in.



Businesses that prioritize sustainability cannot only help protect the environment but also appeal to consumers who are looking for environmentally responsible products.

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HELPING MEET INDUSTRY STANDARDS

The Advanced Machine Tool Testing Facility is an important facility that plays a crucial role in the development and advancement of machine tools. It provides a comprehensive platform for testing and evaluating the performance and accuracy of machine tools.

The Advanced Machine Tool Testing Facility (AMTTF) in Bengaluru, India, is a facility that specializes in providing testing and calibra-

tion services for Machine Tools and other Engineering industries. The facility was established in the year 2011 as a joint project by the Government of

India, Central Manufacturing Technology Institute (CMTI), Indian Machine Tool Manufacturers' Association (IMTMA), and industry partners.

One of the main areas of focus for AMTTF is the development of new testing and calibration standards for machine tools along with the Bureau of Indian Standards (BIS). The facility works closely with industry partners to develop and implement new testing procedures that help ensure and enhance the quality and accuracy of machines.



A look at the Advanced Machine Tool Testing Facility



Source: AMTTF

The primary objective of AMTTF is to support the Manufacturing industry pan India by providing accurate and reliable testing and calibration services for machine tools, in particular, and generally for other manufacturing industries. With experienced and highly skilled engineers, AMTTF assists industries to improve the quality and accuracy of machine tools and other manufacturing equipment.

AMTTF offers a wide range of testing and calibration services, including geometric testing, vibration analysis, thermal analysis, and accuracy testing. The facility has a variety of equipment for Vibration Analysis, EMI/EMC Testing, Modal Analysis, Spindle Error Analysis, Thermal Analysis, Residual Stress & Retained Austenite Testing (XRD), and oth-

er equipment including Laser Interferometer, Ball bar, and Spindle Balancer. AMTTF has carried out more than 2,500 assignments and has served more than 200 customers since its inception.

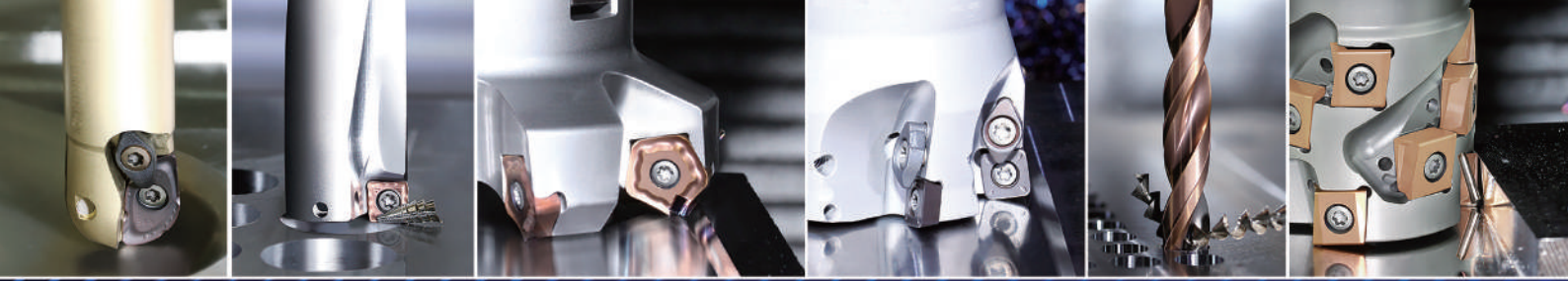
The facility also houses dedicated test rigs for performance evaluation of Spindles and for reliability testing of Telescopic Covers. AMTTF has a 4m x 4m Thermal Chamber which is used to study the thermal behavior of the machines and equipment at different ambient conditions and support in developing thermal compensation algorithms.

The core motto of the facility is Testing, Troubleshooting, and Problem-Solving. AMTTF has carried out several root cause analysis projects in the user industries to troubleshoot various problems in the machines

like chatter, reduced tool life, and abnormal noise. Some of the case studies include solving chatter issues on a VTL, enhancing tool life on a VMC, solving tool breaking issues on a Twin Spindle HMC, and eliminating chatter lobes on a precision grinding machine.

The vast list of customers includes major machine tool builders like ACE Designers, AMS, BFW, MGTL, Precitec, UCAM, and Kennametal; defence & aerospace companies such as HAL, NAL, L&T, Boeing, BFL, and Poer Jets; auto companies like ARAI, Ather Energy, Bosch, Brakes India, Hero Motors, Wheels India, TVS, Mahindra, Mahle, Musashi, TAFE, and Rane; and other institutes and companies like PSG College, IIT-Madras, NIT-K, GE, Lam Research, Timken, Triveni Turbines, TUV, and Wipro. 

Source: AMTTF

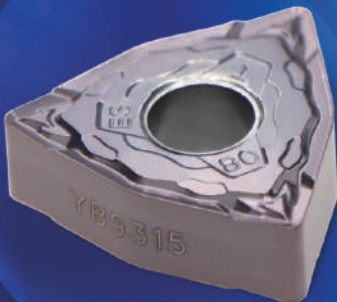


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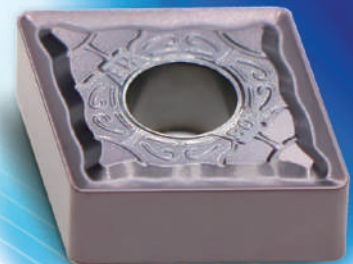
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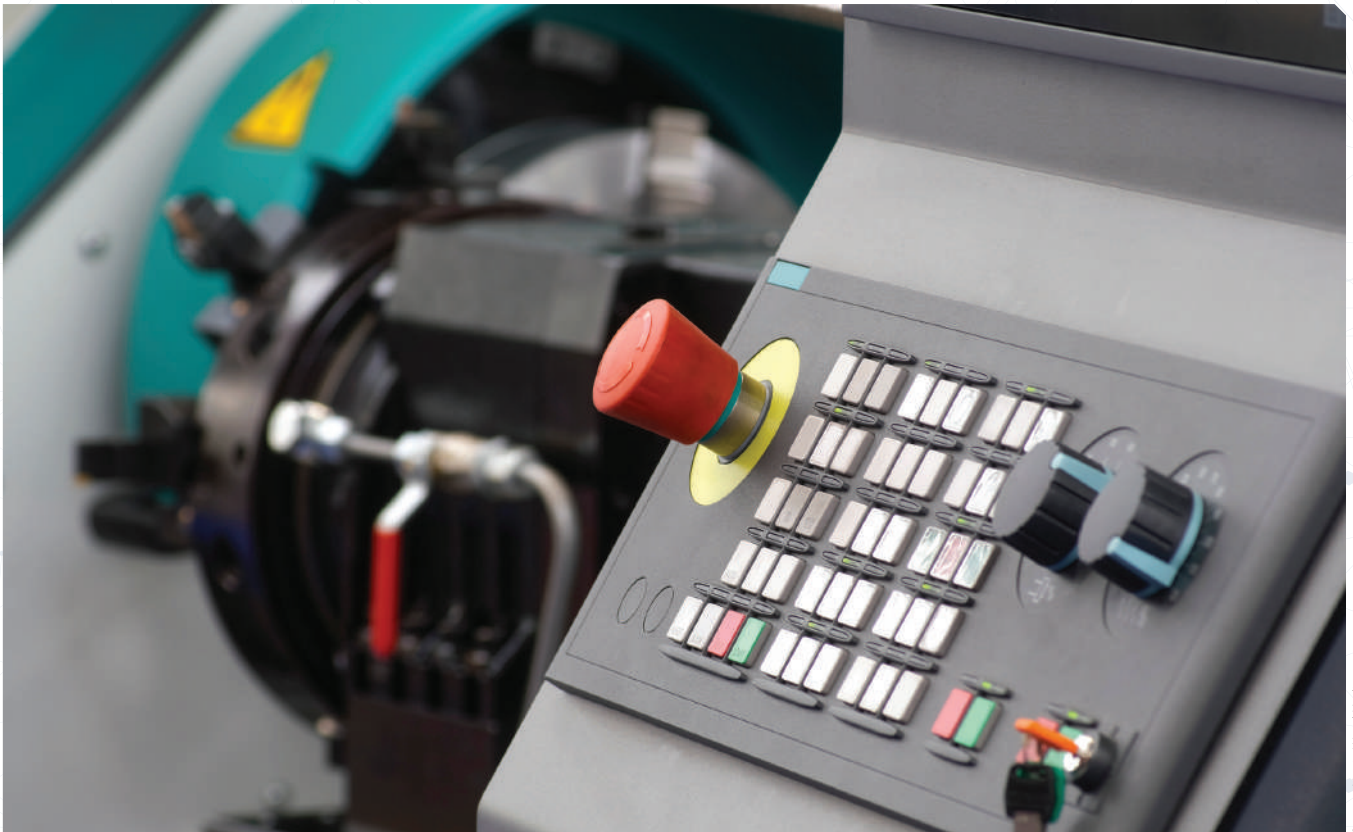


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REMEMBERING JOHN T PARSONS

MMI pays tribute to John T Parsons, the inventor of CNC Technology who is considered by many to be the father of the second industrial revolution.



Source: Magic Wand Media

Every day hundreds of thousands of CNC machines churn out millions of products. Virtually, almost every product we use in our daily lives has been touched by CNC technology somewhere in the process.

Numerical Control marked the beginning of the second industrial revolution and the advent of an age in which the control of machines and industrial processes would pass from an imprecise craft to exact science. The impact of this invention is little understood, yet its applications range from Computer Chips to Medical, Aerospace, Machine Tools, Marine, Surface Transportation, Oil and Gas, Defence, Electronics, Clothing, Mobile phones, etc

The man behind CNC

Even though CNC has become a household name, not many people are aware of John T Parsons, the inventor of CNC Technology and considered by many to be the father of the second industrial revolution. Computerized Numerical Control, or CNC as we all know it, came about shortly after WWII as a result of

the Aircraft industry's desire to produce more accurate and complex parts.

The story of numerical control starts with John Parsons becoming aware of the use of accounting machines for solving engineering problems and employing this technique to check helicopter rotor blade airfoil patterns.

These developments were done in collaboration with his Chief Engineer and Vice President of Engineering, Frank L Stulen, whom Parsons hired when he was head of the Rotary Wing Branch of the Propeller Lab at Wright-Patterson Air Force Base, USA in April 1946.

Together, they were the first to use computer methods to solve machining problems, in particular, the accurate interpolation of the curves describing helicopter rotor blades.

In the 1940s, a 'computer' meant a punch card-operated calculation machine. At the time John Parsons's company Parsons Corporation had made only made one prototype of a helicopter propeller, but Parsons convinced Sikorsky Helicopter that they could

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A BRIEF TIMELINE OF JOHN PARSONS'S CONTRIBUTION TO THE ENGINEERING INDUSTRY

1944

Devised a manufacturing system for producing 22 in. Sikorsky R-5 rotor blades. The quality of the product was so good and the costs so low, that the US Army refused to approve Sikorsky's request for a second source, even when the requirement increased to 405 blades per month.

1945

Conceived and installed the world's first production facility for metal-to-metal adhesive bonding of primary aircraft structures for the R-5 Sikorsky rotor blade spars. Redesigned the spar from spot-weld to adhesively bonded construction.

1947

Devised and implemented a system for producing airfoil templates on a manual milling machine, using machine tool table settings calculated and tabulated on IBM accounting machines.

1948

Conceived a machine for producing aircraft structural shapes automatically from punched-card/tape input.

1949

Negotiated and executed a contract with the US Air Force to build the first numerical control milling machine. Coordinated its development with Parsons' staff and its principal subcontractors - IBM, Snyder Corporation, and Massachusetts Institute of Technology. Monitored the design and completion of the machine between 1950-1952.

1950

Designed, manufactured, and installed a modular tooling system for aircraft plants, resulting in a great reduction in tooling costs and floor space requirements.

1951

Designed the layout of a new rotor blade manufacturing plant, including materials laboratories for ferrous and nonferrous metals, resins, and reinforced plastics, and test laboratories for structural, dynamic, and flight tests.

1954

Devised and installed an Operations Control System at Parsons Corporation using a single source document to control total engineering, manufacturing, quality, and service functions.

1955

Granted exclusive license of Parsons N/C patent to Bendix, and was signatory to its sublicenses to General Electric, TRW, Sundstrand, Milacron, Allen-Bradley, IBM, Fujitsu, Bosch, etc.

1956

Conceived and installed a hydraulic adhesive bonding press with a 2 in. x 22 in. platen with an automated load/unload system. Developed and installed programmable salt bath furnaces for heat-treating 25 in.-long alloy steel tubes.

1958

Parsons received a patent for his Motor Controlled Apparatus for Positioning Machine Tools (patent number 2,820,187, filed on May 5, 1952)

1964

Conceived and directed the installation of a special 4-axis N/C machine tool for helicopter rotor blades.

1965

Participated in the blade design and designed and developed the manufacturing process and tooling for the world's first tapered metal helicopter rotor blade (Lockheed AH-56 helicopter). Not even one blade was said to have been scrapped during the entire program.

1967

Conceived a programmable surface preparation system for adhesive bonding stainless, titanium, aluminum, and alloy steel aircraft structures up to 35 in. long in random sequence.

1969

Devised NC techniques and tooling for producing polystyrene foam patterns for aluminum, bronze, iron, and steel castings marketed under the 'ComputerBilt' trademark.

1971

Designed and developed an NC system for the automatic inspection of turbine blades.

1973

Developed rotor blade designs for large wind energy turbines.

1977

Designed NC ball-screw presses to replace crank, eccentric, and hydraulic presses for many uses.

The story of numerical control starts with John Parsons becoming aware of the use of accounting machines for solving engineering problems and employing this technique to check helicopter rotor blade airfoil patterns.

produce extremely precise templates for propeller assembly and manufacturing.

He ended up inventing a punch card computer method to calculate points on a helicopter rotor blade. Parsons and Stulen generated two-axis coordinate tables of the contours for checking the airfoil patterns, utiliz-

ing early model punched card tabulating equipment. Once they were able to define the pattern numerically, Parsons then had the idea to use the same data to direct the machine and thus define the part numerically. An ordinary milling machine was extensively modified - the table, cross-slide, head drives, and controls

Parsons's invention of Numerical Control has created employment for millions of people around the world and has changed the way we approach manufacturing forever.

were removed, and three variable-speed hydraulic transmissions were installed and connected to leadscrews. Each transmission would produce, through gearing and leadscrew, a 0.0005-in. motion of the table, head, or cross-slide for each electrical pulse received from the director. A feedback system was provided to make sure the machine was doing what it was told. A synchronous motor geared to each motion generated a voltage response to movement, which was sent back to the director and compared with the original command voltage

By 1951, the system had been assembled, and application studies were begun and in a couple of years, enough data had been assembled to indicate practical possibilities that could be developed.

Patent received

MIT was also at the same time developing a similar prototype that employed a Flexowriter and its eight-column paper tape, a tape reader, and a vacuum-tube electronic control system.

Parsons's patent application arrived three months before MIT's and on January 14, 1958, he received a patent for a Motor Controlled Apparatus for Positioning Machine Tool (patent number 2,820,187, filed on May 5, 1952)


Initially, the NC concept was slow to catch on as the people selling the concept were computer engineers and not machine tool engineers. By the early 1970s, however, the US Army itself popularized the use of NC computers by building and leasing them to numerous manufacturers. The CNC controller evolved in parallel with the computer, driving more and more productivity and automation into the manufacturing processes, especially machining.

John Parsons's genius spawned many other inventions that benefitted a wide range of industries. He

pioneered adhesive bonding in metal aircraft structure and then built the first all-composite airplane. He produced the gigantic fuel lines for the Saturn booster that propelled US astronauts towards the moon, and he brought computer technology to aircraft design, manufacturing, and real-time management reporting. Parsons also developed NC produced evaporative patterns to replace weldments and streamlined castings, which revolutionized the production of automobile body dies.

Winning accolades

In 1968, John Parsons became the first recipient of the Numerical Control Society's 'Joseph Marie Jacquard Memorial Award'. The Society of Manufacturing Engineers awarded him a plaque in 1975, naming him 'The Father of the Second Industrial Revolution' and in 1985, Parsons and Stulen received the National Medal of Technology from President Ronald Reagan. Parsons, who didn't have a college degree, was also awarded an honorary Doctor of Engineering degree from the University of Michigan in 1988. He was inducted into the National Inventors Hall Of Fame in 1993 for inventing numerical control systems, joining a long list of luminaries like Alexander Graham Bell, Thomas Edison, Henry Ford, Steve Jobs, etc.

Parsons's invention of Numerical Control has created employment for millions of people around the world and has changed the way we approach manufacturing forever. 

Tech Talks is a column by industry veteran and journalist Reji Varghese that talks about the latest advancements in Machine Tools, provides snippets from history, interesting facts, etc. about the Machine Tool industry.



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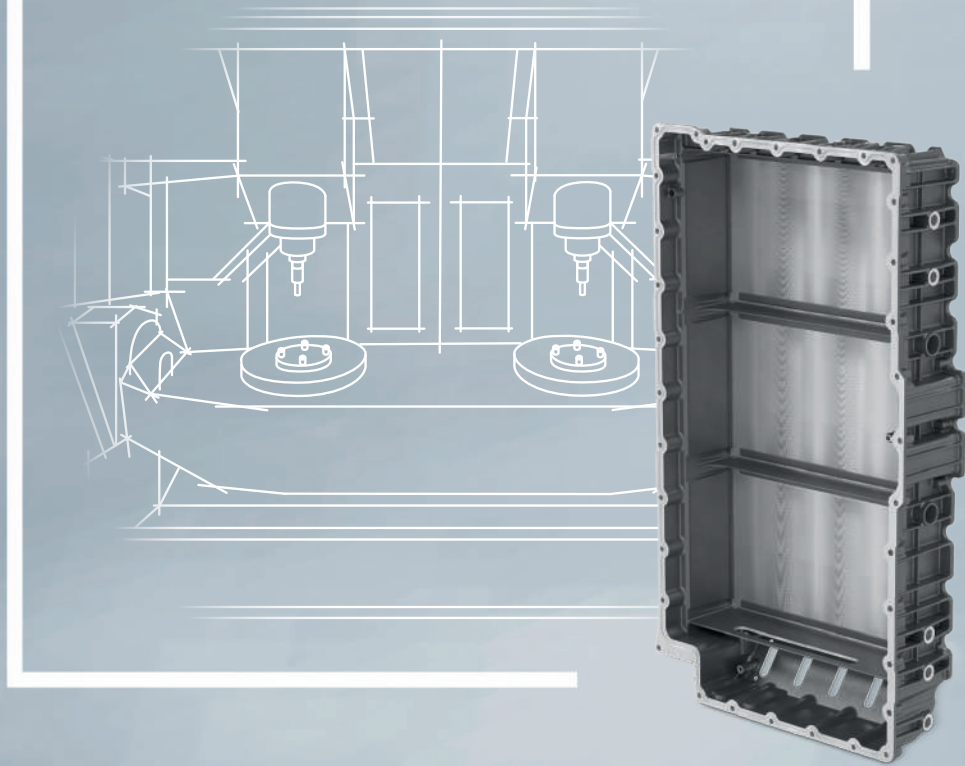
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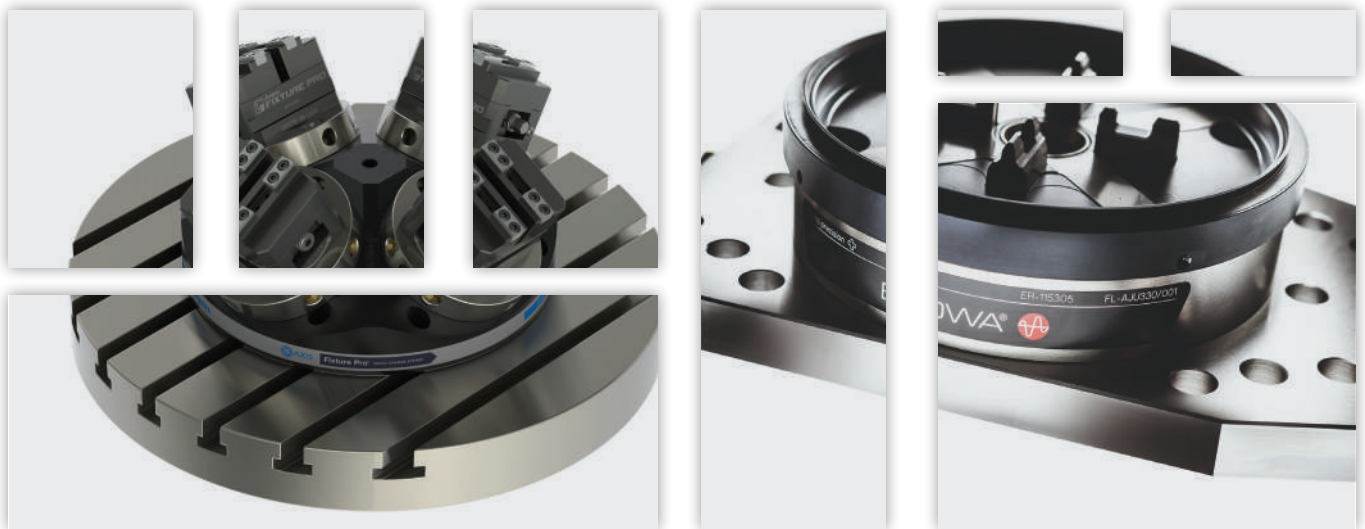
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ADDRESSING MACHINING CHALLENGES



Source: MMS

When considering workholding solutions, shops have a variety of options that offer flexibility, enhance throughput, and facilitate five-axis machining. Here are a few to provide a peek into the exhaustive range available in the market.

JULIA HIDER
Senior Editor
Modern Machine Shop



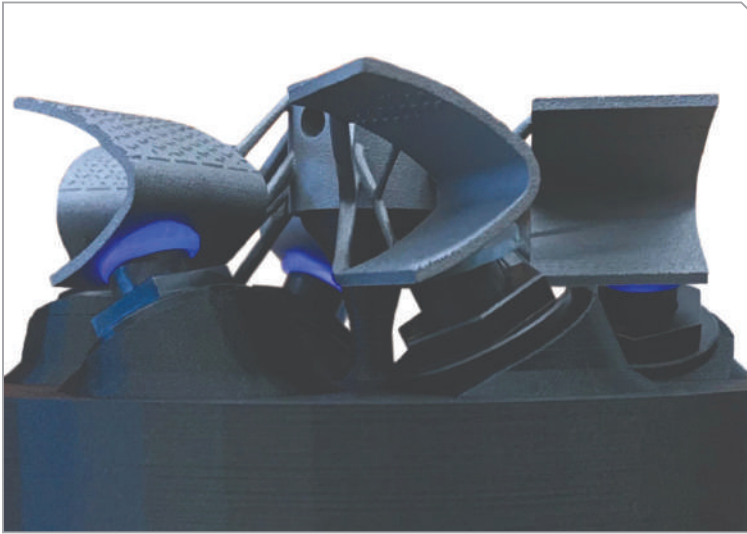
Workholding solutions vary almost as much as applications. This gives shops the ability to choose workholding that is targeted to their needs, prioritizing different factors depending on the type of work they do. Job shops that handle high-mix, low-volume work will place a high val-

ue on flexibility in workholding. Production shops seek workholding that will increase throughput by working with automation systems. Shops that do five-axis machining need specialized workholding that provides access to five sides of a workpiece for machining. And those that handle delicate

workpieces, or parts that require access to the full outer diameter for machining can benefit from ID workholding.

Flexible workholding

For shops that handle short-run and one-off jobs, flexible workholding is key to producing work cost-effectively. This



Source: MMS

UV (ultraviolet)-light transmitting workholding grippers from Blue Photon are suited for short-run jobs that are fragile and prone to distortion from mechanical and vacuum clamps.

might involve quick-change workholding that speeds setups, or solutions that leave the sides of parts free for machining, requiring fewer setups.

Hainbuch's modular workholding system, which consists of chuck and jaw modules, now features a two-jaw module for holding square parts. According to the company, change-over from round parts, which are held in collets or the three-jaw module depending on size, takes less than 2 minutes. The two- and three-jaw modules both use the Hainbuch collet chuck as their base. The Centrex quick-change interface enables changeovers without removing the collet chuck and realignment. The company adds that the two-jaw module's compact profile makes it a good alternative for large and heavy centric vises. The new module can handle turning operations at speeds as fast as 15,000 rpm, and, like the three-jaw module, uses the Hainbuch collet chuck as a base and a Centrex quick-change interface for changeovers. Overall, the system is designed as an alternate choice in applications that require long tools and taking care

to avoid interference because the workholding is larger than the parts.

For short-run jobs that are fragile and prone to distortion from mechanical or vacuum clamps, adhesive workholding is also an option. Blue Photon now offers its high-performance, UV (ultraviolet)-light transmitting workholding grippers in metric sizes. The device is designed with multiple diameters to hold small to large workpieces. The grippers are inserted into a fixture, and the workpiece is secured to the grippers with the company's gel-like adhesive material, BlueGrip. UV light is transmitted through the core of the gripper for 60 to 90 seconds to cure the adhesive, bonding the gripper to the part.

Providing repeatability to within 10 microns when quickly switching one chuck for another, SMW Autoblok's CCS chuck system can be installed on new or existing lathes. A standard adapter system provides automatic push-off and easy mounting to all types of traditional or custom workholding, including two- and three-jaw chucks, collet chucks, mandrels and manual fixtures, among others, the

company says. With the turn of a key, the user can quickly connect workholding devices to the machine spindle and draw tube of the actuating cylinder. This is said to guarantee operator safety in addition to minimizing machine downtime. A large through-the-hole and visual safety control of the locking status are also said to add to the system's versatility.

Dillon Manufacturing's Fast-Trac jaw nuts convert standard chucks into quick-change chucks, reducing jaw change time by 50 percent or more, according to the company. This system enables users to preassemble the jaws required for the next operation while the machine is running a separate job. The quick-change capability allows for more productivity per square foot of manufacturing space by productively using machining time, which is ideal for facilities operating with fewer employees, the company says. Dillon's jaw nuts, T nuts, and keys are available to fit all 6-inch to 24-inch diameter power chucks from a range of companies.

Automation-ready workholding

As more shops add automation, they will need workholding systems that are compatible with the systems they have implemented, whether they are robots, pallet systems, or something else.

Kurt Workholding has added three new models to its Precision Force five-axis MaxLock vise lineup. The robot-ready Kurt PF-series vises are designed to offer user-friendly features including easy-to-adjust lash and 52-mm spacing for automation-ready mounting systems to adapt to competitors' zero-point systems. Quick Centerline Adjustment is designed

For short-run jobs that are fragile and prone to distortion from mechanical or vacuum clamps, adhesive workholding is also an option. Blue Photon now offers its high-performance, UV-light transmitting workholding grippers in metric sizes.

Big Kaiser's Unilock is a modular workholding system for multi-axis machining. It is designed to provide flexibility and functionality for five-axis and five-sided machining via multiple part transfers.

to make centerline adjustment fast and efficient. Spring-loaded gibs keep parts square and are designed to maximize part-positioning repeatability through multiple cycles. Kurt's PF 420, PF 440, and PF 460 vises come with a standard 4-inch jaw width and jaw openings ranging from 2.625 inches to 6.625 inches. PF-series vises replace the previous Kurt HP models and feature the patented AngLock design to minimize jaw lift and deflection. The AngLock design pushes the vise jaws down and forward, allowing much greater surface contact on parts – maximizing holding strength with less clamp force. Available in three jaw configurations, with either carvable, dovetail, or serrated jaws, customers can save the added expense of buying an additional jaw set. All jaw sets can be sold completely and separately.

The Erowa PowerChuck P is a universal interface for quick and precise positioning of palletized workpieces or fixtures on a machine table. The palletizing system is suitable for milling and drilling machines, profile or surface grinding machines, or the spindles of dividing heads and lathes. PowerChuck P chucks and pallets are fully compatible with previous versions. The 10,000-newton clamping force is said to provide reliable hold during workpiece manufacturing. The compact, low-profile design of the clamping system leaves room for machining, the company says. The device uses low-wear ceramic clamping balls to provide consistent, low-maintenance performance over a longer period of time compared with the previous clamping balls. The PowerChuck P can be automated. Sealing rings protect the chucks from waste and ensure safe automatic loading.



SMW Autoblok's CCS chuck system is said to provide repeatability to within 10 microns when quickly switching chucks.

Source: MMS

Five-axis workholding

As more shops add five-axis machining capabilities, they will need to re-think their workholding in order to get the most out of their new machines.

Big Kaiser's Unilock is a modular workholding system for multi-axis machining. It is designed to provide flexibility and functionality for five-axis and five-sided machining via multiple part transfers, and also offers solutions for machines that have been retrofitted with fourth- and fifth-axis tables. The multi-axis workholding solutions, which include chucks, clamping knobs and pallets, mineral cast systems, robot interfaces, and stabilizers, are said to locate and stabilize workpieces without obstructing access to the top and sides of the part. They also allow a clamped workpiece to be flipped into new orientations for subsequent machining operations without being unclamped from the workholding. Pyramid risers, such as the three- and four-sided versions from Jergens Inc., are designed to permit multi-part loading

and provide greater access for five-axis machining applications. Part of the company's Fixture-Pro line of quick-change, modular workholding solutions, the pyramid risers feature a 30-degree mounting surface to ensure clearance for spindle and cutting tool paths, enabling more machining per setup. The system offers three mounting options. Direct-to-table uses T-slots, a center pin, and a timing key, and is secured using T-nuts and socket head cap screws (SHCS). Quick Locating System (QLS) mounts are designed to accurately locate and clamp the pyramid to a base element, such as a subplate, using a combination of QLS shoulder screws and SHCS. Quick-Loc pallet systems use pull studs (spaced at the industry-standard 96-mm pattern) to locate and clamp in a single step. The lightweight aluminum risers are compatible with virtually all five-axis CNC machining centers and are designed to provide fast changeover and setup. Available in both three- and four-position configurations, the pyramid risers are designed

to mate with many top tooling choices including self-centering vises, dovetail vises and ER collet fixtures.

Magnetic workholding is also a good fit for five-axis machining applications, as it provides access to five sides of a part in a single setup. Techniks says its EEPM magnetic chucks can speed up drilling, milling, and boring operations on either thick or thin workpieces. Magnetic chucks make setup and part change-over faster and safer, reducing the number of required operations. They're designed to easily integrate with pallet changing and tombstone systems used in production cells. Magnetic workholding uniformly holds workpieces without part distortion or dead spots, reducing chatter and harmonics for improved surface finish and tool life.

ID Workholding

ID workholding, such as expanding mandrels, has a number of benefits and is suited to a range of applications. These fixtures can provide full access to a part's OD, pro-



The PowerChuck P universal interface from Erowa is designed to provide quick and precise positioning of palletized workpieces or fixtures on a machine table.

Source: MMS

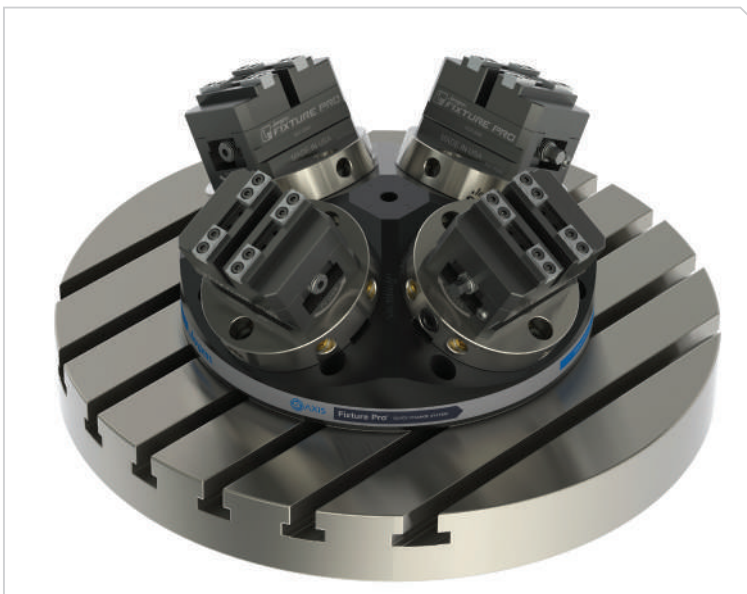
viding a rigid, even hold that increases accuracy.

The HDDS by Ringspann is an inner clamping system that can serve as a mechanical alternative to hydraulic expanding clamping mandrels. According to the company, the system provides a true running accuracy of less than or equal to 5 micrometers and is suited for workpieces with bores of tol-

erances ranging to class IT10. Unlike hydraulic expanding clamping mandrels, the HDDS's mechanical expanding sleeve mandrel eliminates the risk of leaks and increases process safety in series production. The only source of wear in the system is its clamping discs. When users need to replace the discs, they can do it themselves without removing the mandrel from the spindle. Some versions of the HDDS can clamp bores from diameters of 23 mm. The system also works on applications that have bores with inner geometries that are interrupted by grooves. In addition, its mechanics perform a pull-back action, pressing the workpiece against a backstop and aligning it, making it suitable for workpieces with short clamping lengths.

Speedgrip Chuck Company's Sabertooth expanding mandrels are available in several variations to suit the specific need of almost any application. The mandrels can be actuated manually, using the draw bar or drawtube of the machine or via the company's self-contained actuator assembly.

The HDDS by Ringspann is an inner clamping system that can serve as a mechanical alternative to hydraulic expanding clamping mandrels. It provides a true running accuracy of less than or equal to 5 micrometers and is suited for workpieces with bores of tolerances ranging to class IT10.



Pyramid risers, such as these from Jergens, enable multi-part load and provide greater access for five-axis machining applications.

Source: MMS



COMMITTED TO 'MATERIAL LEADERSHIP'

In the following interview with Soumi Mitra, Editor-in-Chief of MMI, Ananthasheshan Narayanan, Managing Director, Carborundum Universal Ltd (CUMI), a leading materials science solutions provider, discusses the company's vision and mission, its strengths, competitive strategies, growth partners, his perspective on the capabilities of Indian machine tool builders, and the necessary measures they should take to enhance their game.

Please tell us about the history and mission of Carborundum Universal Ltd (CUMI). How has CUMI evolved and adapted to changes in the abrasives, ceramics, and electro-minerals industry over the years?

Ananthasheshan Narayanan: CUMI started as a tripartite joint venture between Carborundum, USA and Universal Grinding Wheels, UK, in 1954. We started as an Abrasives company, pursuing only one material property, which is the hardness of Silicon Carbide while producing sand papers and grinding wheels. Over the years, as we pursued a lofty goal of how we can pursue sophistication, we integrated across the value chain while also developing an enormous strength in application engineering and formulations. This allowed us to expand our materials portfolio, the properties we harnessed, and the industrial applications we could address. As we step into the seventh decade of our journey, we are now a leading materials science solutions provider present in over 6 continents with a business and portfolio that caters to the needs of the world, both the current and future.

Can you walk us through some of the key products or services that CUMI offers and their applications in various industries?

In the Abrasives segment,



Ananthasheshan Narayanan, Managing Director, Carborundum Universal Ltd (CUMI)

CUMI manufactures a full range of abrasives, from coated abrasives, vitrified bonded abrasives, resin bonded cutting and grinding wheels, and super abrasives. These are used extensively in applications like general engineering, auto components, food processing, wood and metal working, defence, and aerospace.

In the Electrominerals space, CUMI is among the largest manufacturers of synthetic minerals like aluminum ox-

ides and silicon carbides. These are the major input minerals in the manufacture of abrasives, refractories, and blasting of surfaces.

Our Industrial Ceramics products generally address the wear requirements of mining applications, power generation, distribution, and transmission. These products also find use in chemical equipment and pumps and as substrates and components in semiconductor manufacturing.

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Super Refractories are engineered materials in aluminum oxide and silicon carbide that address high heat resistance requirements in iron and steel making, glass, ceramics, cement, carbon black, fertilizers, and chemical process industries used in kiln furniture or furnace linings.

How does CUMI prioritize innovation and R&D to stay ahead of competitors in the industry?

The innovation mindset and application engineering is in CUMI's DNA. What we've been good at is working with customers, understanding their problems, and translating their problems into possible solutions. We then work with customers, academic institutions, and in our 8 DSIR-approved laboratories to develop new products, services, and solutions that address customer problems. In 2018, one such solution – metallized vacuum cylinders – won the CSIR Diamond Jubilee Technology Award. This is a recognition that we are an Indian company creating products made in India and sold globally.

At CUMI, we firmly believe that competition is good. But, we don't focus too much on competition. What we are committed to is 'material leadership', keeping our focus on what is possible with materials. We are energized when we work with customers to discover possibilities for them. Through that, we enrich them and ourselves. That is one way of keeping ahead of the competition.

How does CUMI prioritize talent development and retention within the company, and what initiatives has the company undertaken in this regard?

Our journey to becoming a globally admired materials science company would not be possible

“The innovation mindset and application engineering is in CUMI's DNA. What we've been good at is working with customers, understanding their problems, and translating their problems into possible solutions. We then work with customers, academic institutions, and in our 8 DSIR-approved laboratories to develop new products, services, and solutions that address customer problems.”

Ananthasheshan Narayanan
Managing Director
Carborundum Universal Ltd (CUMI)

without building the capability of people. We have an intensive program to consciously pick graduate engineers, support their year-long induction, and then support their transition into positions that interest them or where the company requires them to work.

As people grow within the organization, we have a formalized system – the CUMI Leadership Programme (CLP). Through this program, we identify bright sparks and train them to expand their mindset to manage larger teams.

Further, we have the Business Leadership Programme (BLP) which is for senior leadership. As most of us are engineers and not MBAs, so as one grows up the ladder we also need to have those management inputs. The BLP leads to a pool of talent that can run companies over time.

We also sponsor specialized training programs like Fulbright scholarships and even sabbaticals for technical colleagues to pursue their PhD programs while they continue to work.

How has CUMI addressed challenges related to sustainability and environmental impact in its

operations and products?

Across the segments we operate in, we are consumers of large amounts of energy. Since we deal with mineral processing, there's dust and a certain amount of waste. We, therefore, took a target of becoming a much cleaner, more responsible production site across the world. We are primarily looking at reducing the intensity by 25 percent in the following 4 areas – energy, emission, water, and waste – by the year 2025. Towards this, each operation has laid down plans and projects in place which has over the last three years resulted in a significant reduction. We produce 100,000 tonne of silicon carbide in Russia and it is one of the cleanest factories. Similarly, in Kerala, we have been receiving awards from the State Government for energy, water conservation, and environmental cleanliness. We will continue on this journey to make a material difference not only to what we do at work but also to communities and our customers.

Can you discuss any notable partnerships or collaborations that CUMI has undertaken to enhance its offerings or expand its reach?

CUMI was born out of a tripartite joint venture. Through our journey, we have nurtured very deep relationships with global leaders. Some of our early joint venture partners were Morgan thermal ceramics of the UK to make ceramic fibers. Subsequently, when we grew outside the country, we acquired companies. Our largest manufacturing acquisition for the Murugappa Group is a company in Russia, which is possibly the single largest producer of silicon carbide in the world. Later, we did a technology transfer from Coorstek, Denver, for ceramic lining for

In the Abrasives segment, CUMI manufactures a full range of abrasives, from coated abrasives, vitrified bonded abrasives, resin bonded cutting and grinding wheels, and super abrasives. These are used extensively in applications like general engineering, auto components, food processing, wood and metal working, defence, and aerospace.

India has the second-largest military in the world and is the third-largest military spender after the US and China. But India is also one of the world's largest arms importers (with Russia, France, and the US being its biggest suppliers).

wear resistance. We have other partnerships across the world in South Africa Foskor Zirco- nia, and joint venture partner- ships in Australia. Recently, we also acquired two companies in Germany - RHODIUS Abrasives and AWUKO Abrasives. Both of them are leaders; AWUKO in coated abrasives and RHODIUS in cutting and grinding wheels. CUMI has grown both organi- cally and inorganically. The phi- losophy has always been about growing through partnerships. Acquisitions are not just to ben- efit the top line but they have to make sense to the business and fit the ecosystem of the partic- ular segment we are looking at.

Kindly shed light on CUMI's MoU with DRDO's RCI Laboratory for Ceramic Radome Technology.

Missile technology, especially su- personic (exceeding the speed of sound) and hypersonic (exceed- ing 5 times the speed of sound) technology, is a very niche do- main that requires lightweight engineering materials for struc- tural and functional applications. CUMI has signed a ToT (Transfer of Technology) agreement for the manufacture of ceramic radomes with DRDO's Research Centre Imarat (RCI) laboratory. Radome is the nose of the missile, which houses the radar antenna and associated electronic equipment. The radome structure must pro- tect this equipment from the weather. The radome material needs to provide high thermal shock resistance as well as elec- tro-magnetic permeability for radar communication. CUMI's ceramic radomes have proved to be an effective solution for the same. The Business Head of CU- MI's Industrial Ceramics Division has signed the Licensing Agree- ment for Transfer of Technol- ogy (LAToT) with Shri Raja Babu, Director, DRDO - RCI. The LA- ToT was formally handed over

"Technology trends are moving towards self-diagnostics and self-correction in the future. Customer expectations include automation to minimize manual intervention using processes like pick and place and in-pro- cess measuring gauges, prod- uct performance optimized for accuracy, variants in the number and types of products, delivery performance, scalable solutions with the flexibility to accommodate diversity and complexity of customer re- quirements and reliability."

**Ananthasheshan Narayanan
Managing Director
Carborundum Universal Ltd (CUMI)**

to Subramanian Venkatachala- m, Head, Corporate Marketing, CUMI, in the presence of Shri Ra- jnath Singh, the Defence Min- ister of India, during AERO INDIA 2023. The Ceramic Radome tech- nology transferred to CUMI is in the process of absorption and commercialization. This would be one more step forward in CU- MI's journey to create defence solutions made in India.

From your perspective, how does India's defence manu- facturing capability and infra- structure compare to that of other leading countries in the

world? What are some of the key strengths and weaknesses of India's defence manufactur- ing industry, and what potential opportunities and challenges lie ahead?

India has the second-largest military in the world and is the third-largest military spender after the US and China. But India is also one of the world's largest arms im- porters (with Russia, France, and the US being its biggest suppliers). India's main weak- nesses in defence manufacturing have been - dependence on PSUs for meeting demand; slow and complex defence acquisition pro- cedures; long gestation periods for contracts; high capital costs to set up advanced manufacturing and R&D capabilities; and lack of testing and certification facilities. Towards overcoming these weaknesses and reducing the country's dependence on arms imports, the Indian Government has taken a series of measures to boost self-reliance in defence manufacturing by making Aero- space & Defence a focus sector in its 'Make in India' program. These reforms include allowing private sector participation in defence manufacturing, creating a separate budget for buying indig- enous defence products, increas-



Source: Carborundum Universal Ltd



CUMI's Sriperumbudur factory in India is spread over 22 acres and produces 17 million sq ft of coated abrasives annually

ing foreign direct investment from 49 percent to 74 percent, simplifying defence procurement procedures, incentivizing R&D through schemes such as Technology Development Fund (TDF), and notifying import embargo lists of hundreds of weapons and systems which are planned to be indigenized over the next five to six years. These initiatives have resulted in an increase in the share of domestic procurement in India's total defence procurement. In 2018-19, the domestic procurement stood at 54 percent of the total procurement which jumped to 68 percent in 2022-23 for domestic procurement. A record 75 percent or approximately ₹1 lakh crore of the defence capital procurement budget has been earmarked for the domestic industry in the financial year 2023-24.

India's key strengths in defence manufacturing are its large domestic market, a large pool of skilled technical manpower, cost arbitrage, a growing participation of the private sector which has increased its R&D capabilities and ramped up production. The way forward for India is to not just aim for self-reliance in defence

manufacturing but also to target the larger ambition of being an exporter of defence equipment which can compete with the offerings of globally established players. Weapons and systems manufactured in India that hold high export potential include the light combat aircraft Tejas, UAVs, artillery guns, missiles & missile systems, tanks, protective gear, sonars, and radars (CUMI manufactures components for all of the aforementioned items).


What is the proportion of machines that you import compared to those you source domestically?

Our operations and technologies span high-temperature processes to discrete manufacturing equipment like presses. On a case-to-case basis, depending on the nature and sophistication required, we either source or build our machines.

Kindly share your perspective on the capabilities of Indian machine tool builders in terms of the technologies or machines you believe are most crucial for Indian machine tool builders to focus on to remain globally competitive.

Technology trends are moving towards self-diagnostics and self-correction in the future. Customer expectations include automation to minimize manual intervention using processes like pick and place and in-process measuring gauges, product performance optimized for accuracy, variants in the number and types of products, delivery performance, scalable solutions with the flexibility to accommodate diversity and complexity of customer requirements and reliability.

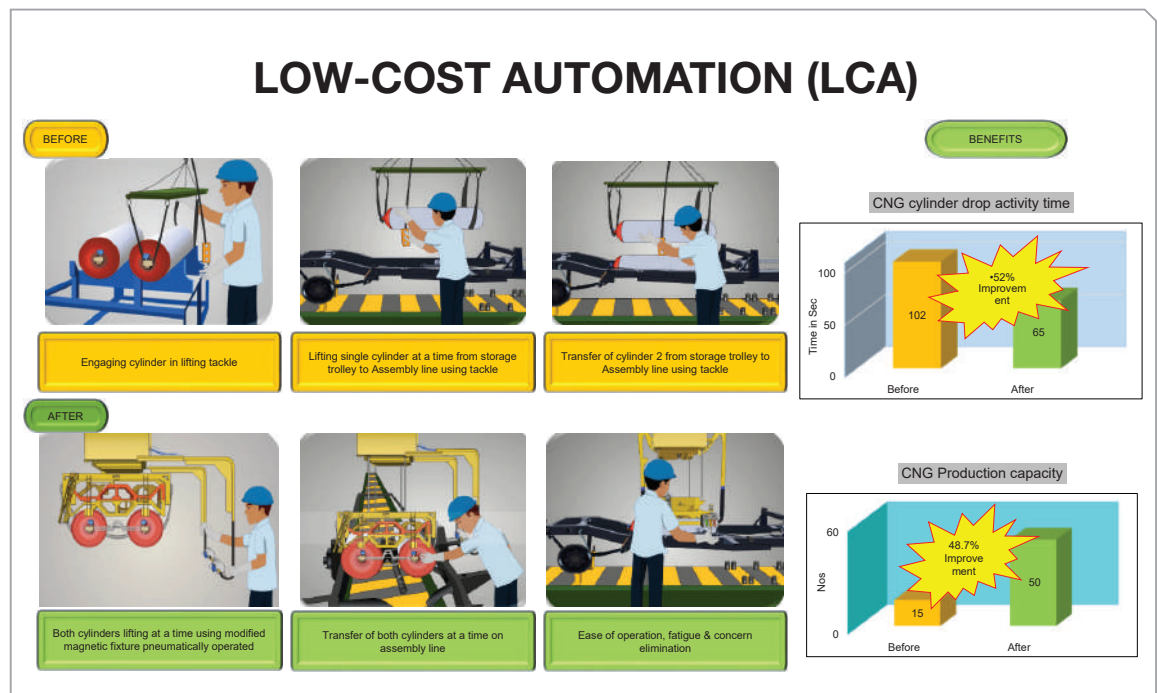
We are still largely dependent on imported machines in these areas - Computer Numerical Control (CNC) Systems, high-accuracy Ball Screws & Guideways, Drives, and Vision System.

To address the global customer requirements, we must build design capabilities with digital technology to meet Industry 4.0 requirements, including sensors to capture power utilization, noise level, vibrations, temperature, coolant level, and thermal behavior. It will also be important for machines to have capabilities including sending data to a centralized server, communicating with other machines, and embedding network connectivity for remote monitoring. 

To address the global customer requirements, Indian machine tool builders must build design capabilities with digital technology to meet Industry 4.0 requirements, including sensors to capture power utilization, noise level, vibrations, temperature, coolant level, and thermal behavior.

ACCELERATING TOWARDS EXCELLENCE

'Single piece flow' is a lean manufacturing method that has proven to be the key to boosting efficiency; it increases productivity, reduces waste, enhances quality, and shortens production lead time. Here's knowing how the Kandivali plant of Mahindra & Mahindra leveraged it to improve its overall manufacturing efficiency and to achieve its target.



Source: Mahindra & Mahindra Ltd

Today's manufacturing environment is characterized by rising production costs. The Automotive sector is an industry that is constantly growing but keeping up with customer needs at the lowest possible cost is a challenge for many companies. To remain competitive in a turbulent environment, a company must reduce its production costs. Customer satisfaction has become a much more critical competitive differentiator and a greater influencer. Being a leading automaker in the CV segment, Mahindra & Mahindra Ltd seeks to further strengthen its presence in the pick-up

segment and grow the market share to 65-70 percent in the coming months, up from 54 percent currently, with the launch of more products, including new tech products built on its latest platforms with 'First time right, Every time right' approach. Single Piece Flow has proven to be an effective method of improving quality, reducing waste, and increasing efficiency, shortening production lead time.

Acknowledging limitations

The principles of lean manufacturing have revolutionized the Automotive industry, allowing the players to cut costs and improve their efficiency. Lean

manufacturing is a series of methods designed to minimize the waste of material and labor while maintaining or increasing levels of production. This results in a net improvement in total productivity. Mahindra & Mahindra's Kandivali plant, which was established in 1964, faced several constraints in meeting the demands of Single Piece Flow. These limitations included fitting precedence parts, tasks that take longer than the cycle time, and insufficient infrastructure accommodations on the current line due to the plant's age. Two significant obstacles were encountered by the company

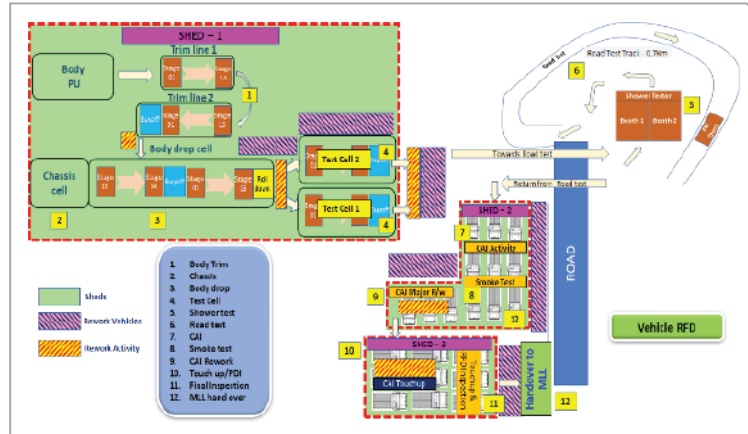
AMAR PATIL
General Manager
Manufacturing Unit
Head- Body, Vehicle,
Foundry & CMD
Mahindra & Mahindra
Ltd



during the implementation of Single Piece Flow in the vehicle assembly line. These included a limited layout space and a high level of work-in-progress inventory of vehicles within the plant.

Towards productivity improvement

A special CFT (Cross Functional Team) was formed that took the challenge of 'No Fault Forward' for productivity improvement. Rather than focusing only on time and motion-based improvements, the team explored all possible levers to minimize efforts and maximize the output. A special task force of LCA (Low-Cost Automation) was roped in for innovative and frugal solutions to overcome various challenges. The team started working on two major challenges. For the layout space constraint, the team brainstormed and came up with many alternatives for optimizing space. For reducing the high work-in-progress inventory of vehicles, different levers were identified to work on and bring in collaborative efforts to result in exponential growth in productivity. These included • Fundamental Process Design Change • Process Improvement • Rework Reduction • Innovative Material Handling • Digitization • Automation • People Development



Source: Mahindra & Mahindra Ltd

- Strengthening & Sustenance through System Audit
- Focus on the 'Cannot Make & Cannot Flow' Concept.

Solution implementation: preparing for the new landscape

In order to implement the Single Piece Flow production process, we opted to balance the production line and establish a lean flow. This involved eliminating various forms of waste, such as intermediate stocks, transportation, and excess products at different stages of the process. By doing so, the team was able to reduce the waste rate, improve the quality of the product, and shorten the production lead time.

To achieve the production time, certain conditions had to be met. The operators needed to be qualified to perform all the steps

of the process, and the cycle time and work content of the assembly process had to be completed within the given TAKT time. Moreover, it was crucial to eliminate any variations or inconsistencies that existed between the intermediate production cells or work stages that made up the production line.

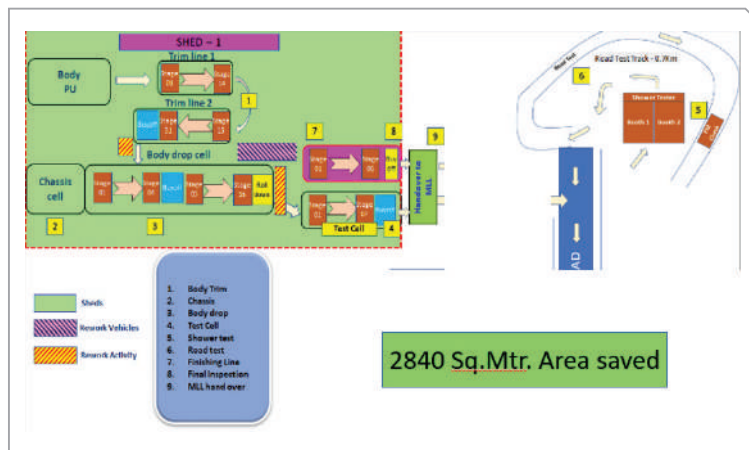
During the implementation of the Single Piece Flow production system, we faced several obstacles and devised the following solution to achieve our target.

Line Balancing & Layout Optimization:

The vehicle assembly process was divided into three different sheds (with a total area of 9,317 sqm) and followed a discrete process flow, as depicted in the layout. The process comprised twelve production cells, each with its own work-in-progress inventory, which consumed a significant amount of space. Multiple movements of vehicles within the assembly line resulted in waste, poor quality, high lead time, poor on-time delivery, and handling damages.

To implement Single Piece Flow, the complete vehicle assembly process had to be conducted within a single shed. While shed 1 activities were being carried out in accordance with Single Piece Flow, this was not the case for sheds 2 and 3. All activities within these sheds

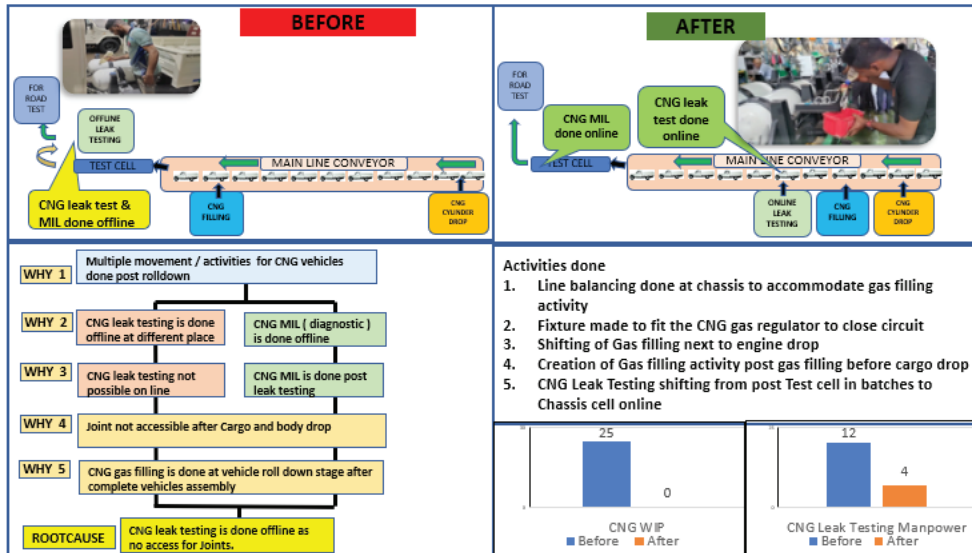
The optimization of the layout and redesign of the process has resulted in several benefits, including a reduction in lead time, space saving of 2,840 sqm, and a decrease in the high inventory of vehicles from 300 to 150.



Source: Mahindra & Mahindra Ltd

Fundamental Process Design change

Offline to Online – CNG offline Leak testing taken online on conveyor



Source: Mahindra & Mahindra Ltd

Employing continuous improvement is crucial in identifying bottlenecks, eliminating non-value-adding activities, and reducing processing cycle time.

were being carried out offline and in a discrete process flow. As there was currently no space available in shed 1, the team brainstormed and devised a plan to merge two test lines. The test cell line activities were rebalanced using line balancing and MOST techniques, resulting in the creation of 550 sqm of additional space.

The subsequent challenge was to incorporate all activities of sheds 2 and 3 alongside the test cell line within shed 1. We addressed this issue by installing a slat conveyor and consolidating all Customer Acceptance Inspection (CAI) activities onto a single line in eight stages within the existing shed. The finishing line, where the final approved vehicle is handed over to the logistics team, marks the end of the process. This was a breakthrough project, as it chal-

lenged the conventional process flow of 58 years by adopting alternative thinking with minimal investment and optimizing existing resources using line balancing and MOST techniques.

The optimization of the layout and redesign of the process has resulted in several benefits, including a reduction in lead time, space saving of 2,840 sqm, and a decrease in the high inventory of vehicles from 300 to 150. However, the target was to further reduce the work-in-progress inventory to below 50 vehicles. To achieve this goal, several strategies/initiatives were implemented.

Fundamental Process Design Change:

In order to optimize existing resources and prepare for future growth, a review of the current

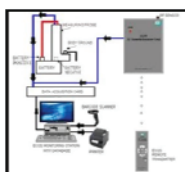
process flow was necessary. Strategic priorities were adjusted accordingly, and several offline activities with high work content were transitioned to online platforms. This resulted in a reduction in lead time and an increase in productivity. Specifically, fourteen offline subassemblies were converted to online. An example of this conversion process can be seen with the CNG subassembly.

Process Improvement:

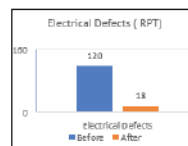
Employing continuous improvement is crucial in identifying bottlenecks, eliminating non-value-adding activities, and reducing processing cycle time. In fact, a total of 51 process improvements were implemented in the assembly line. One specific example is illustrated below. ECOS is utilized in both the end-of-line testing and assembly levels. In the case of vehicles such as trucks and commercial vehicles, they are constructed in two parts: the chassis and the cabin. ECOS is implemented to individually test each part, ensuring that once the two circuits are joined, there are no issues present.

Source: Mahindra & Mahindra Ltd

PROCESS IMPROVEMENT



- > Electrical defects resolution using ECOS system.
- > Electrical circuit of 12V power supply made inhouse which gives electrical supply to wiring harness thus the Wiper, Cluster and Instrument panel parts functioning can be checked.
- > Made inhouse under 15K
- > Non detectable parameters converted into detectable



KITTING

Innovative yet frugal kitting implementation, 1st time in Kandivli plant Auto sector.

ASRS

ASRS installation for body & cargo storage with benefit of Rs.37.5 Lacs manpower cost saving, 4000Sq.ft. space saving

Innovative Material Handling: Kitting & ASRS:

Throughout the manufacturing process, materials require careful handling to ensure their safe arrival at their respective destinations. In order to optimize the movement of goods and ma-

terials around manufacturing and storage facilities, innovative material handling systems must be implemented. A properly designed material handling system can lead to improved customer service, lowered costs, and reduced risk of accidents

and damage. With the integration of such a system, products can be located with greater ease and orders can be more accurately fulfilled.

People Development:

To sustain high growth for an organization, the most critical aspect is to develop a workforce that is prepared for the future. This can be achieved by bridging the gap between the demand and supply of manpower and addressing issues surrounding skills and quality. To this end, six approaches have been implemented under the theme of skill building and people development.

Digitization and analysis play crucial roles in making information easily accessible and secure, ultimately leading to more efficient workflows and simplified activities.

People development

People Development – Skill building

Total 21 skilled Employees, 100000+ hrs

SIX AXES APPROACH

To avoid Walk home failure (WHF) & Unscheduled visit (USV) of customer.

<p>Walk home failure (WHF)</p>	<p>Vehicle Immobilized in field – Towing required for the vehicle from reported location to Service Centre for repairing purpose</p>	<p>Dissatisfied customer</p>
<p>Unscheduled visit (USV)</p>	<p>to service center</p>	

DIGITIZATION

Digitization for ontime Data Capturing & Controls

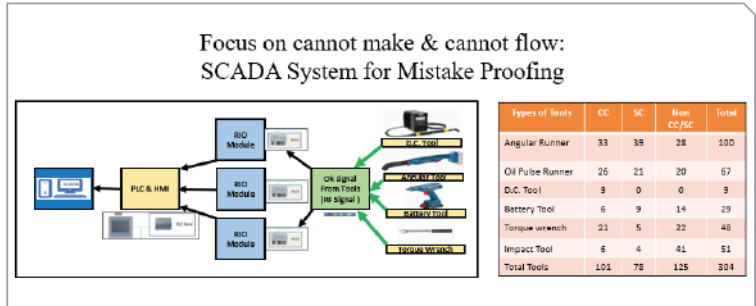
QUALITY DEFECT MONITORING SYSTEM

DATA STRATIFICATION

Lean approach is based on the belief that a continuous flow of improvements, when executed diligently, can result in transformational outcomes.

Digitization:

Digitization and analysis play crucial roles in making information easily accessible and secure, ultimately leading to more efficient workflows and simplified activities. Collaboration among departments and the capture of real-time data are essential elements of digital transformation. The team has developed software for capturing defects during inspection stages, which has made real-time monitoring and stratification of concerns easier. As a result, there has been a significant improvement in the communication of concerns related to defects and the analysis of data for resolving defects from anywhere within the plant.



Source: Mahindra & Mahindra Ltd

Focus on 'Cannot make & Cannot flow':

To minimize waste within the process, particular attention has been paid to reducing re-work activities that consume valuable resources. To this end, the team has implemented seven design improvements, four process improvements, and 58 poka-yoke actions (mis-

take-proofing) to eliminate re-work. An example of such a poka-yoke is illustrated in the figure, where a torque feedback control tool is utilized.

Transforming through lean approach

Through the adoption of a lean approach and the implementation of incremental improvements, all elements of the organization have been enhanced. This approach is based on the belief that a continuous flow of improvements, when executed diligently, can result in transformational outcomes. As a result, the organization has been able to establish a competitive edge within the commercial vehicle segment.

Way forward

By maintaining our current pace of work, we have successfully implemented a Direct to Dealer (D2D) system, whereby the vehicle is delivered to the dealer without undergoing any inspections by the quality team within the plant. It is a matter of pride that our Kandivali plant was the first in the automotive sector to implement this system. We have also taken on the challenge of implementing a wash-and-deliver system, which means that vehicles are delivered to customers directly without undergoing any PDI inspections at the dealership. These improvements have been instrumental in helping our organization gain a significant market share of 62 percent within the commercial segment.

Business Metrics

Mandatory Parameters	Before	After	Unit of Measurement
WIP	245	85	No. of vehicles
WIP cost	13.47	7.15	Rs in Cr/day
Scrap generation	4.5	1	Rs in Lakhs/ annum
Quality	Online RPT: 3000 Offline RPT: 139	Online RPT: 1600 Offline RPT: 84	RPT
Manpower	56	42	No. of working men
Delivery	83%	92%	% Rolldown to RFD
Safety	6	0	Unsafe Condition
Space (Space Saving)	2,840	0	Sqm

Resource impact

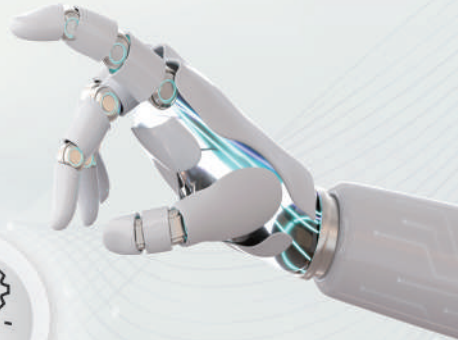
Parameters	Before	After	Unit of Measurement
Energy Consumption	12,753	5,778	Units/Year
Fuel Consumption (diesel)	3,600	Nil	Litres/Year
Reduction in carbon footprint	9,522	Zero	Kg/Year



Automation



Intelligence Green Machines



UA432L
Compact Linear Motor Drive Wire Cut EDM



CPE T6
6-Axis PCD Saw Blade EDM



DX4030L
Linear Motor Drive Die Sinker EDM for Automation



AD5L
Premium Small Hole Drilling EDM



HM6050L
Linear Motor Drive High Speed Milling Machine



PL6880
High Precision Linear Motor Drive
Laser Cutting Machines

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CREATING INNOVATIVE SOLUTIONS

The Indian die and mold industry is expected to grow by over US\$ 1 billion from 2021 to 2025, fueled by demand from the automotive, healthcare, electronics, and plastics sectors. WIDMA, Machining Solutions Group is helping to meet this demand by providing deep-hole drilling technology that offers high accuracy and productivity.

The Die and Mold industry in India has been experiencing significant and consistent growth over the years. According to researchandmarkets.com, the Indian market alone is expected to grow by more than US\$ 1 billion from 2021 to 2025, progressing at a CAGR of 9 percent. Driving the market is not only a pent-up demand in Automotive but also substantial growth in sunrise sectors as well, including Healthcare, Electronics and Electricals, and Plastics. In India, we must also take into consideration aluminum metal injection molding and automation in die casting, which are also likely contributors, along with increased construction activities and the push to 'Make in India'.

In the automotive market, OEMs are faced with the challenge of inflation as well as productivity. Large machines where the size and complexity of the die and mold are in high demand. Die and mold requirements are evolving, becoming more and more complex, and requiring higher levels of machining accuracy.

Helping OEMs enhance production

WIDMA™, a machine tool building division of Kennametal®, India, is helping OEMs optimize production, providing deep-hole drilling technologies that meet the industry's standards of accuracy, reliability, and performance.

The WIDMA UGC Series Deep Hole Drilling (DHD) machine is made for high-accuracy ma-



Source: WIDMA

chining, multi-axis positioning, and deep-hole drilling in a single setup. When designing the UGC Series, not just the variation in materials to machines was taken into consideration but also the size and complexity of the component. The UGC Series can be configured with up to seven axes including a CNC rotary table and spindle tilting feature, which together enable customers to drill complex angles and structures in a single clamping setup.

To give customers the flexibility to optimize machining time and resources, UGC Series machines can also mill, tap, and bore, in addition to deep hole drilling, with minimal setup changes. And with options to customize, the Series offers drilling depths up to 2000 mm and 40 mm diameter and has the capability to support up to 30 tonne.

WIDMA strengths

Anticipating our customers' needs and helping them overcome manufacturing challenges

is what we do at WIDMA. Our teams are focused on designing high-performance machines that not only drive efficiency and productivity but are easy to operate and low maintenance. WIDMA machines also feature adaptive machining technology that defines values of torque to maintain operating levels and standards for accuracy. Linear glass scales and wireless probes are also offered with UGC Series machines.

WIDMA is a leader in providing customized metal-cutting CNC machines that offer high accuracy and productivity across industries. Founded in 1984, WIDMA diversified into customized, semi-standard, and standard machines for machining requirements, ranging from micro tools to large structural parts for the locomotive and general engineering industries. Working with some of the world's most notable brands, WIDMA is recognized for high-performing machines that deliver on metal removal rates, drilling speeds, and depths. 

To give customers the flexibility to optimize machining time and resources, UGC Series machines can also mill, tap, and bore, in addition to deep hole drilling, with minimal setup changes.

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FOR DETAILS



MEASURES THAT MATTER

Marposs' offerings to the biomedical segment include measurement and inspection solutions for medical devices and components. Here's knowing a few and the noteworthy advantages they bring to the table.



Source: Marposs

In the biomedical segment, Marposs is primarily focused on what we consider two main segments - disposable products and implants.

Disposable products, such as bloodlines, dialysis products, flexible pouches, syringes, filters, and glass or plastic bottles, are normally used outside the body or inserted for temporary purposes. They are designed to hold consumable products, such as pills in plastic containers or liquids in glass bottles.

Implants are considered long-term or extended-use products that are inserted in the body like joint replacement products or

surgical pins, screws, and nails. Marposs biomedical solutions can be used manually where an operator installs a part into the testing position for the type of instrument or sensor and then initiates the test cycle.

Optical measurement solution by Marposs

Marposs Optoflash XS is a unique optical measurement solution designed to meet the requirements of biomedical implantology. Thanks to the absence of Z-axis movement, Optoflash is extremely fast and guarantees continuous and stable measurement performance over millions of cycles. The measurement

cycle is incredibly fast, taking 100 static measurements in just 2 seconds, regardless of the distribution of measurement sections along the part.

The user interface allows anyone to use Optoflash and configure new measurements. Features such as an intelligent visual representation of results, images of part details, and graphical configurations allow the operator to quickly check parts in production as well as detect causes of non-conformities.

Marposs Optoflash XS is used to measure items like nails, pins, and screws. The application is normally manually loaded. An operator loads the part into a

Source: Marposs

tool holder and presses a start button. The tool holder rotates 360 degrees while 2D measurements are taken, creating a data file allowing a single combined image to be generated with hundreds of measurements. Those hundreds of measurements are used to verify if the part is within defined tolerances.

Thread inspection tools allow an operator to verify that the treads have been made correctly and that when used will travel the full length and not bind. This helps ensure that connections made will be tight and functional. Marposs also automates that same technology into a turn-key automatic system where the operator is only needed to fill a parts hopper every 7 hours. A recent system for surgical implants consists of four automatic stations.

The flexible FlexiFeed robot

The company uses a standard modular and flexible FlexiFeed robot which consists of a turning table, six-axis robot, and a vision system to individually find and then place a part into

the different inspection stations while being fed from a common parts hopper. An operator loads up to 7 hours' worth of parts into the hopper and FlexiFeed selects and identifies the component and selects the predefined recipe matrix which defines what needs to be tested and measured before presenting it to the first station.

FlexiFeed first puts the CUT (Component Under Test) into a cleaning station that uses a vacuum to remove all dust and debris. This system is not intended to test wet or oily parts that would impact test and inspection results. After removing the debris, the CUT is placed in an orientation station to get it into position for the next visual inspection station.

Marposs OptoFlash can be used manually if an operator inserts the part but in this system, Marposs is using the FlexiFeed robot to load the part into a special fixture that will allow the OptoFlash to create the measurement inspection file. Most of the pins and screws are inspected for diameter, length, radius roundness chamfer,

and pitch. Each article will have its recipe for how many, where, and how many of the inspections will be needed, and these measurements are easily set up using the OptoFlash toolbox which has predefined measurement types.

After the dimensional inspection, FlexiFeed moves the CUT to the thread-checking station. This station is a dynamic inspection of the threads, verifying not only


proper fit and travel distance, but the proper level of torque required, which is not dependent on the operator for a sense of feel.

FlexiFeed places the CUT into a special custom-designed tool holder mounted to a track that moves the CUT to one of three different types of manual thread masters, each integrated with a Marposs torque spindle to verify the proper dynamic parameters and store those data points for analysis. After the completion of the torque and thread inspection, FlexiFeed places the parts into either an accept or reject bin depending on the inspection results.

The flexibility of the Marposs FlexiFeed system will work equally well for dental implant hardware, but the modular design also allows for systems with other automated inspection requirements outside of implants.

Marposs FlexiFeed can also be set up for disposable medical products. Replacing the dimensional inspection station with a leak test instrument and associated sealing components allows for pressure decay or mass flow testing of many different types of medical devices. Adding Marposs laser micrometers allows for accurate, simple diameter and roundness measurements for cylindrical parts.

The high flexibility of the application allows to configure it with additional controls or packaging systems, adapting perfectly to the customer's needs.

This solution integrates different types of controls in a single application, demonstrating how Marposs is a reliable partner for quality control in the biomedical sector considered in its entirety. Not only implants, Marposs also produces numerous solutions for the control of disposable devices, such as syringes and dialysis equipment. 

Marposs Optoflash XS is a unique optical measurement solution designed to meet the requirements of biomedical implantology. Thanks to the absence of Z-axis movement, Optoflash is extremely fast and guarantees continuous and stable measurement performance over millions of cycles.



Source: Marposs

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NEW-GENERATION CBN/DIAMOND TOOLS FOR HIGH PRODUCTIVITY

Prof Amitava Ghosh and his research team at IIT Madras are carrying out cutting-edge research on the development of new-generation abrasive tools and advanced grinding technologies. The team is on a mission to develop a wide range of superabrasive tools for versatile applications, which can bring a paradigm shift in a common understanding of grinding.



A range of different tools developed by the research group

Source: IIT Madras

The tools that the professor and his team are working on are meant to be potentially capable of withstanding a very high material removal rate without compromising the product quality when grinding is practised as a finishing operation by the machining industries of the Manufacturing sector. The research team essentially uses state-of-the-art high-vacuum active brazing technology. In grinding, an abrasive wheel, which is an aggregate of tiny

micro-abrasive particles and bonding material, is used for material removal operations to achieve a high finish and tight tolerances on the part to be produced. Often, they are made of alumina, silicon carbide, cBN (cubic boron nitride), or diamond. These tools are of various shapes. They can be like a small pin, a disc, or of a highly irregular shape too. When high productivity with longer tool life is needed, alumina and silicon carbide are replaced with superabrasives like cBN or dia-

mond. They are superior in their characteristics, hence are called superabrasives. They are superior in terms of hardness and toughness and are highly conductive than conventional abrasives. The product quality and economy of the process largely depend on the performance of such tools.

Knowing multi-point/ single-layer tools

The tools being developed at the laboratory of Prof Ghosh belong to a particular class called

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The tools can be produced for versatile applications found in Aerospace, Automobile, Mining, and Medical sectors, such as rock cutting, ceramic grinding, deep grinding of profiles on metallic alloys and composites, precision dressing, and surgical dentistry procedures.



Source: IIT Madras

High-vacuum, high-temperature brazing of diamond with a suitable filler

multi-point/single-layer tools. Superabrasive particles (grit), made either of cBN or diamond, are brazed on a metallic substrate at multiple points and in a single-layer configuration. The technology essentially requires high-vacuum and super specialty active brazing filler. The active brazing with specialty alloys facilitates extraordinarily good wetting, ensuring higher crystal exposure above the bond level after the brazing of cBN or diamond with steel substrate. It enables an abrasive tool to bite more material during removal if the strength of the joint can withstand high load, thus making active brazing technology a superior choice over its commercial counterpart, electroplating technology. A turbo-propelled high-vacuum, high-temperature brazing furnace that offers a vacuum level of 10^{-6} mbar at a maximum temperature of 1200° C is used for active brazing. The research group is also developing application-specific novel formulations through extensive research on underlying mechano-metallurgical factors

that influence the quality of the tools. These special formulations make the bonding stronger with enhanced wear resistance properties, which, in turn, increase the tools' life.

What is more novel to the approach of making these new-generation grinding tools is positioning the grits uniformly on the working surface in a custom-designed manner. This design of the pattern is exclusively application driven. As Prof Ghosh explains, "This uniform grit distribution pattern will be extremely effective in terms of realizing grinding with high material removal rate without traces of wheel loading as it can accommodate a larger volume of chips in the inter-grit space. The arrangement does not compromise on achieving an adequate level of precision on the part being ground."

New-gen tools superior to commercial counterparts

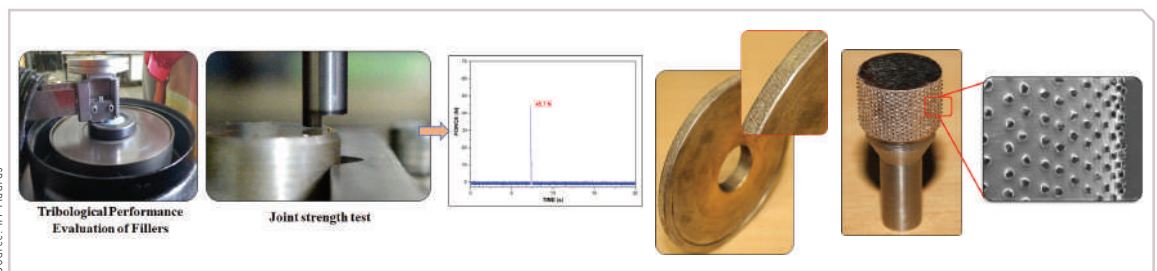
The newly developed tools have been rigorously tested in the lab for their capability and superiority to the available commercial products. The research team has developed, in-house, a novel test bench to experimentally quantify the force-withstanding capability of the joint and a high-speed grinding test rig to evaluate the performance of the tools and compare the same with that of commercial counterparts against various workpiece materials. Such a diamond tool with a 120 mm diameter was found to be capable of abrasive-milling of an aluminum composite with a depth of

2.5 mm without any loading and bond breakage, even when used in a vertical machining center. In summary, these new-generation single-layer tools are potentially far superior to the commercial ones in terms of stronger joint strength, higher crystal exposure, higher tool life, and patterned grit distribution.

Machining and grinding tool manufacturers are the direct potential beneficiary of this technology. The tools can be produced for versatile applications found in Aerospace, Automobile, Mining, and Medical sectors, such as rock cutting, ceramic grinding, deep grinding of profiles on metallic alloys and composites, precision dressing, and surgical dentistry procedures.

The work has been showcased at IIT R&D Fair 2022 at IIT Delhi and very recently at the i2-Academia Pavilion of IMTEX 2023 held at Bangalore International Exhibition Centre. It received recognition and appreciation from pioneering industries in the relevant field. The team is keen to upscale the technology and looks forward to transferring it to a competent hand to contribute to the 'Make-In-India' initiative. "The untiring efforts of the group's research scholars including Prithviraj Mukhopadhyay, Raghava Simhan D, and Trilochan P Nanda have paved the path of the journey. I also acknowledge the financial support from SERB, the Indian Government, and IIT Madras for accomplishing the R&D activities," adds Prof Ghosh. 

Source: IIT Madras



Different test methods for improved alloy formulation

Grinding wheels with patterned grit distribution



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DOMINATING WITH QUALITY

Trishul Machine Tools is widely acknowledged within the country as the top producer of Polygon Turning Machines. The company's unwavering focus and diligence, that has led to its current success, is likely to propel it to the number one position globally as well.



Source: Trishul Machine Tools Pvt Ltd

Trishul Machine Tools Pvt Ltd has gained recognition for its Polygon Turning Machines that cater to the Automotive, Fasteners, Aerospace, Valve, and Power Tool industries. While its position has remained unchallenged since its establishment in 1994 in Bengaluru, Trishul has also gained a reasonably good following in the international markets, especially in the United Kingdom and Turkey.

In the words of CS Shiva Shankaraiah, Managing Director, Trishul Machine Tools, the journey has been both eventful and enjoyable, with the company taking measured steps towards

growth. "Each stage has been approached with caution to avoid any financial complications. While there have been ups and downs, the company has maintained an average growth rate of 15 percent. However, a few years between 2008 and 2013 and the COVID-19 period proved to be particularly challenging, resulting in significant setbacks. Despite this, Trishul machines have been well-received in the domestic market and have gained ample recognition," he shares.

Trishul's strengths

Trishul Machine Tools is in the business of manufacturing Poly-

gon Turning Machines that are used as second-operation machines after the Turning operation. Polygon Turning is a highly cost-effective solution for machining Flats, Squares, Hexagons, and other Polygonal Surfaces on mass-produced components.

Certain automotive parts, such as Fuel Injection parts, Power Steering parts, Valves Stems, etc., require operations that need to be carried out on the Polygon Turning Machines for various technical reasons. Trishul specializes in providing solutions to these operations.

Currently, the company's Polygon Turning machines are sold in Mexico, USA, Turkey, UK,

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Germany, Kenya, Saudi Arabia, South Korea, China, and Taiwan. "We have a significant number of our machines in the UK and Turkey. Although exporting machine tools can be a difficult undertaking, it is a fascinating opportunity as we engage with individuals from diverse countries, with diverse norms, professional practices, customs, and preferences," he adds.

In the post-Covid era, there has been a surge in export orders for the company, leading to its greater presence and influence in the market. "The pandemic has significantly impacted the Manufacturing industry, causing disruptions in the global supply chain. In response, OEM companies worldwide are seeking sustainable and reliable supply chains that are less vulnerable to the policy fluctuations of certain countries. In this regard, India has been seen as a preferred destination for sourcing, as it scores high on these parameters," Shiva Shankaraiah further adds.

Trishul's major domestic clients include Mahindra CIE Ltd, Sansera Engineering, and Ankit Aerospace Pvt Ltd. Whereas, its major international clients include Lonestar Group, Erlson Precision Components Ltd, and Alca Fasteners Ltd.

Setting a new standard

Trishul Machine Tools' machines are recognized for their superior speed, accuracy, and productivity. They are completely automated and simple to operate, leaving behind a high-precision finished surface on the machined components. The company's TPT series of Polygon Turning Machines are considered game-changers and, hence, require a special mention here.

"Trishul Polygon Turning Machine Model TPT-2S is a highly popular model for machining

second operation Milling operations. On certain applications, this model is reported to have replaced three VMCs, thereby bringing in enormous cost benefits for our customers," explains Shiva Shankaraiah.

The TPT-2S is a versatile, popular, and advanced model that takes care of most of the general engineering industry requirements. The TPT-5S is another sophisticated model that is primarily useful to machine polar arrayed features like the ones found on ratchets, splines, and serrations. "The Servodrives we use on the machines have the AI feature. In the Electronic Gearbox applications, the Gain corrections have to be on a real-time basis. There will be a time lag between the sensing, command, and delivery of the Gain Current. The AI learns the Gain patterns and Pumps the current at the right time, without any lag. This feature has enabled us to venture into hitherto unexplored applications," he shares. Trishul Machine Tools has received numerous accolades, including the 'EEPC Export Excellence Award', the 'Outstanding Entrepreneur Award in memory of Vinod Doshi' by IMTMA in 2020, and the 'IMTMA Export Performance Award' most recently, due to the high quality of their machines and prompt service. Shiva Shankaraiah, when asked about the diligence required to receive such honors, states, "We simply focus on performing our duties diligently and strive to improve every day. We are not taking any special measures to attain these recognitions. We are grateful for the recognition and will continue to work hard."

Highlighting problems

The SME sector has grown dynamically over the last five decades and contributes a sub-




Source: Trishul Machine Tools Pvt Ltd

"Our aim is to remain dedicated to the development of the Polygon Turning Machines in the upcoming years. Currently holding the top position in the country, our goal is to attain the number one spot globally in the near future."

CS Shiva Shankaraiah
Managing Director
Trishul Machine Tools Pvt Ltd

stantial portion of the country's exports, creating millions of jobs annually. However, it still suffers from a burden of challenges. Shiva Shankaraiah points to the ones he believes must be looked at if the sector has to grow to its full potential.

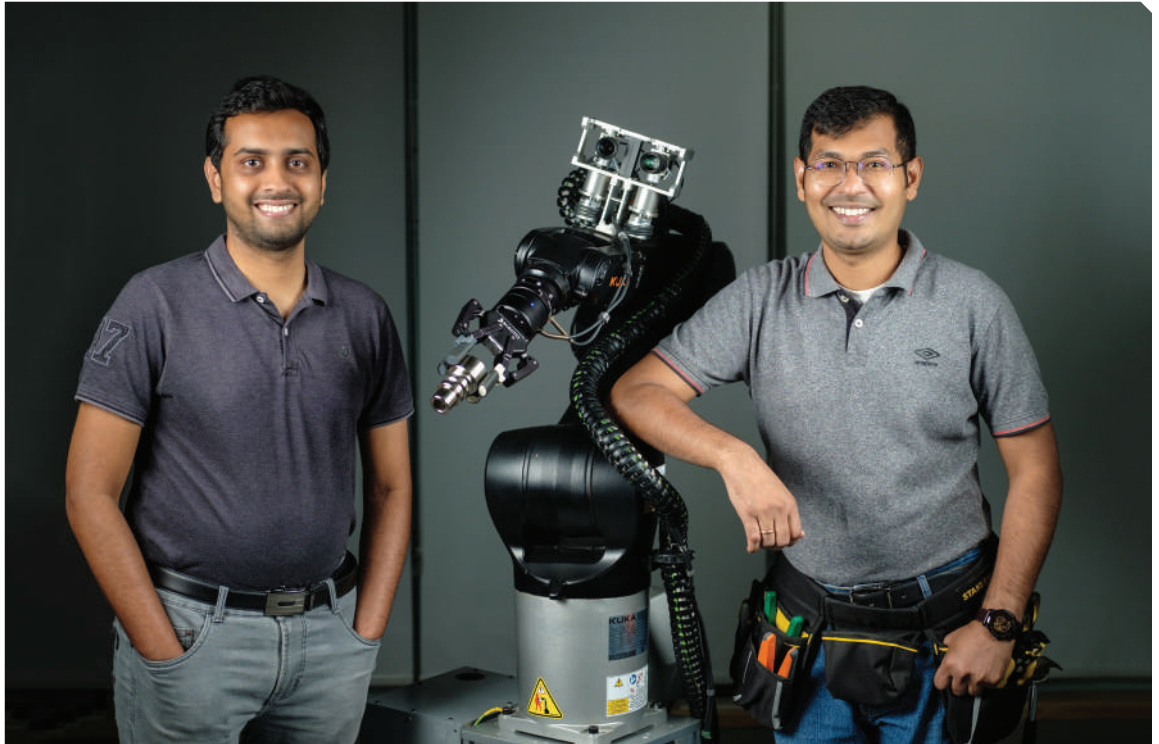
The SME sector, he says, has been facing a scarcity of manpower across all levels, and this has been a persistent complaint from SMEs. Despite discussions around unemployment in the country, the shortage of manpower in SMEs has remained a challenge. He notes that there has been no survey conducted on this issue in SME units. However, they are actively working on implementing various schemes to overcome this challenge and expect to see progress soon.

Meanwhile, the company aims to stay dedicated to the development of the Polygon Turning Machines in the upcoming years. "While we currently hold the top position in the country, our goal is to attain the number one spot globally in the near future," says Shiva Shankaraiah, signing off. 

The TPT-2S is a versatile, popular, and advanced model that takes care of most of the general engineering industry requirements. The TPT-5S is another sophisticated model that is primarily useful to machine polar arrayed features like the ones found on ratchets, splines, and serrations.

REDEFINING MACHINE VISION

With its revolutionary vision technology, CynLr, a robotics deep-tech startup, is altering the field of industrial robotics and autonomous navigation, promising to simplify factory lines and empower robots to undertake any task.



(L-R) Nikhil Ramaswamy, Co-founder & CEO, CynLr and Gokul NA, Co-founder, Brand, Product, and Design, & CTO, CynLr

Source: CynLr: Cybernetics Laboratory

CynLr, short for Cybernetics Laboratory, is a startup in the field of robotics and deep-tech that specializes in developing advanced vision technology and intelligence for industrial robotics and autonomous navigation. Its Co-founders Nikhil Ramaswamy, CEO, and Gokul NA, CTO, share that the idea behind the company came from their experience working at National Instruments (NI), a leader in machine vision hardware and software. They identified shortcomings in the global approach to machine vision, which motivated them to establish CynLr.

“Machine vision is notorious for being unreliable, and if

National Instruments had ten opportunities in machine vision from customers, they would only have a technical solution for three of them, while seven would fail,” Ramaswamy explains. This led to a soul-searching exercise by the founders to discover the missing layers, and in 2015, after four years at National Instruments, they left their jobs to start consulting in this space, applying their unique perspectives in machine vision to real-world problems.

Going ahead

In the next three years, they solved over 30 previously unsolved machine vision problems for customers in automotive

and healthcare manufacturing, including GE X-Rays, Timken, and Sansera. Backed by the success of their approaches, they launched CynLr in 2019 with a seed round of Venture Capital (VC) funding to build a universal vision platform for robots. “We are VC funded. We have raised US\$ 5.25 M (close to ₹40 crore) in venture funding from India’s Deep-Tech VCs and family offices,” Ramaswamy informs. “We will be looking to further raise our Series A round of funding for commercialization and scale later this year. Simultaneously, our customers also fund us for the collaborative design reference engagements that we are currently undertaking.”

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“We have endured hardships for the startup, tided through the disruption caused by COVID-19 lockdowns, and the subsequent strains caused by the supply chain crisis. The only reason we have stuck for this long is the vision we had for the immense potential this technology could unlock for manufacturing and physical industries,” he shares.”

Nikhil Ramaswamy
Co-founder & CEO
CynLr

Universalization of machine vision

Ramaswamy explains that he and Gokul have been chasing the opportunity to solve the universalization of machine vision for robotics use cases for over a decade now, in different organizations. “One thing that will stand out in our entrepreneurial journeys is the steadfast focus and perseverance in solving this one technological problem through peaks and troughs,” he adds. They have endured hardships for the startup, tided through the disruption caused by COVID-19 lockdowns, and the subsequent strains caused by the supply chain crisis. “The only reason we have stuck for this long is the vision we had for the immense potential this technology could unlock for manufacturing and physical industries,” he shares.

The journey

Reflecting on his journey, Ramaswamy says, “Prior to CynLr, Gokul and I began our careers on the same team at NI a decade ago. We have been relentlessly pursuing this problem of making machines see and manipulate like humans.” During his time at NI, he quickly advanced to the role of Key Accounts Manager within a short span of 1.5 years and successfully doubled the company’s annual revenues from major clients such as GE, establishing it as the largest private account in India. His client portfolio included renowned semiconductor and engineering companies like Intel, Cypress, Bosch, GE, and Honeywell. Meanwhile, Gokul excelled as a Staff Specialist in Vision, RF, and Embedded systems at NI. He catered to algorithmic require-

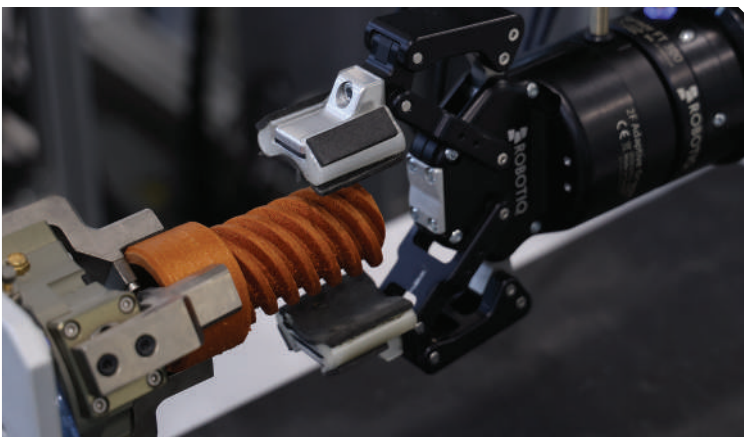
ments from Europe, Taiwan, and India, replacing ranks as the architect for the largest automated Verification and Validation (V&V) with 300K test cases from Jaguar and Land Rover. Gokul also played a significant role in architecting over 40 vision systems at NI. Additionally, he spearheaded the growth of the vision business in India by recruiting teams, structuring vision courses, and training more than 50 vision engineers to cater to customer needs.

In 2015, Ramaswamy and Gokul made the decision to leave NI and venture into the market to explore their unique approach to machine vision for object manipulation.

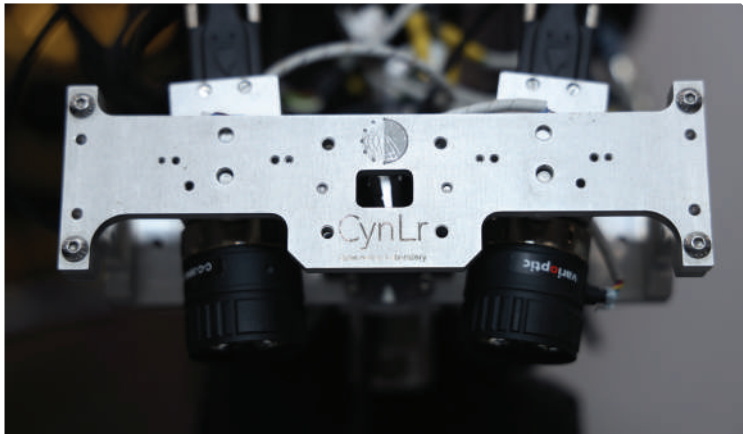
Industrial robotics landscape in India

According to Ramaswamy, India has been slow to adopt robotics because of its low manual labor wages and abundance of skilled workers. However, positive developments in Indian manufacturing are expected to increase demand for robotics in the near future. He also notes that contrary to popular belief, labor costs are not the main driver of robotics adoption, even in more advanced economies. Instead, factors such as production quality, consistency, repeatability, and traceability are the primary drivers. As a result, industries such as automotive, which require high precision and repeatability in manufacturing, have already experienced steady growth in robotics adoption. The recent trend of the Government incentivizing electronics manufacturing in India is expected to further this demand. “Even China, which rose to fame by making manufacturing cheaper for the world because labor was cheaper, eventually had to look at robotics to sustain the growth. Today, China is the

The founders, Nikhil Ramaswamy and Gokul NA, identified gaps in the approach to machine vision globally and successfully solved over 30 previously unsolved machine vision problems in automotive and healthcare manufacturing, including GE X-Rays, Timken, and Sansera.



The company is VC-funded, having successfully raised US\$ 5.25 million (₹40 crore) in venture funding from India's Deep-Tech VCs and family offices. It further plans to seek additional funding through a Series A round later this year, aiming to drive commercialization and scale.



Source: CynLr Cybernetics Laboratory

largest buyer of robots, and as a single country, it buys more robots than all of Europe put together. This trend will soon happen in India too," the CynLR CEO points out.

According to him, for India to gain and retain its brand as a quality manufacturing destination beyond just low cost, it is imperative that the industry focuses on advanced manufacturing, including robotics.

Emphasizing that the global demand for CNC machines surpasses 8,00,000 units annually, catering to the diverse needs of industries such as Automotive, Electronics, and Aerospace, Ra-

maswamy adds, "This number is expected to triple to 2,400,000 machines by 2030. Traditionally, feeding parts to the CNC machine and removing them after the job is done has either been manual or required manual preparation of pallets by humans so that robots can blindly handle the task. Machine Tending Automation faces the same challenges as any other robot automation—you either need the parts to be arranged manually before the robot can pick, or you have to invest in expensive, time-consuming automation projects that are not scalable."

CynLr's visual robots revolu-

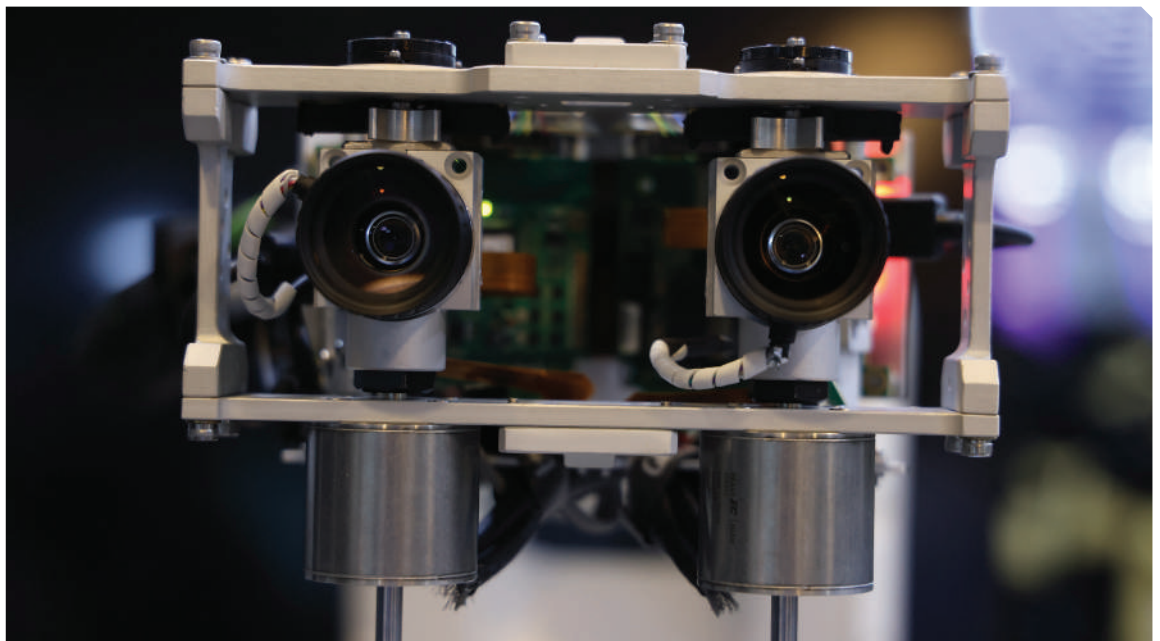
"For India to gain and retain its brand as a quality manufacturing destination beyond just low cost, it is imperative that the industry focuses on advanced manufacturing, including robotics."

Nikhil Ramaswamy
Co-founder & CEO
CynLr

tionize the field by enabling robots to handle any CNC task, regardless of geometric complexity, lighting conditions, or the nature of the task.

CynLr's vision for modular micro-factories

CynLr Vision stack makes machines instinctively see and pick any object under any ambience without any training, just like a baby's brain, shares Ramaswamy. "Today, we do not have a robot that can fit a screw into a nut without slipping a thread. Even to assemble such simple parts, factories are forced to build heavily customized machines. Imagine what it would take for a robot to assemble a smartphone or a car by putting together



Source: CynLr Cybernetics Laboratory

thousands of parts with varied shapes and weights, all in random orientations,” he reasons. Thus, factories become complex, asset-heavy, and underutilized. CynLr enables visual robots to intuitively pick and grasp any object, even from clutter—a universal alternative to custom machines, simplifying factory lines into modular LEGO blocks of micro-factories. “Simplifying factories with robots that can pick and place any object has been a 40-year pipe dream, touted as the Holy Grail of Robotics,” he says. “To achieve this intuitiveness with objects, CynLr’s camera sees motion, color, and depth, which incidentally becomes a one-stop replacement for RADAR, LiDAR, and Camera, simplifying sensor fusion for ADAS.”

Cybernetics H. I.V.E and collaboration

With the launch of Cybernetics H.I.V.E—short for Hub for Intelligence and Vision Excellence—at Bengaluru, CynLr is set to serve as a launchpad for advanced robotics and vision research in collaboration with Ford, Gener-

“CynLr enables visual robots to intuitively pick and grasp any object, even from clutter—a universal alternative to custom machines, simplifying factory lines into modular LEGO blocks of micro-factories.”

Nikhil Ramaswamy
Co-founder & CEO
CynLr

al Motors, Ace Micromatic, and many more. “From a tiny 250 sq ft basement space in 2019, CynLr has metamorphosed to a 52x larger, 13,000 sq ft state-of-the-art lab with the highest density of robots dedicated for vision and robotics research in the country—Cybernetics H.I.V.E.” reveals Ramaswamy.

CynLr has undergone rapid expansion, growing from a team of 8 members to a workforce of over 35 individuals, with plans to scale even further to over 70. The company has received significant attention, as evidenced by its ability to attract more than 12,000 applicants in the previous year alone. To support its research and development efforts, CynLr operates

a research facility that includes 16 robot cells capable of accommodating up to 25 robots for different product and application research. Additionally, the facility boasts over 400 components and technologies, and the company has established over 200 partnerships with vendors and other entities to facilitate cutting-edge research and delivery.

Expansion plans

“We are partnering with Indian and global CNC machine builders to offer a robot solution that they can sell as an out-of-the-box add-on to the machine to automate any tending task,” he reveals. The company is working collaboratively to define scalable reference designs for robots with vision across applications in machine tending, kitting, and assembly with India’s largest CNC manufacturer, two of the largest car OEMs in North America, and a Tier 1 manufacturer in Europe. He further adds, “We are also in advanced talks for use cases within a larger aerospace OEM, a few electronics manufacturers, and large Tier 1 auto component suppliers.” 

With the launch of Cybernetics H.I.V.E, CynLr is set to serve as a launchpad for advanced robotics and vision research in collaboration with Ford, General Motors, Ace Micromatic, and many more.



Source: CynLr Cybernetics Laboratory

CREATING A BRIGHTER FUTURE TOGETHER

Siemens Ltd is committed to helping students in India reach their full potential through its Siemens Scholarship Program, which is an excellent example of how education and industry can work together to create a bright future for students and a stronger economy for the country.



Source: Siemens Ltd

Siemens has been reshaping communities throughout India through Corporate Citizenship initiatives that focus on three pillars: access to technology, access to education, and sustaining communities. Siemens Scholarship Program (SSP) is one of the flagship education projects that provides economically disadvantaged communities with access to quality education.

SSP: A unique program

Siemens Scholarship Program is a corporate citizenship flagship project of Siemens Ltd. Sunil Mathur, Managing Director and

Chief Executive Officer, Siemens Ltd, elaborated, "It is a unique program with a 4-year Holistic Development Plan to foster young talent. It's based on the German dual education system and aims to make youth industry-ready engineers, enabling them to start a sustainable career in engineering, R&D, or the Manufacturing industry. The program was started in the year 2013 with 20 students as a pilot and has recently completed 10 years. The program offers four-year scholarships to meritorious engineering students from economically disadvantaged families."

Helping graduates overcome barriers

The program is intended for enthusiastic and determined first-year engineering students at a government college who are committed to success through hard work, dedication, and perseverance. Employees provide support throughout the entire project cycle. A PAN India program, SSP offers them the right support to achieve both their personal and professional goals.

Under the program, Siemens provides financial assistance to deserving, meritorious stu-

SOVAN TUDU
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dents who are unable to afford their educational expenses. “The program aims to tackle the challenges faced by engineering graduates when it comes to employability. SSP tries to address this issue through the German Dual Education model that combines the advantages of on-the-job training and education,” Mathur said. “It supports young people to transition from academia to industries and guarantees industries a skilled workforce to strengthen the economy.”

Stating that Siemens offers students full scholarships covering the college fees and educational allowances for books, stationery, etc., he added, “Students are provided with internships, training on mechatronics, soft skills, projects, and mentorships throughout the four years of engineering to make them truly industry-ready.” Furthermore, SSP focuses on technical and functional skills, facilitating the transition of scholars from learning to industry readiness and employability by responding to the skills needed by industries.

The impact so far

Siemens Scholars who have graduated from the program have been placed in leading companies in various sectors such as engineering, banking and finance, IT services, infrastructure, automotive, and consumer goods, as well as in Siemens. “To date, over 1,300 students from 125 government engineering colleges across 27 states in India have been part of the Siemens Scholarship Program,” pointed out Mathur. “The program is aimed at creating a pool of first-class, industry-ready engineers and addressing the individual, social, and economic dimensions students face. The program



Source: Siemens Ltd

“The program aims to tackle the challenges faced by engineering graduates when it comes to employability. SSP tries to address this issue through the German Dual Education model that combines the advantages of on-the-job training and education. It supports young people to transition from academia to industries and guarantees industries a skilled workforce to strengthen the economy.”

Sunil Mathur
Managing Director and Chief Executive Officer
Siemens Ltd

also focuses on increasing its footprint and empowering the skilled workforce.”

The internships are at Siemens and other multinational companies, and the yearly scholarship is subject to students clearing all subjects. “SSP scholars get to go through internships and mechatronics training under the SITRAIN India team, which makes them get a certification from Siemens Berlin,” he shared. “They are groomed on soft skills and functional skills throughout and are supported on campus placement preparation such as personal interviews, group discussions, aptitude tests, resumes, etc. in their 7th semester.” Out of the total number of students who enroll in the program, fifty percent are young women, and 50 percent of the scholarships are reserved for girls.

All these programs give SSP Scholars an edge over their

classmates due to additional industry experience and knowledge, such as mechatronics, which helps the students in their placements. “Our scholars are placed in various well-known companies, such as MNCs, Public Sector Companies, and Indian companies too. To name a few, we have L&T, TCS, Amazon, Accenture, IOC, and Bharat Petroleum,” he shared. “Few do higher education at IIT Bombay, IIM Ranchi and Shillong, RWTH Aachen University, Germany, etc. They have turned out to be role models in their communities and colleges, motivating many towards taking up engineering as a career and enhancing their living conditions for their families.”

Success stories

Sharing her experience, Namrata Gupta, SSP-2017, PGDIE Student, National Institute of Industrial Engineering (NITIE), said, “The scholarship program not only provided me with financial support during my undergrad years but also helped me develop my technical and interpersonal skills. The internship project and SSP’s soft skills program helped me stand out among my peers, get shortlisted for better companies, and land a summer internship at one of the best FMCG firms.”

Tanay Atpadkar, an SSP-2019 alumnus who currently serves as a Grade A1 Officer at one of India’s largest Oil PSUs, shared that interacting with individuals from across the country and belonging to a community of like-minded people was a once-in-a-lifetime experience. The program began during Tanay’s first year of Mechanical Engineering and continued for the entire four-year period, incorporating exceptional features such as mechatronics

Siemens Scholars who have graduated from the program have been placed in leading companies in various sectors such as engineering, banking and finance, IT services, infrastructure, automotive, and consumer goods, as well as in Siemens.

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Source: Siemens Ltd

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Namrata Gupta
SSP-2017
PGDIE Student
National Institute of Industrial Engineering (NITIE)

“Interacting with individuals from across the country and belonging to a community of like-minded people was a once-in-a-lifetime experience. The program began during my first year of Mechanical Engineering and continued for the entire four-year period, incorporating exceptional features such as mechatronics workshops, internships, and training sessions. SSP is truly a comprehensive program that fosters holistic development.”

Tanay Atpadkar
SSP-2019
Grade A1 Officer
Oil PSU



Source: Siemens Ltd

“Siemens Scholarship Program guided me towards my career path, equipping me with valuable lessons that enabled me to achieve financial independence. Thanks to SSP, I have gained extensive technical expertise, experienced professional growth, and developed my behavioral skills, among numerous other benefits.”


Dineshprabhu Jagadeeshwaran
SSP-2022
Startup

“Through SSP, I have experienced remarkable economic growth, going from a situation where I struggled to pay my fees to one where I am now able to fund my sister’s postgraduate education. In addition, my technical skills have flourished, transforming me from a student who struggled with PLC programming to a manager who can confidently handle refinery automation and procurement tasks independently. This is a testament to SSP’s distinctive focus on the comprehensive development of its scholars.”

Mukesh Radkar
SSP-2018
Assistant Manager
Premium PSU

workshops, internships, and training sessions. “The trainers doubled as mentors with whom the scholars could discuss their concerns, and their extra effort to prepare us for our professional careers was noteworthy. SSP is truly a comprehensive program that fosters holistic development,” he added.

In a similar vein, Dineshprabhu Jagadeeshwaran, SSP-2022, who started his own startup venture, commented, “Siemens Scholarship Program guided me towards my career path, equipping me with valuable lessons that enabled me to achieve financial independence. Thanks to SSP, I have gained extensive technical expertise, experienced professional growth, and developed my behavioral skills, among numerous other benefits.”

Mukesh Radkar, SSP-2018, Assistant Manager at a premium PSU, shared, “Through SSP, I have experienced remarkable economic growth, going from a situation where I struggled to pay my fees to one where I am now able to fund my sister’s postgraduate education. In addition, my technical skills have flourished, transforming me from a student who struggled with PLC programming to a manager who can confidently handle refinery automation and procurement tasks independently. This is a testament to SSP’s distinctive focus on the comprehensive development of its scholars,” he added. 



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EXPLORING MANUFACTURING FEATS

DMTX 2023 (Delhi Machine Tool Expo), scheduled from August 24-27, 2023, at Pragati Maidan, New Delhi, is to feature some of the most cutting-edge technologies from around the world. This preview aims to provide a glimpse of the manufacturing excellence that awaits to be explored at the expo.

VISION MEASURING SYSTEMS

FOR ACCURATE 2D MEASUREMENTS

OPTIV LITE OLM is a series of manual Video Measuring Machines from Hexagon Manufacturing Intelligence. Video Measuring Machines, also known as Vision Measuring Systems, are used for quick and accurate 2D measurements of small parts with video edge detection techniques. With the capability to detect edges on high-resolution video through a simple click, the measurement process is expedited and reduces dependency on operators.

OPTIV LITE OLM offers several notable features, including:

- High-precision granite base and columns that ensure stability to the mechanical system;
- To prevent thermal deformation of the measured objects, the OPTIV LITE OLM utilizes continuously adjustable LED cold light for both bottom and surface illumination;
- A manual operations mode facilitates seamless switching and rapid motion. A pre-posed axis Z hand wheel ensures convenient operation;
- The Windows measuring software is user-friendly, making it easy to learn and use;
- A perfectly automatic boundary search and de-burring function reduces errors caused by the user and improves efficiency;
- Automatic focus indication makes it convenient to interface with software such as AutoCAD visual programming according to the imported DXF file, suitable for batch testing;
- The OPTIV LITE OLM offers the capability of graphical and textual output reporting.



Asiatic Engineers
www.asiaticengineers.com
 Hall & Stand: 12/A-102



METROLOGY STYLI

INDO SERVICES' STYLI

For the past 20 years, Indo Services has been trading replacement styli for all metrology applications used in shop floors, QA labs, standards rooms, and metrology departments throughout India.

Post-COVID-19, to cater to the needs of the growing Indian Manufacturing industry, the company's focus has shifted from importing these replacement styli from Europe to instead manufacturing them in-house as part of the 'Make in India' initiative.

Its manufacturing range includes styli for critical applications such as Surface Roughness Measurement (with a tip radius of 2 micron and 5 micron), Contour Measurement (with a tip radius of 25 micron), Roundness measurement, and Thread Measurement.

Indo Services' knowledge and experience in the Quality Assurance field aids it in manufacturing special styli as per customer needs. It maintains an exhaustive stock for the benefit of its customers, and most styli are available ex-stock to ensure the best delivery times for them. Its entire range of styli can be accessed on the company website.

Indo Services
www.indoservices.net
 Hall & Stand: 12/A-107

DRILL TAP CENTERS

JD 1- HIGH-SPEED DRILL TAP CENTER

LMW Machine Tool Division, India's finest range of CNC Machine manufacturer, presents JD 1, a high-speed drill tap center, that has stroke capabilities of 500 mm on the X-axis, 400 mm on the Y-axis, and 320 mm on the Z-axis. It also boasts a spacious pallet size of 650 mm X 400 mm, allowing for efficient handling of the materials. Equipped with a maximum power of 30 kW, this machine is designed to deliver superior performance and precision. It features a rigid structure that provides a wider working area, allowing for greater flexibility and precision.

With a direct drive spindle of BBT 30 and spindle speeds of up to 24,000 rpm, this machine is capable of delivering unparalleled performance and accuracy. The high-speed pocket tilting automatic tool changer ensures smooth and seamless tool changes, while the high rapid transverse rates of 48 m/min enable efficient and speedy movements of the machine.

With its advanced features and capabilities, this machine is designed to deliver precision and efficiency in producing components for Automobile, Electric Vehicle, Die & Mold and Electronic industries.



Lakshmi Machine Works Ltd
www.lmwglobal.com / www.lmwncnc.com
Hall & Stand: 11/B-120

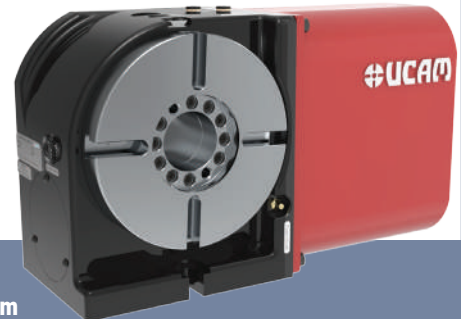
CNC ROTARY TABLES

Q SERIES FROM UCAM

The Q Series CNC rotary tables from UCAM is designed to revolutionize industries like Automotive, Aerospace, and Medical Device manufacturing. With their compact design and exceptional performance, these rotary tables are poised to enhance production capabilities across various sectors.

Features of the Q Series:

- **Compact and Lightweight:** The URQ series, a part of the Q Series, offers a 30 percent reduction in size and weight compared to traditional rotary tables. This compactness allows for improved machine acceleration and deceleration, resulting in faster production cycles.
- **High Positioning Accuracy:** The Q Series is engineered for precise machining, delivering high positioning accuracy. This ensures impeccable workmanship and superior finished products.
- **Quick Acceleration:** Achieve quick acceleration, enabling efficient and time-saving production processes.
- **Easy Installation:** The compact size and lightweight design of the Q Series makes it easy to install and integrate into existing systems. Customers can mount servo motors and set up electrical routings effortlessly.
- **Maintenance-friendly:** The Q Series is designed for easy maintenance and adjustments. Its robust and reliable construction ensures long-lasting performance with minimal downtime.
- **Versatile Applications:** The Q Series is ideal for a wide range of applications that require efficient rotary motion. From precision machining to complex manufacturing processes, these rotary tables deliver exceptional performance.
- **IP65 Protection:** The rotary tables are equipped with IP65 protection, ensuring resistance to dust and water ingress. This feature enhances the durability and reliability of the tables, making them suitable for various industrial environments.
- **Aesthetically Superior:** In addition to their exceptional functionality, the Q Series rotary tables boast an aesthetically superior design. With sleek lines and modern aesthetics, they not only deliver top-notch performance but also add a touch of sophistication to one's production setup.



UCAM Pvt Ltd
www.ucamind.com
Hall & Stand: 11/B-105



SourcePro Infotech Pvt Ltd
 www.sourcepro.co.in
 Hall & Stand: 12/A-107

ERP SOFTWARE SOLUTIONS

EXPLORING A 'NEW HORIZON'

SourcePro is an industry leader with the vision of optimizing businesses through advanced ERP software solutions. With more than 25 years of experience in developing enterprise solutions, it provides future-ready business platforms to clients using the latest technology to deliver the best ROI.

New Horizon ERP by SourcePro is a smart integrated business solution that allows small- and medium-sized businesses to streamline their critical processes across multiple offices, factories, and locations. Powered by an unmatched MRP engine and auto MIL, New Horizon ERP is a versatile solution for discrete manufacturing that easily adapts to your business and industry needs.

This robust platform unifies all business information in 9 core modules to provide a 360-degree view of business drivers and customers at your fingertips. It's an ideal solution for a broad range of manufacturing houses working on Made-to-Order, Made-to-Stock, and Made-to-Design models.

Businesses leverage New Horizon to cope with operational inefficiencies while maintaining their position in the market. As a centralized platform, it helps establish an integrated system for the efficient management of fragmented operations by defining critical processes on the go. It eliminates the transfer delays introduced between processes by smoothening out the internal procedure through enhanced coordination and real-time communication throughout various functions and departments.



Patankar Industries
 www.patankarindustries.com
 Hall & Stand: 12A/D-107

INDUSTRIAL LAMPS

LED CNC LAMPS FOR VARIED APPLICATIONS

For more than 30 years, the brand Patankar Industries has been leading in the field of industrial lamps, offering a complete range of glare-free, highly reliable, long-lasting, and energy-efficient industrial lamps.

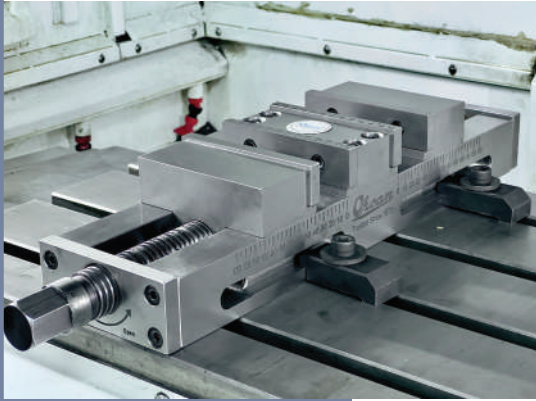
The LED CNC machine lamp is specifically designed for CNC (Computer Numerical Control) and VMC (Vertical Machining Center) applications. The LED CNC Machine lamp from the company is IP67 water-, oil-, and coolant-proof. The lamp can be rotated 360°. Equipped with Nylon 6 Black mounting brackets, the LED CNC machine lamp is specifically designed to withstand extremely harsh operating conditions. Additionally, it features a diffused polycarbonate lens that ensures glare-free illumination.

The new generation of LED lights is specifically engineered to modernize and replace traditional fluorescent industrial tube lights. Premium LED (OSRAM) materials and technology offer 50,000 hours of maintenance-free operation. Available in various lengths, these LED lights are designed as direct replacements for existing light fixtures. With a color temperature of 6500K, they provide clear and bright vision. Moreover, these lights emit no UV or IR radiation, ensuring a safe working environment. They are available in multiple voltage options, including 24 VDC/AC, 10 VAC, and 230 VAC. Additionally, these low-voltage power lamps offer cost-saving energy efficiency. Notably, they are designed to eliminate any stroboscopic effect, providing a stable and consistent lighting experience.

LED industrial lamps have a wide range of applications, including: Machine tools applications, Logistics facilities, Cold storage environments, Shop floors, Emergency lighting situations, Forklifts and construction equipment, Paint booth illumination, Marine applications, Vision inspection processes, and EOT crane movement with red or blue lamps.

WORKHOLDING SOLUTIONS

TWIN JOB CNC MACHINE VICE



orcan products of India
www.orcan.com
Hall & Stand: 11/C-126

Orcan, the leading workholding manufacturing company with 45 years of experience, has recently launched its latest innovation, the Twin Job CNC Alloy Steel Machine Vice. This new product can hold two pieces of the same size or different sizes, with a jaw width of 125 mm and jaw opening of 125 mm.

The Twin Job CNC Alloy Steel Machine Vice has been designed to improve productivity and reduce operator time. By using four vices on a machine table to process eight jobs in one setup, the product can free operator time by as much as 86 percent, leading to increased productivity by up to 7 percent. With an ROI of less than one year, this product is an investment that can pay off quickly.

Orcan's new product is perfect for companies that need to process multiple jobs in a single setup, thereby reducing the downtime between setups. With this product, companies can improve their bottom line and increase their efficiency without having to compromise on quality.

VERTICAL TURNING CENTERS

VTC WITH INCREASED CAPACITY

Macpower Vertical Turning Center (VTC), the VTX-800, combines power, rigidity, and versatility with increased capacity. Wide access to the chuck zone facilitates ease of loading and unloading of parts. Linear motion guideways on X and Z axes ensure better positioning and repeatability.

The major construction parts are based on FG260 grade cast iron to ensure optimum harmonic stability and maximum damping during cutting.

The base and the column are reinforced with heavy ribs for stability and minimum distortion. The uniformly dense, fine-graded casting distributes stress and heat throughout the machine structure.

A vertical column with higher base contact and an A-type structure strengthens the machine and minimizes the complete overhang for higher travel of the Y-axis.

The machine has undergone a thorough inspection process, including Laser calibration, Ball Bar testing, PDI (Pre-Delivery Inspection), and multiple inspection layers to ensure its quality and performance.

Macpower VTL machine is ideal for turning heavy, large-diameter components like fly wheels, brake drums, big-size gears, etc. It is conducive for easy loading and unloading of heavy components. It occupies smaller floor space than a horizontal turning machine that can turn comparable-sized parts.



Macpower CNC Machines Ltd
www.macpowercnc.com
Hall & Stand: 11/A-112



Mechmatrix
www.mechmatrix.in

CHAMFERING TOOL

MMX02 BY MECHMATRIX

Often modern CNC shop leaders unknowingly spend more than necessary time and effort in deburring-chamfering operations after machining. Amidst the pressure of increasing productivity and reducing cycle time, the challenge of maintaining a friendly working environment with the operator team adds to the struggle.

Mechmatrix provides an innovative solution that substantially reduces operator fatigue and increases productivity in deburring-chamfering operations by 5 times.

EASYMECH brand handheld chamfering-deburring tools are proving to be the popular choice to provide world-class edge finishing on machined and pressed components without the operator having to sweat heavily on the shop floor.

Modern CNC shops can easily Deburr-Chamfer sharp edges on components after operations including Casting & Forging, Plasma cutting, Laser cutting, CNC machining, Fabrication, Pressed components, Water jet cutting, and Shearing on press brakes.

The benefits and savings in the operator's time and effort provide a substantial reduction in the cycle time. Thus also enhancing respect for the supplier machining the parts. Mechmatrix enables companies to increase profitability by improving productivity.

Companies are enabled to become process-dependent instead of person-dependent on the shop floor for secondary edge finishing operations like deburring-chamfering.



Duracarb India Pvt Ltd
www.duracarb-india.com
Hall & Stand: 11/B-103

INSERTS

ONMU 05 & 07 SERIES OF INSERTS

High-Feed Milling (HF) is a machining technique that uses a low-entry-angle milling cutter to achieve high metal removal rates in various applications. By using a low entry angle (usually less than 25°), the depth of cut is reduced and the feed rate is increased, resulting in higher productivity and efficiency. Duracarb India provides a wide range of solutions for high-feed milling, from 3-corner to 16-corner inserts, depending on the machining stability. One of the most advanced solutions is the ONMU 05 and 07 series of inserts, which have several features that make them ideal for high-feed milling. These features are:

- A thicker insert design for higher rigidity and longer tool life
- A helical cutting-edge geometry for smoother cutting action and lower cutting forces
- An angular clamping system for stable clamping in the pockets
- An integrated wiping edge design for good surface finish and accuracy
- A wedge clamp cutter option for ONMU 07 size for enhanced stability and productivity
- The ONMU 05 and 07 series of inserts can help achieve optimal performance and quality in high-feed milling operations.

TUBE BENDING MACHINES

ALL-ELECTRIC TUBE BENDERS

Electropneumatics is a market leader in India with the widest range of tube bending machines. One of the latest models the company has introduced is All-Electric Tube Benders, which has bi-directional bending capability. This machine is ideally suited for the bending of complex tubular parts of automobile seating, chair frames in a single setup for the Furniture industry, etc. They are highly productive and produce parts with superior repeatability and quality.

These bi-directional benders have 9 axes with 3 radii bending capability using 3 stacks for different bend radii. The bend head automatically moves to adjust its position vertically for different bending dies and lateral movement for the different radii of the bend.

With the machine, the company also provides tooling and automation for draw bending along with 1D/Boost/Large radius/different material/complex profile benders for special applications.

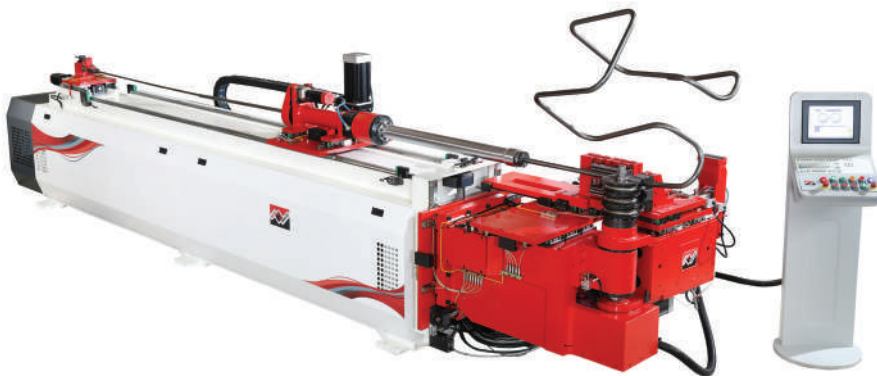
The machine enables bi-directional bending, allowing for the creation of intricate profiles. All 9 axes of the machine are driven by AC electric servo, ensuring enhanced speed, accuracy, and flexibility. It is equipped with 3 stacks for bending 3 different radii. The optimized parallel axes motions contribute to high productivity. The machine operates cleanly and quietly. Data entry can be done using push-turn-bend (Y-B-C) values or X-Y-Z coordinates. Comprehensive online diagnostics are available for easy troubleshooting.

The machine incorporates Electropneumatics' Smart Bend CNC system, featuring a powerful and user-friendly Linux-based touchscreen CNC software with an intuitive interface. It offers programmable closed-loop position-speed control, optimizing parallel axes motions.

An independent pressure die assist (friction boost) system is included. Anticipatory mandrel withdrawal is implemented for improved efficiency. Automatic self-lubrication is provided for LM guide maintenance. Remote access to the machine is possible using TeamViewer software. Auto diagnosis feature aids in troubleshooting and main-

tenance. Automatic mandrel lubrication is integrated into the machine's functionality. Anti-collision simulation software allows for virtual testing on the customer's PC.

Additionally, an automatic seam detection system is included. Safety measures such as a safety mat, safety flaps on both sides of the bend arm, and an area laser scanner are incorporated. The machine is compatible with Industry 4.0 standards, ensuring connectivity and integration within a smart manufacturing environment.



Electropneumatics & Hydraulics (I) Pvt Ltd
www.electropneumatics.com
Hall & Stand: 11/B-109

Who did you notice more?



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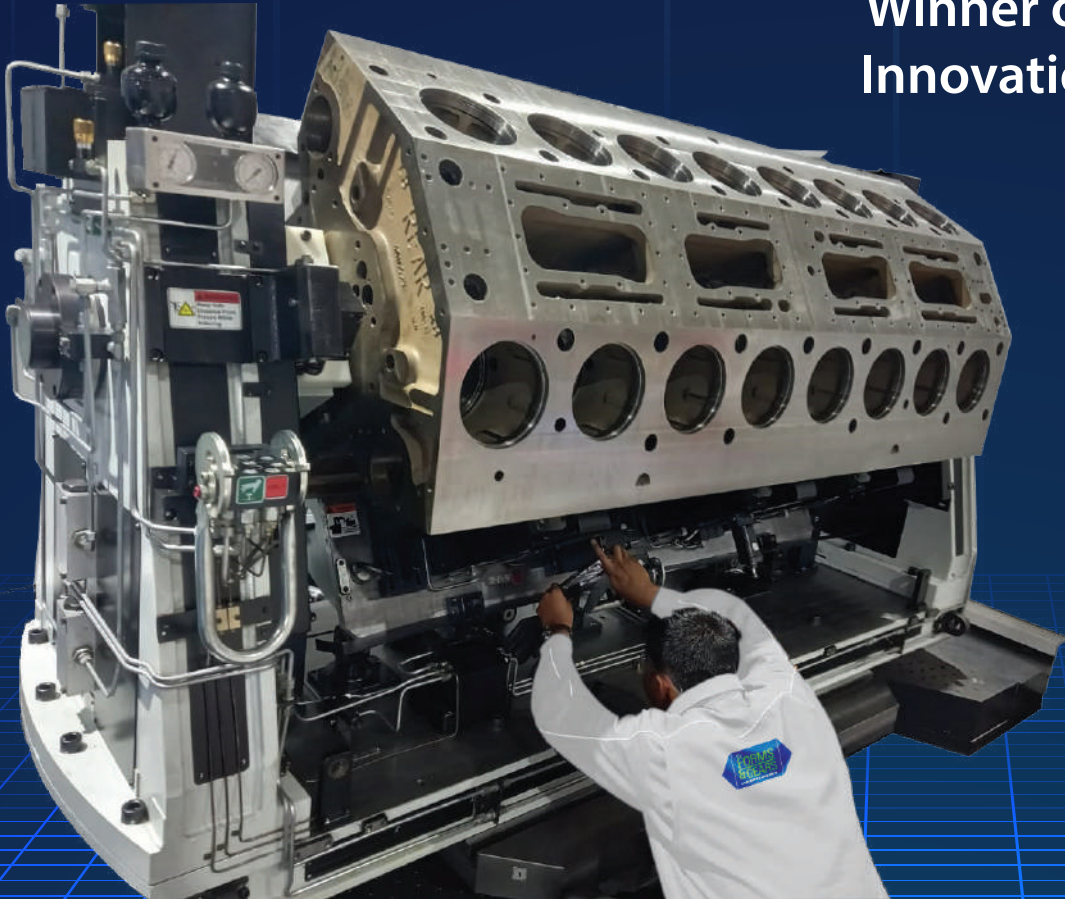


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