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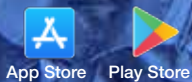
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Indian Machine Tools Industry: Shaping for the future

The market is driven by the rising industrial automation in India. In addition, the adoption of 3D printing technology is anticipated to boost the growth of the machine tools market in India. Industrial automation is becoming a norm in various industries because it provides higher reliability and productivity. Computer numerical control (CNC) machine tools are automated tools, which are replacing conventional machine tools as they provide additional computational and flexibility features. It ensures fewer defects in final products, eliminates extra labor costs, and boosts the production process.

The penetration of CNC milling tools is increasing in the automotive industry for the manufacture of automotive components such as flywheels, wheels, gearbox cases, pistons, transmissions, and engine cylinder heads. The use of such automated machines lowers the cycle time and increases throughput for manufacturers. Thus, the rising industrial automation in India is expected to drive market growth during the forecast period.

Post COVID-19, the Global Machine Tool Market size is projected to reach USD 68.9 billion by 2021 from an estimated USD 65.6 billion in 2020, at a CAGR of 5.0%. The projections were based on the ongoing automotive industry production drop, which is the biggest consumer of machine tools and, additionally, the supply chain disruptions caused by the COVID-19 pandemic in the manufacturing industry.

After the lockdown period, many manufacturers will face problems in meeting the demand due to supply chain disruptions caused by a period of stagnation during the global crisis. Asian suppliers, especially, will have difficulties in ramping up production, which will cause severe bottlenecks in the supply of some key components and delays in delivery.

Revival of the automobile sector has brought relief to machine tools. Around 40 per cent of the machine tools business is primarily driven by the automobile/auto components sector, and during the Covid pandemic, it was severely impacted with muted growth. The industry is looking at a gradual switching to EVs from the internal combustion engine over the next 10 years or so. There is also a good possibility of the emergence of automated vehicles.

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Mitsubishi Electric India CNC upgrades manufacturing industry to make India self-reliant

The Indian manufacturing industry, which emerged as one of the high growth sectors in the country has undergone a paradigm shift. The industry undoubtedly gained momentum when PM Narendra Modi initiated a major national programme 'Make in India' to make the country a manufacturing hub and give global appreciation to the economy.

The manufacturing industry has an immense potential to provide a major push to diverse companies including those engaged in manufacturing of machinery and equipment, electrical and metal products, building and construction material, automation technology, etc. However, these companies require pro-active support for their proper functioning and delivery.

In a bid to offer support to the manufacturers and the industry on the whole, there are several global leaders who have been taking measures to diversify service support and enhance the production. Mitsubishi Electric India is also in the same league, providing CNC manufacturing facilities in the country to maintain responsive and quicker product deliveries while ensuring robust production in India.

CNC, a mainstay in the manufacturing industry for decades now, is a manufacturing process where pre-programmed computer software controls the movement of factory machinery. Mitsubishi Electric India, so as to strengthen the services, sales and manufacturing vertical, established a CNC centre in Peenya, Bengaluru in 2016. This CNC technical centre provides support to the machine tool market in India.

Set up as an initiative to support the government's 'Make in India' mission, CNCs by Mitsubishi Electric India use precisely programmed commands that

help in maintaining the accuracy and productivity in manufacturing.

Touted to be the future of Indian manufacturing, CNCs have opened up new avenues for India to ramp up its manufacturing capacity and reduce delivery times.

Mitsubishi Electric India, the global leader in the manufacturing industry, has been taking new initiatives that might be helpful for the industry in the long run. These are as follows:



The Extended Warranty Scheme

To facilitate better services to customers, the company has launched a new Extended Warranty Contract (EWC) for selected CNCs. This initiative will help in assuring prompt responses, reliable technologies, and a user-friendly support system to ensure better after-sales services for clients all across India. There's no denying that EWC also comes with a brief discount and special payment terms.

Benefits associated with Extended Warranty Scheme

Priority response: The company's service team is always a call away. Whenever there's a breakdown, one can call or mail service engineers anytime to get a solution for the problem.

Low running costs: The company assures to minimise downtime involved and an increased machine lifetime. The EWC is also available at an attractive price in the market as compared to others.

Lower breakdown time: Highly trained and well-equipped engineers are always there to ensure that the machines are restored in the shortest time.

Free inspection visit: the company also conducts a free of cost machine evaluation at the time of purchase of the EWC. This helps the customer to know about the machine's health and condition.

No hidden charges: As per EWC, travel and lodging for engineers, freight charges for shipments, and the returns of parts are covered under the contract.

The company has several CNCs covered under the extended warranty contract.

They are as follows:

Economical: For economical controllers, E70/E80 series with turning/grinding/gantry machines.

Standard: For standard controllers, M60/M70/E70/M80/E80 series.

Custom: For windows/customised controllers of Japanese as well as Taiwanese machine tool builders, including the C70/C80 series.

The Importance of Preventive Maintenance Support (PM)

For keeping shop machines running efficiently, one should opt for routine check-ups. These check-ups not only boost output efficiencies but help in increasing uptime, and improving profit margins.

Meanwhile, this may be a bit difficult with CNC machines and larger systems. When a machine runs continuously, there is a possibility of deterioration of the CNC's parts. This, in turn, can lead to a machine breakdown.

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Also, any variation in the voltage, cabinet temperature, or machine vibration can affect the life of the CNC parts. However, with regular preventive maintenance, customers can easily overcome such issues and ensure increased machine availability for their production procedures.

This preventive maintenance includes:

Proper health-check for all CNC parts available in the machine, including the supply, temperature, and vibrations; Overhauling of the drives and motor; Cleaning of the units and replacing anything such as the battery or fans; Complete data back-up of the CNC

Round the Clock Support – CNC SS24

The company's CNC front engineers are

available 24x7 to offer technical support at the toll-free number and via email. The round-the-clock support – CNC SS24 offers various other features as well.

Troubleshooting & counselling: The trained engineers will assist maintenance personnel to diagnose the problem and to restore the machine quickly.

Priority service & support: The Company maintains a complete machine failure history and will provide priority service for registered customers under SS24.

Dispatch of parts and engineers: The Company always maintains an ever-ready stock of the necessary spare parts based on the machines' hardware configurations. According to the

company's standard service policy, these parts are dispatched the very next day of the service request.

Working towards making 'Atmanirbhar Bharat'

"Our aim is to become the trusted partner for businesses targeting global and future-oriented development. We are helping the Indian manufacturing industry with solutions that cover targeted segments for the growth and development of the country. This step is being undertaken to bring transformation and to support the government's 'Make in India' initiative among manufacturers, ensuring that self-reliant India is also able to maintain high quality," says Masaya Takeda, General Manager-CNC Systems, Mitsubishi Electric India Pvt. Ltd. 

CNC Software Europe Reaches Milestone, Celebrates Anniversary

Mastercam, headquartered in Tolland, Connecticut, is celebrating the tenth anniversary of the opening of its Swiss office. CNC Software Europe, SA was opened in April 2011 as a development office primarily to support the market for small precision turned parts. Today, the office is now 10 years old and is a part of several teams within CNC Software, Inc., contributing across the entire suite of Mastercam products.

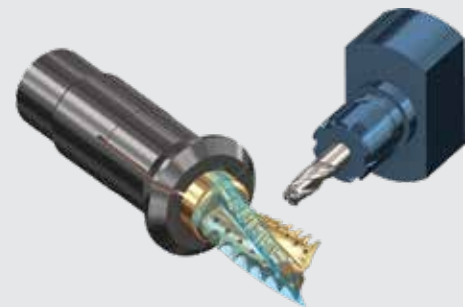
According to Gary Hargreaves, CNC Software Chief Legal Officer, "We opened the development center in Switzerland because of our commitment to the Swiss market. Hiring the right talent in Switzerland gave us the team to successfully push forward in this growing market. The Mastercam Swiss Machining Solution is a great compliment to the existing suite of Mastercam products."

Located in Porrentruy, Switzerland, CNC Software Europe allowed the company to access the expertise available


in the Jura Region of Switzerland, known as the birthplace of Swiss machining and is known for watchmaking, medical, and has many companies manufacturing products with small, precise moving parts.

According to Matthieu Saner, Manager, Software Engineering, "In addition to Swiss machining expertise, the Swiss office contributes today to many features being developed in Mastercam, as well as in post processor development." Saner continues, "Some research projects in the field of manufacturing automation and Industry 4.0 are being completed in partnership with Swiss universities driven by the Swiss office. Our office also participates in local internship programs to provide opportunities for students to become familiar with the development of leading software in the world."

Swiss turning machines can be highly complex with many operations happening simultaneously. The ability to accurately



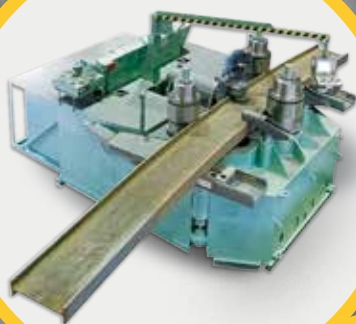
drive these machines requires software developed specifically for this type of machine. Mastercam's Swiss Solution combines Mastercam Mill and Lathe with an optimized post processor to give users a reliable set of tools to program parts for their Swiss machines.

The market for Swiss type lathes has been increasing steadily. In addition to the shop that specializes in Swiss machines creating small, precision parts, the use of products like Mastercam Swiss Machining Solution has allowed the job shop to expand into this market. Many existing Mastercam customers are now buying Swiss CNC machines to produce smaller lots of parts and provide faster turnaround to their customers. 

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AMADA WELD TECH Announces CD-A1000A Capacitive Discharge Welder

AMADA WELD TECH, INC., a leading manufacturer of welding, marking, cutting, sealing, and bonding technology, announces the release of the CD-A1000A, a 1000 watt-second advanced capacitive discharge welder, ideal for battery tab welding, honeycomb tacking, and welding of conductive terminals. This next generation CD welder is the latest in a long line of CD welders manufactured by AMADA WELD TECH.

The unit is automation-ready and features dual pulse output with control and monitoring of both pulses. The dual pulse function helps overcome surface inconsistencies – such as dirt and oil contamination – during the first pulse and makes consistent welds with the second. A built-in process monitor measures peak current for both pulses; this value is displayed after each weld. Upper and lower limits can be set for both pulses to ensure weld consistency. An option to inhibit Pulse



2 if Pulse 1 is out of limits prevents weld blow out. The process monitor helps operators assess performance with a color coded bar graph that gives operators an instant weld history of in limit/out of limit percentages.

CD-A1000A offers up to four selectable pulse widths, increasing the range of welding applications and improving process optimization. Extremely efficient power electronics provide high repetition rates. 63 schedules can be stored locally when a

variety of welding processes are planned at the same station.

"The CD-A1000A is the latest generation of advanced CD welders at AMADA WELD TECH," says Mark Boyle, Product Manager. "Our previous generation units have been workhorses in the battery and aerospace industries. We are excited about this new product that will carry on that tradition and transition those products into modern manufacturing." **MTW**

Aequs Expands Board with Two Industry Veterans

Aequs, a diversified contract manufacturing company, has inducted two industry veterans and thought leaders into its Board of Directors. Aequs established India's first Aerospace focused SEZ and recently it expanded its manufacturing ecosystems into the Toys and Consumer Durable Goods sectors.

Dr. Klaus Richter, former Airbus and BMW procurement head, and currently President designate of the Executive Board at German technology conglomerate, Diehl Stiftung GmbH & Co., brings to the Aequs Board a deep understanding and experience in global supply chains. His area of expertise is critical given emerging industry priorities in the wake of the

Pandemic where supply chain players must rapidly adjust to a new normal with evolving customer expectations and the geopolitical situation. Credited with introducing car making strategies at Airbus, Aequs will leverage his expertise to do the same in other industry sectors it is expanding into.

Dr. Shubhada M Rao, founder of lead research house QuantEco, and former Senior Group President & Chief Economist at YES Bank. She complements the Board with her insights into the banking, financial markets, and risk management that will be invaluable for sound and informed decisions in relation to investment options and resource management. Her domain expertise and



knowledge of the Indian economy will be critical as Aequs forays into consumer durable goods sector.

"We are pleased to welcome Klaus and Shubhada as new independent directors to the Aequs board. Their presence will be a tremendous asset as we further our mission of expanding our manufacturing ecosystems to other sectors," said Aravind Melligeri, Chairman & CEO. "We are confident along with

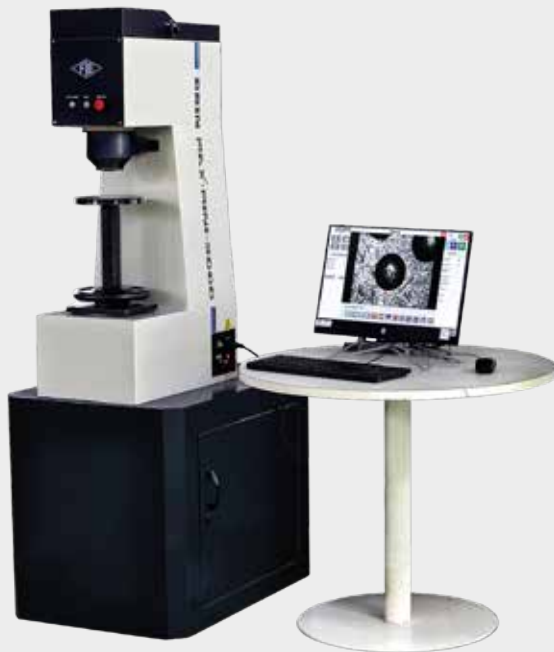
existing board members Dr. Ajay Prabhu and Rajeev Kaul, they will provide valuable perspectives as we execute our strategy, enhance customer value, and drive profitability."

"Aequs has been a highly competitive, reliable supplier and partner to various aerospace customers over the past several years. I am delighted to support the strong team in their efforts to further develop the business and in strengthening its supply chain strategies as it expands into other industries," said Dr. Klaus Richter.

"I am delighted to join the Board of Aequs, a company that epitomizes the growth mantra 'Make in India' through its various business verticals, that have a sizeable global

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footprint. The company with its visionary leadership team, demonstrates enormous potential to emerge a significant global brand. In this journey, I look forward to my responsibility as a Board member," said Dr. Shubhada Rao.

Dr. Klaus Richter has specialized in developing strategies for supply chain management, setting them up and making them global. Until 2019 he was Chief Procurement Officer at Airbus Operations GmbH, Germany,



and a member of Airbus Executive Committee. Before joining Airbus, Klaus was Head of Materials Management at BMW.

Dr. Shubhada Rao brings with her over 30 years of

experience in academia and industry. Before setting up QuantEco, and her stint at YES Bank, she worked as Chief Economist with marquee financial sector entities like Kotak Institutional Equities, CRISIL and Times Bank and as an Economist with the Risk Department at Bank of Baroda. She has advised several central banks including the US Federal Reserve, the Bank of England, Bank of Canada on the Indian economy.

The expansion of the Aequs Board comes at a

time when the group has set out on an ambitious growth path. Apart from establishing the Aerospace ecosystem at Belagavi, Aequs is founding two additional ecosystems, the Koppal Toy Manufacturing Cluster (KTC), and the Consumer Durable Goods Manufacturing Cluster (HDC), at Hubballi, both firsts of their kind in India. The two manufacturing ecosystems, when complete, are projected to provide direct employment approaching 40,000 people in the region. **MTW**

Phillips Machine Tools creates affordable Additive Hybrid Solution

Phillips Machine Tools, a leading solutions provider of manufacturing technology products and services to both commercial and federal government markets, has integrated Haas Automation's subtractive machine tool technology with an additive laser head manufactured by Meltio. Engineering a seamless connection between controls, the Phillips Additive Hybrid is capable of traditional machining coupled with an additive manufacturing process using direct energy deposition technology. The result is that Phillips has successfully integrated the power of both subtractive and additive processes for a revolutionary and affordable solution to producing and repairing parts.

Key advantages of this solution include:

- Ability to use and learn both subtractive and additive technologies on the Haas standard platform
- 3D print and complete a part using only one machine
- Repair or modify parts by adding material and machining it to final shape
- Use different materials on the same



part for best design, weight and strength

- Produce high density parts with good resolution using Wire Laser DED
- Backed by Phillips applications engineering, service and training teams

"Meltio is proud to welcome Phillips Corporation as a Haas hybrid integration partner. Hybrid manufacturing offers the benefits of both additive and subtractive processes in one machine, providing cost and complexity advantages that have not been accessible before," said Meltio's Chief Technology & Innovation Officer Brian Matthews. "Meltio values the opportunity to work closely with Phillips

to offer this exciting technology to its large base of industrial customers."

"Phillips Corporation is pleased to be joining forces with Haas and Meltio to harness the combined power of affordable subtractive and additive manufacturing," said Phillips CEO Alan M. Phillips. "The commercial and federal industrial supply chains have accelerating interest, applications and demand for 3D printed parts. The Phillips Additive Hybrid solution is an optimal fit for customers seeking to add exceptional capability to their subtractive tools while also entering or expanding upon their additive manufacturing capability – all in one machine."

Speaking on this development, Mr. Terrence Miranda, Managing Director: Phillips Machine Tools, India, shared "The Phillips Hybrid combines the ease of use and popularity of a HAAS CNC Mill with additive technology from Meltio all brought together seamlessly by Phillips in a package that is revolutionary in its simplicity, wide applicability and affordability." **MTW**

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Godrej & Boyce Partners with Indian Railways to Develop Universal Coach Assembly Station

Godrej & Boyce, the flagship company of the Godrej Group, announced that its business Godrej Tooling has partnered with the Indian Railways to design and develop the Universal Coach Assembly station as an indigenous solution for Coach Assembly fabrication in the brand new Marathwada Railcoach Factory in Latur, Maharashtra. The Universal Coach Assembly Station has cut the time it takes to assemble a coach from 24 hours to 12 hours.

In 2019, the railways were facing the challenge of increasing productivity substantially in their production shops to meet the growing demands of passenger and freight traffic. Godrej & Boyce's partnership with Rail Vikas Nigam Ltd. (RVNL) began in 2019 with the latter awarding Godrej Tooling the project of developing with Universal Shell Body Assembly Fixture through their EPC contractor -M/s ISGEC for their upcoming Marathwada Railcoach Factory at Latur. This fixture greatly benefits the Indian Railways by deskilling operations, enhanced production, and a huge increase of 100% in the productivity of the line.

The integration of the auto welder setup makes it capable of welding different variants of coaches like EMU, MEMU and LHB type coaches through flexibility in Clamping, resting level pads and slides. The key advantage for each Coach consists of components like underframe, side walls, end walls and roof which are assembled, rigidly secured and clamped in the state of the art Universal Assembly station, and are then sequentially welded through a set of auto welders for seamless welding. This minimizes the human efforts, improves the welding quality and also reduces cycle time thus increasing line



productivity.

Pankaj Abhyankar, Senior Vice President and Business Head, Godrej Tooling, commented, "With India's commitment to advance its self-reliance across sectors gathering momentum, we are honoured to partner with the Indian Railways to further strengthen the railway network across the nation. Our team carried out extensive studies of the current manufacturing processes which included in-depth interactions with the factory personnel at the Integrated Coach Factory (ICF) in Chennai. This helped us design the flexible Universal Coach Assembly station with an automated welding arrangement which can accommodate multiple coach variants. The team, committed to the vision of a stronger railway network, successfully installed and commissioned both the Assembly stations through the pandemic. We look forward to further associating with the Indian Railways and strengthening our partnership. In the next 3 years, we plan to grow the industrial machines business by 100crs."

Godrej Tooling, through its Industrial Machines (IM) line of business,



provides specialized solutions including automation of jigs & fixtures, material handling, welding and robotics for a wide range of manufacturing activities for improving productivity in Indian Railways and metro rail sectors. Over the last few years Godrej Tooling has forayed into catering to the automation requirements of customers like the Indian Railways and Ordnance Factories. Over the years, the business is best known for taking on large & technically complex assignments. **MTW**

CUTTING TOOLS SECTION

Read More ▶▶▶





LMT TOOLS: The global leadership in precision tools arena

MR. RAMAKANT REDDY
Managing Director,
LMT Tools India

Q. Please brief us about company's Indian & global reach.

LMT Tools is one of the most renowned specialists in the development and production of precision tools. With a passion for precision, it is ensured that the industrial customers implement unparalleled quality at the crucial interface between machine and work piece, thereby offering excellent products, which hold their own in the market.

With more than 1,200 employees worldwide, LMT Tools bundles the competence of leading specialists in precision tool technology and is comprised of the manufacturing companies LMT Belin, LMT Fette, LMT Kieninger and LMT Onsrud, as well as

subsidiaries operating worldwide.

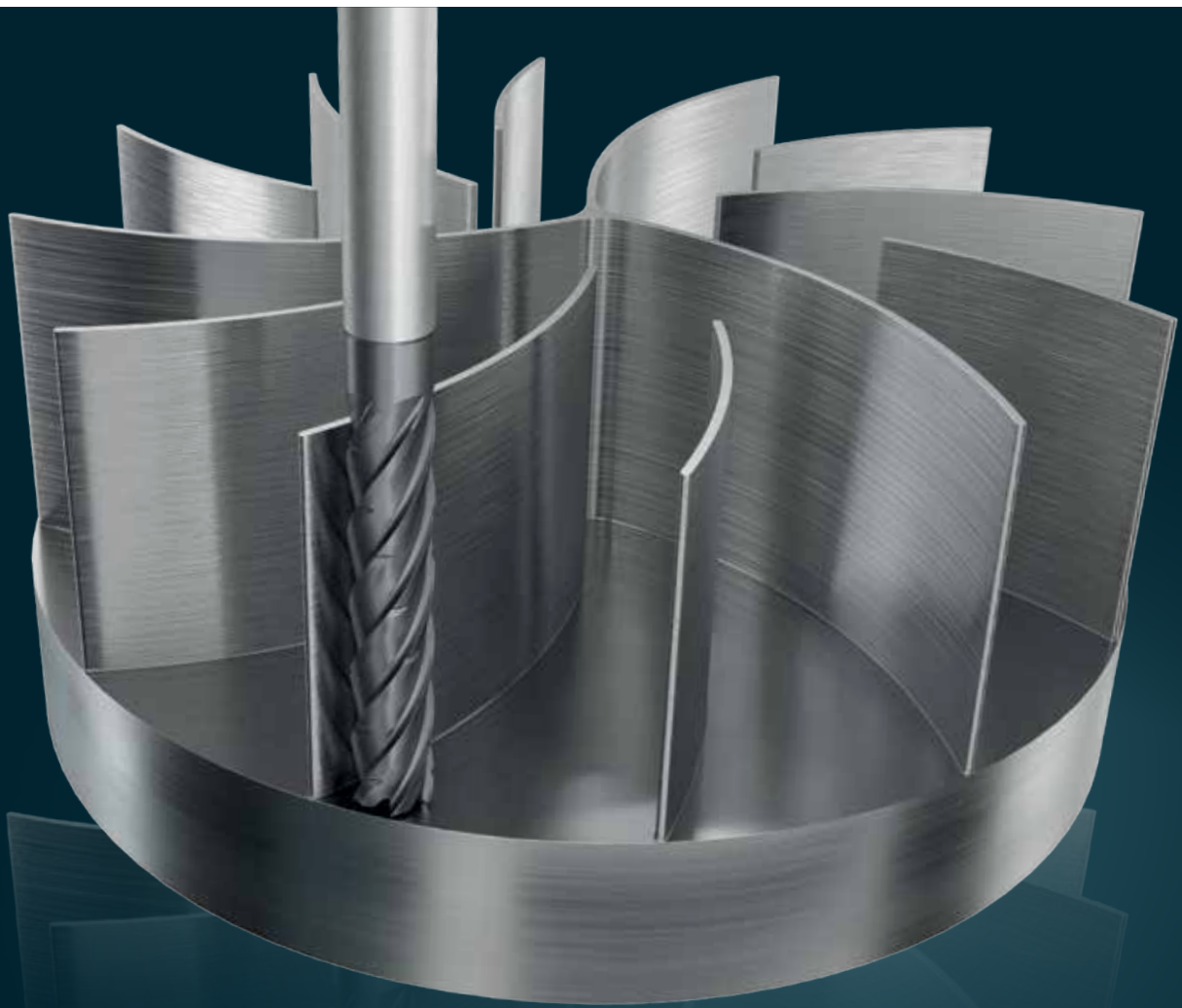
LMT Tools India Pvt. Ltd is a 100% owned subsidiary of the LMT Group and has been conducting business in India since the year 2000. We have a state of the art manufacturing facility in Chakan, Pune apart from branch offices & residential executives in Bangalore, Chennai, Delhi, Hyderabad & Coimbatore among other parts of the country.

LMT Tools offers its customers an extensive product range of standard and special tools, permitting maximum quality and performance for general machining, the automotive sector, aviation and aerospace technology, energy technology, medical technology, and mould and die. All over the world,

tool solutions for processing high-strength steel materials up to composites and plastic materials are being used. In this process, LMT Tools products focus on milling and threading, rolling systems, gear cutting and advanced tooling.

Q. Please also highlight the latest initiatives in cutting tools industry domain.

The trend towards commoditization of larger providers is foreseeable, smaller and medium-sized providers often use this to specialize. As an expert in different industries, we continue to develop our offering according to our customers' needs - this means we offer both the solution for standard tools and the special developments.



THE PERFECT SOLUTION FOR TROCHOIDAL MILLING

With its maximum feed depth of $3xD$ and $5xD$, the innovative CARBLoop offers optimum cutting performance. With our powerful tool, short machining times and long tool life are guaranteed. Its geometry and coating are specially adapted to trochoidal milling, enabling efficient and economical production.

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Q. What are the market opportunities for your company's products in India?

LMT Tools uses this opportunity to further build our market position in niches like Gear Cutting, Thread Rolling, Die & Mold tooling. This is in addition to our offering for automotive machining, innovation in PCD and 3D printing for e-Mobility components and composites machining.

Q. What is future prospect for cutting tools industry?

The cutting Tools industry may have had a setback in 2020 due to the global pandemic, however, 2021 sees growth and over the next few years, it is likely to grow with the increase in demand for automotive & other sectors.

The cutting Tool industry is experiencing many trends such as; Near Net shape – more finishing, less roughing, additive manufacturing, more automatization and different qualification for employees (robotics, IT).

Ecological and political initiatives are encouraging new technological developments (e.g. e-mobility as solutions to reduce CO2 emissions) to make smarter tooling concepts necessary. Trends of lightweight materials (Titanium, CFRP, and



Aluminium) in mobility continues due to CO2 regulations.

The cutting tool industry will have to find ways and means to machine the new materials effectively.

Q. Is there any plans for expansion & new investment in terms of product development or new technology adoption to cater the demand of the industry?

LMT Tools is consistently investing in developing innovative products year-on-year. We are further strengthening our production capacities in India to

support our esteem customers. Our recent product launches are benefiting our customers in their SMART Manufacturing initiatives.

Q. Which is the top line product range & is there any plans to launch new products?

LMT Tools is the market leaders in Gear Cutting, Thread Rolling & Line Boring solutions. We have created our niche in the Milling & Threading solutions. We are working consistently to introduce new products in all these segments, e.g. Gear Skiving Tool, Tangential Knurling System & Trochoidal Milling Cutter are example of our commitment towards innovation.

Q. What is your vision for your company?

LMT Tools India is committed to provide quality precision cutting tools and prompt service to its customers.

Our aim is to be among the top 3 preferred suppliers for precision cutting tools.

For more information:

Website: www.lmt-tools.com





TOOL CRAFT FOR AIRCRAFT

In machining aerospace components, the main challenges relate to component materials. Titanium, high-temperature superalloys (HTSA), and creep-resisting steel are difficult to cut and machining is a real bottleneck in the whole aircraft supply chain. Poor machinability of these materials results in low cutting speeds, which significantly reduces productivity and shortens tool life. Both these factors are directly connected with cutting tools. In fact, when dealing with hard-to-machine typical aerospace materials, cutting tool functionality defines the existing level of productivity. The truth is, cutting tools in their development lag machine tools, and this development gap limits the capabilities of leading-edge machines in the manufacturing of aerospace components. Modern aircraft, especially unmanned aerial vehicles (UAV), feature a considerably increased share of composite materials. Effective machining composites demand specific cutting tools, which is the focus of a technological leap in the aerospace industry.

Aircraft-grade aluminum continues to be a widely used material for fuselage elements. It may seem that machining aluminum is simple, however, selecting the right cutting tool is a necessary key to success in high-efficiency machining of aluminum.

A complex part shape is a specific feature of the turbine engine technology. Most geometrically complicated parts of aero engines work in highly corrosive environments and are made from hard-to-cut materials, such as titanium and HTSA, to ensure the required life cycle. A combination of complex shape, low material machinability, and high accuracy requirements are the main difficulties in producing these parts. Leading multi-axis machining centers enable various chip removal strategies to provide complex profiles in a more effective way. But a cutting tool, which comes into direct contact with a part, has a strong impact on the success of machining. Intensive tool wear affects surface accuracy, while an unpredictable tool breakage may lead to the discarding of a whole part.

Advanced multitasking machines, Swiss-type lathes, and live tooling lathes have profoundly changed manufacturing small-size parts of various hydraulic and pneumatic systems, actuators, and accessories, which are used in aircrafts. Consequently, the aerospace industry requires more and more cutting tools that are designed specifically for such machines to achieve maximum machining efficiency.

A cutting tool – the smallest element of a manufacturing system – turns into a key pillar for substantially improved performance. Therefore, aerospace part manufacturers and machine tool builders are waiting for innovative solutions for a new level of chip removal processes from their cutting tool producers. The

solution targets are evident: more productivity and more tool life. Machining complex shapes of specific aerospace parts and large-sized fuselage components demand a predictable tool life period for reliable process planning and a well-timed replacement of worn tools or their exchangeable cutting components.

The cutting tool manufacturer has a limited choice of sources for finding an ideal solution and may only have cutting tool materials, a cutting geometry, and an intelligent robust design as the main instruments to progress. However, despite these limited choices, the cutting tool manufacturer continues all efforts to provide a new generation of tools to meet the growing requirements of the aerospace industry. COVID 19 has seriously slowed down industry development, but this does not make the industry demands any less actual. The latest tool designs are good evidence of the cutting tool manufacturer's response to the demand for aerospace component production.

Coolant jet

In machining titanium, HTSA and creep-resisting steel, high pressure cooling (HPC) is an efficient tool for improving performance and increasing productivity. Pinpointed HPC significantly reduces the temperature at the cutting edge, ensures better chip formation and provides small, segmented chips. This contributes to higher cutting data and better tool life when compared with conventional cooling methods. More and more intensive applying HPC to machining difficult-to-cut materials is a clear trend in manufacturing aerospace components. Understandably, cutting tool manufacturers consider HPC tooling an important direction of development.



Fig. 1 - A picture from NPA 49-2020.



ISCAR, one of leaders in cutting tool manufacturing, has a vast product range for machining with HPC. In the last year, ISCAR has expanded its range by introducing new milling cutters carrying "classical" HELI200 and HELIMILL indexable inserts with 2 cutting edges (**Fig. 1**). This step brings an entire page of history to ISCAR's product line.

In the 1990's, ISCAR introduced the HELIMILL – a family of indexable milling tools, which carried inserts with a helical cutting edge. The new design provides constant rake and relief angles along a mill cutting edge and results in a smooth and light cut with a significant reduction in power consumption. The HELIMILL principle turned into a recognized concept in the design of the 90° indexable milling cutters.

The HELIMILL was modified and underwent changes which led to additional milling families and inserts with more cutting edges. The excellent performance and its close derivatives of the original tools ensured their phenomenal popularity in metalworking. Therefore, by adding a modern HPC tool design to the proven HELIMILL family was a direct response to customer demand and the next logical tool line to develop.

In Turning, ISCAR considerably expanded its line of assembled modular tools comprising of bars and exchangeable heads with indexable inserts. With the use of a serrated connection, these tools fit a wide range of heads with a range of different insert geometries, including threading and standard ISO turning inserts for different applications for greater flexibility.

The bars have both traditional and anti-vibration designs and differ by their adaptation: cylindrical or polygonal taper shank. A common feature for the nodular tools is the delivery of internal coolant to be supplied directly to the required insert cutting edge (**Fig. 2**). Depending on the diameter of a cylindrical-shank tool, the maximum coolant pressure varies from 30 to 70 bars, while the tools with polygonal taper shank facilitate ultra HPC at a

pressure of up to 300 bars. The efficient distribution of coolant increases the insert's tool life by reducing the temperature and improving chip control and chip evacuation; substantially increasing this application line in the aerospace industry.

Drilling solutions

Machining composite materials is filled with various traps and pitfalls. High abrasiveness of composites intensifies wear rate which shortens tool life and affects the performance. Drilling is the most common cutting operation in machining composites, hence even a small improvement in functionality of drilling tools is of key importance.

ISCAR developed a range of new drills that are intended especially for composite materials. To increase abrasion resistance, these drills have a cutting part made from extra hard polycrystalline diamond (PCD) or diamond coating. Depending on the drill diameter, the PCD cutting part is known as a nib or a wafer; and in both cases is suitable for regrinding up to 5 times. The CVD diamond-coated solid carbide drills are attractive because of another specific design feature: the wavy shape of main cutting edges. In machining composite materials, a tool produces more chattering than a cutting effect. The wavy shape of the cutting edge considerably reduces delamination and burrs, especially when drilling carbon fiber reinforced plastics (CFRP) and carbon laminates. In addition to composites, the diamond-coated drills are suitable for machining other high-abrasive engineering materials. If necessary, these drills can be delivered with optional tool through coolant holes.

Drilling deep, small-in-diameter holes is a common operation in manufacturing aerospace components. ISCAR's new solid carbide drills in the diameter range of 3-10 mm (0.125"-0.391") (**Fig. 3**) are intended specifically for such an operation. The combination of a split point geometry, a double-margin design, polished flutes,



Fig. 2 - A picture from NPA 12-2021.



Fig. 3 - A picture from NPA 11-2021.



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a multi-layer coating and coolant holes provides a noteworthy tool family for effective one-pass drilling holes with a depth of up to 50 hole diameters in difficult-to-cut austenitic and creep-resisting steels and ferrum-based alloys.

For any complexity

Airfoils of aero-engine turbines and compressors, impellers, and integrally bladed rotors (IBR) have a complex shape that is defined by aerodynamic requirements. New developments, which are directed on improving aero-engine efficiency, add to this complexity. Advancement of technology brought new methods for producing formed parts, in particular 3D printing, which significantly diminishes material stock for chip removal. However, machining remains the most common method for the final shaping method in manufacturing geometrically complex aerospace components. The progress in 5-axis machining and CAD/CAM systems has enriched the manufacturer's solution pool to overcome difficulties in component production.

Barrel-shaped milling cutters have good prospects in 5-axis machining of aerospace components with complex surfaces. ISCAR has developed a series of barrel-shaped cutters of 8 - 16 mm (.312" - .500") in diameter in two designed configurations: solid carbide endmills and exchangeable heads with a Multi-Master threaded connection. The introduction of these tools into the machining processes is a major advantage of intensifying blade manufacturing.

Promising multitasking

Effectiveness of chip-removal processing on compact multitasking machines and Swiss-type lathes depends largely on correct tool selection. Demands to increase productivity require



Fig. 4 - A picture from NPA 10-2021.



Fig. 5 - A picture from NPA 01-2021.

maximum tool holding stiffness and limited working space to minimize tool overhang.

Recently, ISCAR introduced NEOCOLLET, a new tool holding family, which provides an alternative to clamping tools with spring collets. One of the typical toolholders in this family has a tapered shank that can be mounted in a collet chuck directly (Fig. 4), ensuring a rigid and reliable connection to improve tool performance. The new family includes the holders for ISCAR T-SLOT exchangeable slot and face milling heads from cemented carbide.

As mentioned, applying high pressure cooling can substantially change machining results especially when deal with titanium, HTSA and difficult-to-cut stainless steel – the main materials for aircraft hydraulic and pneumatic systems and light-sized accessories. The new turning tools with a square shank and a reliable screw clamping mechanism for 55° rhombic insert facilitate HPC in longitudinal, face and profile turning operations on small-diameter parts

(Fig. 5).

The given examples illustrate how the toolmaker tries to find more effective solutions to meet the new requirements of the aerospace industry. A slowdown in the industry growth and reduction of aircraft production caused by COVID 19 has not diminished the toolmaker's focus on their needs for partners. On the contrary, new progressive cutting tools have been developed and ISCAR will successfully find its new and upgraded applications in the restored aircraft production of tomorrow.

For more information,
Website: www.iscar.in





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HYDRAULIC TOOLHOLDER KIT HSK-A 63 HC20S 080	HSKA63	17771

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The CARBLoop from LMT Tools: New high performers for trochoidal milling

With the CARBLoop, LMT Tools is expanding its extensive tool portfolio to include solid carbide milling cutters that have been specially developed for trochoidal milling. Thanks to its maximum depth of cut ($3 \times \varnothing$ and $5 \times \varnothing$) and ideally matched geometry, the new trochoidal milling cutter guarantees outstanding cutting performance, the shortest machining times and long tool life. Production costs can thus be drastically reduced.

Trochoidal milling is an extremely dynamic machining process that is increasingly gaining ground due to its noteworthy advantages. Thanks to high speeds, machining times can be reduced by up to 70 percent compared to the conventional milling strategy and productivity is significantly increased. At the same time, tool life is more than tripled because less cutting heat is generated thanks to the smaller wrap angle. The tool cutting edge is therefore exposed to lower stresses. The lower cutting forces due to smaller and consistent chip cross sections also have a positive effect on wear.

A new benchmark for trochoidal milling

With the CARBLoop, LMT Tools now provides the perfect tool solution. The new trochoidal milling cutter has been specially designed for innovative milling and adapted to the process-specific requirements. One characteristic feature is the completely newly developed chip breakers, which are arranged offset to each other. The chip breakers reduce the chip volume by half and ensure smooth chip evacuation even at high cutting values. Depending on the diameter, the tools have up to 14 chip breakers. This high number not only ensures optimum chip removal, but also significantly reduces vibration, which has a positive effect on tool life. A special cutting edge geometry with defined edge preparation and the latest coating enables high cutting speeds and guarantees maximum metal removal rates as well as tooth feeds. Another advantage is the 2 mm longer cutting edge. This means that the CARBLoop can be reground several times without sacrificing the maximum insert depth.

More efficiency for deep cavity machining

The CARBLoop is available in two variants: as CARBLoop STEEL for the application range ISO-P and ISO-K as well as CARBLoop INOX for the machining of ISO-S and ISO-M materials. Cutting



geometry, coating and cutting edge treatment have been specially developed for the materials to be machined and are optimally matched to each other. This enables the best milling results to be achieved. In particular, components with deep cavities benefit from switching to trochoidal milling, because the high metal removal rate means enormous time savings. But thin-walled or unstable components can also be machined excellently thanks to the low cutting forces.

The perfect solution for trochoidal milling

Whether in die and mold making, aerospace or general mechanical engineering: trochoidal milling opens up unimagined performance and efficiency potential in roughing and semi-finishing. With the new CARBLoop, LMT Tools makes this accessible and offers a powerful tool solution that sets standards in terms of productivity, machining time, tool life and economy.

By the way: The CARBLoop is not only suitable for trochoidal milling, but its advantages - high infeed depth, high cutting speeds, low cutting forces, efficient chip removal and long tool life - are just as effective in conventional corner milling or slicing.

For more information:

Website: www.lmt-tools.com/en



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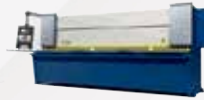
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WHY CHOOSE US?



ANCA: Providing grinding technology excellence with precision

Q. ANCA has gained substantial market share in Indian machine tool industry, please elucidate the success story of the company?

ANCA is a technology company with nearly 50 years of experience providing innovative solutions to our customers. We are a major player in the Indian market and have had a local presence in this region since the early 1990's. Due to local demand and a desire to provide the best possible customer experience, we moved to a direct sales approach establishing ANCA India in Bangalore. Our office has a spare parts facility, demonstration centre and Research and Development centre. Currently we have more than 30 employees working in our India office and have a satellite office in Chennai and in the Pune area with sales and service staff.

The fantastic performance of our products and local Indian sales, support and service teams has resulted in an increase of our market share. Essentially, our customers are happy and continue to invest in ANCA. Customer demands are always changing and our investment in research and development means that we are often releasing new technology that solves emerging manufacturing

challenges. New innovations such linear motors, in-process laser measurement systems and production monitoring software differentiates us from our competitors and offer key advantages to customers.

Some of our latest developments include tool runout compensation software to measure and compensate radial and axial runout. The Barrel Shape Ballnose (BSB) tool type in ANCA's latest ToolRoom allows customers to manufacture complex high performance endmills, with huge cost and time savings for end-users.

Faster cycle times along with superior surface finishes on tools are achieved along with the ability to run the factory unattended for 24/7 production. This I believe is the future, and we have the technology to make it happen today.

Q. Please brief us about exports, overseas operations, and global alliances made to stand out from the competition?

ANCA is a truly global company. Our head office is in Melbourne Australia where we fully design and build our technology. We also have a manufacturing plant in Thailand and service and spare parts located in

key hubs around the world. ANCA is vertically integrated and have precision component manufacturing, moulding, painting and high precision assembly capabilities within our machine tools business. Our sister companies have capabilities in the sheet metal and control system segments from locations in Thailand and Taiwan. As a major developer of technology that we sell around the world, not just our machines but also the components developed and sold by ANCA Motion, there's a lot of potential for our technology in the broader market.

To give a sense of our global impact about 70,000 cutting tools are manufactured each hour on ANCA machines around the world. We export our products to customers in over 50 countries.

What sets ANCA apart is by virtue of competing on a global scale we have a strong brand and are widely acknowledged by customers as delivering the most advanced and innovative solutions in our sector. We are strong in software; it is one of the key enablers for our machines and ANCA has pioneered some key software features such as full 3D simulation for tool grinding. Innovation is also a key value for ANCA,



KISHORE A P
Country Manager - India
Anca Machine Tools Private Ltd.



ANCA

CNC MACHINES

we are constantly working to release first-to-market technologies and to offer capabilities that our competitors cannot.

Q. What are the market prospects for ANCA products in India and How do you plan to position these products?

ANCA has enjoyed success in the local Indian market and the prospects continue to look promising. Locally made special tools are in high demand and we have fantastic solutions for this

manufacturing segment.

Growth in the automotive segment along with the global alliances of Indian companies with some of our international customers has had a positive impact for our business. The range of machines that we produce means that we can offer quality products at a range of price points and we have products that are suited for the Indian market and other emerging markets that has helped us to increase our share in this lucrative market.

We are expecting tremendous growth in our segment over the next five years as the demand for Indian made cutting tools increases.

ANCA does not solely cater to cutting tool manufacture but also across a diverse range of competitive industries including automotive, aerospace, electronics, medical applications and gear cutting tools such as skiving cutters and stick blade grinding applications.

We also support our customers with complete solutions in terms of



the manufacturing process with tool grinding, wheel balancing, in-machine measurement and compensation. Through this we provide additional benefits to cutting tool manufacturers.

Q. Can you brief us about the marketing strategies that were applied in order to stand out from the competition of machine tool industry?

For us it is all about improving our customers' experience. We leverage our

expertise and 40 plus years' experience in cutting tools to create content and other materials that enable our customers to get the best out of their ANCA technology

We have a robust and engaged social media community which is a great platform for us to share our content and useful and practical tips for our customers such as via weekly #ANCAToolTipTuesday videos.

This year it is the fourth year that we are running our industry-first customer competition Tool of the Year. With both functional and virtual categories open to our customers to enter it enables our customers to celebrate the craft of cutting tool making and showcase their skills and creativity.

Keeping our customers informed with our latest product developments is an important way to support our existing customers and gain new business. Our monthly e-news is shared with our subscribers providing the latest thought leadership, customer success stories and technical and product updates.

We are also very active and visible in the digital and print media space to help share the benefits of our technology for our customers.

At ANCA we are also committed to providing the best possible after sales and service to our customers. To support this ANCA India moved to a larger premises to enable us to stock a significant range of spare parts as well as demonstration machines in our Bangalore facility.

Q. Please elucidate in brief about the company's infrastructure and what are the measures that are being taken from product manufacturing to distribution?

Within the ANCA Group we have ANCA CNC Machines, ANCA Motion, ANCA Engineering Solutions and ANCA Sheet Metal Solutions. We maintain strict

quality control of all our manufacturing processes across all our locations. In our Melbourne headquarters we design, build and produce our technology and also have our production facility in Rayong, Thailand.

We utilise lean manufacturing principles along with 5S throughout our organisation and have a global supply chain enabling a delivery schedule to our customers. We have a quality team regularly reviewing our processes and procedures to ensure we are delivering total quality to our customers, an approach that is ingrained throughout our organisation.

Due to our level of vertical integration, we can provide a complete service offering to our customers and guarantee the best technology for all parts of the product. This means we have the flexibility to meet our customers' specialist needs – often taking on projects to design solutions to meet a specific customer need. We use the best quality specialist components where needed, for example, ballscrews, rails, bearings.

Q. Brief us about the R&D and Quality policy for your business?

We are a technology company and pride ourselves on being first to market with new products that have revolutionised the market. What is exciting about our industry is that it is always changing and evolving and as we move towards automation and Industry 4.0 the technology is becoming more sophisticated. For ANCA research and development is a key part of our operational and success planning.

To ensure we can offer the market the most advanced technology we invest 10% of our revenue into Research and Development each year. We have dedicated software development and engineering teams located in Melbourne. In India we have more than 12 software



developers and our own R&D facility to support our headquarters. This approach proves successful for ANCA as we continue to release innovative technology to market.

We have a strict quality policy to ensure that all product meets our quality control standards. Our specialist applications engineers and technicians are located around the globe to provide our customers with ongoing technical advice and support as per our goal to be number one in lifetime customer experience.

Q. Please comment on the current machine tool scenario in India?

The current market for machine tools in India is strong. As growth in other markets stabilises, I see that India will experience continued growth and could potentially be the next growth market for ANCA in the years to come. Given our market success in the region we have invested in our operations in Bangalore and have expanded our capacity to ensure that we are ready to meet such growth in demand.

In the Indian market there is huge

potential in affordable automation options and customers are focusing on high quality with low cost. ANCA's AR300 robot offers our customers the many benefits of automation, with our solutions making it easier to achieve high quality product manufacturing while reducing waste.

Q. Could you brief us on Indian & Global perspective of machine tool industry? What are the distinguishing factors?

During the COVID-19 pandemic there was an overall focus on product quality along with cost reduction. Due to labour shortages we have also seen a drive towards automation solutions. This has kept the industry focused on new technology and online support and installation.

The market is quite dynamic and constantly changing, more quickly today than before. Certainly no one predicted the scale of the current global pandemic. Agility to respond to market changes is more important than ever.

The machine tool industry is cyclical and across the board machine tool

builders have enjoyed tremendous growth over the last four to five years on the back of the huge demand for smart phones. In India we are seeing new developments of smart phone manufacturing plants which is continuing this trend.

At ANCA, our machines are generally used for making cutting tools for the 3C industry as well as gear cutting, automotive, aerospace and other general industry. However our products are also used in component manufacturing, PCD applications, gear cutting tools such as skiving cutters, hobs, shaper and shaving cutters. ANCA has also enjoyed success in the medical industry with dental drills and knee implants.

Recently we have developed our machine for skiving cutter grinding, the GCX Linear. Skiving is growing in popularity due to the rise of electric vehicles (EV). For EV, efficiency – as well as noise emission – is of much higher priority for customers. Gears for EV require greater precision and higher performance. The quality needs to increase from DIN 10 to DIN 6 for the internal gears; the gear industry sees hard skiving as the revolutionary process to produce the millions of internal ring gears needed for EV. ANCA's GCX Linear provides a complete solution for manufacturing DIN AA quality solid carbide skiving cutters – the highest in the industry. Adapted from ANCA's proven top-of-the-range CNC grinder platform, the GCX Linear adds tailored features to finish all operations for skiving cutters and shaper cutters in a single setup.

Q. In your opinion how can the Indian machine tool industry become globally competitive?

It is about quality – this is key to success in the machine tool industry. Keeping this in mind along with keeping up with the latest technologies will go a long way to help the local industry in India.

Q. What are the key technological trends that are driving machine tool industry?

Customers are after more productivity, higher accuracy, and more process stability. There is a lot of interest in automation, Industry 4.0, and technologies used to digitally lash all aspects of production together.

We have responded to this demand with our latest offering, AIMS or ANCA Integrated Manufacturing System, to enable optimised cutting tool production through a holistic solution for end-to-end tool manufacturing challenges. AIMS is the overarching platform under which we'll be releasing software and hardware through the coming years. At the top is an overarching suite of management software, and underneath is all of the hardware to grind, measure, and process cutting tools.

More than 70 percent of the company's customers require machines with robotic functionality. The AIMS system connects all of the processes used in cutting tool manufacturing—the automation, measurement equipment and post-production processes such as laser marking as well as the grinding equipment itself. The interconnected grinding technology solution eliminates wasteful manual handling, reduces machine downtime between batches and takes away the need to have operators constantly monitoring and adjusting production machines.

We are also seeing an increasing trend with our customers moving towards 'lights out' manufacturing and automation. We provide a range of automation solutions to enable our customers to increase their capability, from ANCA's designed and built AR300 SCARA loader that provides excellent value for money, to the dual robot cell on the TXcell machine.

Customers are looking to produce cutting tools for both mass production

and small batch runs. To achieve this through our machines we need to have the best possible technologies built into our products to meet this demand. The life span of the machine along with high accuracy is critical from our customers point of view.

There is a trend toward for custom tooling to reduce manufacturing costs. This means there is a push towards customisation of cutting tools rather than only offering a standard range, a big move into specials. This leads to combination tools with complex geometries needing skilled machinists, designers, and sophisticated technology,

Q. How do you perceive the future of the Indian machine tool industry?

The Indian Machine tool industry has already made its mark in the world and it is definitely going to grow with the development that is occurring here, and due to the passion of those in the industry. The focus will be on the latest technology, looking to lower cost without compromising quality. Putting the focus on customers is important in the industry and our machine tool manufacturers set the benchmark for this.

Q. How far do the factors like government norms, excise duty, taxation, exim policies affect your business?

Whilst duties and import tariffs have reduced dramatically over the past ten years or so, they are still on the high side and this along with difficult import/export terms does continue to be a challenge for companies importing and in some cases re-exporting machine tools into and out of India. Introducing GST reduced some of the major challenges and I think the government of India is working towards assisting business and we are looking forward to improved business conditions.


Q. What are the best possible remedies you can advise in order to maintain the high profitability in the shrinking margins market of India?

It comes down to delivering a quality product to our customers along with providing the best possible after sales support. From the machine to the software, we take quality very seriously to ensure that our customers achieve maximum accuracy, surface finish and stability throughout the grinding process.

With over 45 years' experience delivering CNC grinders to customers around the world, ANCA carries a reputation for delivering bespoke solutions to meet market needs. When ANCA designs a custom solution, we give our customers tailored and diverse options with shorter set-up times. In an increasingly challenging market, companies grinding tools are always looking at innovative products and diversifying into different sectors using existing or new machinery. When designing a custom solution, our engineering and project management teams are with the customer every step of the journey to ensure their requirements are fulfilled.

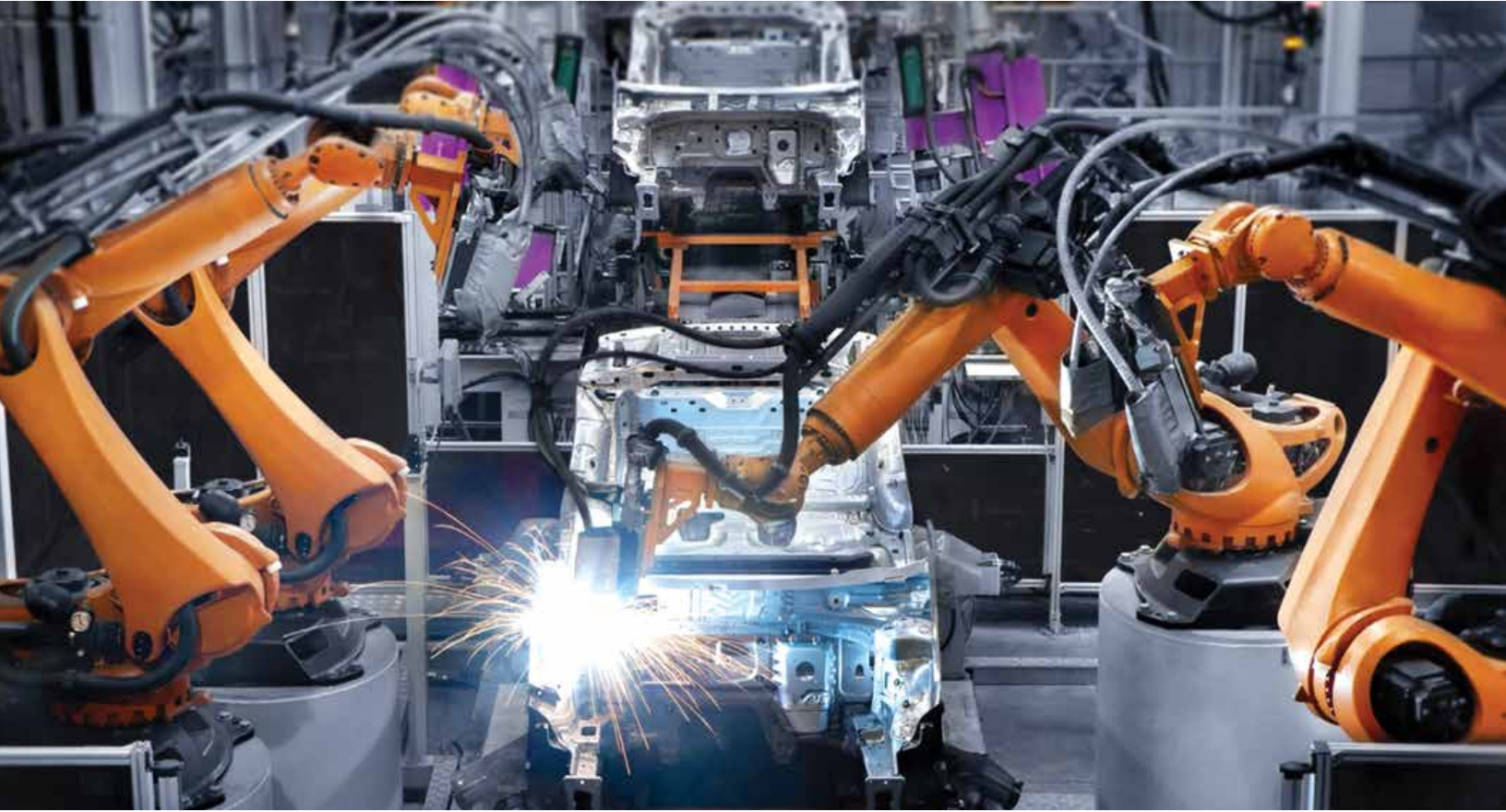
Q. What is your vision for your company?

At ANCA our vision is to be an agile world class leader in supplying innovative technology and to be a leading designer and manufacturer of high quality and innovative products and solutions. We aim to be #1 in lifetime customer experience.

To do this we will continue to leverage our strengths in technology, software, customisation and quality. 



Robots, automation poised to play bigger roles in car manufacturing



Today's industrial robots work in a wide range of industries, from semiconductors and automobiles to plastics processing and metal forging. Pretty much any repetitive operation is a great job for a robot, particularly if it's dangerous or difficult for humans. Robots have been used for high-volume operations, but as the technology advances and costs declines, more options and opportunities are opening even for medium- and small-sized operations. At the same time, these robots are helping manufacturers address many of the key challenges they face, including tight labour pools, global market competitiveness and safety.

Automobile manufacturing robots give car companies a competitive advantage. This is due to the fact that robotics enhance quality and reduce warranty costs; boost capacity and relieve bottlenecks; and protect workers from dirty, difficult and dangerous jobs. Usually, auto assembly factories use robots exclusively for spot welding and painting, but there are also several other

opportunities to use robots throughout the supply chain. Using robotics benefit OEMs, Tier 1s and all other part producers in the car manufacturing industry.

Generally, manufacturers turn to robots for various reasons. Three biggest drivers in the automotive industry are quality, capacity and safety.

Auto plant robots reduce part-to-part variability. Robots perform highly

repeatable processes, they never tire or get distracted like human labour, so every cycle is performed the same way. They do not drop parts or mishandle them in a way that causes damage. As a result, it reduces waste caused by human error, which leads to less variability in car assembly. Additionally, robots are equipped with vision systems and they can even detect variation in incoming materials and adapt

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their programmed paths suitably. Needless to say, that this translates to better customer satisfaction, lesser mistakes and lower warranty costs.

In an automobile assembly line, robots protect workers from exposure to fumes from welding and painting, as well as weld flash and the noise of stamping presses. For manufacturers, automotive robotics cut down accidents and injury claims, by removing workers from these dirty and dangerous tasks and environments.

Advantages of industrial robots

1. Better quality and consistency: Along with other tech — such as the industrial internet of things (IIoT) or 3D printing robots — industrial robots are able to provide better production quality and more precise and reliable processes. Additionally, benefits also include reduced cycle times and real-time monitoring to improve preventive maintenance practices.
2. Maximum productivity and throughput: An industrial robot increases speed for manufacturing processes, in part by operating 24/7. Unlike humans, robots do not need any break or shift changes. The speed and dependability of robots ultimately reduce the cycle time and maximise throughput.
3. Greater safety: Using robots for repetitive tasks means fewer risks of injury for workers, especially when manufacturing has to take place under hostile conditions. There is no need for human presence at the site as supervisors can oversee the process online or from a remote location.
4. Lower investment in labour costs: The cost of having a person handle many manufacturing operations is often more expensive than robot. Deploying robots instead of human resource can free up workers so their skills and expertise can be used in other spheres such as engineering, programming and maintenance.

5. Keeping manufacturing open to jobs: There is an argument that robots are taking jobs away from U.S. workers, but that's not necessarily true. Industrial robots in the US are usually integrated into a series of operations that require human expertise. For instance, you may deploy a robot for welding parts which are then handed over to a person to perform a task that requires a human's intuitive "if, then" thinking.

There are also certain disadvantages of industrial robots

1. High initial investment: Robots typically require a large upfront investment. In the process of gathering information about your business to purchase robots, you need to take into consideration all the costs, including installation and configuration. It is necessary that you analyse whether your robot can be easily tweaked if you need to alter operations in the future.
2. Scarce expertise: Industrial robots demand sophisticated operation, maintenance and programming. Although the number of skilled people is growing still it's not enough. In view of this it's important to focus on the investment you'll need to make to

bring in that expertise or "retool" your existing staff to take on the task.

3. Recurring costs: Industrial robots may cut down some manufacturing labour costs but they do come with their own ongoing expenses, such as maintenance. Additionally, you must consider the costs to keep your robot and any related IIoT connected devices protected from cyberthreats.

Robots are most commonly used in the following areas of auto manufacturing:

1. Collaborative Robots
2. Robotic Painting
3. Robotic Welding
4. Robotic Assembly
5. Material Removal
6. Part Transfer and Machine Tending

In conclusion we would like to mention that robots and artificial intelligence have been used in the automotive industry for quite some time now. Today they are used in many different aspects of automobile manufacturing but the ambit of robotic in the automobile sector is growing by leaps and bounds.

Arijit Nag is a freelance journalist who writes on the economy and current affairs.



CNC Universal Cylindrical Grinding Machines

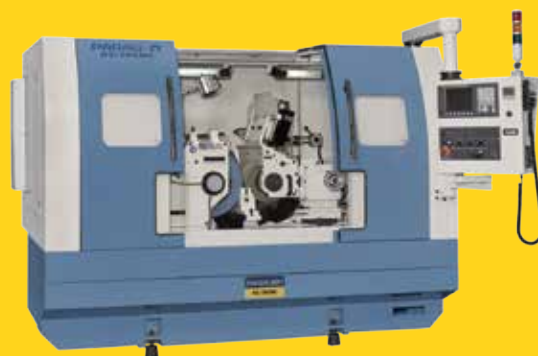
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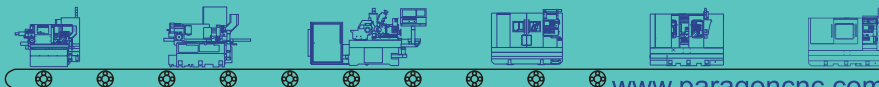
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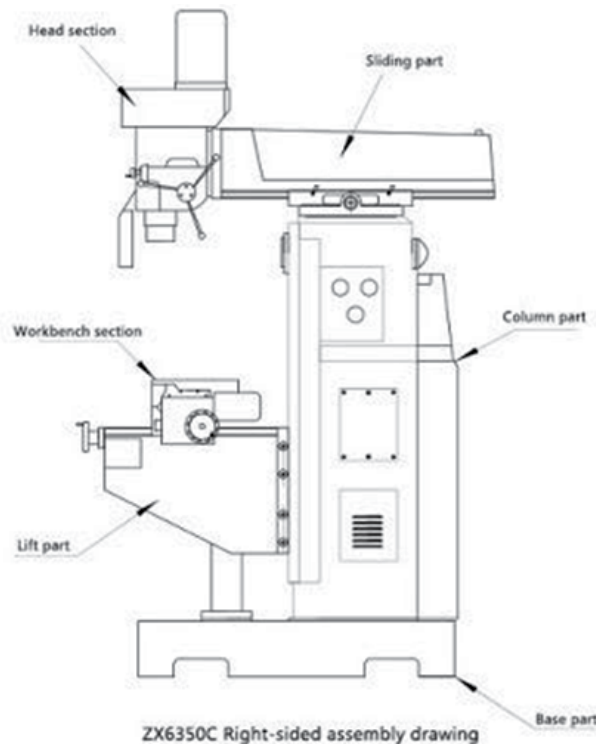
Vertical and Horizontal Milling Machines: Key Points of Difference

Milling is a machining process that requires the involvement of a milling machine to take out material from a stationary workpiece via a rotating cutting tool. Milling keeps the workpiece stationary while ensuring that only the cutting tool is allowed to rotate.

The above process is universal for all milling machines; however, there are distinctive types of milling machines, each bearing unique characteristics for different project types. A common way to categorize milling machines is based on the spindle's orientation, i.e., vertical and horizontal.

Let's discover the main differences between horizontal and vertical milling machines.

Definitions and Functionality



Vertical Milling Machines

For vertical milling machines, the rotary cutting head is vertically aligned, causing the spindle to traverse up and down along the Z-axis while the machine continues with regular operation.

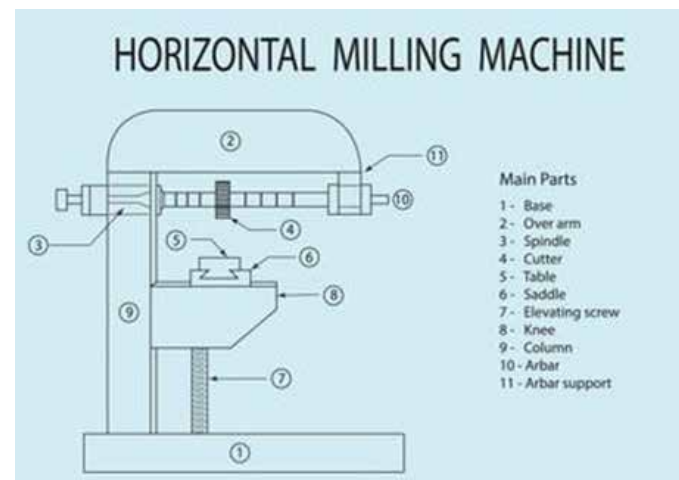
As the spindle moves, the cutters steadily take out material while the rest of the machine shifts along the X-axis and Y-axis to

ensure that the object is positioned at the same place for further cutting.

Vertical milling machines are classified further into two distinct types -

1. **Turret Milling Machines:** The table on a turret milling machine freely operates both left and right and up and down, while the spindle stays locked and stationary.
2. **Bed Milling Machines:** The table on a bed milling machine can only traverse horizontally or perpendicular to the axis, while the spindle moves parallel to the axis.

Horizontal Milling Machines



Horizontal milling machines are designed similar to vertical machines, where a spindle that contains a rotating cutting tool applies force against a workpiece to take out material from the workpiece.

Horizontal milling machines differ from vertical machines in terms of the spindle's orientation, which is horizontal here. Therefore, horizontal milling machines have the cutting tool mounted on a horizontally oriented spindle that selectively takes out material from the stationary workpiece.

Advantages and Industrial Implementation

Vertical Milling Machines

Due to their immense versatility and unparalleled accuracy, several industries depend on vertical milling machines for different projects. Some advantages of vertical milling machines include -



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- **Affordability:** Since casings are smaller and constitute less complex, internal parts, the projects you accomplish with these machines are efficient and budget-friendly.
- **Availability:** Vertical milling machines being more common make it easier to search for spare parts or repair assistance in case of a malfunction. This perk is notably helpful if you need a milling machine that is quick and hassle-free to be set up.
- **Simplicity:** Vertical mills need no additional fixtures and offer more simplicity in terms of operation and maintenance. The smaller learning curve implies less downtime.
- **Space:** Vertical mills occupy less floor space, implying that you have more room to work or install additional machinery, especially if you are a small shop owner.

Horizontal Milling Machines

While horizontal milling machines are not as common as vertical machines, they are equally effective and harbor certain advantages such as -

- **Speed:** Horizontal machines yield high output and offer a quick turnaround time. They can cut faster than a vertical mill and can make more than one cut at a time without sacrificing precision.
- **Durability:** Since horizontal machines work on bulkier materials, they are highly durable and long-lasting compared to vertical machines.
- **Capability:** These machines bear a larger capacity compared to vertical milling machines. They can handle enormous, bulky materials easily and can cut deep.

Which One Should You Choose? Horizontal or Vertical

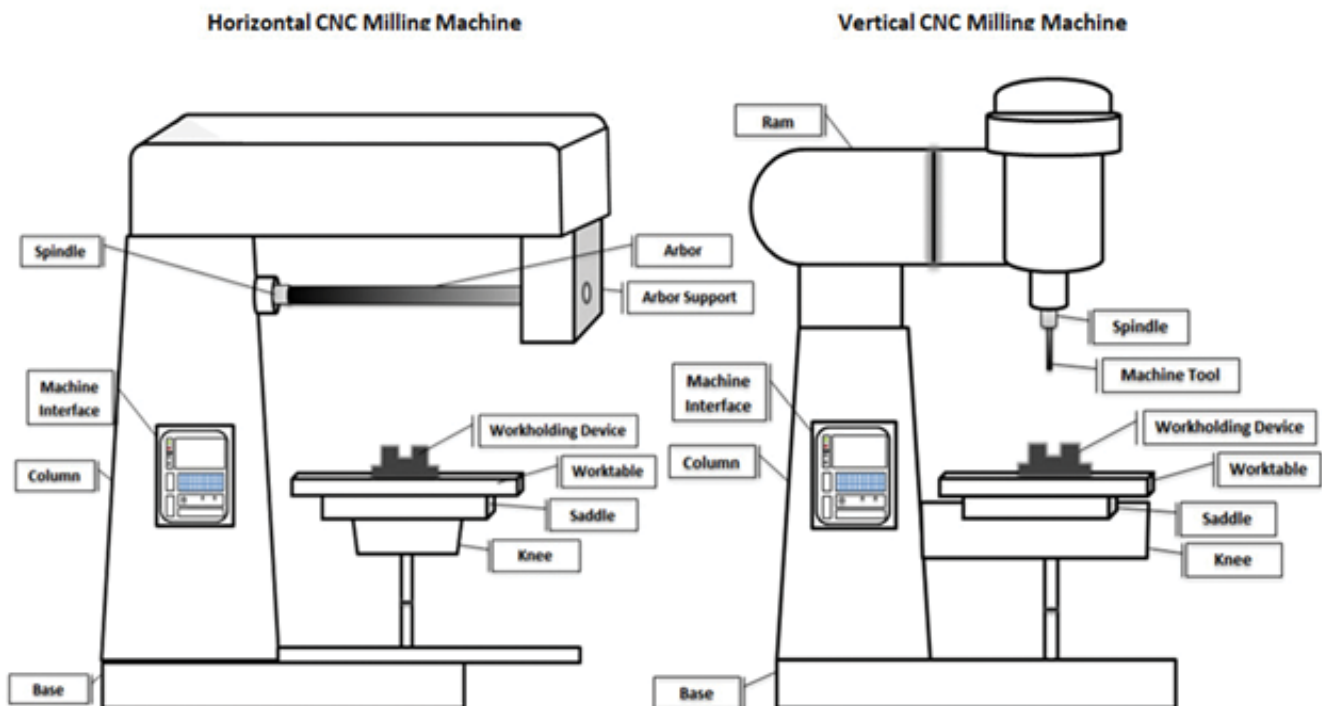
Since both vertical and horizontal milling machines offer compatibility with CNC technology, they can feed data into a computer-based software program to design your finished project. CNC milling machines can create identical replicated cuts that make them quite efficient.

The following factors are pivotal to help you decide between the two milling machines:

Type of Mill Required

Your preference must depend upon the size and shape of the materials you use, the types of projects you undertake, and the time frame required for accomplishing them -

- **Size and Shape:** If you are dealing with a project that involves bulky materials of odd sizes, a horizontal milling machine should be the preferred choice. A horizontal milling machine is also favorable for projects where parts require cutting on numerous sides.
- **The Spectrum of Projects:** If you are working on different categories of projects, opt for the one that lets you perform the broadest range of tasks. This factor must be well-accounted for if you lack the budget to buy add-on parts or the floor space to fit more than one machine.
- **Time:** If you require a milling machine to perform daily tasks or for a long-term project that demands a constant and swift turnaround time, go for a horizontal milling machine. For less time-sensitive projects, consider opting for a vertical machine.

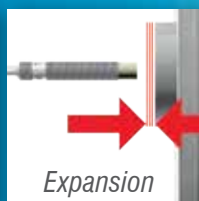
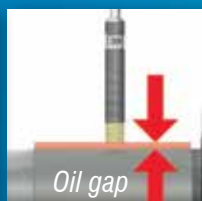


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- Customer-specific sensors and controllers
- Extensive product range for versatile application possibilities



because of its simplicity and affordability.

Budget

Vertical milling machines demand less initial investment compared to horizontal milling machines. This perk makes them an ideal choice if you are operating under a strict budget.

However, since each project involves different processes and materials, a project that might be economical to complete on one machine might not be so for another project. Factors such as the type of cutting tool used or the turnaround time required must be taken into consideration.

It is imperative to analyze your current and upcoming projects, as well as the size and bulk of materials that your milling machine must cut through. It is also advisable to account for the cost of the cutting tools required to execute your project.

Even though a vertical milling machine might be a more economical choice in terms of initial investment, you must ensure that you are not dealing with materials that are too bulky and oddly shaped, or you might end up burning through those savings on repairs.

Final Words

Horizontal and vertical milling machines differ in certain ways and are suitable for different types of projects. The final decision of picking one over the other also depends upon the user's budget.

Vertical machines are more affordable and offer greater versatility.

Horizontal milling machines typically feature different cutting tools compared to vertical milling machines. Vertical milling machines offer long and thin cutting tools, while horizontal milling machines have shorter and thicker tools.

While all this information can be baffling if you are new to the industry of milling machines and are unable to make a purchasing decision, even a benchtop CNC milling machine can deliver intricate and precise cuts, which adds significant value to your shop regardless of its scale.

About the Author:

Peter Jacobs is the Senior Director of Marketing at CNC Masters. He is actively involved in manufacturing processes and regularly contributes his insights for various blogs in CNC machining, 3D printing, rapid tooling, injection molding, metal casting, and manufacturing in general.



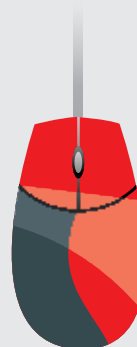
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Wind Energy projects gain momentum in Africa & Middle East & challenges lay ahead

Written by: Javier Lanfranchi, Faccin Group Senior Sales Area Manager

According to GWEC's Global Wind 2021 Report, developing markets in Africa and the Middle East reported 8.2 GW onshore installations last year and new installations in this region will double in 2021 and then triple in 2022 compared with 2020.

Such growth drive is improbable to halt during the rest of the forecast period with 3.2 GW of new capacity projected to be added each year in Africa/Middle East in the next five years (2021-2025), which is principally driven by developments from South Africa, Egypt and Morocco in Africa and Saudi Arabia in the Middle East.

Although relatively low installation capacity compared to other regions, the future of wind power in the Middle East is bright, led by the Kingdom of Saudi Arabia through its Renewable Energy Project Development Office (REPDO) within the Ministry of Energy, with new wind energy projects like the 400-megawatt (MW) Dumat al-Jandal, the Middle East's largest wind farm, who in April 2021 has reached halfway mark on construction. Using Vestas V150 4.2 WTGs (99 x 4 MW), it will be the most cost-efficient wind energy project in the world and largest Middle East wind farm with commercial operations expected to start in Q1 2022.

And REPDO does not stop there. It has announced plans for an 850MW wind farm in Yanbu, as part of NREP's fourth round, and plans to build 35 more wind farms by 2030. Saudi National Grid Company's CEO recently stated that KSA expects to attract more than \$20 billion in renewables investments by 2030.

However, there are challenges ahead. According to GWEC CEO Ben Backwell, for Africa and the Middle East to reap full benefits of wind power, they will have to address challenges such as "policy and power market frameworks, transmission infrastructure bottlenecks, and off-taker risk."

The establishment of policy,

regulatory, technical, and economic frameworks enabling the scaled-up deployment of renewables will be indispensable together with efforts from both private and public sectors is a must to obtain important results in terms of obtaining affordable and clean energy in the Middle East.

Faccin Group is well aware of these challenges and as part of the private sector, continues with its policy of creating, sharing and distributing relevant and valuable content for its customers and public in general.

The Group broadcasted on April 8th 2021 an engaging webinar (add link: https://www.youtube.com/watch?v=ZO_GYd0Zk&list=PLuCygOqEo4RUhE8YRSunKI2HAA8Aphldg&index=1) focused on the wind energy industry and the challenges laying ahead. The event has been watched by hundreds of individuals looking at understanding how the industry will cope with the monumental growth of the sector and the hype that has been created around this renewable source of energy for the future.

During this event, hosted by Javier Lanfranchi, key players of the industry together with the members of Faccin Group's Wind Energy Division, Andrea Comparin, Diego Morbini and Rafael Soto, shared with the public their views on the future of the market, particularly on the challenges related to the construction of ever bigger, taller and heavier towers, the extreme tolerances required, the diameters of the monopiles, the thicknesses to be rolled and the solutions provided by the manufacturers of machinery and how the tower producers should prepare for it.

The conclusion was that preparation, readiness and investment were keys to stay ahead of the competition in this industry and the exponential growth that is expected not only in onshore wind power but also offshore, with the expansion of the Asian and the US

markets. And rolling hundreds of steel cans of bigger diameters and thicker walls with very strict tolerances, was an important point highlighted during the webinar. In this regard, Faccin Group contributed with its expertise based on hundreds of wind tower automation systems installed around the world and covering a wide range of solutions for the rolling of monopiles, especially offshore wind projects, automation systems to produce hundreds of cans for sections and onshore towers and innovative machinery for the serial fabrication of door frames and flanges.

Faccin, through its Wind Towers Division, is well-prepared to assist wind tower section and foundation manufacturers to get the most of their operations.

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India's aerospace defence industry soaring to self-reliance

INDIA'S RUNWAY TO THE FUTURE

The stated objective of the Defence Excellence (iDEX) in April 2018 by Honorable Prime Minister Shri Narendra Modi was to "make the country self-reliant and self-sufficient in matters of defence, through mastering of the fundamentals of identify, incubate, innovate, integrate, and indigenise."

The early 2021 Aero India event in the country's cyber-hub of Bangalore underscored India's skyrocketing strides and position of prominence toward fulfilling the Aatmanirbhar Bharat vision of India as a global aerospace entity. As

exemplified by the HF-24 Marut, from Hindustan Aeronautics Limited's (HAL) first indigenous Indian fighter jet to its latest supersonic HAL Tejas Mark 2, the country has been getting closer and closer to reaching the 'Make in India' goal in the defence and aerospace sector.

From its indigenously designed, developed, manufactured, and overhauled fighters, trainers, helicopters, light-combat aircraft, engines, missiles, and satellites to its collaborative efforts, India is a proven powerhouse. Its rule of law respecting and enforcing intellectual property coupled with its commitment to quality, makes India an ideal international

partner.

With exports to dozens of countries and billions of dollars in defence contracts, including both the USA and Russia, and shared technology agreements, India is a trusted collaborator. Huge opportunities for growth exist, and India's aerospace and defence sector is soaring, taking it closer and closer to self-reliance.

A 'SUPERSONIC', NEXT GENERATION COOLANT

As with India's warp-speed success in the aerospace sector, creative innovation is the heart of progress.



An unprecedented new, 'supersonic' metalworking fluid designed for the aerospace industry is being introduced by Master Fluid Solutions India. It's TRIM™ HyperSol™ 888NXT, a coolant so revolutionary it needed a whole new category.

Termed 'neosynthetic', the patented coolant outperforms all others. It lasts longer, makes production rates fly, and is so lubricious it reduces tool wear while machining titanium, aerospace alloys, Inconel, and stainless steel. Its impressive performance is noted by the following actual reports from aerospace manufacturers. "The launch of HyperSol

888NXT is truly a game-changer for the aerospace metalworking industry," attests Master Fluid Solutions India Director Mandar Samat.

'SPACE AGE' PERFORMANCE, INCREASING PRODUCTIVITY BY 100%

A global OEM supplier of precision machining manufactured aerospace, defence, and medical parts in the USA mills, turns, and machines challenging grades of stainless steel, Inconel, high-nickel alloys, and titanium. With their premium semisynthetic coolant they had solid production rates and long sump and tool life, but wanted to increase production and lower coolant use. They looked to the next generation of coolant—HyperSol 888NXT. The result was double the throughput of stainless steel from 16 to 18 parts/hour to a jump to 36 to 40 parts/hour. With its lower concentrations and makeup rates, they significantly reduced their coolant use.

End result: HyperSol 888NXT means higher profits.

DRAMATICALLY LONGER TOOL LIFE

A global company's EU division producing impellers for aerospace turbojet engines and automotive turbochargers was running 32 machines. Machining titanium, Inconel, and forged aluminum with high tooling costs, they wanted to increase tool life without sacrificing productivity. They ran a trial of high-performance TRIM HyperSol 888NXT neosynthetic on two CNC lathes machining and turning 35NCD16 steel alloy. The dramatic results saw tool life skyrocketing by 234%, while running at higher speeds with less fluid consumption. With the greatly reduced tooling costs, and 7.6% lower coolant costs and overall production gains, the manufacturer anticipates a 20.2% rise in annual savings.

End result: HyperSol 888NXT pays off with profits.

FUELED BY INNOVATION AND INGENUITY

India's growing exponentially as a global manufacturing hub, especially in the defence and aerospace sector. It ranks third in the world for military spending in the government's push to achieve self-reliance in defence production. This paves the way for increased private sector participation. Yet still exports from the defence sector are expected to reach \$5 billion by 2025. The boon in the defence sector marks a new era toward indigenous manufacturing.

For more information,

Website: www.masterfluidsolutions.com.

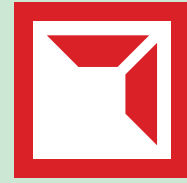


"The resilient Indian economy is seeing unprecedented growth, particularly in the defence industry. The vision of 'Atmanirbhar Bharat' defines policies that move us forward with innovation and indigenization, so that as a nation we are confirming our place as a formidable power in the global economy."

Mandar Samant, Managing Director, Master Fluid Solutions India

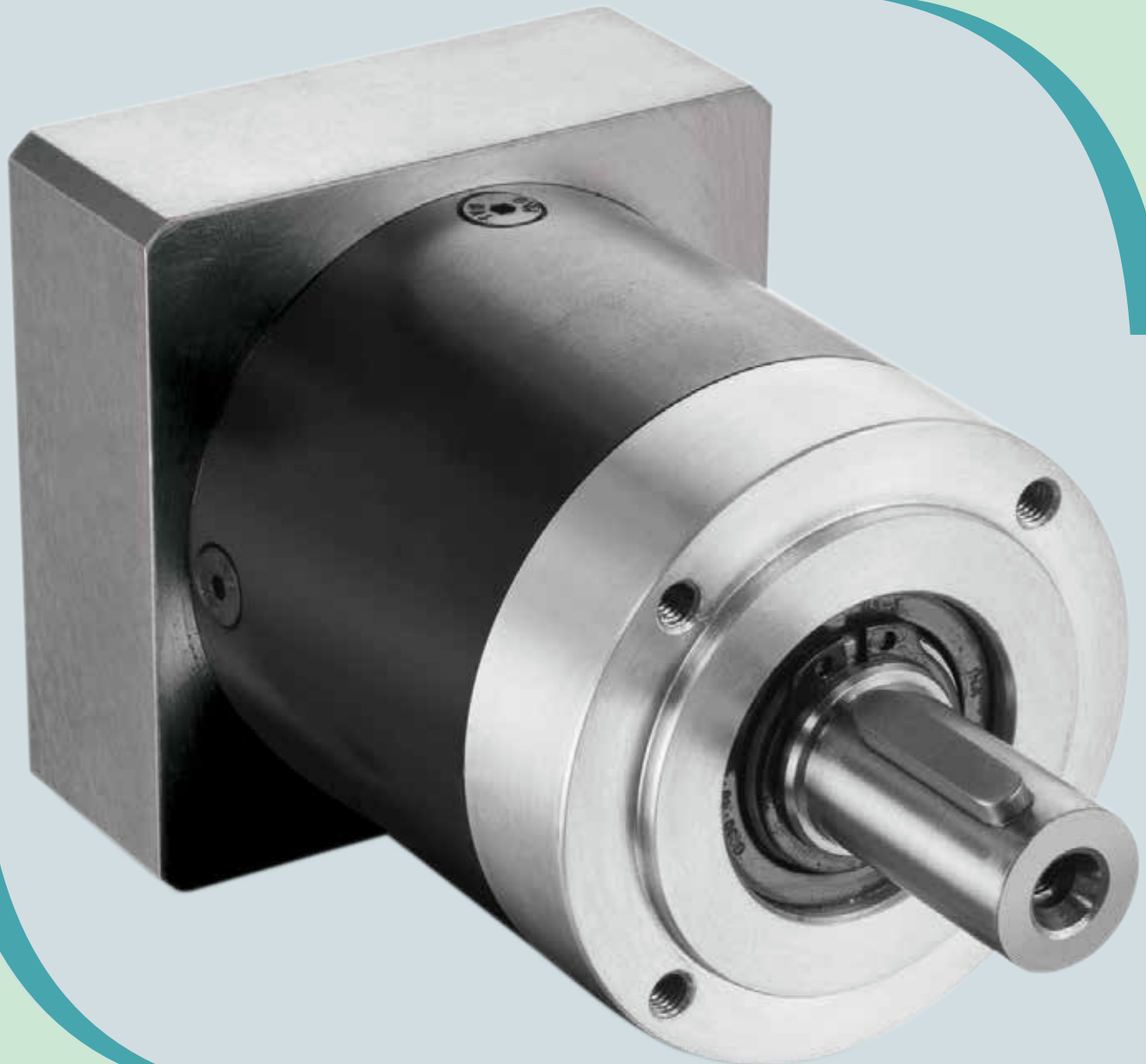
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Safe Speed and Standstill Monitoring



DN3PS2



DN3PD1



DN3PD2



SRB-E...FWS



PSC1

Many machines pose hazards to the operator while trying to clear jams, setting up, or other operational aspects that requires interaction. There are many safe drive monitoring features that can be applied to make the operation safer, with safe speed monitoring and standstill monitoring the most prevalent. These are used not only during the normal automatic operation of the machine but also during manual operation of the machine to lower the risk and keep the operator safe.

Safe Operational Speeds

Sometimes machines may need

to be operated outside of normal conditions, at various speeds and with safety guards open. These occasions would include set-up and parameter setting tasks. European harmonized C-standards, such as DIN EN 12417, have defined several machine operating modes:

Mode 1: "Automatic" - a machine engaged at its normal production process speed with all safety guards closed and secured.

Mode 2: "Set-up" - the machine is running at significantly reduced speeds with the safety guards opened to allow for adjustment activities.

Mode 3: "Extended manual intervention" - requires the use of an enabling switch to allow operators to activate a limited number of machine functions at higher speeds, with safety guards open. Maximum speed is prescribed to set limits.

Standstill

Another consideration in the monitoring of safe speeds is to insure that the machine has reached standstill before safety guards can be opened. After the removal of power to a motor, a machine may still pose hazardous conditions because of flywheel overrun, spindle momentum, or unstable rest positions.

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PROXIMITY SWITCHES

Guards protecting these areas need to remain locked until dangerous conditions have abated.

Methods of monitoring speed or standstill

There are several methods of monitoring safe speeds and standstill:

Back EMF monitoring

Back electromotive force, or Back EMF, is a phenomenon that occurs in electric motors where the rotating armature in the presence of a magnetic field produces a voltage which opposes the original applied voltage. Since Back EMF is proportional to the armature rotational speed and remains after the supply voltage has been removed, monitors can use it to indirectly measure the motor's speed or determine standstill if absent. The DN3PS2 standstill monitoring relay uses this method.

Safe motion monitoring via frequency
Safe speed is determined by monitoring the frequency of the rotating field of the motor. This unique method is cost effective because it does not require sensors and has minimal setup. DN3PD1 and DN3PD2 safe drive monitors use this method.

Monitoring sensor signals

There are a variety of devices that can generate a signal based on the movement of the machine, such as proximity sensors, resolvers, and encoders. The signals generated are picked up by the monitor to determine speed or standstill. The SRB-E...FWS

Series uses proximity sensors to monitor standstill while the PSC1 can use various types of encoders to monitor multiple axis.

Fail to safe timer

Another method to insure standstill is to incorporate a fail-to-safe timer in the circuit. Once power is removed from a motor running at a specific speed, it will usually reach standstill in a consistent amount of time. The timer can be set to delay the enabling signal to unlock the guard doors for the duration needed for the motion to stop. The SRB-E...FWS Series can be used to safely unlock guards at a consistent defined time.

STANDSTILL MONITOR DN3PS2

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SAFE DRIVE MONITOR, WITHOUT SENSOR

DN3PD1

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- Space-saving, no encoder required
- Simple parameterization button
- Adjustable speed from 0 to 600 Hz
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DN3PD2

- Monitoring of safe motion via the

frequency of the rotating field of the motor

- Space-saving, no encoder required
- Simple parameterization via GO:BEYOND Software tool
- Adjustable speed from 0 to 1200 Hz
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SRB-E...FWS

- Monitors 1 or 2 impulse sensors (for standstill monitoring)
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- Reset input
- 2 safe relay outputs
- 1 semiconductor output
- 2 signaling semiconductor outputs
- Guard door monitoring option
- Integral System Diagnostic (ISD)
- 2 channel microprocessor control
- PLe / Category 4

PSC1-C-10-SDM...

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- PLe / Category 4
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SS2 - Stop Category 2
SLS - Safe Limited Speed
SDI - Safe Direction
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Performance, precision, sustainability

Innovative and pioneering solutions – the JUNKER Group, with the JUNKER, LTA and ZEMA brands, is presenting its extensive product range at EMO 2021 in Milan, Italy. The JUNKER Group will present the latest grinding technologies from JUNKER and ZEMA as well as efficient filtration systems from LTA in Hall 3, Booth E20.

High-performance linear drives along the X- and Z-axes allow high travel and acceleration values whilst simultaneously reducing the assembly space, enabling maximum dynamics and accuracies. The latest measuring technologies help to produce good parts from the very beginning of the grinding process.

Up to 35% shorter cycle time

Table assemblies, such as workpiece spindles, tailstocks or steady rests, are installed on standardized universal construction boards, which can be positioned for various workpieces either automatically or manually.

The modular concept stands out thanks to a highly flexible component arrangement of table assemblies on guide rails in the working area. The table assemblies can be easily retooled for future grinding tasks. The entire concept of the system revolves around easy access to all components in and on the machine plus optimized setup. Increased accessibility and serviceability reduce maintenance effort and costs.

The fact that all guides and motors are fully covered makes the grinding machine suitable for use with either emulsion or grinding oil as a coolant.

25% reduced maintenance effort

The polymer concrete machine stand impresses with its outstanding damping performance and high torsional stiffness. The optimized machine bed rinsing makes maintenance easier,



and piping for the media feed integrated into the machine stand allows for future grinding machine upgrades. The decreased machine size also reduces overall transportation costs.

20% more energy efficient

Innovations in the field of cooling, pumps and pressure regulation enable the removal of cooling media harmful to the environment and health. These environmental improvements along with increased energy efficiency reduce maintenance requirements and round off the development of grinding machines with many detailed improvements.

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Resist friction by adopting smart lubrication

Metal industries, whether large or small, encounter an everyday challenge in controlling friction and heat – the inevitable results of a shop floor. To overcome this consequence and ensure precision in output, deploying the correct choice of lubricant can go a long way in boosting performance and augmenting returns. As markets recover after a year of intermittent lockdowns, businesses are scouting for alternatives that

can reduce downtime and waste. Now, especially, deploying the right lubricant which guarantees longer oil life and higher efficiency can significantly aid performance and profitability.

The force of friction

Friction is the force that opposes the relative motion of two surfaces in contact. Consequently, these opposing surfaces scrape against each other producing surface wear and tear. Lubricants play a key role in arresting this friction between two surfaces to control machine performance and ensure longer life. Smooth and precise slideway operations, especially, demand special attention to the frictional properties of a lubricant. Loss of frictional control can cause inaccuracies – in a metal removal process, this ultimately reduces machine tool productivity. Thus, the correct lubrication solution is key to minimizing

friction, protecting machines, enhancing efficiency and improving productivity.

Stick-slip effect

Slideways, also referred to as linear bearings, produce a similar friction. Here, the surfaces in contact are flat and the motion is linear. Slides operate with a break and stop at the end before returning in the opposite direction. Due to stepwise operations and susceptibility of slideways to stick-slip phenomenon, mixed lubrication plays an important role.

Stick-slip is caused by continuous alternating between static and dynamic friction. It ultimately leads to jerky movements of the slide and by extension, the attached work piece or tool. Such uncontrolled motion can result in inaccurate machining operations, unacceptable output quality and subsequent losses. To facilitate smoother operations, special additives called friction modifiers can be added to the lubricant to improve friction control. Modern slideway lubricants usually contain a synergistic mix of friction-modifying additives that enable accurate and smooth operations over a range of operating conditions.

New-age versatility

Modern machine tools and slideway designs demand applied lubricants. Increasing speeds and loads coupled with greater expectations for machine accuracy require sophisticated slideway lubricants. In addition, there are a variety of friction material pairings, like metal-on-plastic, that have specific lubrication needs. The modern slideway lubricants meet these challenges with a carefully balanced combination of base oils and additives to achieve low-static friction for easy start-up, continuous transition from rest to movement and smooth operations even under heavy loads.



It is critical to choose the right slideway lubricant for machine tools to achieve improved productivity of equipment, protect parts from damage and prevent friction stick-slip. There are several recognized friction tests to demonstrate frictional properties of slideway lubricants such as Cincinnati Lamb Friction Test, SKC Tribometer and Darmstadt Rig Test. These enable evaluation of static and dynamic friction characteristics of a lubricant and the effect of various slideway materials.

Mobil advantage

Understanding the challenges of stick-slip under varying circumstances in a machine shop, Mobil™ Lubricants has developed a premium-series of slideway lubricants that specifically meet the requirements of accuracy, aqueous coolant separability and equipment protection of precision machine tools.

The Mobil Vactra™ Oil Numbered Series has been carefully formulated from high-quality base stocks and performance balanced with an advanced additive

system that provides controlled frictional properties, compatibility with aqueous metalworking fluids and corrosion protection. The unique additive package provides exceptional frictional properties on a wide variety of way materials, including steel on steel and steel on polymer. Reducing stick-slip and chatter, it allows smooth, uniform motion at design travel speeds – enhancing machine productivity and accuracy, prolonging tool life and enhancing surface finish.

The series has been specifically designed to provide an extra margin of machine protection by satisfying the stringent demands of slideways. The oils exhibit excellent lubricity and load-carrying performance, contributing significantly to improving the production of quality parts.

As industries resume operations, optimizing operations to reduce downtime and waste will be key to raising profits. Choosing the right lubricant that deals with specific industrial challenges can pave the way for profitability and efficiency.

Mobil advantage

Mobil Industrial Lubricants are developed in close consultation with leading equipment builders. Specially formulated to protect equipment, they ensure problem-free operations in varying conditions. Cutting-edge product solutions like Mobil Vactra™ Oil Numbered Series has been specifically designed to provide separability from aqueous coolants while minimizing the corrosive effects of high pH coolants on lubricated surfaces – leading to smooth slideway operations.

Mobil™

For more information,
Website: www.mobil.in/business

Mobil Vactra™ Oil No. 2
High Performance Slideway Oil (ISO-VG 68)
Recommended for precision machining and enhanced slideway protection
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Resulting in jerky movement of the workpiece

**Smooth slideway operation | Low static & dynamic friction |
Reduced stick slip | Smooth movement even under heavy loads**

FARO Expands Digital Twin Product Suite - Acquires HoloBuilder Inc.



FARO® Technologies, Inc. (Nasdaq: FARO), a global leader of 3D measurement, imaging, and realization solutions for the 3D Metrology, AEC (Architecture, Engineering & Construction), and Public Safety Analytics markets, today announced the acquisition of HoloBuilder, Inc.

HoloBuilder brings to FARO its leading photogrammetry-based 3D platform, which delivers hardware agnostic image capture, registration and viewing to the fast-growing Digital Twin market. With an initial focus on Construction Management, HoloBuilder's technology platform provides general contractors a solution to efficiently capture and virtually manage construction progress using off-the-shelf 360° cameras.

HoloBuilder's SaaS platform will add fast and easy reality-capture photo documentation and added remote access capability to FARO's highly-accurate

3D point cloud-based laser scanning to create the industry's first end-to-end Digital Twin solution—all without leaving the FARO ecosystem. The combined solution will provide comprehensive scanning and image management capabilities for the Digital Twin market including robotic assembly 3D simulation, construction management, facilities operations and management, and incident pre-planning.

"The high-value that digitalization brings to the AEC and Operations & Maintenance (O&M) industries creates significant market opportunity for FARO," stated Michael Burger, FARO President and CEO. "The addition of HoloBuilder to our offering accelerates the reality of a true end-to-end Digital Twin solution and advances our strategic objective of increased recurring revenue through market share gains in this large and growing segment."

"HoloBuilder and FARO together

further our vision of digitizing the physical world to enable process automation and workflow optimization," added Mostafa Akbari-Hochberg, HoloBuilder President & Founder. "The powerful combination of high accuracy laser scanning with real-time 360° photo capture and collaboration will empower both Company's customer bases with a comprehensive Digital Twin solution."

Under terms of the agreement, HoloBuilder shareholders received a cash payment of \$34 million. As of April 30, 2021, HoloBuilder had \$4.0 million in annual recurring revenue with a compounded annual growth rate of nearly 75% since 2019. The transaction closed on June 4 and was funded with available cash reserves. Alantra acted as exclusive financial adviser to HoloBuilder.

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Capacitive principle for non-contact displacement measurement

Non-contact displacement sensors with electromagnetic measuring technique.

Today's requirement for high precision during the machining of parts also places equally demanding requirements on the measurement technology. Fluctuating ambient temperatures, electromagnetic fields in close proximity, and a variety of different measuring objects, require maximum performance from multiple displacement sensors. Despite this, the sensors must provide maximum precision, particularly under these variable conditions. Eddy current and capacitive sensors are ideally suited to these tasks. The major benefit of both these principles is the non-contact mode of operation. Non-contact sensors are always used in

applications where, among other things, rapid changes in displacement need to be measured, where no forces can be exerted on the measurement object, where very sensitive surfaces do not allow any contact, or where a long service life of the sensor is required. Depending on the application, the sensors measure different parameters such as vibration, deflection, position, tilt angle, deformation or thickness. Nevertheless, when it comes to precision and harsh ambient conditions, electromagnetic techniques are unbeatable. Therefore, in terms of performance and reliability, very high requirements are placed on the displacement sensors.

Important application criteria include cut-off frequency, accuracy, temperature stability and resolution. Measurement technology company Micro-Epsilon is now pioneering huge development effort in this area and has already provided innovative solutions in displacement measurement using electromagnetic techniques.

According to the manufacturer, electromagnetic displacement sensors that still have enormous potential include eddy current and capacitive sensors.

Capacitive displacement sensors provide accuracy and stability

The capacitive displacement measurement method is based on the

principle of the ideal plate-type capacitor. A change in the spacing of the plates causes a change in the total capacity. For a sensor system, the two plate electrodes are formed by the sensor and the target. If an alternating current of constant frequency flows through the sensor capacitor, the amplitude of the alternating voltage on the sensor is proportional to the distance to the target (ground electrode). The alternating voltage signals are demodulated in the amplifier electronics and output as analogue signals. Using a special evaluation of the reactance of the plate capacitor, a strictly proportional relationship is obtained without additional linearisation. In practice, this linearity is almost perfectly realised by the guard ring capacitor design of the sensors. This applies to all metal targets, irrespective of their conductivity. Insulating materials can also be measured using the capacitive principle.

The guard ring capacitor principle is realised to its full extent in the new product range, capaNC DT 6100, which makes full use of these technical advantages. The extensive sensor series starts at a measurement range of 50µm and covers displacements up to 10mm with the larger versions. In conjunction with the compact controller, the 6300



Fast capacitive displacement measurement system Series 6350 with powerful controller

Series provides linearity values of 0.2% and resolutions down to 0.0005µm. Cut-off frequencies of 8kHz (6300 Series) and 50kHz (6350 Series) are achieved for dynamic processes. 0-10V and 4-20mA are available at the output.

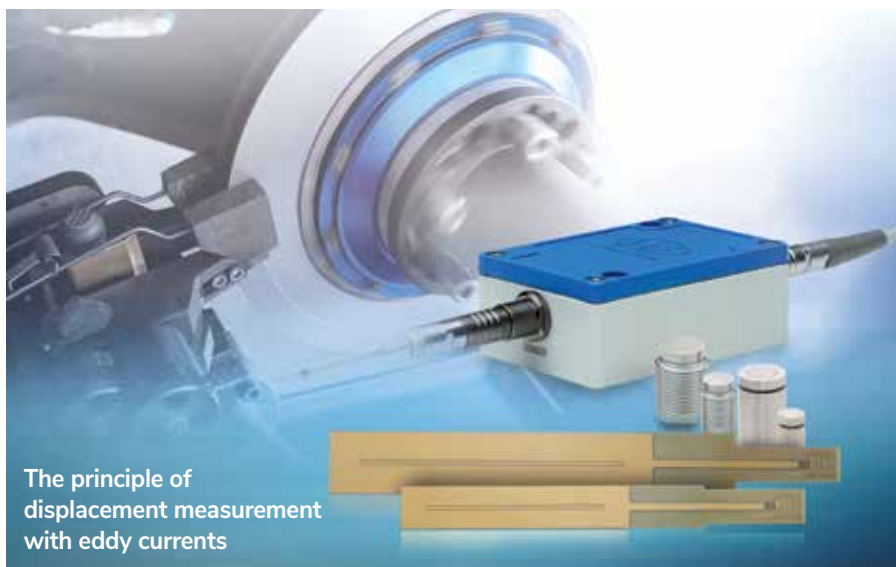
For rapid changes in displacement and difficult environments

The eddy current principle is based on the extraction of energy from an oscillating circuit, which is required for the induction of eddy currents in an electrically conductive metal measuring object. If a metal plate approaches a coil charged with high frequency alternating current, eddy currents will be induced in this plate using the electromagnetic field from the coil. According to the Lenz Rule, the field

of these eddy currents is opposed to the excitation field. Therefore, the energy extraction induced causes a change of the alternating current resistance of the sensor coil as a function of the distance to the measurement object (metal plate).

With the new eddyNC DT (eddy-current non-contact displacement transducers) 3300 Series, the user benefits from a completely new sensor structure and design, as well as new technical and operational features. The high quality industrial plug used makes the sensors more rugged and with IP67 protection, suitable for use in harsh industrial ambient conditions. For arduous applications such as the development of internal combustion engines, a special miniature version is also available, which has a ceramic housing for high pressure duties.

The latest controller technology preconditions the sensor signals for the user. Due to the linearisation which occurs at the point of measurement, and which is greatly simplified by an integral micro-controller, optimum accuracy is achieved for any metallic measurement object and any installation conditions. Operation is supported by an integrated LC graphical display. The measurements can be output as either voltage or current, as well as in metric units. The functional features have been extended with limit monitoring, auto-zero, peak-to-peak value, minimum, maximum and selectable lowpass filters. An aluminium, injection-



The principle of displacement measurement with eddy currents



Eddy current displacement sensors with multifunctional controller eddyNDCT 3300

moulded housing with a modern design, provides the necessary protection for the signal conditioning electronics in applications on machines or in systems.

With the eddyNCDT 3300 Series, measurement ranges from 0.4 to 80mm are provided. A linearity of 0.2% is achieved and the resolution is 0.005%. With Micro-Epsilon's unique compensation technique, stability values of 0.015%/°C are achieved at temperatures of up to 150°C. Very fast movements can be measured with high precision in a bandwidth of up to 100kHz.

Micro-Epsilon's miniature eddy current sensors are now recognised worldwide. With 2mm front diameter, 4mm installation length and only 0.5mm cable diameter, this standard manufactured eddy current sensor is the smallest in the world and so is ideal for use in applications such as internal combustion engines. Here, the sensor measures the following parameters at different positions: piston stroke, shaft play, displacement, piston ring movement, vibrations, oil film thickness and, if needed, also with fuelled engines. A linearity of 1µm and a resolution down to 20µm are achieved for a measuring range of 500µm.



The harsh environment of engine testing is a typical application area for eddy current displacement sensors. Miniature sensors in particular are used for many measurements in the internal combustion engine.

The latest innovation is a slightly larger displacement sensor with ceramic housing and an O-ring seal, for use in high pressure applications. Tests with pressure loads of more than 1,000bar and short-time pressure peaks of 2,000bar have been successfully completed. This sensor model is therefore ideal for measurements in internal combustion engines.

Both of the classic displacement measurement methods mentioned above are often used in a wide variety of systems. These methods detect distances with maximum precision. Depending on

the customer requirements, one of these two principles is usually more suitable.



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PACVD Coatings - The Process & Applications

By Dr. Atul Kulkarni

Presently Indian automobile industry is passing through a transition of Euro (Bharat) 4 to Euro (Bharat) 6 with stringent norms of emission to save our environment.

This transformation prompts the use of smart materials as well as processes in automotive industries. It requires, processing of light weight - high strength steels as well as nonferrous materials such as Aluminium and Titanium. Stamping of these materials can be done with hard wear resistance coatings such as AlTiN, AlCrN, AlTiCrN, Diamond Like Coating (DLC), etc. All these coatings are efficient and do stamping of tools without any scoring marks or deformation. Diamond Like Coating is a low friction coating particularly done to reduce emission from auto engines. Various auto components such as tappets, shoes, piston pins, piston rings, etc. are coated for this purpose. These ceramic coatings are done at low temperatures, which is really a great challenge in itself.

Chemical Vapour Deposition

The process of Chemical Vapour Deposition (CVD) was developed way back in 1960. A few hard wear-resistance coatings were developed such as Titanium Nitride (TiN), Titanium Carbonitride (TiCN), and Aluminium Oxide (Al₂O₃). These coatings have two special properties viz. 1. High hardness of more than 80 HRC and 2. Low coefficient of friction less than 0.5.

The major disadvantage of this process is high processing temperature, 800 - 1000°C which limits the use of base material. Also, the process is a bit hazardous. The CVD process requires post coat treatment viz. Vacuum Heat Treatment for Tool Steel materials leading to consumption of additional time. These limitations forced scientific community to search for an alternative process to counterattack. This drive led to the evolution of an alternative process viz. Physical Vapour Deposition (PVD) around 1980'. The PVD process has various advantages like low process temperature <500°C, short process time, no dimensional changes in tool steels and possibility of having mono as well as multilayer / nano layer complex hard coatings such as AlTiN, AlCrN, TiSiN so and so forth. But unfortunately, one of the major disadvantages of this process is that the coatings are not uniform and coverage on

complex geometry due to its nature of line-of-sight process. Hence it is unable to coat complex profile surfaces as well as inner surfaces of components / tools.

Advent of Plasma Assisted Chemical Vapour Deposition (PACVD)

To overcome the limitations of both CVD and PVD processes, a third process was developed viz. Plasma Assisted Chemical Vapour Deposition (PACVD). This process is carried out with the help of high energy plasma, which allows to apply uniform coatings at low processing temperatures of 150 – 250°C. Cover complex geometries as well as inner surfaces of tooling and components.

Advantages of PACVD

Two examples of advantages of Diamond Like Coating (DLC) carried out through PACVD on stamping tools and auto components:

1. Stamping Tools –

In sheet metal stamping or forming application, the main challenge is dealing with adhesive wear due to the high loads applied, abrasive wear and mechanical fatigue due to repetitive production. Through Plasma Nitriding, optimum mechanical support for the coating is established at the interface of coating and high strength tool steel.



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Another important challenge in surface engineering for stamping process is the frictional forces between stamping sheets and die parts. Through PACVD, frictional forces are reduced with the use of either lubricants or application of coatings with low coefficient of friction.



Mobike(Two wheelers) industry has started using a silencer part made up of 2 mm thick Aluminium 6060 alloy. The said Aluminium alloy is soft and ductile due to low 0.3% silicon content facing sticking and galling problem during stamping. To overcome this problem, a punch of SKD 11 (D2) with vacuum heat treated tempered at > 500oC and plasma Nitrided with Diamond Like Coating deposited through PACVD is being used. Due to the low coefficient of friction of Diamond Like Coating, no sticking or galling is observed. This process not only supports increase in productivity by many folds but also reduces the use of external lubricants such as oil or MoS₂.

2. Auto Components:

Automobile industry is always striving for higher efficiency of engines with lower emission. It supports innovations regarding downsizing, direct fuel injection, better start – stop systems, hybrid systems, increased warranty, and service period.

Auto components required for assembly are of various types. Their details are as follows:

- a. Engines :** Piston Pins, Piston Rings, Valve Tappets, Cam Followers
- b. Injection systems :** Pistons, Plungers, Needle Valves, Pump Components
- c. Car body components :** Various interior parts.

During operations, these auto components slide on each other generating unwanted emission due to continuous friction. All these components are required in high volumes and are

critical to maintain low friction without any surface treatments. Reduction in frictional impact can be attained with special coatings through PACVD process viz. Diamond Like Coatings (DLC) e.g. a-C:H:W + a-C:H or other variants. These coatings are very well suited for pure sliding conditions in tribological contacts. Such coatings exhibit excellent performance on valve train (Tappets), Crank train components (piston pins, rings), Fuel pumps as well as injector components.

Outstanding Properties

DLC coatings are having outstanding properties such as high wear resistance (increased surface hardness >3000Hv) with low coefficient of friction <0.1, which lead to minimal friction and limited emissions. These coatings have increased load carrying capacity, better resistance against galling, erosion, fretting and chemically inert. Other major advantages of said coatings are self-lubricating and can be coated at lower temperature of < 200oC. This facilitates selection of cost-effective wide range of base materials which can outperform expensive alternatives.

Thus, PACVD process of high-performance thin film coating on high strength tool steel tooling and auto components is a well suited process to increase performance with reduced or no use of lubrication.

About the Author:

Dr. Atul Kulkarni is Executive Director at Ionbond Coatings Pvt. Ltd. He has completed his doctoral work in "Thin Film Technology and developed CVD Diamond Coating for Cutting Tools" from University of Pune.



At the University of Arkansas, USA he completed his post-doctoral research. Thereafter joined and working with Multi Arc / Ionbond since last 24 years. During this tenure, he shouldered various responsibilities including Scientific Development to Production Manager to Operations Manager. He has expertise in High Performance CVD / PVD / PACVD coatings for Cutting Tools, Forming and Molding Tools, Industrial / Auto Components, Medical Implants and Devices, etc.

Emergency Stop Devices

More than an OFF Switch



Picture 1: A typical red E-Stop button mounted in a yellow housing

Emergency Stop (E-Stop) buttons are arguably the most identifiable element on a piece of machinery and serve a specific function which is universally known. This is not by chance, but instead a requirement as called out by governing bodies such as OSHA and in consensus standards. NFPA 79 defines an Emergency Stop as “a device designed to be used in reaction to an incident or hazardous situation.”

They are not considered machine safe-guarding devices because an Emergency Stop neither detects nor prevents employee exposure to machine hazards; rather they initiate an action to stop hazardous motion when an employee recognizes a hazard and activates the Emergency Stop. In other words, an Emergency Stop is a secondary safety measure. Being a separate secondary safety function it is good practice to not wire an Emergency Stop in series with the primary safety functions, but to wire it in its own safety circuit.

Standard Requirements

Similar to any safety device, an

Emergency Stop must fulfill specific standard requirements. When looking at the installation of an Emergency Stop, governing bodies such as OSHA and standards such as IEC 60204-1 state that it must be readily accessible to the operator. This means that every operator station or any area of the machine worked on which is considered part of the normal operating procedure needs a means for an emergency stop, also referenced by National Fire Protection Association under the NFPA79 standard. It should be unobstructed and easily accessible without having to reach over, under or around to actuate.



Picture 2: machine controls with emergency stop, mounted at a safety guard access door.

Proper use

Being an easy one-step process by design, an Emergency Stop is often misused as an OFF switch. At first glance one may think this is acceptable and may even use the argument that it brings the machine to a safe condition anyway. In reality, using an Emergency Stop device as an OFF switch

will do more harm than good; enough harm which may lead to a devastating failure.

An Emergency Stop device is only meant to be used in just that - an “emergency”. As such, this secondary safety device will have different requirements than an ON/OFF switch or even a safety rated guard switch. For example, when looking into ISO13849 the highest achievable performance level for an E-STOP will be a PLd. This is because the probability of a dangerous failure is based on the fact that it will not be actuated frequently. If this frequency parameter is altered and increased due to the misuse of the E-STOP then its probability of a dangerous failure will increase. Meanwhile the measure to protect against such a failure remains unchanged, thus leading to the possibility that it will not perform when actually needed.

E-Stop devices

An Emergency Stop can include, but are not limited to, devices such as pull cord operated switches, foot operated switches without a mechanical guard and, most common, push button operated switches.



Picture 3: an emergency cable pull device

Physical requirements

NFPA79 and ISO 13850 detail the physical

characteristics of a push button E-Stop, which will include a RED mushroom operator head with YELLOW background. They must also be self-latching, meaning that once actuated the Emergency Stop will remain in the actuated state until a voluntary and deliberate action is performed, such as twisting and/or pulling of the palm button for reset. In addition, this resetting of the E-Stop alone should not resume operation; instead a second deliberate action is needed, such as the pressing of a RESET button.

Types of stopping

IEC 60204-1 and NFPA79 also de-scribe the different types of emergen-cy stopping - which are Category 0, Category 1 and Category 2, not to be confused with Control Categories of ISO13849. Every machine must have at least one Category 0 means of an Emer-gency Stop, also called an uncontrolled stop which is defined by the immediate removal of power to the



Picture 4: an emergency stop main switch with Lockout/Tagout capability

machine actuators.

Category 1, or a controlled stop, is where power remains at the machine actuators as they are needed to bring the machine to a stop.

A Category 2 stop is a controlled stop

where power remains at the actuators even once the machine is stopped.

The determination on which type of Category Stop to implement is dependent on a Risk Assessment accompanied with a stop time analysis.

Conclusion

An Emergency Stop device is one of the most crucial elements within the safety related parts of the control system. In most cases it is the last resort to safely bring hazardous conditions under control. Although the overall ideal scenario is that we will never have to use such a device, reality is that accidents do happen, machinery and machine process may not function as intended. It is important that the Emergency Stop and its functions are understood and respected enough to where it is not misused.

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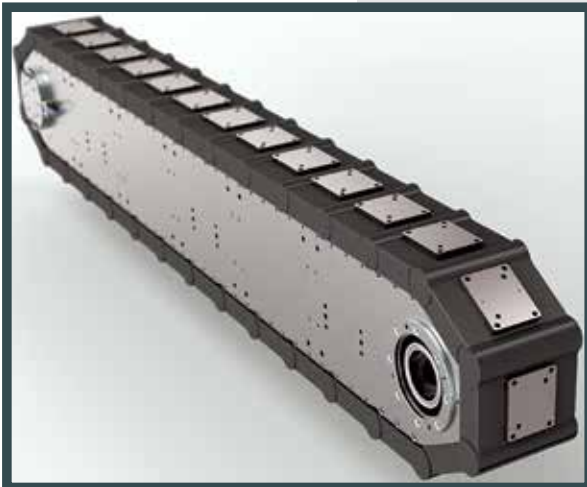
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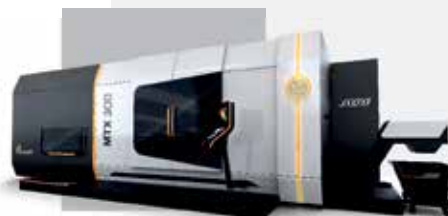
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