

TAGMA TIMES

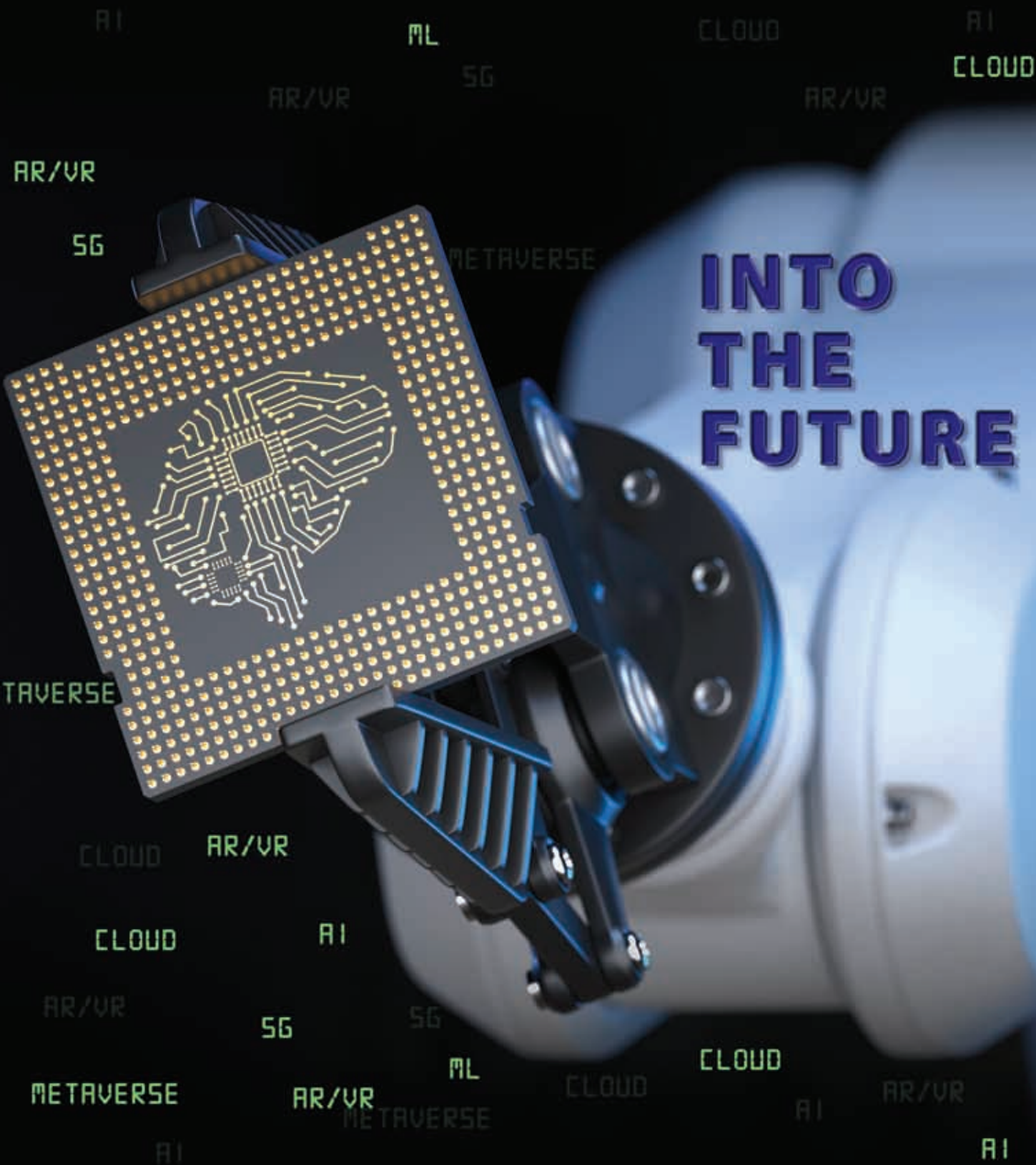
NEWSLETTER

(Technical Info. on Die, Moulds & Toolroom)

Volume: XXVIII / No. 11

(Private Circulation for Members Only)

July 2022



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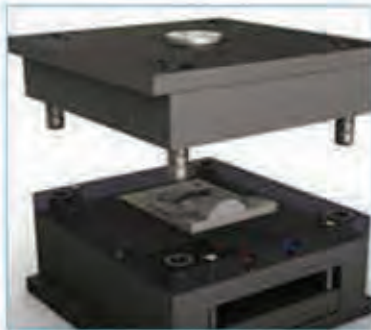
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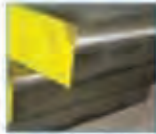
Hot Work Tools
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High Speed
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Beryllium
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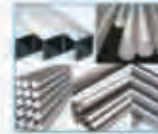
Cold Work Tools
Steel



Plastic Mould
Steel



Aerospace
Aluminum



Other Alloy Steel
(En19, 24, 31, 36 etc.)



Square Bars



M S Rounds



TMT Bars



Flat Bars



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M S Beams



P-20



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P - 20



SS 316



SS P-20

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Factory:
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Shatyabrata Das,
Sr GM – Tooling, IAC Group

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Nishant Kashyap
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Kimberley D'Mello
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Injection molding tool for the Bumper



Injection molded Bumper part



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Corporate Office

PCK HOUSE,
New No. 84, Old No.13,
South West Boag Road,
T. Nagar, Chennai - 600 017
Tel : + 91 44 2434 6503 / 1904 / 8638
Fax : + 91 44 2434 1181
Email : info@pck-buderus.com

Pune Stock Holding Center Machining Division

New Gat 754, Pune Nagar Road
Wagholi, Pune - 412 207
Tel : + 91 20 2705 1958, 3254 6767
Fax : + 91 20 2705 0700
Email : punewh@pck-buderus.com

Ludhiana Stock Holding Center

C-I, Industrial Area C, Jaspal Main Road,
Kanganwal, Ludhiana - 141 120, Punjab.
Tel : + 91 161 6532016 / 2017 / 2510073
Fax : +91 161 2510072
Email : ludwh@pck-buderus.com

Kolkatta Office

Flat No. 403, Vishal Apartments
4th Floor, No. 18,
Prince Anwar Shah Road,
Kolkatta - 700 033
Tel : + 91 33 2417 1078
Email : info@pck-buderus.com

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C/o. NTTF
23/24, Peenya Industrial Area,
II Phase, Bangalore - 560 058.
Tel.: 080-28397196 • Fax : 080-64509966
Email: tagma.bangalore@tagmaindia.org
Contact: Mr. Ashok Shetty - Secretary
Cell.: +91 98453 97780

CENTRAL OFFICE

A-33, NandJyot Indl. Estate,
Safed Pool, Mumbai - 400 072.
Tel.: 022-28526876 / 28508976
Cell.: +91 96534 27396 / 97694 07809
Email: tagma.mumbai@tagmaindia.org

PUNE OFFICE

Plot A-22/2, Chakan Industrial Area,
Phase II, M.I.D.C, Village Khalumbre 410501
Tal. Khed, Dist. Pune.
Cell.: +91-95276 89700
Email: tagma.pune@tagmaindia.org

COIMBATORE CHAPTER

C/o. S & T Engineers (P) Ltd.
22, Vasanth Nagar, Trichy Road,
Singanallur, Coimbatore - 641 005.
Tel.: 0422-2590810 • Fax : 0422-2573629
Email: tagma.coimbatore@tagmaindia.org

PRESIDENT

Mr. D. M. Sheregar
Devu Tools Pvt. Ltd., Mumbai – 400 072
Email: president@tagmaindia.org; sheregar@devutools.com

VICE PRESIDENT

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S & T Engineers (P) Ltd., Coimbatore – 641 005
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MEMBERS

Mr. Akshay Kalyanpur
Sridevi Tool Engineers Pvt. Ltd., Vasai – 401 208
Email: akshay@sridevitools.com

Mr. Amit Kumar Parashar
Subros Tool Engineering Center (STEC), Noida – 201 301
Email: aparashar@subros.com

Mr. D. Ravi
Classic Moulds & Dies, Chennai – 600 058
Email: ravi@classicmoulds.com

Mr. Gopalakrishnan T. S.
Multiple Special Steel Pvt. Ltd., Bangalore – 560 099
Email: gopalakrishnants@gmail.com

Mr. Paresh Panchal
Cam Tools, Mumbai – 400 072
Email: paresh@digitaltoolroom.com

Mr. Parveen Satija
Stitch Overseas Pvt. Ltd., Gurgaon – 122 004
Email: parveen@stitchtools.com

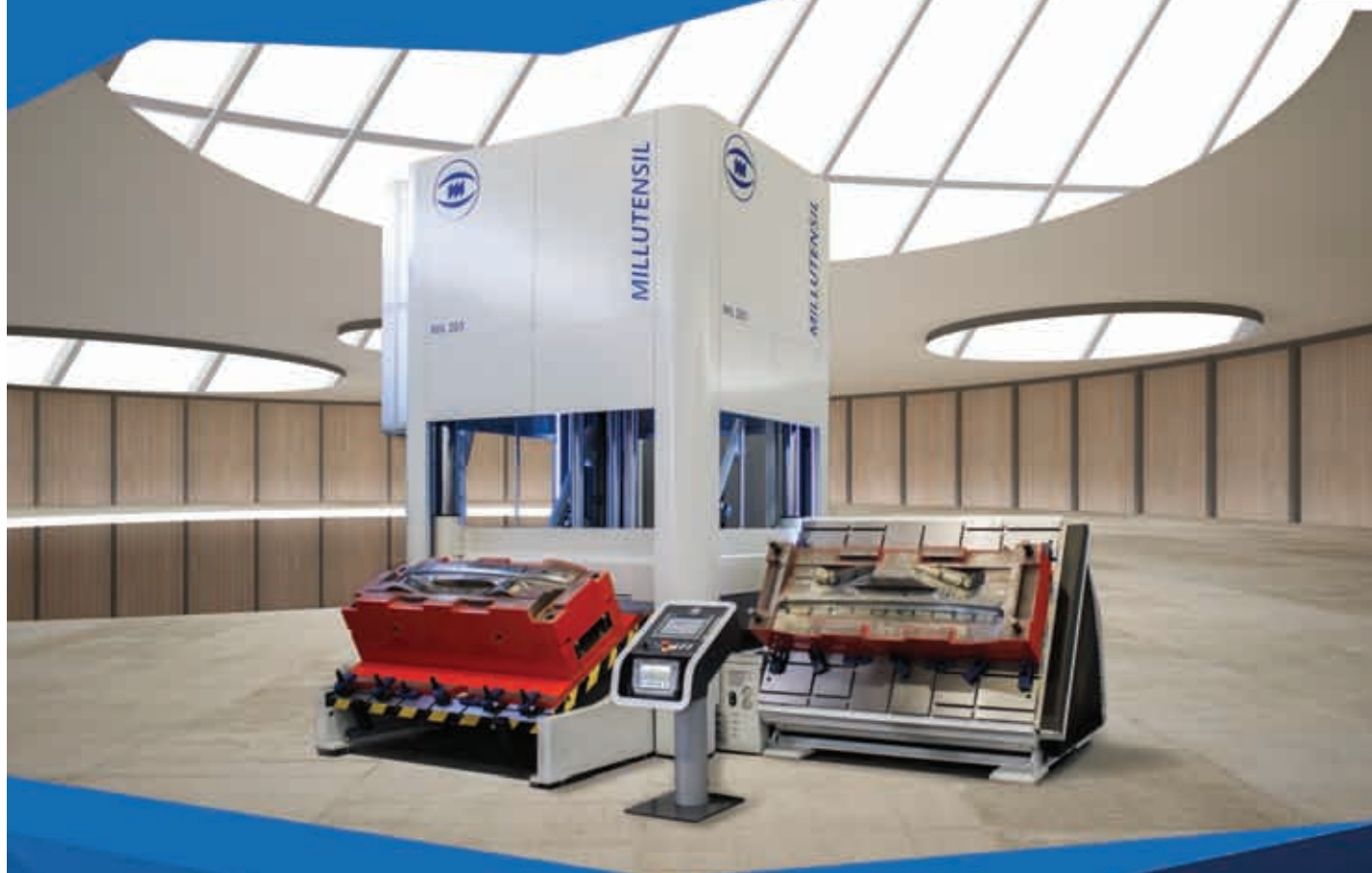
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Let's talk digital

Imagine you are holidaying, sitting on a pristine beach in the Bahamas and your shop floor is functioning smoothly. You are able to control production, manage inventory, order raw materials, organise dispatch, and take care of all such important requirements using your mobile phone. Sounds unreal? What if I told you it could be real?

With the advent of technologies like 5G, AI, ML, Cloud, Digital Twin, and Metaverse, we are entering into an era of digital manufacturing that is more efficient, accurate, cost-effective, and sustainable. Thanks to these technologies, you can not only predict the outcome and prevent any possible breakdown, but with the help of Digital Twin, you can create a virtual replica of something in the physical world. Digital Twins can be anything from a small individual component of a product to a massive warehouse. They can be used for planning, testing, and building strategic products and training, thereby removing the risk of costly mistakes and shortening product lifecycles.

But, the important questions we need to introspect on are: 'Are we ready for such advancements?' 'Do we have enough information?' 'How much will it cost to implement such technologies in small shop floors?' 'Is it viable for Indian shop floors, where many companies lack basic automation in their facility?'

While we don't know the answers to these questions yet, one thing is clear, we have to gradually migrate to digital manufacturing in the near future. Therefore, it's wise to start gathering information and equipping ourselves with the necessary skills as soon as possible.

To help you make an informed choice, we have carefully crafted this edition of TAGMA Times. Our 'In Focus' section has interesting information on 5G, Metaverse and Industry 4.0. It covers aspects like the benefits of adopting these technologies and how these could be applied to the manufacturing industry.

We hope you love reading this issue as we enjoyed putting it together for you, dear readers.

Happy Reading!

Nishant Kashyap
Editor
nishant@antechmedia.in

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TAGMA announces 6th International Tooling Summit

ORGANISED by the Tool & Gauge Manufacturers Association of India (TAGMA India), the leading conference for the die and mould industry, International Tooling Summit (ITS), is scheduled to take place during September 21-22, 2022, at The Leela Ambience, Gurugram. The two-day conference will provide you with an elite platform to network with domain experts, gain an in-depth understanding of the latest technologies, identify market trends, and acquire competitive knowledge of leading market players.

As per reports, by the end of this decade, India will be among the top three economies with the youngest working population. The emergence of many sectors in India and government initiatives such as PLI Schemes will further help the Indian tooling industry. Keeping these developments and opportunities in mind, this year's ITS will revolve around opportunities, growth prospects, latest technology developments, policy framework, diversification, and challenges. The theme for the event will be 'Indian Tooling Industry: Poised for Growth'.

Mr. D. M. Sheregar, President, TAGMA India, said, "After the pandemic, the industry has bounced back faster. We, as toolmakers, see good opportunities in front of us. At ITS, we will invite speakers and delegates from various industries such as



File Photo

automotive, aerospace & defence, consumer durables, home appliances, white goods, and packaging, among others, to learn about their expectations and showcase our capabilities."

The two-day event will feature four panel discussions, and over 15 technical sessions and will be attended by more than 400 delegates from various industries.

The five editions held in Mumbai in 2016, in New Delhi in 2017, in Chennai in 2018, in Pune in 2019, and virtually held in 2020 were a massive success with quality participation



File Photo



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from the national and international tooling fraternity. The International Tooling Summit proved to be the perfect platform for international and national business leaders to get together and share their opinions with industry delegates present from all around the world.

HIGHLIGHTS

BÖHLER M268
VMR**BÖHLER M310**
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ISOPLAST**BÖHLER M380**
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As an innovation leader in the development and production of tool steels we have made sustainable production processes and responsible use of resources an inherent part of our corporate philosophy for decades. With over 150 years of experience, we are able to provide material solutions of the highest quality for any application. One example is BÖHLER M333 ISOPLAST, an plastic mold steel with excellent corrosion resistance, improved thermal conductivity, exceptional toughness, and optimal mirror-finish polishing characteristics for high-tech products that require the highest quality surface finish.



DesignTech Systems organised a technical webinar

DESIGNTECH Systems in association with TAGMA organised a technical webinar on “Learn about all the latest features that Creo 9 has to offer”. Creo 9 is a 3D CAD Software that digitally creates 2D drawings and 3D models of real-world products—before they’re manufactured. With 3D CAD, you can share, review, simulate, and modify designs easily, opening doors to innovative and differentiated products that get to market fast.

The webinar was scheduled on June 28, 2022. It received an overwhelming response and was attended by many industry professionals in the tooling industry. The session highlighted the new features of Creo 9 such as tools for ergonomics, Model-Based Definition (MBD), simulation, generative design, and additive/subtractive manufacturing.



TAGMA launches Tooling Academy to help the industry with skill development

EXPERTS believe that if India wants to become a hub for mould making, reduce mould imports and serve global customers, the Indian toolmakers must work on skill development. Keeping the same in mind, the Tool & Gauge Manufacturers Association, India has launched Tooling Academy to help Indian toolmakers with skill development.

“The world is moving fast and the expectation from the user industry regarding, efficiency and quality and is constantly becoming more stringent. In such a scenario, having the right infrastructure is not the only solution, we must have the right skill set on the shop floor, design, and quality department as well. Tooling Academy is an initiative towards that,” said D Shanmugasundaram, Vice President, TAGMA India.

For Tooling Academy, TAGMA partners with subject experts in a specific field related to the tooling industry and conducts virtual training. The first session on the topic “Press Tools-Basics, Types, Design Considerations” was

highly successful. The objective of this session was to understand various types of sheet metal processes, types of press tools, and understand the various elements of a press tool. The session was attended by 32 participants.

The trainer for the session was Mr Joseph Abraham, who has over 38 years of experience in Tool Designing & Manufacturing, Plastic

injection Moulding, Training, Quality Management and Product Design & Development. He worked as a Vice-Principal with NTTF. He has worked as a Tool Room Manager with several organizations such as Balda Solutions, Malaysia, BPL Tool room, Bangalore and Tool Product, Singapore. He currently provides training and tooling consultancy to several small-scale industries.





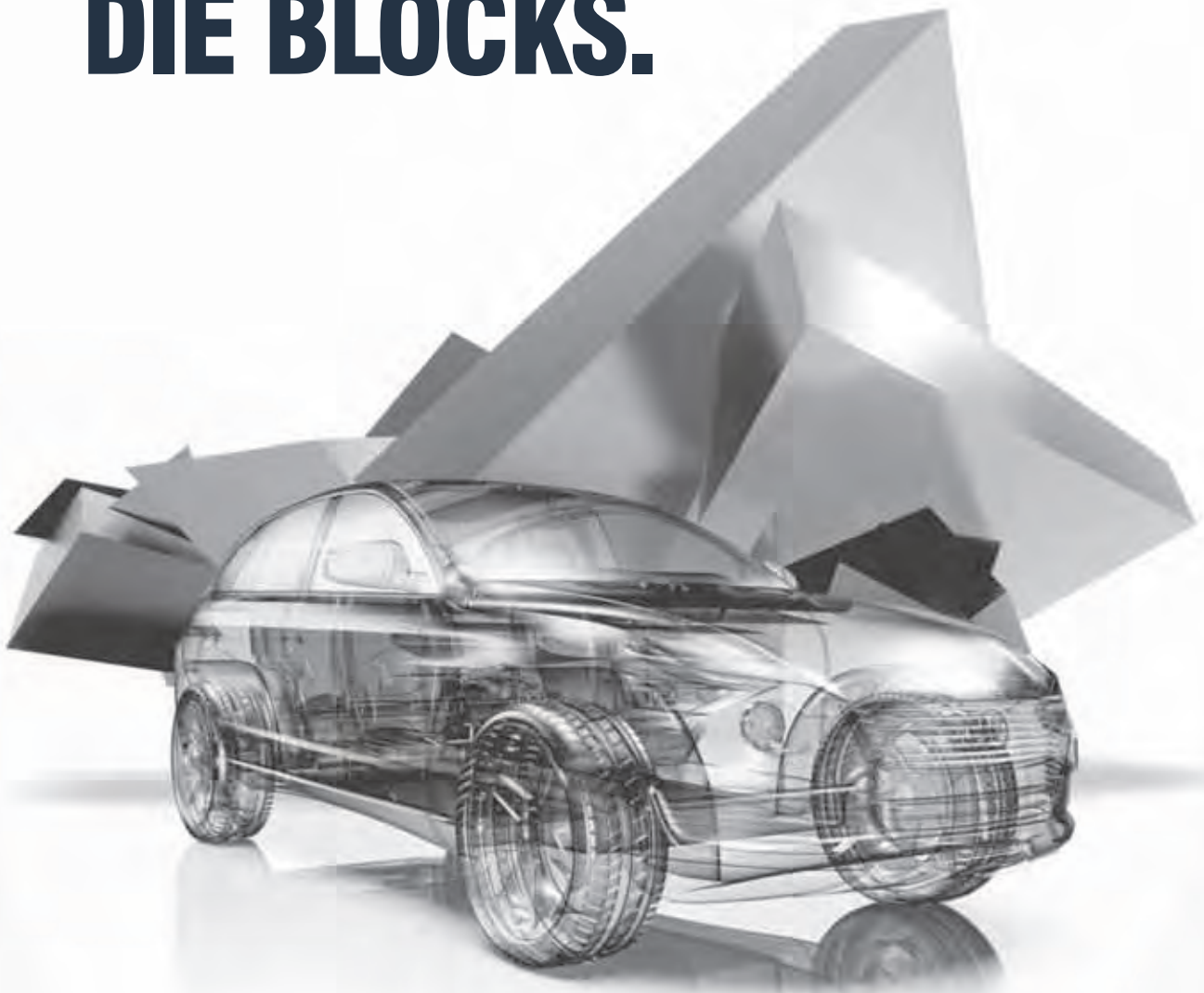
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India's Tata Group readying plan for battery company in India, abroad

INDIA'S tech-to-autos Tata Group is drawing up plans to launch a battery company in India and abroad, its chairman N. Chandrasekaran recently said, as Tata deepens its push to build electric vehicles. The group is making a transition towards sustainability across businesses, which includes a clean mobility push at Tata Motors and its British luxury unit Jaguar Land Rover, Chandrasekaran said at an industry event.

To meet stringent climate goals, automakers globally are pursuing zero-emission strategies by also investing in batteries and their raw material supply



chain. Tata Motors, India's biggest electric carmaker, has plans to launch 10 electric models by 2025, whereas Jaguar Land Rover's luxury Jaguar brand will be entirely electric by 2025 and the

carmaker will launch e-models of its entire lineup by 2030.

"Pressure on making the climate transition is only going to increase... deadlines will only get advanced going forward," he said, adding that the Tata group will soon announce its goal towards becoming carbon neutral. The battery "blueprint" is part of a broader plan to be "future ready" by investing in renewable energy, hydrogen, storage solutions and the circular economy, he said.

Courtesy Reuters

Webasto broadens footprint in Asia



TO meet the growing demand for roof and battery systems for cars in Asia-Pacific, Webasto has expanded its capacities in the region in recent months. "South Korea, India and Japan are dynamic growth markets with great potential for both our core business and our electromobility solutions. As a basic principle, we produce in the market for the market, so given the need for our products in these countries, it quickly became clear that we would strengthen our local presence. Broadening our footprint

in Asia beyond China, our largest single market to date, is a strategically important decision for the future of Webasto," explains Dr. Holger Engelmann, Chairman of the Management Board of Webasto SE.

In total, the global systems partner to the automotive industry is investing more than 130 million euros at Asian locations. In Pune, Webasto built a larger local production site for roof systems as the original buildings had become too small. In recent years, the sunroof has become

a very popular vehicle equipment feature in India, and demand is steadily growing. International car manufacturers with Indian subsidiaries as well as local OEMs are increasingly looking for partners to produce openable roof systems within the country. Webasto has been in the Indian market for around ten years and has so far supplied smaller volumes of roofs from its former site in Pune and from a plant in South Korea to India.

After receiving several large-volume orders, the

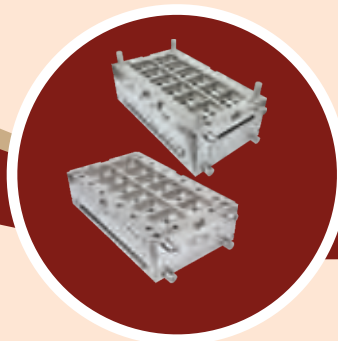
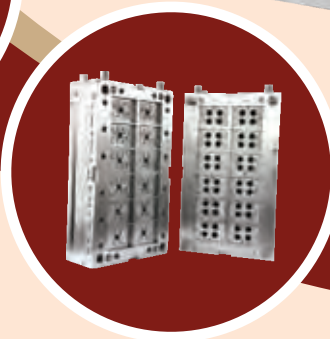
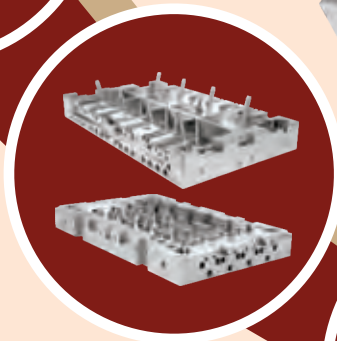
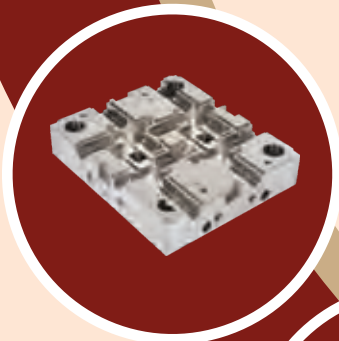
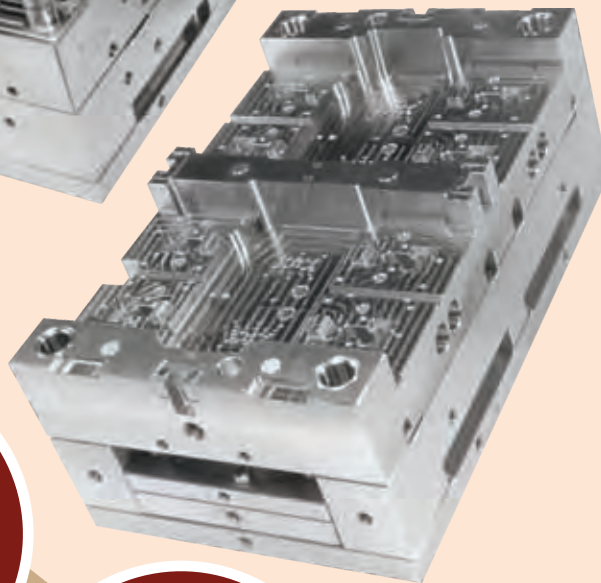
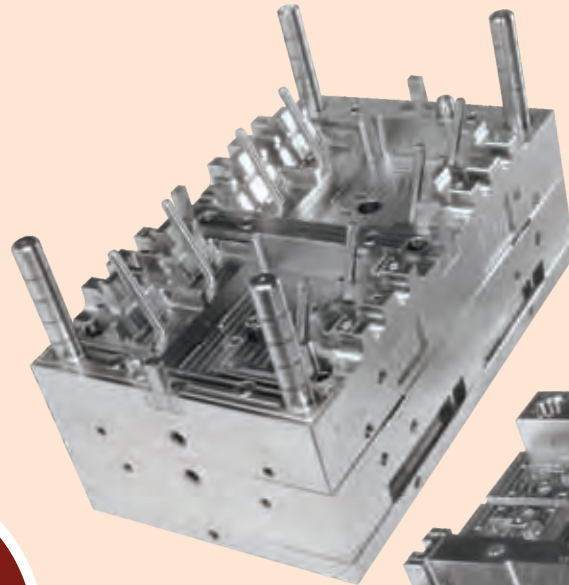
company decided to build a new, significantly larger plant ten kilometers from its previous location. The groundbreaking ceremony for the 18,000-square-meter site in Phulgaon (Pune) took place in early January 2021. In addition to a production capacity for 400,000 roofs per year, the building also houses a validation area. Here, the quality and functionality of roof systems are tested under extreme climatic conditions, among other things.

Due to the high demand, a second plant for the production of roof systems for the Indian market is already being planned near the coast in the southwest of the country. In order to be able to adapt its products even better to the future market requirements in the region, Webasto has also set up a development team in Pune in recent months. In total, Webasto is investing around 40 million euros in India by 2025.

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Okinawa Autotech to invest INR 500 crore for manufacturing plant in Rajasthan

ELECTRIC two-wheeler maker Okinawa Autotech recently said it will invest INR 500 crore to set up a new manufacturing plant at Karoli in Rajasthan. Spread across 30 acres of land, the factory will have an annual production capacity of 10 lakh units and will be fully operational from October 2023, Okinawa Autotech said in a statement. The plant will employ more than 5,000 people. This will be the third plant of the company apart from the two manufacturing facilities at Alwar in Rajasthan, it added.

“As the market leader in the electric two-wheeler segment, we are



committed to addressing the most significant issues faced by the sector. The R&D facilities planned in the mega factory will be futuristic to ensure we meet the sector’s demand ahead,” Okinawa Autotech founder and MD Jeetender Sharma said.

The factory will not only concentrate on the manufacturing of vehicles, but it will also have a supplier park that will take into account motors, controllers, battery packs and other electrical parts

meant to support the complete EV ecosystem, he added.

This plant will have an in-house automatic robotic battery manufacturing unit along with a motor and controller plant, the company said, adding there would also be robotic automation of plastic body parts moulding and a state-of-the-art paint shop to facilitate the localisation in the production process. Okinawa said the manufacturing of the entire range of scooters and motorcycles under its current joint venture with Tacita, meant for domestic as well as international markets, will be done at the new plant.

Indigenously-developed Laser-Guided ATGM successfully tested by DRDO & Indian Army

INDIGENOUSLY-developed Laser-Guided Anti-Tank Guided Missile (ATGM) was successfully test-fired from Main Battle Tank (MBT) Arjun by Defence Research and Development Organisation (DRDO) and Indian Army at KK Ranges with support of Armoured Corps Centre & School (ACC&S) Ahmednagar. In the test, the ATGM hit the bull’s eye with textbook precision and successfully defeated the target at minimum ranges. Telemetry systems recorded the satisfactory flight performance of the missile.

The all-indigenous ATGM employs a tandem High Explosive Anti-Tank (HEAT) warhead to defeat Explosive Reactive Armour (ERA) protected armoured vehicles. The ATGM has been developed with multi-platform launch capability and is currently undergoing technical evaluation trials from 120 mm rifled gun of MBT Arjun.

Engaging the targets at lower ranges is a challenge due to the dimensional constraints of tank launched ATGMs, which has been successfully



accomplished by the ATGM for MBT Arjun. With the trial, the ATGM’s capability to engage targets from minimum to maximum range has been established. Earlier the trials have been successful for maximum range.

Raksha Mantri Shri Rajnath Singh has congratulated DRDO and Indian Army for the successful trial of the Laser Guided ATGM and said that development of this system is an

important step towards realising Prime Minister Shri Narendra Modi’s vision of ‘Aatmanirbhar Bharat’.

Secretary, Department of Defence R&D and Chairman DRDO Dr. G. Satheesh Reddy congratulated the teams involved in design, development and trial of the system. He stated that successful development of laser guided ATGM will enhance the fire power of the MBT Arjun.

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- ❖ Two inlet and outlet enables descaling in two circuits, simultaneously
- ❖ Digital Flowmeter to record the flow rate of fluid before and after descaling
- ❖ Timer controlled operations – safe to use, prevent excessive contact of chemicals with cooling channels
- ❖ Descaling & Flushing system with an extremely powerful pump to flush out the stubborn Scale / Rust / Deposits formed on Cooling Channels
- ❖ Auto cut-off heater maintains optimum temperature for best results – enhance the performance of chemicals
- ❖ Tank, pump and fittings made of non-corrosive PP material – no effect of descaling chemicals on machine



Ultrasonic Cleaning System



Polishing Machines & Air tools



Polishing Consumables



Standard Mould Parts



Descaling and Flushing System



e-CAMGUARD- Mould/Die Protection System

Hypertherm announces release of ProNest 2023 CAD/CAM nesting software

HYPERTHERM, a U.S. based manufacturer of industrial cutting systems and software, recently announced a major version update to ProNest® 2023, its advanced CAD/CAM nesting software for automated cutting. This new release contains a collection of new features and on-going enhancements designed to help customers improve their operational efficiency while reducing non-value-added tasks.

ProNest 2023 includes full functionality for PlateSaver™, a SureCut™ technology that combines the arc stability of X-Definition® plasma with specialized software parameters to dramatically increase material utilization when cutting mild steel. In addition, it contains enhancements to ProNest's Production Manager, a web-based module that seamlessly integrates with Hypertherm's EDGE Connect® CNC to automatically capture real-time machine data. Enhancements include the ability to edit production times for completed

nests, set job status changes, and search for nests by customer. There is also a feature that merges XPR setups. The software will now automatically detect and merge changes made to the process parameters or bevel spreadsheets



into a new setup during installation. Customers can choose to use their existing customizations or the latest factory cut charts.

Finally, the software is even easier to use. Changes to the user interface include a new welcome screen and customizable ribbon. The welcome screen contains an informative dashboard that highlights

training videos, application tips, and other valuable resources while the ribbon allows users to add, remove and rearrange tabs. Customers can save different ribbon configurations and easily switch between them as needed, to best fit their workflow.

“Our software developers have really focused on reducing the waste inherent in most cutting operations. Features like PlateSaver do this by maximizing the number of parts on a plate so customers have to buy fewer plates and waste less metal,” said Tom Stillwell, Product Marketing Manager for Hypertherm CAD/CAM software products. “At the same time, the internet of things has allowed us to make great strides in manufacturing automation. Data that we’ve never had before is now easily at our fingertips. Tools like our Production Manager module will help customers look at their operations more holistically, providing insight to help them work smarter, faster, and more profitably.”

Cut longer with Kennametal's KCK20B™ and KCKP10™ indexable milling grades

NEW grades offer higher wear resistance and longer tool life, increasing productivity in cast iron and compacted graphite cast iron machining.

Kennametal has introduced the KCK20B and KCKP10 indexable milling grades for higher wear resistance and up to 30% longer tool life when machining cast iron and compacted graphite iron components. Both grades offer higher productivity and consistent, repeatable performance during roughing, semi-finishing, and finishing operations.

“The new grades feature High-Power Impulse Magnetron Sputtering (High-PIMS) technology that provides a smoother insert surface and optimal layer adhesion for less flank wear – one of the leading causes of insert

failure,” says Gil Getz, Product Manager, Kennametal. He notes that the new coating technology also increases cutting-edge strength. “The result is



high-performance milling in a broad range of cast iron alloys, including grey cast iron, ductile cast iron, and compacted graphite cast iron.”

KCK20B and KCKP10 are suitable for wet or dry cuts. These include rotor hubs

used in windmills, pump housings, steering knuckles and gear housings for heavy equipment, and automotive components like crankshafts and cylinder heads. While KCK20B delivers higher productivity in roughing and semi-finishing operations, KCKP10 is applicable for finishing operations, but also works exceptionally well when profiling and copy milling cast iron and steels up to 45HRC.

“For customers where high tooling cost and downtime associated with tool changes are especially important, KCK20B and KCKP10 grades promise to increase tool life tremendously,” says Getz. “And for those who wish to increase throughput, the new grades deliver there as well. Either way, it is a win-win for any shop machining cast iron.”



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The new MACH line for supersonic threading

VARGUS Ltd., the worldwide leader in threading, is pleased to announce the global launch of MACH – Supersonic Threading. Developed for unparalleled threading productivity, the MACH Line is the new industry game changer. With more than two years of research and development, the VARGUS team has completely redefined the way threading is produced.

The MACH Line offers its new innovative tools for both Thread Milling (MACH TM) and Thread Turning (MACH TT) applications. The revolutionary MACH tools, which work twice as fast as standard tools, are now available to provide maximized productivity and higher profitability with significant machining cost savings.



MACH TT – More Than 2 Times Faster – Fewer Passes for Machining

MACH TT tools, with numerous features, including an improved rake and reinforced geometry, provide high resistance with a considerably reduced number of passes. The new dovetail clamping system is super rigid and is designed for machining heavy loads. The brand new VK8 grade – with a unique AlTiN + TiN PVD coating – along with an improved

profile design, guarantees a superior threading surface finish for general purpose applications. With MACH TT tools, productivity is maximized, machining time is decreased, and tool life is greatly increased!

MACH TM – More Than 2 Times Faster – Additional Flutes for High Feed

The proven advantage of the MACH TM tools is its high feed rate per flute, which dramatically decreases machining time and boosts both competence and productivity. MACH TM tools feature improved cutting edges, advanced surface treatment and reinforced geometry for high loads. The tools are designed with coolant-thru, critical for better chip flow and superior surface finish. The large core diameter allows for increased stability and the optimal flute length enables considerably higher rigidity and efficient chip evacuation. The new and innovative VH4 grade with TiCN PVD coating is excellent for machining general applications with high wear resistance. Maximize efficiency and production due to the extremely significant feed rate, which dramatically decreases machining time and increases tool life by 50% more than standard tools!

For a quick start: MTB application kits

COBOTS are the perfect helpers. They can be used very easily and are mobile for machine loading and unloading in the production hall. They insert raw parts and remove the finished products. In doing so, they relieve employees of monotonous and stressful tasks and create time for the employees to do other ones. But how do you get started with automated applications? It is easy with the new MTB application kits from SCHUNK. The automation specialist developed three kits specifically for this purpose.

Gripping and clamping from a single source

Depending on the space and task at hand, application kits are available with either

single or double grippers. Each includes one or two universal JGP-P grippers with a blow-off nozzle and sealed valve box. SCHUNK launched the high-performance 2-finger parallel gripper at the end of last year. The “double gripper kit” ensures

maximum productivity, as the two grippers can load and unload the machine in one operation, resulting in a time saving of almost 50%. Commissioning is particularly fast and easy. SCHUNK offers a third application kit for

automated stationary workpiece clamping for this purpose: The power vise and gripper are combined in one kit and it comes from a single source. It includes the compact and low-maintenance PGS3 clamping force block with valve terminal. It can be mounted on the machine table via an integrated flange. Both, gripper and clamping force block can be easily integrated into the robot control system.



The new SCHUNK MTB application kits are convenient and facilitate the start into partial automation of machine tools with cobots. Photo: SCHUNK

Due to the sealed valve box, the convenient product kits are ideally suited for use in the harsh environment of a cutting machine. The gripper kit includes an integrated blow-off nozzle and additionally relieves the operator from stressful tasks.

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5G is set to usher in a new era in manufacturing. It will not only make operations faster and more efficient, but will also ensure that the manufacturing process is more transparent and smooth. Like any new technology, adopting 5G will bring along with it many challenges. The question that you need to ask yourself is:

Are you ready to make the biG switch?



Image used for representation only. Courtesy Envato Elements.

Kimberley D'Mello

In Focus: 5G

As the effects of the pandemic slowly fade away and Industry 4.0 gradually reboots systems and operations, the manufacturing sector is gearing up for an upgrade. Digitization, advancement of manufacturing processes and the surrounding ecosystem to create more flexible, efficient and sustainable production lines are some of the aspects that are set to define manufacturing. 5G IoT will be a key enabler here, as it will not only offer manufacturers and their supply chain partners enhanced visibility over their whole ecosystem, but also set the foundation for technologies including Artificial Intelligence (AI) and machine vision.

Does adopting 5G make sense?

To answer this question, we first need to understand what the current manufacturing scenario looks like. Currently, even as the manufacturing industry gears up to adopt advanced technologies, it faces challenges in terms of the connectivity levels, latency and bandwidth needed for these technologies to work efficiently. Ensuring connectivity of multiple machines, sensors, devices and networks poses quite a challenge on the shop floor, which make it difficult to ensure real-time data availability and data collection. As technologies continue to advance, devices and sensors are not far behind and so, manufacturers need to be able to switch over to more efficient and reliable networks.

Role of 5G post-COVID

The pandemic has made manufacturers realise that automation, smarter technologies, and stronger supply chains are critical in order to thrive. The advantages that 5G will offer in terms of automating the shop floor and enhancing services related to the production process will make it a must-have. "Companies can focus on several key advantages to get the most out of 5G investments and transformative technologies in a challenging economy, these include greater automation, increased M&A activity and smarter supply chains. The advent of 5G has ushered in many more options for businesses that want to automate their operations, boost productivity and increase agility," elaborated PwC on its website.

What are its benefits?

5G will offer manufacturers and telecom operators the opportunity to build smart factories and help them better reap the benefits of technologies such as AI, Augmented Reality (AR), automation, and the Internet of Things (IoT). A recently published whitepaper by L&T Infotech (LTI) titled: '5G: High-Speed Connectivity Enables Emerging Dimensions

in Manufacturing' highlights the following benefits of adopting 5G:

▶▶ Increased data flow

Organizations depend highly on data to improve their manufacturing process and to boost their operational & business intelligence. With the use of various devices, a vast amount of data is generated daily. This collection of data can be transmitted and analyzed faster with 5G's low latency and high bandwidth.

▶▶ Increased machine availability

With the increased data flow, sensors with 5G connectivity can monitor and give the information of equipment performance in real-time. This information combined with technologies such as Machine Learning or predictive analytics, helps in proactively identifying the likelihood of any failure, thus preventing the equipment stoppage and downtime.

▶▶ Unified supply chain

With the integration of smart devices, 5G enables the supply chain to transform from separately managed functions to a connected network of devices that share data in real time. It also enables quick communication between devices and functions and hence, unifies the entire chain.

▶▶ Increased automation

Automation requires massive wireless sensor networks and connectivity. Robotic systems to perform the tasks or to inspect the products in real-time with high accuracy require low latency and high reliability to communicate faster with backend systems. All this is now possible with the capabilities offered by 5G.

▶▶ Enhanced mobility

5G provides support to the increased mobility on shop floor and it is more important as automation



Image used for representation only. Courtesy Envato Elements.

is increasingly prevalent. For example, 5G enables manufacturing companies to design and deploy robots: AGVs and Autonomous mobile robots (AMRs). These intelligent devices are extremely flexible and are not fixed to one particular location. With this increased mobility and wireless communication, 5G provides the support with security, real-time communication and monitoring with high data rates.

▶ **Asset tracking and management**

5G provides high precision location information, which helps in effective asset management with real-time tracking of machines, tools and even workforce.

Companies going the 5G way

5G is set to boost the connectivity experience for manufacturers. Let's take a look at a few companies that are using 5G to offer that revolutionary experience:

▶ **Airtel deploys India's first private 5G network at BOSCH facility**

In July 2022, communications solutions provider Bharti Airtel announced through a press release the successful trial of India's first 5G Private Network at Bosch Automotive Electronics India Pvt. Ltd. (RBAI) facility in Bengaluru. According to the press release, "Airtel has implemented two industrial grade use cases for quality improvement and operational efficiency at Bosch's state-of-the-art manufacturing facility, utilising the trial spectrum. In both the cases, 5G technology such as mobile broadband and ultra-reliable low latency communications drove automated operations ensuring faster scale up and reduced downtimes."

▶ **KUKA relies on 5G for product development and system planning**

KUKA has established the 5G campus network at its Augsburg site. The automation specialist is incorporating the new wireless technology into product development and system planning, stated a press release issued in June this year. According to the German Federal Network Agency, more than 200 frequencies have been allocated for local 5G networks by spring 2022. The Augsburg-based robot and systems manufacturer has also secured the use of certain frequency ranges. "This will enable KUKA to work on products and solutions in the coming years that exploit the potential of fast, reliable and secure 5G connectivity," says Michael Wagner, Head of Control Technology in KUKA's robotics division.

▶ **Volkswagen's tests 5G for production**

Last year, Volkswagen took a further step in the direction of fully networked factories, the company said in a press release. "A local 5G standalone network ("campus network") is now available at its main plant in Wolfsburg that initially covers the main production development center and the pilot hall. The pilot project will test whether the 5G technology meets the demanding requirements of vehicle production with a view to developing this for industrial series production in the future. A dedicated 5G radio frequency will be used to safeguard secure, delay-free transmission of data. The Transparent Factory in Dresden has also put a so-called "5G island" into operation," the press release stated.

Did you know?

In an industry-first effort, Suzuki Motor Corporation, Japan (SMC), Maruti Suzuki India Limited (MSIL), and IIT Hyderabad (IITH) have teamed up to research India-specific vehicle usage scenarios based on futuristic V2X (Vehicle-to-Everything) communication technology. V2X communications technology, when used in conjunction with appropriate infrastructure, traffic rules and driver education, can help reduce traffic incidents and road congestion.

Source: IIT Hyderabad

Good news for MSMEs

The Department of Telecommunications (DoT) has approved a grant of INR 50 crore to 43 start-ups and MSMEs to indigenously develop 5G equipment and technologies. The ministry of communications recently tweeted: "the grant given to the 43 startups and MSMEs will be for development of telecom technologies like 5G core, RAN, NMS, IMS, chipsets, devices, ICT solutions and applications enhancing deep tech, to create competencies in domestic entities and preparing India for roll out of 5G services."

As the manufacturing sector advances on its digital transformation journey, it requires the highly robust and reliable network that 5G can offer. 5G will help the sector benefit in terms of enhanced productivity, improved performance and increased safety, among other benefits. It's time for MSMEs to explore newer opportunities, test out emerging technologies, get equipped with the required infrastructure and skill the workforce, if they are looking to smoothly transition into future. 🌈

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How the Metaverse is set to impact the manufacturing industry?

The Metaverse is attracting social media companies and Silicon Valley figureheads. Rest assured, it is not something you have to worry about. This article talks about what exactly is the Metaverse and what opportunities will its popularity among tech companies and consumers translate into for manufacturing companies.

Nishant Kashyap



Image Courtesy Envato Elements

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Manufacturing, a highly complicated process, is the most important part of supply chain management. Several components, including the availability of raw materials, inventory and labour costs, and overall marketplace demand, among others, affect the manufacturing production process.

Since the beginning of the Industrial Revolution, the effective marriage of machines and systems has allowed us to accelerate production times, reduce product expenses, and find new ways to organise work. In the last 50 years, digital transformation has continued this trend, enabling us to understand the physical through digital operations better.

Manufacturing has a comprehensive concept of a “digital twin” of physical facilities and their machinery. The consumer-oriented approach of this concept has been

rebranded with the “Metaverse” and is attracting social media companies and Silicon Valley figureheads.

Rest assured, the Metaverse is not something you have to worry about. This article will explain what exactly is the Metaverse and what opportunities will its popularity among tech companies and consumers translate into for manufacturing companies.

What is the Metaverse?

Ernest Cline’s novel ‘Ready Player One’ gives an apt conceptualization of the Metaverse, where any individual can easily create and participate in virtual experiences. A near-future world struggles with an energy crisis and global warming in the novel. So the novel’s version of the Metaverse, called the OASIS, provides virtual games, economy, and experiences. In many ways, the Metaverse performs as its unique society. The Metaverse can be described as “Internet+”, including Internet+Web3, Internet+ VR/AR, or any kind of function built on the Internet.

The six characteristics that define Metaverse are:

- ▶▶ Fully functioning economy
- ▶▶ Persistence/synchrony
- ▶▶ Interoperability of digital assets, information, etc.
- ▶▶ User-generated content
- ▶▶ Unlimited concurrent users
- ▶▶ Spanning open/closed platforms, private/public networks, etc.

In spite of the existence of digital twins in the industry, the Metaverse will be capable of taking the simulation environment to a complete new level.

How manufacturing is done today?

Manufacturing is a challenging process and is probably the most critical step in supply chain management.

In Focus: Metaverse

Different manufacturing tactics in today's market optimise other objectives. These strategies usually consider labour costs, inventory control, overhead customisation, and production speed. Here are the top three production strategies:

- **Make-to-stock:** Optimise based on demand forecasts (utilising different signals such as market size, seasonality, etc.).
- **Make-to-order:** Custom-build products to specifications (generally utilised for heavy machinery).
- **Make-to-assemble:** A hybrid model of the first two strategies that allow some components to be customisable based on customer demand.

How the manufacturing industry can leverage the Metaverse?

A Metaverse-driven approach to manufacturing is similar to companies like Shopify, Amazon, eBay, etc., democratising e-commerce and facilitating relationships between suppliers and business owners. In terms of the Metaverse, you will have three key stakeholders in the manufacturing process:

- **Design companies/owners:** Individuals or organisations will use simulation and CAD-like software to design factory layouts and design elements to be manufactured.
- **Third-party manufacturers and logistics providers:** Individuals or companies in the supply chain ecosystem will set up manufacturing centers and produce numerous commodities with less friction and shorter lead times.
- **Customers:** These users will ultimately see the delivery time for products.

Additionally, there are key elements of a service-based Metaverse that will change the manufacturing landscape for all of these stakeholders. Here are some of the key highlights:

- **Rapid production process design**
BMW has already affected one of their manufacturing facilities to plan their production process more precisely. They can simulate real physics and find new ways their work can be made more efficient and safe without slowing their production to achieve the same results by physically testing all the changes one at a time. With better virtual spaces to replicate your facility's production process, you could quickly see how moving your assets around would impact production.

- **Easier collaboration on product development**
Inevitably there will be highly specialized tools for manufacturers to utilise, which will enable them to harness the power of the real-time 3D modeling tools to collaboratively prepare CAD files and make product recommendations to upstream suppliers. These advancements will additionally make it easier and faster to request modifications from upstream suppliers and for you to gain insight into how your customers are using your product.

- **Increase number of product designs**
As with any new technology with ease-of-access for user-generated content, there is an expectation of seeing more content within specific genres and business segments (similar to how YouTube handles content). In the case of the manufacturing industry, the barrier to entry for designing easy-to-build, low-cost products are typically lower with more specific measurements and advanced CAD-like software.

- **Reduced risk to quality control**
With more elaborated, physics-based designs, the margin of error for production is smaller. With regard to the impact on businesses, they will see lower churn rates for customers as well as lower return rates for defective products.

- **Transparent Supply Chain**
What if customers expect to track their order from raw materials to a well-finished product on their doorstep? If trends in supply chain transparency continue to gain popularity, this could be the future. Technology will enable insight into every piece of a customer's order, as it moves towards assembly, shipping, and finally, onto their doorstep. There are already solutions being developed that would enable such transparency.

Paving a new path

The Metaverse will pave a new way towards a digital-first approach in manufacturing. This will usually be driven by consumer preferences and different types of actions necessary to operate inside a virtual world.

There are important steps that manufacturers can take to bring us closer to an ideal Metaverse system. For starters, they must harvest data from their processes and implement the best interoperability protocols for connecting given data across the supply chain.

This is an extraordinarily exciting and innovative time for manufacturing technologies such as AI, blockchain, and cloud. Among these technologies further lies a spot for applying Metaverse fundamentals to disrupt manufacturing systems. 🌈

What are the advanced Industry 4.0 technologies?

Industry 4.0 is revolutionizing the way organizations manufacture, enhance and distribute their products. Manufacturers are integrating new technologies such as cloud computing and analytics, Internet of Things (IoT), AI and machine learning into their production units and throughout their operations. It has the key to accessing real-time outcomes and data that will catapult the industry into new levels of lean achievements.



The concept of Industry 4.0 is not a simple one. It envelops numerous technologies and is used in a variety of contexts. Known as the new phase in the Industrial Revolution, Industry 4.0 focuses mainly on interconnectivity, machine learning, automation, and real-time data. The aim is to focus solely on manufacturing and supply chain management.

Characterized as IIoT or smart manufacturing, Industry 4.0 marries physical production and operations with intelligent digital technology such as big data, and machine learning to create a more holistic and better-connected ecosystem for organizations.

Technologies that drive Industry 4.0

Big Data: According to Forbes, Big Data accumulates data from traditional and digital sources inside and

outside your organization, showing a source for ongoing process and analysis. Today, data is obtained everywhere, right from systems and sensors to mobile devices. The real challenge is that the industry is still evolving methods to interpret data best. The evolution of Industry 4.0 will change the way organizations and solutions work together; teams will make better, smarter decisions.

Internet of Things (IoT): The Internet of Things is an essential element of smart factories. On the factory floor, machines are well-equipped with sensors that have an IP address, enabling the machines to connect with other web-enabled devices. This mechanization and connectivity simply make it possible for large amounts of valuable data to be collected, analyzed, and exchanged.

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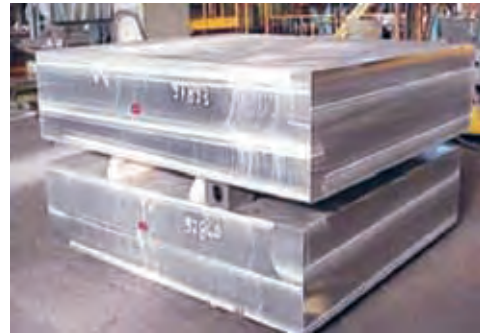
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Pune Office :

Warehouse & Machining Division:

Gat. No. 191, 192, 193, Alandi-Markal Road,
VaduKhurd, Tal. Haveli, Pune - 412216/INDIA
Tel. : 020 66783000/66783002 to 66783023
Fax : 020 6678 3001
E-mail : punewh@pck-buderus.com
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Ludhiana Stock Holding Center

C-I, Industrial Area C, Jaspal Main Road,
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Email : ludwh@pck-buderus.com

Kolkatta Office

Flat No. 403, Vishal Apartments,
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Pune Stock Holding Center Machining Division

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Alandi-markal Road, Vadu Khurd,
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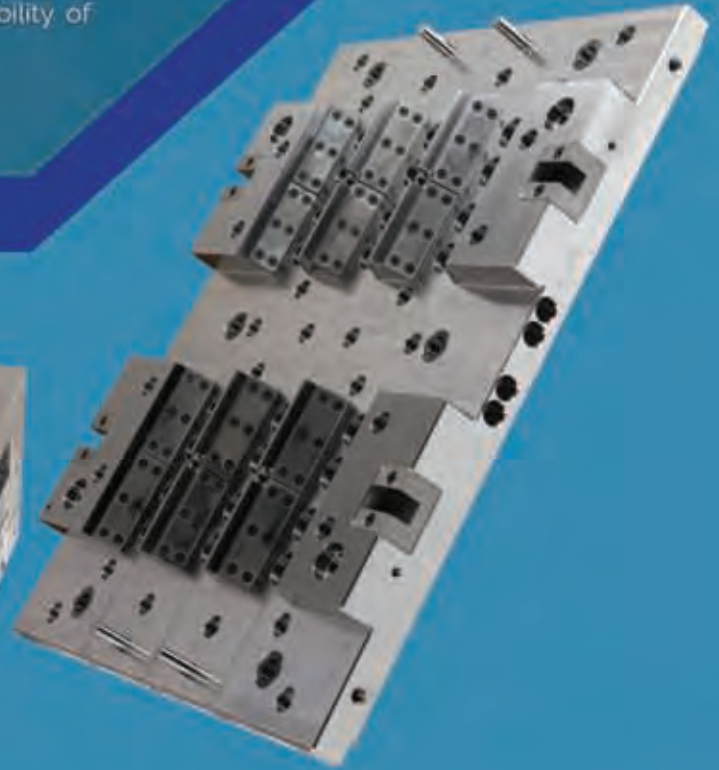
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AI and Machine Learning: Machine learning and AI enable manufacturing organizations to get the most out of the data generated on the factory floor and across their business units and from third-party sources and partners. AI and machine learning can furnish insights, predictability, visibility, and automation of business and operation processes (for example, when industrial machines could be subject to breaking down during the production process). Utilizing data obtained from these assets can assist businesses in performing predictive maintenance depending upon machine learning algorithms, following in optimal uptime and higher efficiency.

Digital Twin: The digital transformation powered by Industry 4.0 has permitted manufacturers to create digital twins that are virtual replicas of processes, factories, supply chains, and production lines. A digital twin is formed by pulling data from IoT sensors, PLCs, devices, and other objects connected to the Internet. Manufacturers can utilize digital twins to help boost productivity, design new products, and improve workflows. For instance, by simulating a production process, manufacturers can test changes to find ways to improve capacity or decrease downtime.

Smart Factory: The smart factory is the seamless connection of unique manufacturing steps, from planning to actuators. Soon, equipment and machinery will improve processes through self-optimization. Systems will autonomously adapt to the network environment and traffic profile. Autonomous Mobile Robots (AMRs) are integral to the Smart Factory. Their autonomous intelligence connects the factory, allowing seamless operations.

Cloud Computing: Cloud computing is known as the practice of using interconnected remote servers hosted on the Internet to store, manage, and process information. The typically large amount of data stored and analyzed can be processed more efficiently and cost-effectively with the cloud. Further, cloud computing can diminish start-up costs for small and medium-sized manufacturers, who can right-size their needs and scale as their business grows.

Cyber-physical Systems (CPS): Cyber-physical systems, also known as cyber manufacturing, refer to an Industry 4.0-enabled manufacturing environment that provides real-time data collection, transparency, and analysis across every aspect of a manufacturing operation.

Industry 4.0 outcomes

Regardless of whether it's Smart Industry, Industry 4.0, or the Industrial Internet, manufacturers have numerous benefits to transform the way they work. Some of the benefits include:

▶▶ **Enhanced productivity through optimization and automation**

All of the Industry 4.0 connectivity sensors, IoT, AI, etc. – services have one primary purpose of optimizing manufacturing processes. Automation enables manufacturers to work faster; predictive maintenance means less downtime for machines, data analytics empowers leadership to make data-driven decisions and increase efficiency. Monitoring systems offer real-time yield optimization across the operation.

At the point when manufacturers can get the most out of their production with sensor-monitored machines, everything while giving personalized attention and quick service to

Who is Industry 4.0 right for?

You should start analyzing Industry 4.0 technology and solution providers for allotting the resources needed for deployment if...

- ▶▶ You're in an exceptionally competitive industry with many tech-savvy players
- ▶▶ You're having a difficult time filling vacancies in your organization
- ▶▶ You need better visibility across your supply chain
- ▶▶ You want to recognize and address issues before they turn into bigger problems
- ▶▶ You're looking to increase profitability and efficiency across your entire organization
- ▶▶ You want your entire team to have up-to-date, informed, and relevant glimpses of production and essential business processes
- ▶▶ You want more profound and more timely analytics
- ▶▶ You want to digitize and make sense of information
- ▶▶ You want to increase customer satisfaction and CX
- ▶▶ You want to enhance product quality or keep product quality intact
- ▶▶ You require an integrated ERP system that spans inventory and planning and financials, customer relationships, supply chain management, and manufacturing performance
- ▶▶ You require a consistent and flexible view of production and business operations tailored to particular areas or users in your business
- ▶▶ You need real-time insights that help you make better, faster decisions about your business each day

In Focus: Industry 4.0

customers through AI and field service, they can actually recognize the benefit of the connected factory.

▶▶ Asset tracking and optimization

Industry 4.0 solutions encourage manufacturers to become more efficient with assets at each stage of the supply chain and keep a better pulse on quality, inventory, and optimization possibilities for logistics. With IoT in place at a factory, employees can get deeper visibility into their assets worldwide. Regular asset management tasks such as asset disposals, transfers, reclassifications, and adjustments can be streamlined and managed in real-time.

▶▶ Supply chain and inventory

Data analytics and IoT-enabled sensors give manufacturers deeper insight into the entire supply chain and production process. This visibility level, along with AI and machine learning capabilities, simply means that supply chain optimization can be achieved in real-time. Some call it Supply Chain 4.0. The application of the Internet of Things, advanced robotics, and advanced big data analytics in supply chain management: create networks everywhere,

automate anything, place sensors in everything, and analyze everything to enhance performance and customer satisfaction significantly.

After Sales Service

While this doesn't directly impact a manufacturer, they can significantly improve customer and field service offerings if they create goods capable of IoT connectivity.

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‘Technology adoption will define the growth of Indian toolmakers’

“For example, handling more complex products, which require more sophisticated dies and moulds to manufacture, and the technology that the toolmaker invests in to make such tools, will decide how toolmakers grow,” says **Shatyabrata Das, Sr GM – Tooling, IAC Group.**



Q How would you describe your company and its footprint in India?

International Automotive Components (IAC) Group, a multinational company, has a global footprint in the automotive interior business. In India, our customers include M&M, Maruti Suzuki, Volvo Eicher, and FMAL, among others. However, I would say that our anchor customer is M&M. In India, we

have our headquarters at Pune and five plants across the country. We have two manufacturing plants at Pune, and one each at Nashik, Manesar, and Bangalore. We source close to 150-200 moulds per annum ranging from 50T to 2800T. We work with most of the Indian and global toolmakers.

Q What is your opinion of the Indian automotive industry and some of the emerging trends in the global automotive industry?

The Indian automotive industry is the fourth largest in the world. India is the largest tractor, 2-wheeler, and 3-wheeler manufacturer, second largest bus manufacturer, third largest heavy truck manufacturer and fourth largest car manufacturer in the world.

The industry contributes about 7.1% of India's GDP and employs close to 35 million people. We expect this growth to continue in the coming days, as 65% of our population comprises youth; this will be at the peak around 2036-2040 when it will reach approximately 70%. This means more people at work, which will in turn enhance the purchasing power of Indian citizens and help many industries. It is expected that by 2023, the Indian automotive industry will be \$300 billion. With the growth of the economy and enhancing the purchasing power of Indians, we see good days ahead for automotive OEMs and component suppliers.

Tool Talk

I also see a good shift happening towards EVs in India. The government is also supporting that and many OEMs – be it 2-wheeler, 3-wheeler or 4-wheeler – already have big plans for EVs.

A few other trends that I observe are autonomous vehicles, electrification and connectivity, shared mobility, big data & data analytics, human-machine interface, blockchain, AI, IoT, and 3D printing.

Q How is the components industry gearing up to adopt the changes brought about by OEMs?

I would say that:

- ▶ From labour-intensive to automation, India is undergoing a transition. We should be quick enough to adopt the technology.
- ▶ Availability of skilled manpower is a challenge today.
- ▶ We need to optimise the inventory by digitally managing the supply chain.
- ▶ We should be in a position to predict a machine breakdown in advance and work towards fully digitalizing manufacturing and non-manufacturing operations.
- ▶ Lastly, component manufacturers should try to shield and expand their business.

Q How would you describe the role of the tooling industry in the development of the manufacturing industry?

The tooling industry is a complex and strategic industry. The industry plays a major role in the development of the manufacturing sector, but their contribution to the industry is sometimes ignored. Starting from aerospace, medical, automotive, and moving on to apparel, white goods and packaging, no product can be produced without tools. Delivering these tools on time and with quality requirements is the primary role of the tooling industry.

The Indian tooling industry's market size is close to INR 18,000 crore with ~70% of the demands being met domestically and ~30% via imports. We have a vital role to play here in terms of putting in our best efforts to reduce imports and increase exports. We must eye the global requirements. In fact, this is the right time to put our best foot forward considering the global slowdown and China at rest.

Talking about the Indian tooling industry, I would say that we have come a long way and now, we can make any complex tools that the rest of the globe makes. So, there's no doubt about the

“**Talking about the Indian tooling industry, I would say that we have come a long way and now, we can make any complex tools that the rest of the globe makes. So, there's no doubt about the capability.**”

capability. Now, Indian companies are looking at high-end CNC machining like 5-axis milling, deep hole drilling, conformal cooling rapid tooling, high-speed machining, and super smooth surface technology in manufacturing and are focusing on quality. All this points to the fact that the future of this industry is indeed bright and the tooling industry is committed towards offering nothing but the best.

However, I would suggest the Indian tooling industry to come together and set a benchmark for the global tooling industry. We are capable and can compete with any global tooling industry. Our belief, efforts and dedication will help us pave the way forward.

Q You have experience of working with toolmakers from countries like China, Taiwan, Korea, etc. How would you describe your experience of working with overseas toolmakers vs Indian toolmakers?

Firstly, I would like to convey that Indian toolmakers are at par with toolmakers in China and Korea. The ecosystem developed in China and Korea has taken a long time and the government has played a significant role in establishing the clusters and helping the industry with incentives to make tools. Our tool manufacturing process with limited high-end machine availability is far better than any tooling industry around the globe. Machine manufacturers should help the tooling industry with high-end machines made in India. I am hopeful that this is going to help both the tooling and the machine tool industries.

Most Indian toolmakers do not have mould flow seats. Because of the cost involved, toolmakers prefer to outsource it. They fully understand the risk of accuracy and can expect it from the vendor. This risks the complete development cycle of the mould. Now it's time for India to demonstrate the same pace in less time. We can't wait and watch any more, we need to act fast and either match or exceed the speed in delivering the moulds.

I feel that if steel and high-end 5-axis machines are available in the country, Indian toolmakers will do wonders. The investment cost of the machine is so high that the small- and medium-sized toolmakers sometimes cannot afford it. Also, we must invest in training manpower and work on retaining the trained employees. So, we all should work closely to support this industry. I expect someday people to ask the question of how the Indian tooling industry has exceeded global players like China, Korea, and Taiwan.

Q What are the key evaluation factors of any automotive OEM before finalising a tool room for any project?

Some factors that come to mind are:

- ▶ QCD was formerly taken into consideration when sourcing a tool from a toolmaker. Now, these three terms are taken for granted. We only talk about the technology the toolmaker is bringing in to make the tools.
- ▶ The lead time and quality meeting global standards are major considerations.
- ▶ Dealing with qualitative changes, complexity with higher accuracies, efficient processes.
- ▶ Permanent manpower in the critical area has become a must criterion after the pandemic.
- ▶ Service and support that we receive during installation and after industrialization of the mould.

Q What are your expectations from Indian toolmakers? How do you suggest they improve?

The Indian die & mould industry is a major contributor to the economy. Hence, the expectations from this industry is high. I believe that toolmakers can improve if they adopt the following practices:

- ▶ *Speed to change (disruption):* This industry must adopt a modern management system. Most Indian tool rooms are being managed using a traditional system, which needs to be looked into. There's a need to adapt to the changes.
- ▶ *The native technique of manufacturing to the adaptation of the latest technology:* We must take a holistic 360-degree view and consider technology over the traditional method of tooling, like, for instance, Industry4.0.
- ▶ *Tackle complexity with accuracy:* If we take a close look, most large tools like bumper, IP, top pad, and door trims are being imported. We have a limited number of toolmakers in India, who can manage such large tools.

▶ *Focus on delivery:* The Indian tooling industry should critically focus on delivery. We must match the speed of China and Korea, who can satisfactorily meet the quick delivery requirements. As per my knowledge, the import of tools is mainly for the timeline today and is not because of the cost.

▶ *This industry requires heavy investment to set up a tool room:* Typically, the manufacturing cycle of a mould may vary from three months and may go up to six months depending on the tool size and complexity. The toolmaker gets only 30% advance from the customer and must manage the rest of the show. So, more than the toolmakers' role, the OEMs/ Tier-1s should support the tooling industry.

▶ *This industry is also dependent on skilled manpower:* Getting skilled manpower and managing them is a task for a toolmaker. So, skill development is another serious issue, which needs to be addressed urgently. The industry and training institutions must come together and understand the need of the hour.

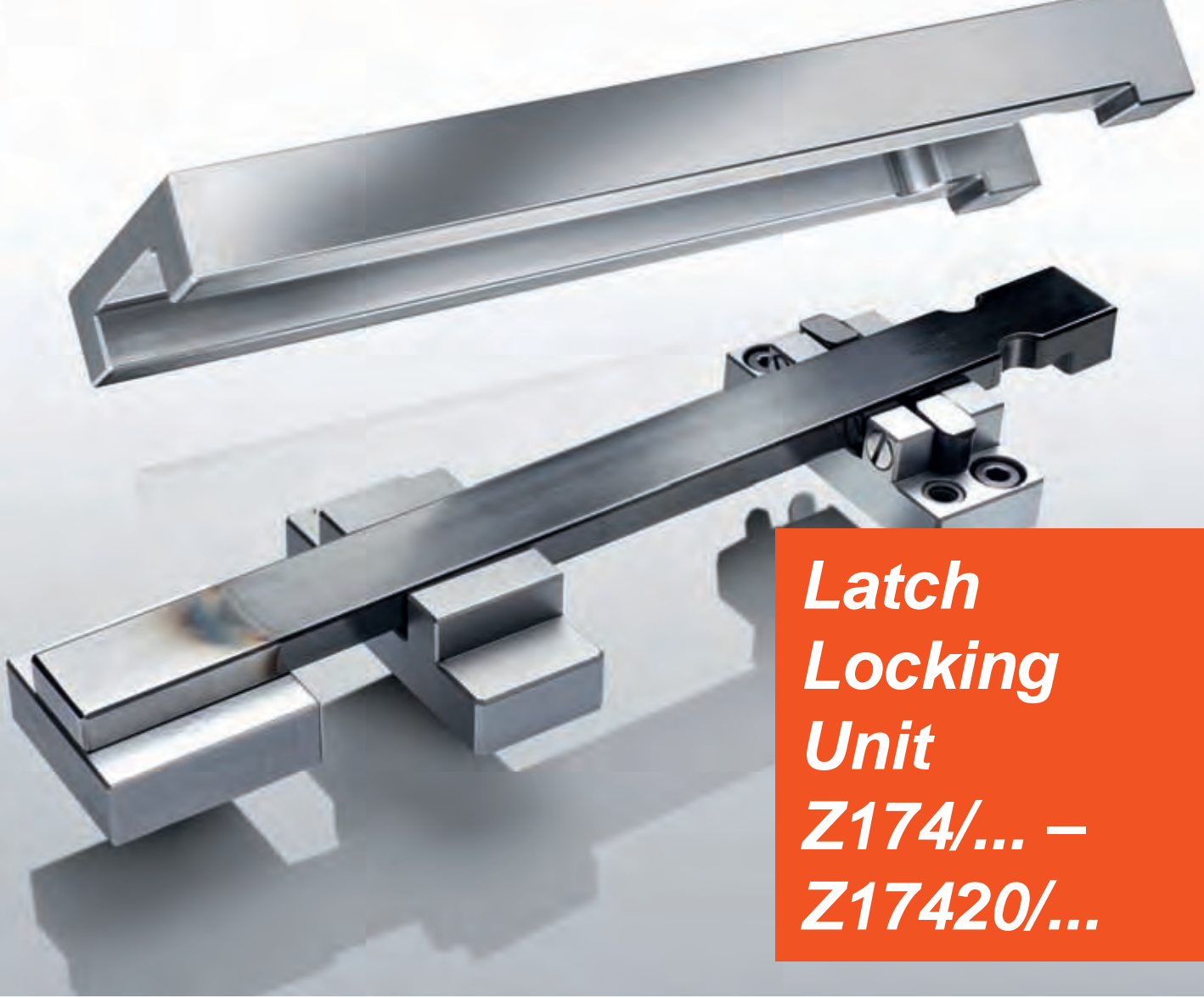
▶ *Encourage more women employees at work:* This should be the case particularly in the design department.

The opportunities are enormous, but the tooling industry should gear up for the same and aim to increase the export of moulds.

Q What role can the government play in the development of the tooling industry?

The government has a major role to play in the development of the industry. There have been some good developments. Besides, campaigns like 'Invest in India', 'Make in India' and PLI Scheme for various industries will definitely help Indian toolmakers.

Today, the allocation is in terms of 22 cars per 1000 individuals. This means that we have enormous opportunities in front of us. The tooling industry should get some incentives, which will help them invest in infrastructure to encash this opportunity. Interest rates on loans for investing in high-end machines should be reduced to support the tooling industry. Also, the inverted duty structure on imports of machines and access to finance should be made easy. Tool steel, one of the most important components to make moulds, is difficult to get in India presently. The government must help toolmakers import such key components.



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I would suggest the Indian tooling industry to come together and set a benchmark for the global tooling industry. We are capable and can compete with any global tooling industry. Our belief, efforts and dedication will help us pave the way forward.

Another important aspect that will help companies develop is cluster development. The Indian government should develop tooling clusters in India to help the industry grow.

Q What factors will aid the growth of the Indian tooling industry?

The growth of the die and mould market is driven by the increasing demand for new products in various industries. The automotive segment is expected to grow by 8%, consumer durables by 9%, plastics by 12%, electronics 14%, and electrical by 21%, according to data. Toolmakers should be ready to grab this opportunity. Also, industries like aerospace, construction equipment, agriculture equipment, and medical will also generate good opportunities for toolmakers. In industries like 2-wheelers and white goods, because of the volume, the demand for repetition of the moulds is high, which will be beneficial for toolmakers.

Technology adoption will also define the growth of Indian toolmakers. For example, handling more complex products, which require more sophisticated dies and moulds to manufacture, and the technology that the toolmaker invests in to make such tools, will decide how toolmakers grow.

Q What are your five key suggestions for Indian toolmakers?

I would suggest the following:

- ▶▶ Invest in technology and stay ahead of time. Most of my toolmakers don't have a spotting press, which is a basic need.
- ▶▶ Train and retain your staff. In the future, getting people to work in tooling may be a big challenge.
- ▶▶ Unlearn the learnings. Now, the lead time to make a tool is significantly changing and the demand for getting it right the first time is going up.
- ▶▶ Embrace Industry 4.0. Another part of the globe is taking the advantage of this. A lot can be done in tooling using Industry 4.0.
- ▶▶ Know your customers. The name of your customers may remain the same, but the generation and management are changing and with change. We need to demonstrate better and be ahead of our customers' expectations. 🌈

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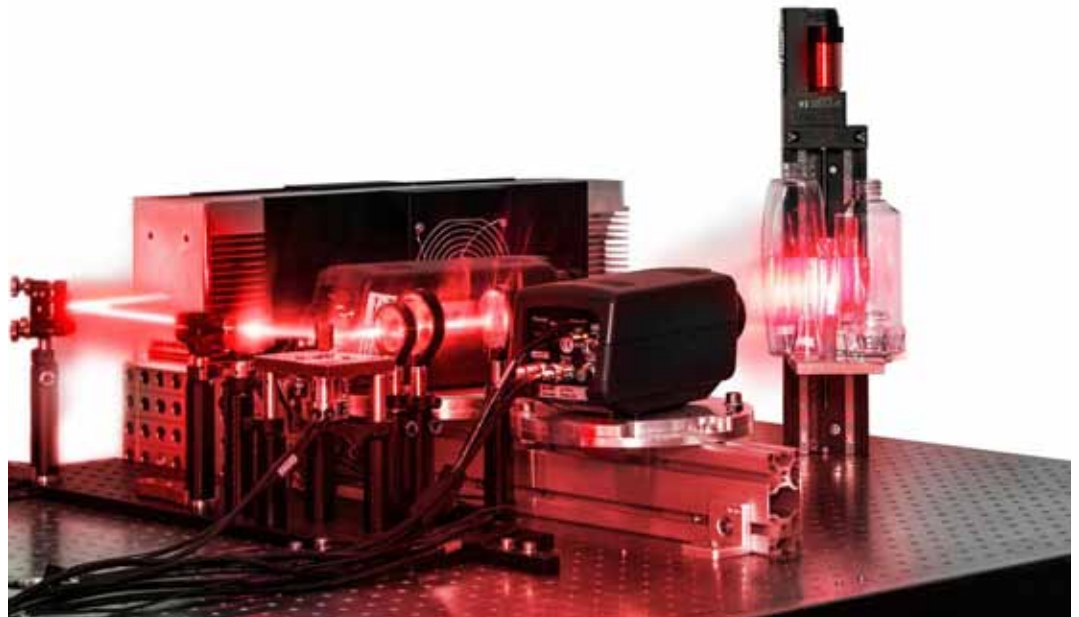
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The robot has the view

Capturing transparent objects in three dimensions is a major challenge. Researchers at Fraunhofer Institute for Applied Optics and Precision Engineering IOF have developed a sensor that is able to solve this problem. The system has now been successfully tested for the first time with a robot. Applications in large-scale industrial manufacturing processes, such as the semiconductor or automotive industry, could be possible.



Lab setup demonstrating the MWIR 3D measurement principle.

Courtesy: © Fraunhofer IOF

Transparent objects have their drawbacks: It is not without reason that we have stickers of birds' silhouettes on big glass windows in order to protect their real-life conspecifics from colliding with the transparent barrier. Just as these animals have difficulties recognizing transparent surfaces, robots are also limited in their capabilities: They cannot "see" glass or other so-called "uncooperative surfaces" – i.e., surfaces that are glossy metal, extremely reflective, or jet-black. Especially in an industrial environment, this has been impeding the use of robots in the past. Many projects of automatization stagnate because uncooperative surfaces could only be detected too slowly or too inaccurately in 3D measurement.

Thermographic 3D sensor makes transparent objects visible to robots for the first time

A new 3D measurement technique, developed by researchers at Fraunhofer IOF last year, solves this problem: The "MWIR 3D Sensor" – also called "Glass360Dgree" – can detect objects with reflective or light-absorbing surfaces spatially and reliably for the first time. For this purpose, the system combines infrared laser projection and thermography: After locally heating up the object to be measured, two thermal imaging cameras determine the resulting temperature distribution on the object's surface. Contrary to conventionally

Tech Know-how

used sensors, the newly developed system does not require additional measurement aids or special, temporarily applied markings, for example in the form of (spray) paint.

High measurement speed for applications in large-scale industrial processes

Production processes are often about speed combined with high quality. This means: The more work steps a system can perform per minute without producing defective products, the more profitable is the production. The researchers at Fraunhofer IOF have taken this self-image of industry as an opportunity to adapt "Glass360Dgree" to various production scenarios. In recent months, the researchers from Jena have succeeded in increasing the measurement speed accordingly and optimizing the parameters of the measurement field.

"Our research group has been cooperating for years with companies from a wide range of production fields," explains Dr. Stefan Heist, head of the "3D Sensors" research group at Fraunhofer IOF. "Among them are companies from semiconductor manufacturing, the automotive industry and aviation. We looked at joint projects from the past and analyzed how our 3D glass sensor could achieve better results than conventional sensors in various application scenarios," explains the researcher, who has been working vigorously on new methods for 3D measurement for years. "We were able to identify three key starting points to make our system ready for potential use in a large-scale industrial manufacturing facility."

The team found the ideal balance between the level of detail needed in resolution and the duration of a measurement. They also investigated various options for the optical setup of their 3D sensor in order to variably adapt the measurement field to



Courtesy: © Fraunhofer IOF

The system works with thermal radiation for the 3D detection of transparent objects.

the task at hand and the space available within a manufacturing plant. In addition, the team led by Dr. Stefan Heist and Martin Landmann, also researcher at Fraunhofer IOF, worked closely with researchers from the Ilmenau University of Technology to optimize the data processing of their measurement system. The team from Ilmenau succeeded in efficiently deriving the active control of a robot and its respective tools from the obtained measurement data.

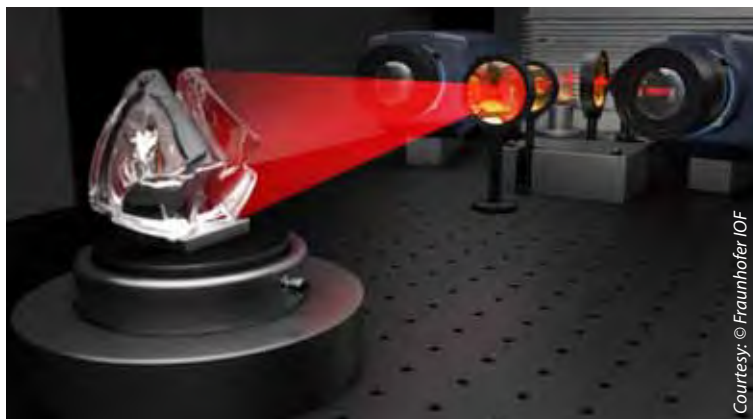
A new dimension in flexibility and diversity

With its great flexibility and unprecedented versatility in the properties of the objects to be scanned, "Glass360Dgree" opens up completely new possibilities in the automation of industrial processes as well as in product design.

The thermographic 3D sensor uses thermal radiation and imaging for 3D detection. A high-energy CO₂ laser and a mobile optical setup with special lenses project a line moving in several steps over the measured object in fractions of a second. Throughout the measurement, the object absorbs the energy of the laser light and emits it clearly visible to the two highly sensitive thermal imaging cameras.

Special software developed at Fraunhofer IOF analyzes the images of the heat signature left by the narrow infrared line on the object for a short time. The software uses the two differing viewing angles and the resulting deformation in the recorded fringe pattern to reconstruct the spatial coordinates. It then merges the data into the exact dimensions of the measured object. The thermal energy introduced for the 3D analysis is so low that the object is not damaged: The temperature difference between heated and non-heated surfaces is typically less than 3°C. 🌈

Article and images courtesy: Fraunhofer-Gesellschaft



Courtesy: © Fraunhofer IOF

"Glass360Dgree" visualization of the 3D scanning process.

Linex Manufacturing overcomes inspection challenges by introducing metal 3D printed custom stylus on Equator™ gauging system

A move to Renishaw's Equator™ 300 automated gauging system gave Linex Manufacturing all the inspection speed and accuracy it needed. However, on a project implemented before the larger Equator™ 500 was available, bolt holes on the extremities of a workpiece lay just outside the gauge's working envelope. When standard styli and stylus extensions could not reach, an additively manufactured custom stylus provided the answer.

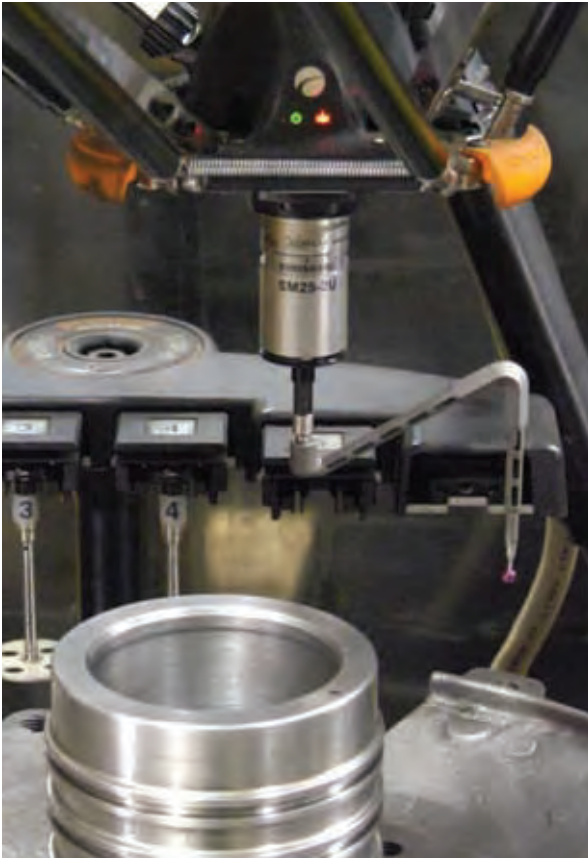


Linex Manufacturing is a division of Linamar Corporation, one of the world's leading automotive parts manufacturers, which uses multiple Equator flexible gauges at many global production plants. At its base in Ontario, Canada, Linex produces a range of precision-machined automotive components.

Its core business lies in the production of automatic transmission components used in medium- and heavy-duty commercial vehicles. Its customers are global transmission manufacturers, and production volumes are high.

Linex first purchased two Equator 300 gauging

Case Study



Inspecting automotive component on Equator 300 with additively manufactured stylus

systems in 2015. When a major new product launch required continuous 5-day working with three rotating 8-hour shifts, Linex decided to buy four more Equator 300 gauges in 2017 to keep pace with the elevated production levels.

Capable of component scanning speeds in excess of 200 mm/s and maintaining high accuracy over the temperature range of 5 °C to 50 °C, the Equator 300 provided Linex Manufacturing with a versatile diametric inspection volume of 300 mm to a height of 150 mm, capable of supporting workpiece weights up to 25 kg.

The Equator gauges were tasked with performing high duty-cycle in-process inspection of a wide range of production processes and customer-critical part features. The gauges also helped free up the availability of Linex's quality laboratory CMMs (coordinate measurement machines).

Since this project, Linex became the first company in Canada to operate Renishaw's Equator 500, an automated gauging system with an even bigger working envelope, inspecting automotive workpieces up to four times heavier.

Challenge

Introducing the Equator gauging systems to Linex' shop floor had a significant positive impact on productivity, increased production capability and inspection process throughput.

Narcis Georgescu, Senior Quality Supervisor at Linex Manufacturing, explained one unexpected challenge, "For one component in particular - a front support assembly - we needed to closely inspect a series of 11 mm bolt holes required for mating to another component. Precision was paramount, and they had to be inspected thoroughly. The challenge we faced was that these bolt holes lay just outside of the Equator 300 working envelope."

"Initially, to overcome this challenge, a unique L-shaped tool configuration was produced with multiple components that could help extend this volume and provide us with the inspection access we needed. While it seemed to work well, over time, it was causing an unexpected measurement uncertainty."

Solution

Thorough metrological testing of the Equator system carried out with Renishaw engineers verified the repeatability of the gauge itself. It confirmed the need for a robust stylus construction for specifically inspecting the bolt holes.

Determining that a probing setup using multiple components did not provide the necessary rigidity, Renishaw proposed the development of a custom stylus using metal additive manufacturing (AM), also known as metal 3D printing.

Conceived digitally in 3D CAD software and printed at Renishaw's Solutions Centre in Ontario, Canada, an elegant Z-shaped stylus was produced as a single-piece monolithic construction with internal latticework to reduce its weight and avoid the risk of false triggers.

The stylus was rapidly printed with a high-strength titanium alloy powder on a Renishaw RenAM 500Q metal additive manufacturing system using a process known as metal powder bed fusion, or laser melting.

By avoiding traditional manufacturing techniques such as casting, forging and machining, Renishaw provided a complex, single-piece stylus solution to Linex quickly.



■ Additively manufactured custom stylus design

“The AM stylus’ impact on productivity has been profound. It means that we now have complete assurance that we will avoid any costly rejections, due to either bolt hole size or position being out of spec. Now we have accuracy and repeatability in our bolt hole inspections that remain within acceptable limits and irrespective of ambient conditions, stability stays within a 5% limit.

Linex Manufacturing (Canada)

Results

The introduction of the custom-designed, additively manufactured stylus brought Linex the accuracy and repeatability it needed to inspect component

bolt holes outside the Equator 300 gauge’s working envelope.

Narcis Georgescu said, “Thanks to its robust, one-piece design, the titanium AM stylus has enabled us to carry out full component inspections. It brings a combination of lightness and stiffness that we could not achieve.”

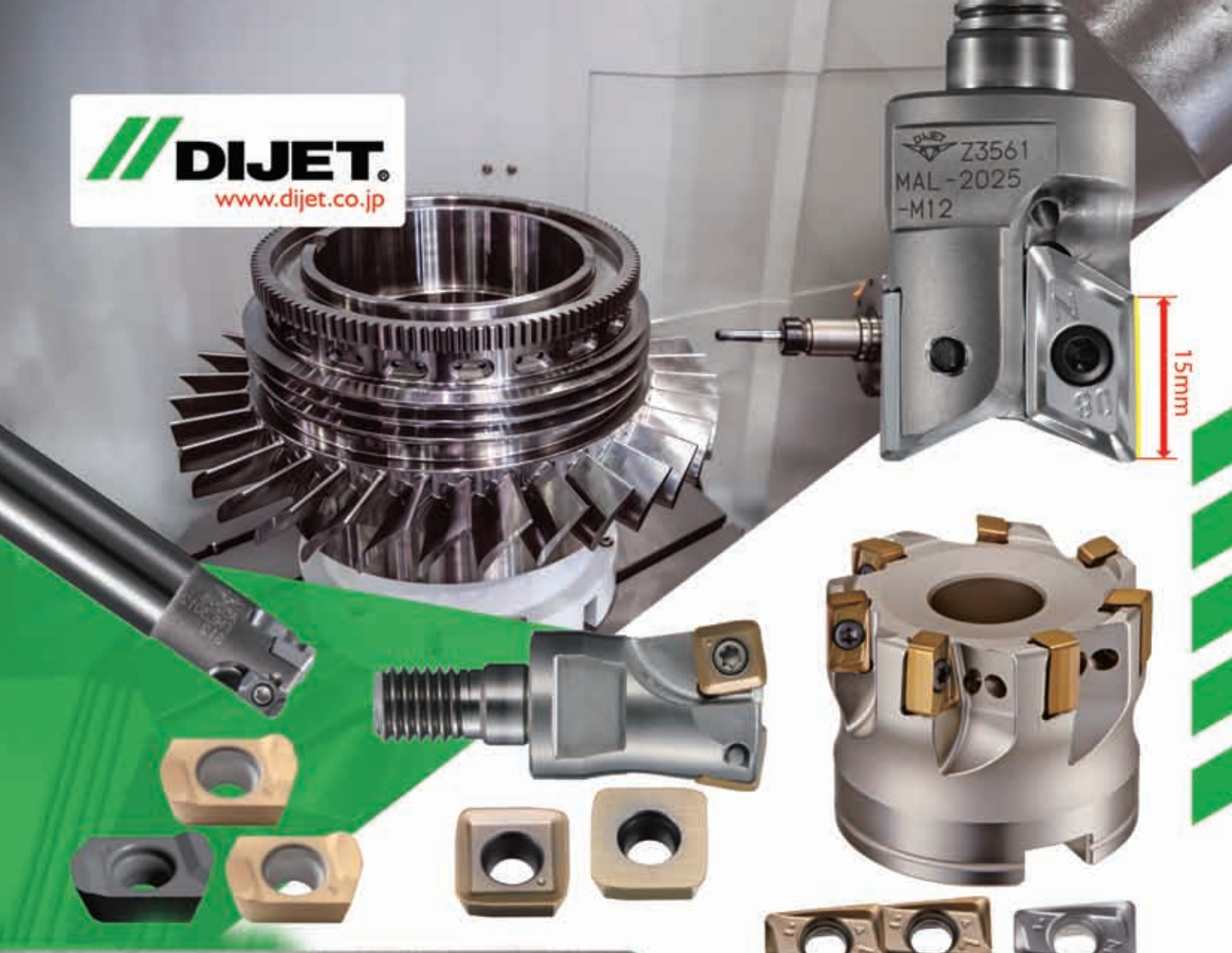
A few years on and the original AM stylus is still running without any degradation in its performance. Linex purchased a second AM stylus in the exact same design, and the company is now operating six Equator 300 gauges and one larger Equator 500 gauge. 🇨🇦

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■ Custom stylus metal 3D printed on a RenAM 500Q system

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‘Auto ancillaries’ revenues to grow by 8-10% in FY2023’



Image used for representation only. Courtesy Envato Elements

ICRA forecasts the revenue growth of auto ancillaries at 8-10% in FY2023 led by stable demand and the likely easing of supply-chain related concerns in H2 FY2023. The rating agency also expects the sector's coverage metrics to remain comfortable in this fiscal, benefitting from healthy accruals and relatively low incremental debt funding requirements.

Ms. Vinutaa S., Vice President and Sector Head, ICRA Limited, says, "ICRA expects auto ancillaries' revenues to grow by 8-10% in FY2023, supported by stable demand as well as the expected easing of supply-chain related issues in H2 FY2023. Over the long term, premiumisation of vehicles, focus on localization, improved exports potential and EV opportunities, resulting in higher content per vehicle, would

ICRA Report

translate to healthy growth for auto component suppliers, in our view. Auto ancillaries have displayed adequate liquidity position, especially across tier-I and tier-II players. ICRA expects the coverage metrics for this sector to remain comfortable going forward as well, aided by healthy accruals and relatively low incremental debt funding."

In FY2022, ICRA's sample of 31 auto component companies with cumulative revenues of over INR 1,75,000 crore had registered a 23% Y-o-Y growth in revenues, driven by domestic OEM, replacement, export volumes and passthrough of commodity prices. Though the growth came on a relatively low base of FY2021, the actual revenue expansion was better than the rating agency's estimates, partly on account of better-than-expected exports and increase in realisations to pass on the impact of higher commodity inflation and freight costs. ICRA's estimation of operating margins for FY2022 had factored operating leverage benefits. However, the unprecedented inflation in raw material costs and freight costs in H2 FY2022 and inability to pass on the same completely and in a timely manner impacted the profit margins in FY2022. Operating margins for the sample in FY2022 were the lowest in the last five years.

Commenting further, Ms. Vinutaa S. says, "The estimated revenue growth for the sample in FY2022 was constrained by factors like semiconductor shortage issues, muted two-wheeler and tractor demand, and the impact of geopolitical developments on international business. However, the industry's actual revenues were supported by healthy exports and better realisations. ICRA's sample of 30 companies (excluding a large auto component supplier) reported operating margins of 10.6% for FY2022, 10 bps lower on a Y-o-Y basis, and 40 bps lower than projections."

Uncertainties on the supply-chain front and cost inflation resulted in auto ancillaries stocking higher inventory, with inventory levels for the sample

being the highest as of March 31, 2022, compared to the last four years. Nevertheless, the working capital intensity remains comfortable, at sub 10% levels.

The operating profits for the sample were higher in FY2022 on YoY basis and compared to FY2020, aided by healthy revenues, despite marginal dip in operating margins. While debt levels increased with rise in working capital intensity, the improvement in operating profits resulted in comfortable debt coverage indicators for the industry. The debt/OPBDITA for the sample stood at 2.1x, compared to 2.3x in FY2020 and 2.4x in FY2021. Similarly, interest coverage for the sample stood at 10.6x in FY2022, compared to 8.7x in FY2020 and 9.6x in FY2021. Compared to ICRA's FY2022 projections, the coverage indicators are marginally weaker due to weaker-than-projected accruals and higher debt.

Capex spend of the auto ancillary sample for FY2022 as a proportion of their operating income was 5.9%, lower than pre-COVID levels of >7.5%. However, it was in line with ICRA's estimates. The incremental investments have been primarily towards capability development i.e. new product additions, product development for committed platforms, and development of advanced technological and EV components, unlike investments towards capacity expansion witnessed in the past. Going forward, the recently-announced PLI scheme will contribute to accelerating capex over the medium-term besides investments by new entrants in the EV segment.

Most auto ancillaries rated by ICRA are in investment grade, reflecting a healthy credit profile. There were more upgrades than downgrades in FY2022, stemming from healthy cash accruals and steady decline in debt levels. This was, in turn, supported by improved demand, increase in market share, superior product mix and strengthening of business profile among other reasons. 🌈

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‘Growth momentum continues, employment outlook improves in manufacturing sector’



Image used for representation only. Courtesy Envato Elements

FICCI's latest quarterly survey on the manufacturing sector reveals that after experiencing revival of Indian manufacturing in the first three quarters of 2021-22, the momentum of growth continued in the subsequent quarters of Q-4 (Jan-Mar 2021-22) and Q-1 April-June (2022-23) and there seems to be an improvement in the hiring/employment outlook after a long gap.

The survey noted that 54.8% respondents reported higher production levels in Q-1 (April-June 2022-23), with an average expectation of increase in production by over 10%. This is slightly more than the percentage of respondents experiencing higher growth in Q-1 of last year. Also, the FICCI survey observed that there seems to be an improvement in employment creation

by the sector as compared to the previous quarter (Q-3 of 2021-22), where only 25% of the respondents were looking at hiring in the next few months.

This percentage has improved significantly to 53% of the respondents in Q-1 2022-23, who are now looking at hiring additional workforce in the next three months. This assessment is also reflective in order books, as 55% of the respondents in Q-1 (April-June 2022-23) are expecting higher number of orders, the survey noted.

FICCI's latest quarterly survey assessed the sentiments of manufacturers for Q-1 April-June (2022-23) for twelve major sectors, namely: Automotive, Capital Goods, Cement, Chemicals, Fertilizers and Pharmaceuticals, Footwear, Machine Tools, Metal & Metal Products, Paper Products, Textiles, Toys, Tyre and Miscellaneous. Responses have been drawn from over 300 manufacturing units from both large and SME segments with a combined annual turnover of over 3 lakh crores.

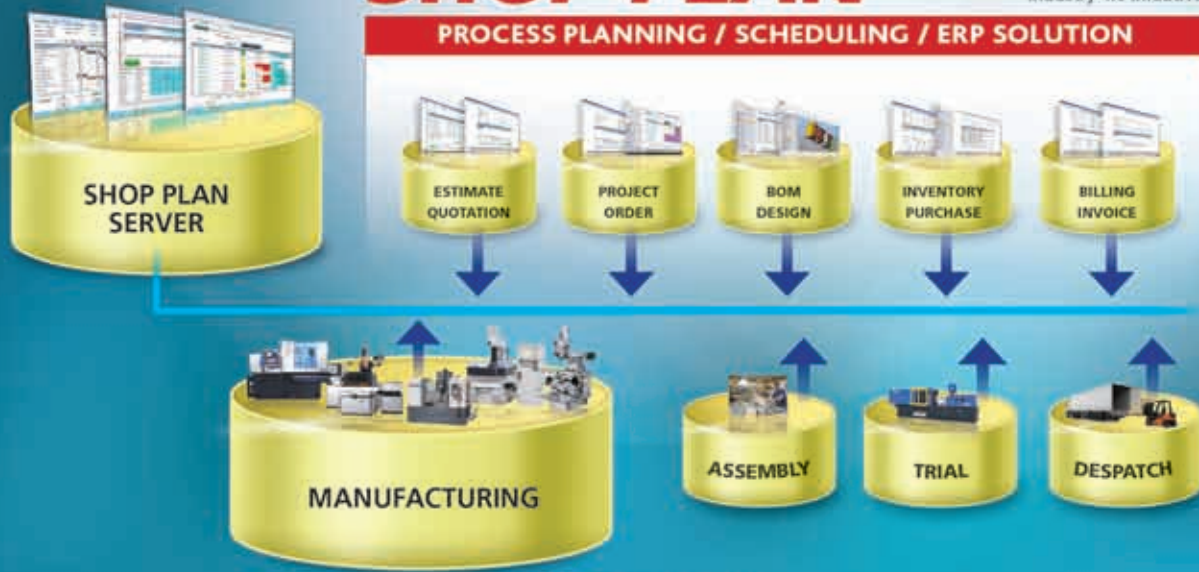


Source FICCI Survey

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Capacity Addition & Utilization

The existing average capacity utilization for Q4 2021-22 in manufacturing is 77%, a little higher than 75% in the previous quarter, which reflects increased economic activity in the sector. The future investment outlook also improved as compared to previous quarters but remains that of cautious optimism, as 40% respondents reported plans for capacity additions in the next six months, by 14% on an average.

Global economic uncertainty caused by the Russia-Ukraine War and increasing cases of COVID worldwide have accentuated the volatilities impacting the major economies. High raw material prices, increased cost of finance, cumbersome regulations and clearances, shortage of working capital, high logistics cost due to rising fuel prices and blocked shipping lanes, low domestic and global demand, excess capacities due to high volume of cheap imports into India, unstable market, high power tariff, shortage of skilled labour, highly volatile prices of certain metals, etc., and other supply chain disruptions are some of the major constraints, which are affecting the expansion plans of the respondents.

The table below, gives average capacity utilization in Q4 2021-22 for various sub-sectors of manufacturing.

Table: Current Average Capacity Utilization Levels as Reported in Survey (%)

Sector	Average Capacity Utilization in Q-4 2021-22
Automotive	80
Capital Goods	75
Cement	80
Chemicals, Fertilizers & Pharmaceuticals	70
Electronics & Electricals	-
Metals & Metal Products	75
Paper Products	95
Textiles	82

Inventories

80% of the respondents expect either more or the same level of inventory in Q-1 April-June 2022-23, which is a bit lower as compared to the previous quarter, where around 90% respondents expected either more or the same level of inventory.

Exports

The outlook for exports seems to be positive, as 53.4% of the respondents expect an average increase of 15.2% in exports in Q-1 2022-23 as compared to the first quarter of last year.

Interest Rate

The average interest rate paid by manufacturers has increased to 9.69% p.a. as against 8.4% p.a. during the last quarter, and the highest rate at which loan has been raised is 16% p.a. High lending rates were reported by around 70% of the respondents.

Sectoral Growth

Based on expectations in different sectors, almost all sectors are likely to register moderate to strong growth in Q-1 2022-23, except few as given in the table below.

Table: Growth expectations for Q-1 2022-23 compared with Q-1 2021-22

Sector	Growth Expectation
Automotive	Moderate
Capital Goods	Strong
Cement	Strong
Chemicals, Fertilizers & Pharmaceuticals	Moderate
Footwear	Low
Machine Tools	Strong
Metals & Metal Products	Moderate
Miscellaneous	Moderate
Paper Products	Moderate
Textiles	Strong
Toys	Moderate
Tyre	Strong

Note: Strong > 10%; 5% < Moderate < 10%; Low < 5%
Source: FICCI Survey

Production Cost

The cost of production as a percentage of sales for manufacturers in the survey has risen for 91% respondents in Q-4 2021-22. Reduced availability and high raw material prices especially that of steel, increased transportation, logistics and freight cost, and rise in the prices of crude oil and fuel have been the main contributors to increasing cost of production. Other factors responsible for escalating production costs include enhanced labour costs, high cost of carrying inventory, and fluctuation in the foreign exchange rate.

Workforce Availability

Most sectors have sufficient labour force engaged in their operations and are not facing shortage of labour at factories. While 77% of our respondents mentioned that they do not have any issues with workforce availability, the remaining 23% feel that there is lack of skilled workforce available in their sector. 🌈

Courtesy: FICCI MEDIA DIVISION



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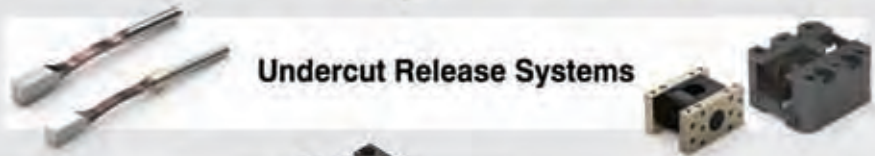
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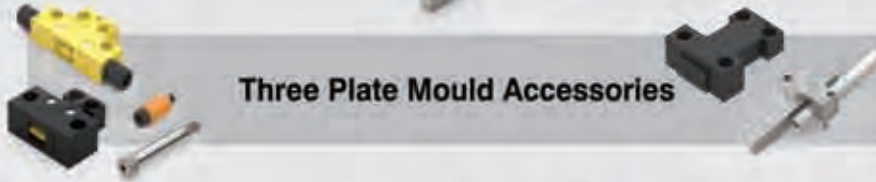
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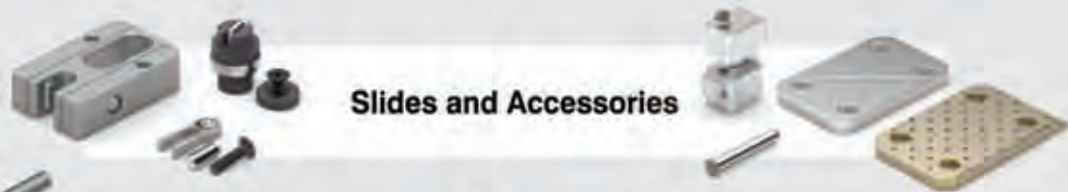
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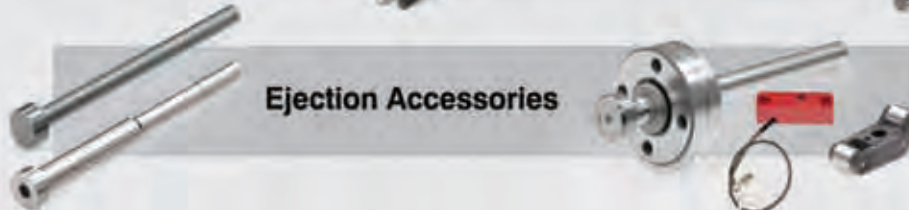
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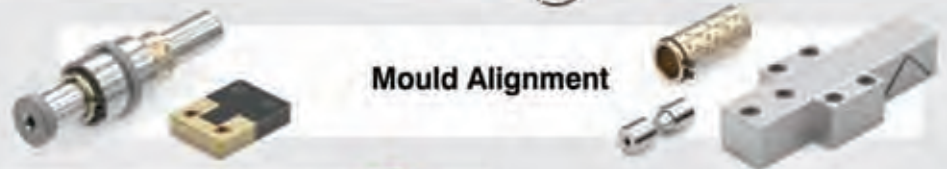
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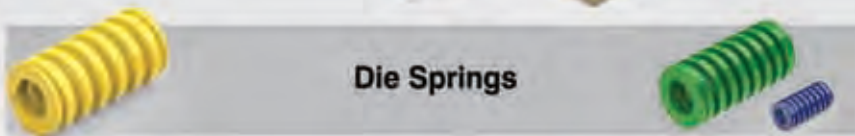
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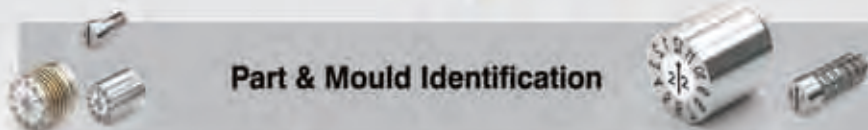
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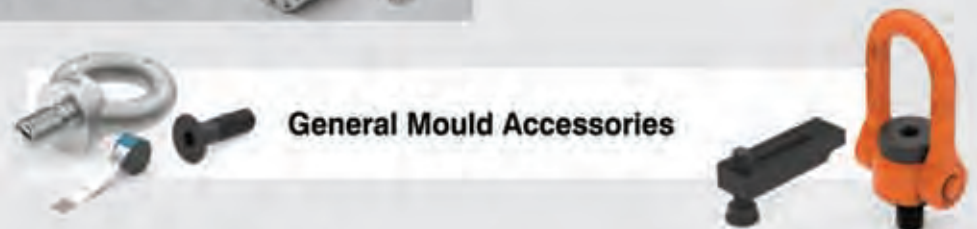
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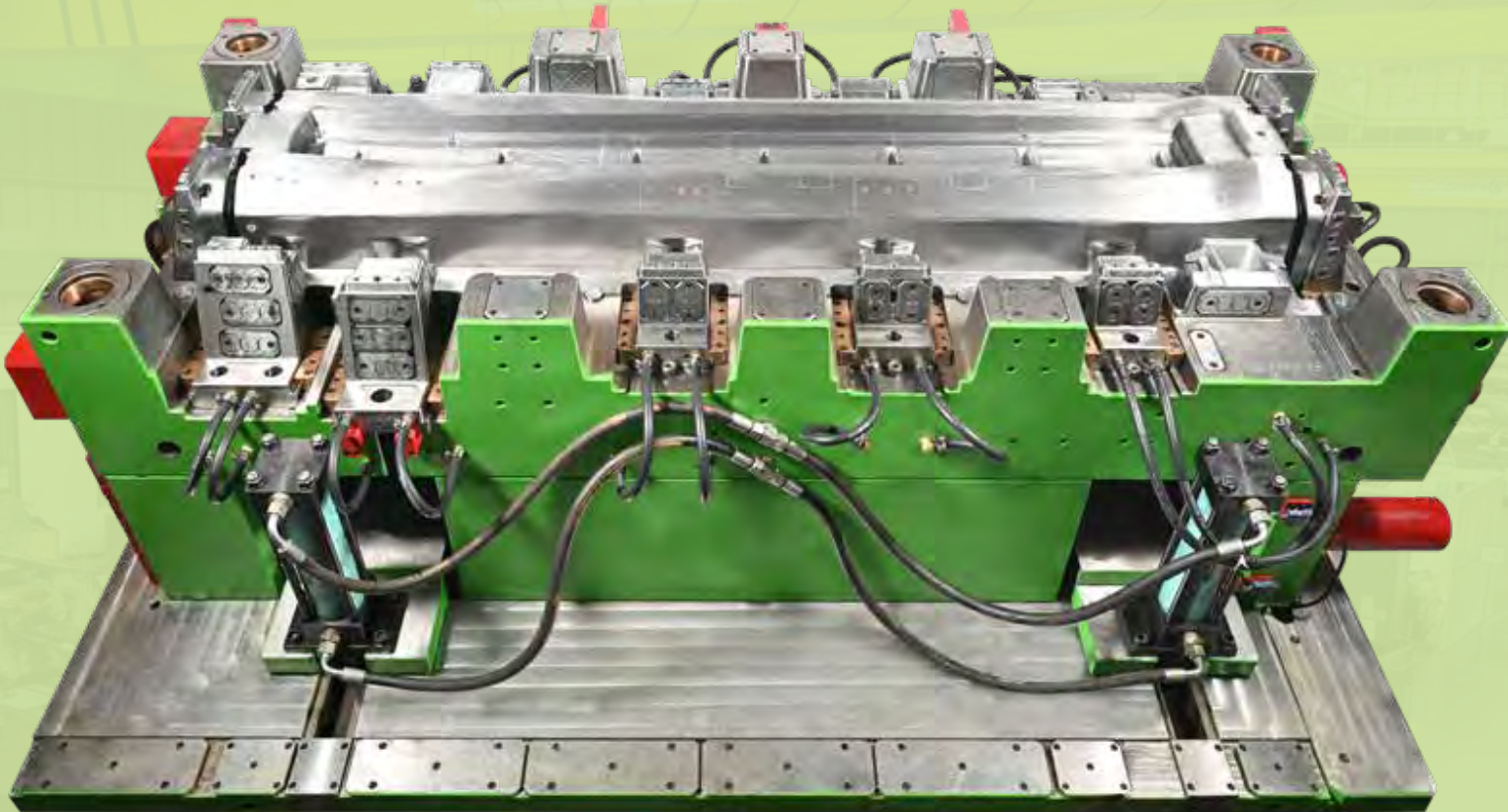
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