

# TAGMA TIMES

NEWSLETTER

(Technical Info. on Die, Moulds & Toolroom)

Volume: XXVI / No. 12

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August 2018

## Industry 4.0: Manufacturing's Next Move

### Leaders Speak

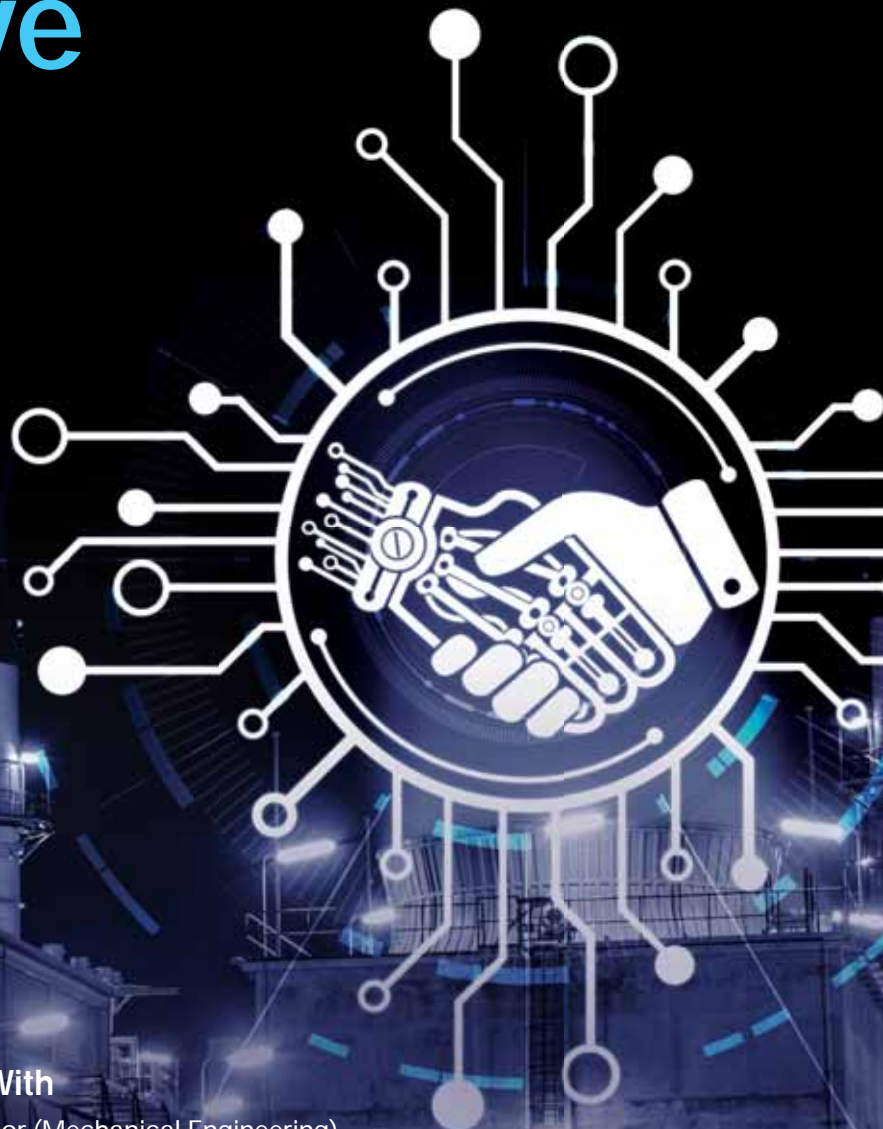
**Chandramohan Natarajan**  
of Craftsman Automation Ltd, India

**S M Nayak**  
of Godrej & Boyce Mfg Co Ltd

### Case Studies

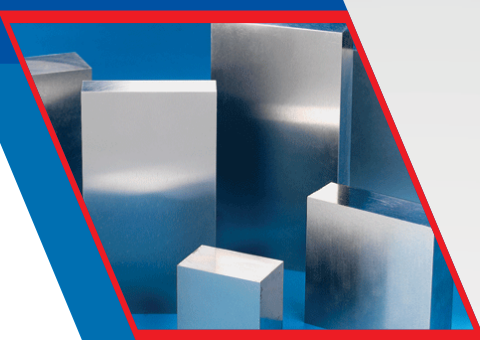
CAM Software to  
Reduce Part Rejection

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### In Conversation With

**Asim Tewari**, Professor (Mechanical Engineering),  
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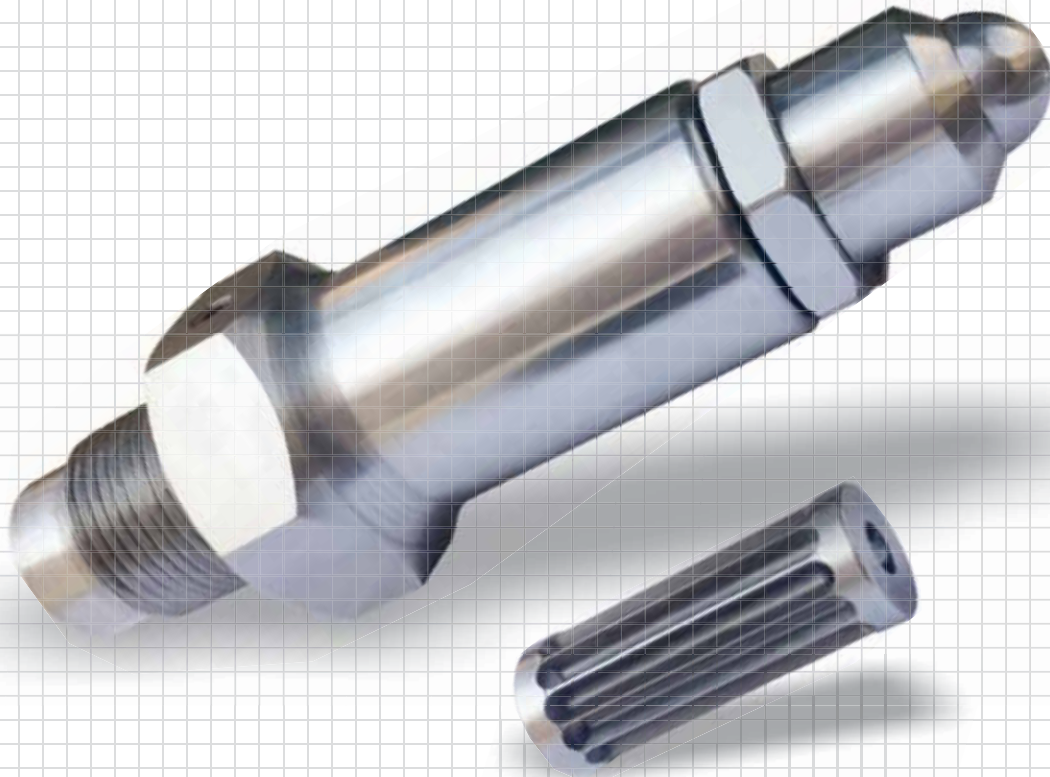
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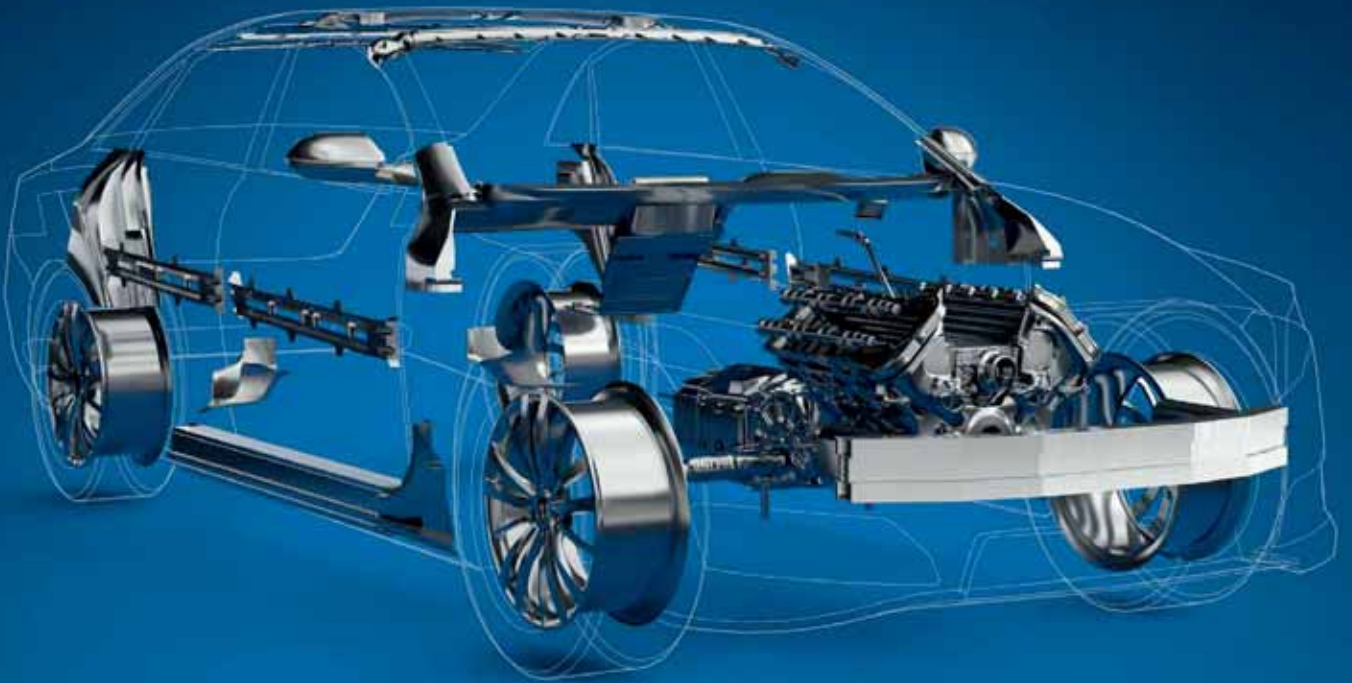
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New Gat 754, Pune Nagar Road  
Wagholi, Pune - 412 207  
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C-1, Industrial Area C, Jaspal Main Road,  
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Fax : +91 161 2510072  
Email : ludwh@pck-buderus.com

**Kolkatta Office**

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

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### Editorial & Design Team

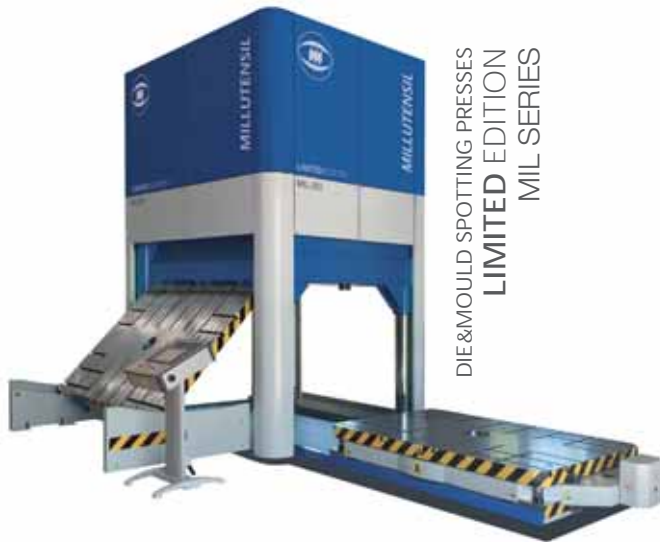
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### REGISTERED OFFICE

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

### CENTRAL OFFICE

A-33, NandJyot Indl. Estate, Safed Pool, Mumbai - 400 072.  
Tel.: 022-28526876 / 28508976  
Fax : 022-28503273  
Email : tagma.mumbai@tagmaindia.org

### PUNE OFFICE

Plot No. C-20, MIDC, Chakan Industrial Area, Phase-1, Taluka - Khed, Dist. - Pune, Chakan - 410 501.  
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. K. Sharma**

Godrej & Boyce Mfg. Co. Ltd. (Tooling Divn.) Mumbai - 400 079  
Email: president@tagmaindia.org

### VICE PRESIDENT

**Mr. D. Shanmugasundaram**

S & T Engineers (P) Ltd. Coimbatore - 641 005.  
Email : shan@stengineers.co.in

### MEMBERS

**Mr. D. M. Sheregar**

Devu Tools Pvt. Ltd. Mumbai - 400 072.  
Email: sheregar@devutools.com

**Mr. Gopalakrishnan T.S.**

Multiple Special Steel Pvt. Ltd. Bangalore - 560 099.  
Email: gopalakrishnants@gmail.com

**Mr. Mayank Varma**

JBM Group, Gurgaon - 122 002.  
Email: mayank.varma@jbmgroup.com

**Mr. Parveen Satija**

Stitch Overseas Pvt. Ltd. Gurgaon - 122 004.  
Email: parveen@stitchtools.com

**Mr. Paresh Panchal**

Cam Tools Mumbai -400 072.  
Email: paresh@digitaltoolroom.com

**Mr. Sree Prakash R.**

Mastercraft Engineers Pvt. Ltd. Bangalore - 560 099.  
Email: prakash@mcraft.net

### CO-OPTED MEMBER

**Mr. D. Ravi**

Classic Moulds & Dies, Chennai - 600058  
Email: ravi@classicmoulds.com

### SECRETARIAT

**Mr. Manjunath G. Bedre - Executive Director**  
Email: manjunath@tagmaindia.org

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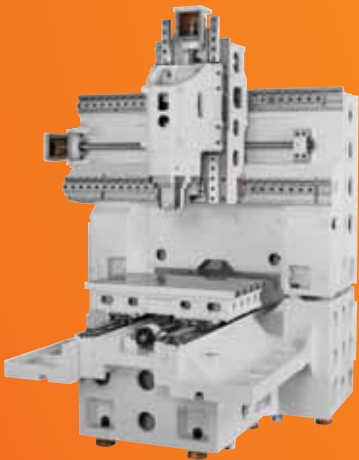
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## Beyond Assembly Line

**M**anufacturing is getting a facelift, thanks to Industry 4.0, designed to make the process more efficient, flexible and connected. A confluence of disruptive digital technologies, Industry 4.0 promises growth, and a fighting chance in the international arena.

Experts believe, Industry 4.0 might be the answer to the sector's looming talent gap as manufacturing becomes less about grease and gears and more about data and digitisation. Tooling industry is not any exception.

But, "Are the Indian tooling companies ready for Industry 4.0?"

The question remains largely unanswered as we still haven't completely moved away from conventional methods to automation.

Another question that has been troubling the tool manufacturers, "Is it viable to go for such a concept when my tool room is running just fine?"

However, industry experts unanimously believe that Industry 4.0 is the way forward, yet the debate is whether it's feasible looking at the current situation.

In the meantime, you can flip through the pages of the latest issue of TAGMA Times. You might find the answers to some of the questions above or learn something new about IoT. We have tried to bring together experts talking about the technology, its benefits, feasibility, challenges in implementation and ROI.

Do not forget to share your opinion/views with us.

A handwritten signature in black ink that reads "Nishant".

**Nishant Kashyap**

Editor

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## Introducing Makino's New UP6 HEAT Wire EDM Designed for Ultra Precision Machining

**INTRODUCING** the new UP6 HEAT Wire EDM machine designed for Ultra Precision machining. The new machine is capable of achieving work piece positional accuracies of 1 micron (0.00004") while providing X/Y/Z travels respectively of 650 x 470 x 320mm (25.59" x 18.50" x 12.68"). The UP6 HEAT machine is designed for high precision stamping and fine blanking applications, and is ideally suited for electric motor stator die tooling. The machine features a stationary work table design that helps improve positional accuracy, as the machine is moving the same mass regardless of work piece weight. The machine uses a programmable rise and fall 3-sided work tank that provides excellent ergonomic access to the work zone, and this configuration also simplifies requirements for automation.

The UP6 HEAT contains several features that are designed to provide the highest level of long-term thermal stability, such as integrating the water di-electric reservoir into the base casting of the



machine, which also minimizes floor space requirements. The machine employs active thermal cooling of the entire structure where chilled dielectric fluid is circulated through the casting to maintain a constant machine temperature. The UP6 HEAT uses the intuitive and revolutionary Hyper-i control that features a large 24" class HD touch screen that operates like a common

smart-phone or tablet. The Hyper-i control delivers a common interface that is used on both Makino Wire and Sinker EDM machines, and contains many helpful advanced functions that support the every need of the operator to boost productivity. The machine also comes standard with the HyperConnect IIoT network connectivity function for remote machine monitoring and interconnectivity of all manufacturing information.

The UP6 HEAT will also feature a new Wire Drive and Wire Threading system, called HyperDrive Extreme, that improves the performance capabilities of the machine. The new Wire Drive system use a new AC motor tensioning system that expands the range and stability of wire tension, and also reduces the maintenance requirements. The new Wire Threading system provides both Jet and Jet-less threading modes, and can rethread the wire in the gap at a break point.

## Seco Partners with MachineMetrics to Offer Manufacturing Analytics

**AS** part of a global initiative to ensure the continued success of its customers, Seco Tools is expanding their customer service capabilities through a partnership with MachineMetrics. MachineMetrics' manufacturing analytics engine will provide Seco and its customers a technological resource for their advancement into Industry 4.0. As part of a global initiative to ensure the continued success of its customers, Seco Tools is expanding their customer



service capabilities through a partnership with MachineMetrics. MachineMetrics' manufacturing analytics engine will provide Seco and its customers a technological resource for their advancement into Industry 4.0. "Seco has always been committed to providing our customers with the best products and services

available. Partnering with MachineMetrics will allow us to not only continue to help our customers learn about themselves but will transform our ability to help them improve their machine tool utilization and production capacity," said Ben Alexander, Business Manager Online Services at Seco Tools.

Seco plans to use the MachineMetrics Industrial IoT platform and its manufacturing analytics applications as a cornerstone in their expansion into new technology services. With data provided by MachineMetrics, Seco can apply their extensive experience and engineering capabilities to the continuous improvement of their customers by helping them make data driven decisions to improve their efficiency and bottom line.

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# Standard Parts for Dies & Moulds



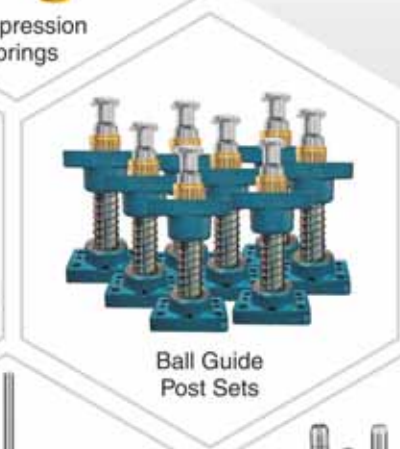
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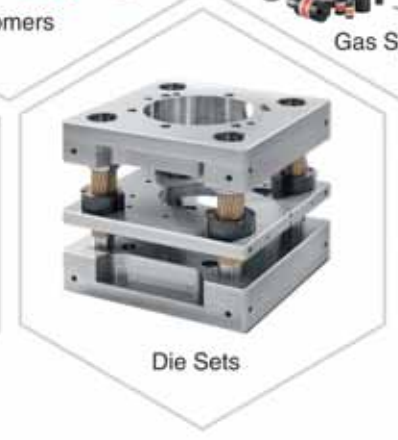
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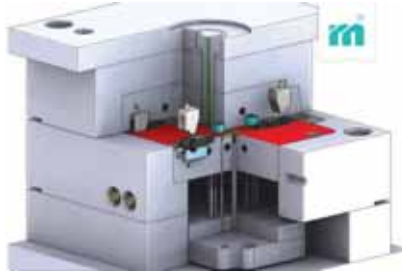
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## Meusburger Presents the smallest ready-to-use slide

**THE** new member of the Meusburger family of compact slide units is the E 3310 TT-Slide unit, which features a compact design. The ready-to-use slide unit reduces overall costs during design and tool manufacturing. In addition, daily work is facilitated through the compatibility of the components and the direct download of CAD data including installation spaces. Small slide units are in particular demand for complex moulds.

With its compact design, the new TT slide unit offers minimum installation spaces. The term TT comes from the T-guides in the slide and cotter. This type of guide



guarantees optimal force transmission at high injection pressures through the surface contact. The DLC coated slide – out of steel grade 1.2343 with 52 HRC – not only offers a high wear resistance but also best sliding properties. Due to the ESR grade the slides are excellent

for mirror polishing. The supplied buffer stops the small slide safely and precisely, even with the highest dynamics. This function can also be implemented directly in the insert or in the cavity plate to save space, which makes previously unrealisable projects such as slides in change moulds possible. In addition, the slide and guide can be installed and removed together. The new TT slide unit is available with slide surfaces 12x10 mm and 15x12 mm. The CAD data is immediately available for download and additional installation spaces can be generated.

## Milacron's success continuous in Low Pressure Injection Moulding (LPIM) Structural Foam machines

**MILACRON** Holdings Corp. (NYSE: MCRN), a leading industrial technology company serving the plastics processing industry has seen demand increase for its industry-leading Low Pressure Injection Moulding (LPIM) Structural Foam machines following a successful NPE 2018 in Orlando, FL. Milacron had a dedicated space

in the NPE booth focusing on LPIM technologies and large part moulding. An eye-catching display showed a replica platen of the massive Cincinnati 6,750 ton machine sold to 20/20 Custom Moulded Plastics of Holiday City, OH.

Owing to 20/20's successful long-standing relationship with Milacron, at the NPE 2018 trade show they entered into an agreement with Milacron to refurbish and upgrade two of their existing 400 ton LPIM machines to 500 ton LPIM machines, and one of their 500 ton LPIM machines to 750 ton LPIM machines. 20/20 is also having Milacron rebuild and upgrade five of their 750 ton LPIM machines. The machines will undergo a complete remanufacture and rebuild process at Milacron's Batavia, OH manufacturing plant and be returned



like new machines. In total, Milacron is currently rebuilding 8 LPIM machines as well as four HPIM machines as well. "Milacron's commitment to the LPIM side of the industry, their quality, performance, and service is second to none and is the reason that we made this decision to have them rebuild and upgrade this equipment," said Ron Ernsberger, President 20/20 Custom Moulded Plastics.

Ernsberger added, "Milacron worked closely with our entire team at 20/20 to identify the upgrades to the existing machines to be rebuilt that will put these machines above today's current machine specifications and give us the widest capabilities for these size machines in the industry. Ernsberger continued, "We also had Milacron integrate some proprietary

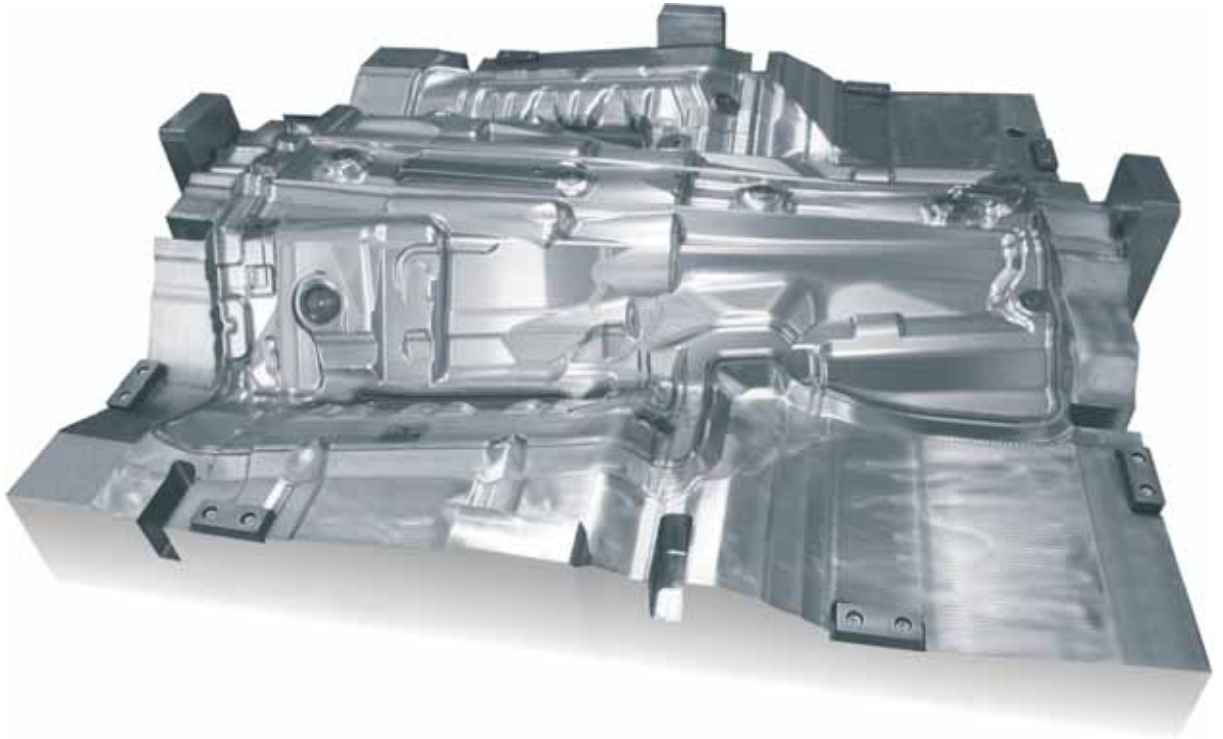
technologies into their machines that allow us to have the most versatile LPIM Structural Foam machine fleet in the custom moulding market. It's a great partnership between the companies, as all equipment at 20/20 CMP is 100% Milacron."

Milacron CEO Tom Goeke stated, "Stories like 20/20's machine retrofits reinforce the fact that Milacron has an unrivaled aftermarket offering. Our aftermarket offerings aren't only spare parts, we can literally take an older machine and transform it to like new condition. Milacron has set the standards, driven innovation and led the industry in Multi-Nozzle Low-Pressure Injection Molding Technologies for more than four decades. These machines can be used for Structural Foam, Structural Web, Gas Assist, Solid Molding, or combinations of these technologies depending on the application." Goeke added, "The LPIM market is strong for our customers that require either new or rebuilt machines in both North America and Europe, and we have a number of solid inquiries both domestically and internationally including many from Latin America and India."



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## Number of women in auto manufacturing witnesses steady rise

**WOMEN** today are making their presence felt on shop floors in making scooters, cars, tractors, and trucks too with companies like Tata Motors, Mahindra & Mahindra (M&M), Eicher Motors, Hero MotoCorp and Bajaj Auto seeking to accelerate the drive of gender diversity.

Four years ago, Tata Motors started with a batch of just five women with an aim of “creating a brigade of ‘Women in Blue’ by enrolling, educating and skilling girls, especially from economically deprived areas”.

Today, the company boasts of 1,812 women employees working on its shop floors, which is about 4% of the total shop floor workforce (as on July 31, 2018), across its different plants.

“At Tata Motors, we strongly believe that what’s good for women is good for society and what’s good for society is good for business,” Tata Motors Chief Human Resources Officer Gajendra Chandel told PTI in an e-mailed response.



He said the company has taken certain internal targets to promote diversity positively balancing the same with meritocracy.

M&M is not far behind. The company's automotive division began with 23 in 2016 and today it has over 380 women across all its manufacturing plants, while the company's farm division and subsidiary Swaraj employs over 250 women on the shop floor.

Likewise, Royal Enfield, the two-wheeler division of Eicher Motors, runs an entire engine assembly line with women workforce of approximately 140. Two-wheeler market leader Hero MotoCorp too had

embarked on Project Tejaswani with an aim of introducing women in shop floor and today the company has 160 women working in various roles in assembly operations at its different factories.

In an e-mailed response, Royal Enfield said the percentage of women workforce in the plants has been increasing 10 percent year-on-year for the last three years. “The organisation aims to increase diversity on the shop floor to 30 percent over the next five years,” it added.

Rival Bajaj Auto also has ‘Women Only’ assembly lines at its Chakan and Pantnagar plants. In the last four years, its women employee strength has more than doubled to 355 in 2017-18 from 148 in 2013-14.

The slowly increasing population of women on shop floors of automobile companies is a sign of the changing times when gender equality is being stressed upon.

## India seeks Japanese, Korean investment in high-grade auto steel

**INDIA** has requested Japanese and South Korean steelmakers to step up their investments by building new plants in the south Asian country to produce high-grade automotive steel, a senior civil servant told Reuters.

India mainly imports the high-tensile steel from Japan and South Korea. However, demand for the auto-grade metal is rising in India as companies such as Hyundai Motor Co ramp up their production to make the country a manufacturing and export hub for small cars.

The Indian government will encourage Japanese and South Korean companies to start greenfield projects in the country, Steel Secretary Aruna Sharma told Reuters in an interview, without giving details. Consultants IHS Markit have forecast that India will become the world's third-largest carmaker by 2020, up from

fifth-largest currently.

Sharma also said state-owned Steel Authority of India Ltd and ArcelorMittal, the world's biggest steelmaker, were “fine-tuning” the terms of their agreements for a \$1 billion automotive steel plant in India.

Billionaire Sajjan Jindal's JSW Group has already tied up with Japan's JFE Holdings to produce 2.3 million tonnes of auto-grade steel. The Ministry of Steel has favoured scrapping the 2.5 per cent import tax on coking coal and ferro-nickel, key steelmaking raw materials, to keep a lid on input costs and Indian steelmakers are importing more coking coal from Canada and Poland to diversify beyond their traditional supplier, Australia, Sharma said.

India's coking coal imports rose 13 per

cent in the year to March 31, with higher purchases from Canada and the United States, largely at the expense of Australia. Sharma said India is talking to U.S. officials about easing quotas and tariff restrictions on Indian steel exports.

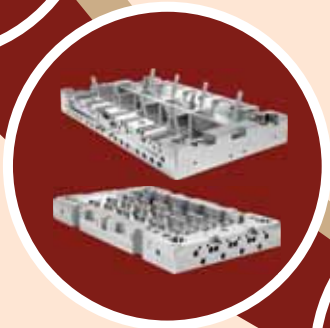
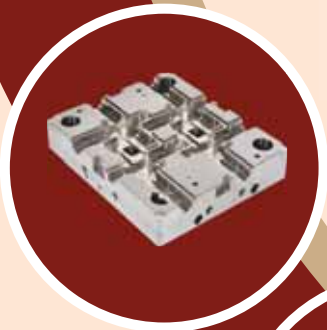
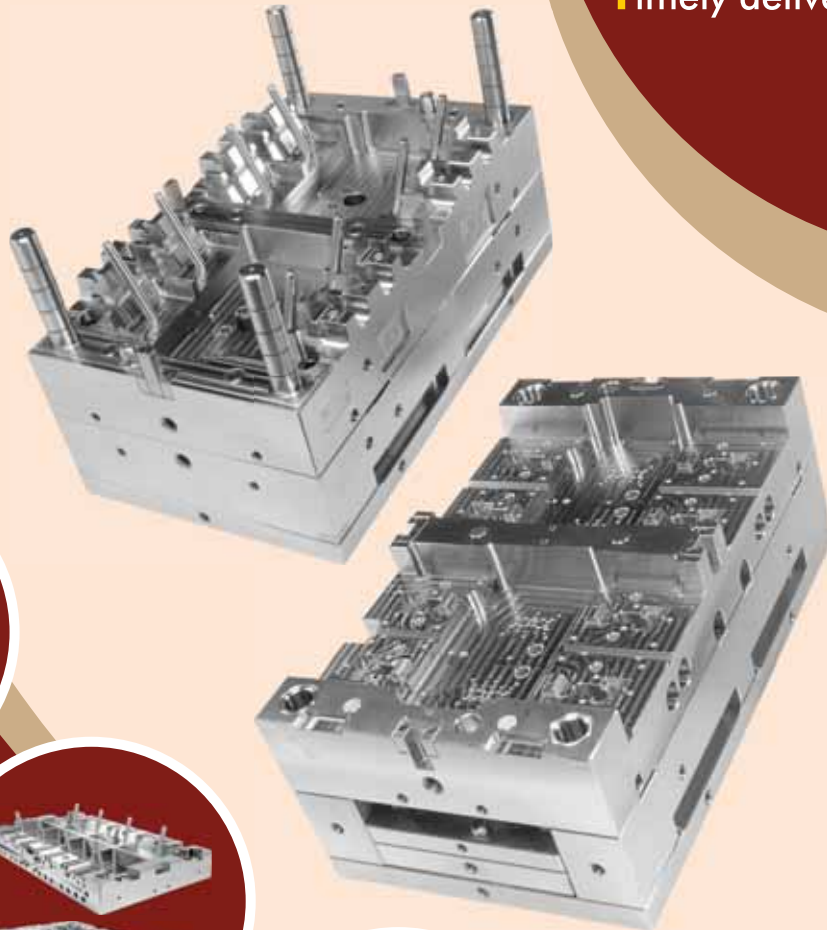
“The United States is open to discussions,” she said. India must have the right to seek exemptions from U.S. tariffs and it must have the liberty to choose the categories that could come under U.S. import quotas if they are enacted, she said.

India will also continue to pursue its formal complaint at the World Trade Organization, where it challenged U.S. tariffs on steel and aluminium, she said. Separately, Sharma said Indian authorities would talk to European Union officials in September to express their concerns over falling steel exports to the bloc.



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## Phillips and EOS conduct seminar on the impact of Additive Manufacturing in investment casting industry

**INDIA'S** leading Machine Tool Solutions provider Phillips Machine Tool India & the global leader in 3D Printing solutions, EOS partnered to organize a seminar on Additive Manufacturing today at Imperial Palace Hotel, Rajkot. The seminar was conducted to explore the possibilities of Additive Manufacturing in the Investment Casting industry.



Titled 'How Will Additive Manufacturing Impact Investment Casting?' the seminar focused on educating attendees about digitizing the pattern making process thus building efficiency and agility to react to the industry needs.

Additive Manufacturing or 3D printing is one of the disruptive technologies changing the entire manufacturing industry scenario with improvement in process and productivity. "Through this seminar, we aim to provide a detailed understanding of using Additive Manufacturing in investment casting. We want more manufacturers to realize the potential of digital transformation, especially in a city like Rajkot that contributes so much to the manufacturing sector in India. By using AM technology, they will be able to enhance their manufacturing processes and improve overall business performance." says Anand Prakasam,

Country Manager, EOS India. "To further catalyse the process of integrating AM, we not only provide our customers with cutting edge technology, but also support them with the expertise of how to utilize AM technology effectively." He added.

Some of the key advantages of using Additive manufacturing in investment casting include the reduction in the number of process steps and lead time, increase in efficiency; a better option for the manufacturing of complex parts; more cost effective as it is a tool-less process, higher degree of accuracy and wider range of materials can be used.

"PHILLIPS Machine Tools India is driven by our mission to partner with our customers and be their most valuable resource in improving competencies in manufacturing technology. Additive

manufacturing offers exciting possibilities and EOS is the undisputed leader in this field. We are happy to partner with EOS in this path breaking technological seminar which is especially relevant to the vibrant city of Rajkot and its innovative industrialists who are always ready to embrace the latest manufacturing techniques and use these to grow their businesses exponentially on a global level."



el." Terrence Miranda, Managing Director, Phillips Machine Tools India.

The seminar was attended by CEOs, R&D personnel, engineers, and casting designers among others from the related industry industries. Other aspects that were discussed include how 3D printing can make an impact in investment casting applications, a comparison between lost wax investment casting vs direct 3D printing and the range of 3D printers available in the market.

## Industrial IoT to surpass consumer space in India by 2020: Report

As the Internet of Things (IoT) adoption picks up in India, sectors like energy and utilities, industrial manufacturing, transport and logistics and agriculture will lead the market and industrial IoT will surpass the consumer IoT space in the country by 2020, a new report said on Wednesday.

IOT can present an opportunity of up to \$12 billion and industrial IOT is expected to consume the higher majority of share when compared to the con-

sumer IOT, said the joint report by The Internet and Mobile Association of India (IAMAI) and Deloitte, released on the sidelines of the "IoT for Smart India" summit here. According to the report, the energy and utilities sector is expected to contribute as much as 25 per cent of the IOT market share, followed by industrial manufacturing sector at 18 per cent by 2020.

"India is well positioned to leverage the power of IoT to create massive growth opportunities

in the country. "We are working closely with the stakeholders to build a vibrant ecosystem that demystifies IoT and works towards developing policy, standards and best practices for IoT connectivity, device protocols, security, mass scale production and cost effectiveness," said Harmeen Mehta, Co-Chair, IoT Committee, IAMAI and Global CIO, Bharti Airtel. One of the key objectives of the draft IoT policy document, released by the Department of Electronics and Information Technology (Dei-

TY) at the summit, is to propel the IoT industry in India to \$15 billion by 2020. The document assumes that India will have a share of 5-6 per cent of the global IoT industry." Given the transformative potential and the significant economic impact IoT can drive for a country like India, IAMAI, together with the industry, has launched a concerted effort towards catalysing the IoT ecosystem in the country," noted Bikram Bedi, Head (India Region) at Amazon Internet Services Pvt Ltd (AISPL).

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## Indian auto component industry grows by 18.3 per cent in 2017-18

**INDIA** has Automotive Component Manufacturers Association of India (ACMA), the apex body representing India's Auto Component manufacturing industry, recently announced the findings of its Industry Performance Review for the fiscal 2017-2018. The automotive component industry that contributes 2.3 per cent to India's GDP and has a share of 4 per cent in India's exports, stood at ₹ 3,45,635 crore (USD 51.2 billion) for the period April 2017 to March 2018, registering a growth of 18.3 per cent over the previous year.

The above data represents the supply from auto component industry (ACMA members and non-members), on-road and off-road vehicle manufacturers and the aftermarket in India along with exports. The data also includes component supplies captive to the OEMs.

by 23.9 per cent in FY 2017-18 to ₹ 90,571 crore (USD 13.5 billion)."

Speaking about the need for government intervention to sustain long-term growth in the auto component industry, Nirmal Minda, President, ACMA said, "The dynamics of the automotive market is undergoing a significant transformation as the industry strives to become compliant to various regulations related to emissions, safety and environment, including the transition from BSIV to BSVI. That apart, key trends such as vehicle connectivity, electrification of vehicles, shared mobility, Industry 4.0 among others are also redefining mobility. To support the changing customer needs and to stay relevant, the auto component sector needs to be encouraged with supportive government policies."

18 per cent will not only ensure better compliance but will also ensure a larger tax base. Further, considering the significant technological changes that the industry is undergoing, there is a critical need for creating a fund to support indigenous R&D and technology creation in the component industry as also for technology acquisition from other parts of the world. Lastly, as we prepare for the introduction of electric mobility in the country, a well-defined, technology agnostic road-map with clear responsibilities of each stakeholder will go a long way in ensuring a smooth roll out as also leading to creation of a local supply base for the same".

### Key findings of the ACMA Industry Performance Review 2017-18:

- Exports:** Exports of auto components grew by 23.9 per cent to ₹ 90,571 crore (USD 13.5 billion) from Rs 73,128 crore (USD 10.9 billion) in 2016-17. Europe accounted for 34 per cent of exports followed by North America and Asia, with 28 per cent and 25 per cent respectively. The key export items included drive transmission & steering, engine components, Body/Chassis, Suspension & Braking etc.
- Imports:** Imports of auto components increased by 17.8 per cent to ₹ 1,06,672 crore (USD 15.9 billion) in 2017-2018 from ₹ 90,571 crore (USD 13.5 billion) in 2016-2017. Asia accounted for 60 per cent of imports followed by Europe and North America, with 30 per cent and 8 per cent respectively.
- Aftermarket:** With increasing vehicle base in the country, the aftermarket in 2017-18 grew by 9.8 per cent to ₹ 61,601 crore (USD 9.2 billion) from ₹ 56,096 crore (USD 8.4 billion) in the previous fiscal.

### Indian Auto Component Industry- Annual Turnover & Growth



Vinnie Mehta, Director General, ACMA said, "The year gone by witnessed an upswing in the overall performance of the vehicle industry, despite it facing several regulatory challenges. The component industry, in tandem, posted an encouraging performance with significant growth of 18.3 percent over the previous fiscal, registering a turnover of ₹ 3,45,635 crore (USD 51.2 billion). Further, exports grew

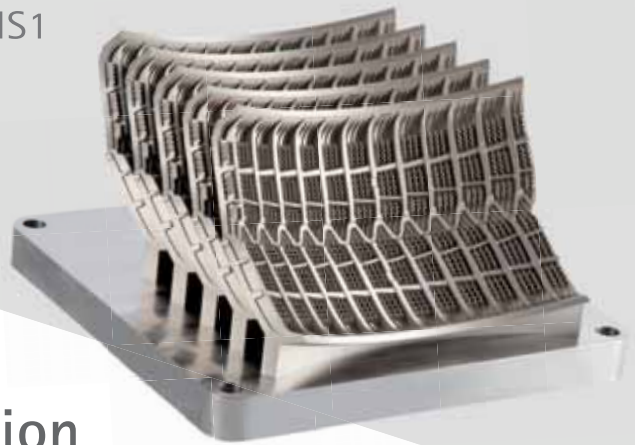
He further added, "One of the key demands of the industry has been a uniform 18% GST rate across the auto component sector; currently 60 per cent of the auto components attract 18 per cent GST rate, while the rest 40 per cent, majority of which are two-wheelers and tractor components, attract 28 per cent. The latter high rate has led to flourishing grey operations in the aftermarket. A benign rate of



# Tire application

Snow tire molding segment

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# Industry 4.0: Manufacturing's Next Move

According to recent reports, there will be 50 billion connected devices by 2020. The Internet of Things (IoT) is spreading its divisions across diligences, organisations, utilities, homes, and almost everywhere. IoT is set to play an important role in the next Industrial Revolution. It will enable a new form of analytics to analyse a massive cloud of dynamic, ever changing information and offer information that can be used for operative and analytical purposes. Its very first and greatest impact is expected to be in the industrial sector, where organised change is more feasible compared to sectors where the consumer is directly involved.

Nishant Kashyap



# In Focus

According to Hemant Kamat, CTO, Shalaka Connected Devices, "IoT is regarded as a disruptive technology and a game changer. It is a network of physical real world objects that can sense information using different sensors, send the information using internet connectivity and perform actions as required. This helps dumb objects understand various parameters and react to stimuli.

## What is Industrial IIoT?

Industrial IoT is termed as IIoT which refers to IoT technologies in manufacturing. IIoT incorporates machine-to-machine communication, machine learning, artificial intelligence and big data technology, harnessing the sensor data and using them for preventive and predictive maintenance. The driving philosophy behind IIoT is that smart machines are better than humans at accuracy, consistency and communicating data.

"IIoT is the next generation of digital technology centered on smartly optimising the industrial processes so as to enable the manufacturers to make the most of the industrial internet revolution," says Sameer Gandhi, MD, Omron Automation, India.

**Process cycle of IIoT:** Collecting data from sensors (things) – decoding this data strategically using big data analytics to turn them into actionable information – presenting this actionable information to the right person at the right time – delivering efficiency by taking corrective action.

IIoT is actually an extension of factory automation and connectivity that has been a part of the manufacturing environment for decades. It is high level automation backed by huge data. These data are then further analysed to make machines intelligent that can take decisions on their own.

"IIoT is a system that incorporates complex machines with high-end software programs and sensors for collecting the real time data and analysing it to increase productivity and reduce operational time and costs," avers Hemant.

## Building blocks of Industrial IoT

The building blocks of Industrial IoT constitutes of Sensing Node (Sensor), Processing Node (MCU), Connectivity Node (Wired/Wireless), Remote Embedded Processing Node and Cloud Computing and Digital Signal Processors. This building block will also have a correspondent at each controller unit, software for each block, security in terms of integrity,

confidentiality & reliability of the data being communicated between the blocks. Built-in hardware security at each node will be an essential requirement.

Says Sameer Gandhi, "This technology is an intricate and fascinating network of products, systems, platforms and applications communicating and sharing intelligence with each other & the manufacturing environment including the people. So it is basically not only making the machines intelligent but also making them communicate with each other and with their operators. This, over a period of time, leads to superior levels of optimisation further leading to real time waste management, economies of scale by bringing down the operating cost and, thus, production of better output which benefits not only the manufacturers but the end users too."

## Applications of Industrial IoT

IIoT has application in every industry in various departments like maintenance, production, design, inventory management, operation and logistics, among others. IIoT enabled device can be used for several industrial applications like monitoring electricity consumption, the viscosity of the material, vehicle tracking, machine health monitoring, detection of harmful gases, raising an alert, detection of sulphur to prevent corrosion, temperature, pressure and humidity monitoring among others. These are just a few hand-picked applications but IIoT has acceptability in almost all the industrial setup.

The technology provides the possibility of achieving extraordinary levels of productivity while constantly assessing risks and relationships. At the core of the technology, currently, are varied smart sensors and PLCs that can connect to the MES/ERP layer facilitating access to real-time information exchange," adds Sameer Gandhi.

Agrees Hemant, "IoT helps to bring in traceability in the manufacturing platform. Traceability is the ability to document the history, location or application of the item. Like for example, operator of the CNC, part machined, duration, time and other information related to the machine during the time of action."

## IIoT in tooling industry

Indian tooling industry's main agenda, at the moment, is to enhance capacity, quality and productivity. With deploying IoT devices they will be able to gather data from their own system and machines which otherwise was not available to them. These data can be further utilised by the management in order to understand their operation faults, quality of the components, quality of the process and production cycle.

Mould manufacturers can witness multiple advantages by implementing smart factory concepts within a mould monitoring system created specifically for production tooling. Such a system consists of three components. A mould monitor— a small, low-cost, battery-powered device that can be installed on a plastic injection mould. It records each time the mould is cycled and calculates average cycle times and efficiency measures for the preceding weeks in advance.

The second device of the system is a press module or a radio frequency transmitter. It is installed on each moulding press and wirelessly communicates with the third component, a 'gateway' that is installed in each moulding facility. The gateway connects via Ethernet to transmit a mould's data in real time to a secure, remote database. From there, customers can log into a website and view information for each mould they have connected to the system. No geographical limitations makes it even better.

Coming to information, the monitoring system can be configured to provide real-time alerts when a mould is not operating within user-defined limits. For example, a user can set required preventive maintenance (PM) intervals and be notified if a mould is approaching required PM or if the mould is overdue for PM. A notes section allows users to record what has been done to the mould during maintenance. Real-time performance measures, like cycle time and efficiency, are also tracked, and users are informed, in real time, if a mould is not performing within the predefined limits.

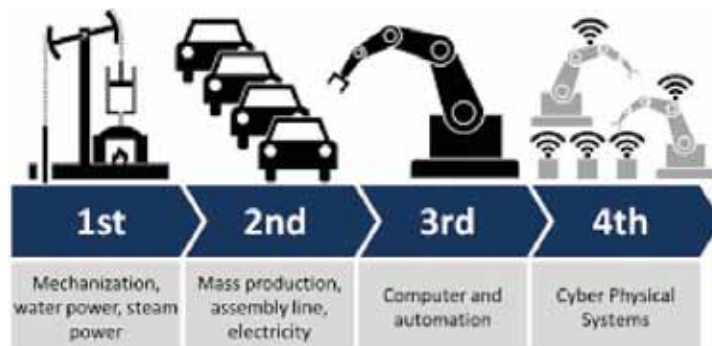
In this system, each mould is a node on a network. Each of these nodes has information that can be acquired. The data that is generated by it is used, in real time, to drive the decisions made by each of the mould's stakeholders. This is the application of Big Data concepts and the IoT to moulds.

These days, the current generation machines such as CNC machines, press, hot runners, etc are equipped with the components of the smart factory.

Thought leaders around the world say the most valued companies will be those that blend digital capabilities and industrial assets. "Introducing IoT flavour in CNC helps increase operational efficiency and increase throughput. This would eventually result in lesser manufacturing cost and better financial margins. IoT helps bring in intangible advantages like predicting machine breakdown and preventing/reducing downtime by taking proper measures. This helps to ensure that machines run at best efficiency and provide the best throughput," says Hemant.

### IIoT can help in:

*Predictive maintenance efficiencies:* Machine break down is the biggest



Stages of industrial revolutions

production cycle of the company and output. Placing sensors in equipment or machines and pairing them with software allows companies to predict when the equipment will fail, and it provides them the opportunity to fix problems well before the breakdown.

*Innovative ways to track and analyse equipment:* While predictive maintenance is a great way to use sensors for the IIoT, several companies are using them for real-time data tracking. Michelin sells some of its tires with embedded sensors to track fuel consumption, tire pressure, temperature, speed, and location in fleet trucks. That data is then sent to cloud service for further analysis.

*Increased revenues:* Even though it's very early to come up with numbers about the increase in revenue or decrease in expenditure on factory maintenance or machine breakdown, the benefits are clearly visible. IIoT helps in increasing efficiency, saving money in maintenance, realising the full potential of the machine and enhance productivity.

Sameer adds, "Imagine an automotive assembly line, which would typically have a few thousand sensors. Now if any of these sensors fail, the entire line could stop working, which will require manual identification and repair/ replacement, leading to non-productive time. With IIoT, Omron is enabling to connect the sensor in a way, wherein we are not only getting information from the sensor but also about the sensor. So we can now look into ambient conditions affecting the sensors and other deeper aspects, allowing us to predict the failure of a sensor before it actually happens."

### India's take on IIoT

The Indian Government's plan to develop 100 smart cities in the country, for which Rs. 7,060 crores have been allocated in the current budget could lead to a massive and quick expansion of IoT in the country. Also, the launch of the Digital India Program of the Government, which aims at 'transforming India into digital empowered society and knowledge economy' will provide the required impetus for the development of the IIoT industry in the country. The various initiatives proposed to be taken under the Smart City concept and the Digital India Program to setup Digital Infrastructure in the country would provide a needed boost to the IIoT industry.

Apart from this, to create awareness and help Indian manufacturers in adopting smart manufacturing



the Government of India (GoI) has conceptualised SAMARTH Udyog Bharat 4.0. It is an Industry 4.0 initiative by the Department of Heavy Industry, Ministry of Heavy Industry & Public Enterprises, Government of India under its scheme on Enhancement of Competitiveness in Indian Capital Goods Sector.

SAMARTH Udyog encompasses manufacturers, vendors and customers as the main stakeholders. The experiential and demonstration centres for Industry 4.0 have been proposed to spread awareness about Industry 4.0 amongst the Indian manufacturing industries. Four centres of Industry 4.0 having a unique identity for spreading awareness and branding have been sanctioned under SAMARTH Udyog. It is emphasized that these centres would have resource sharing, common platform of Industry 4.0 and network each other's resources so that the utilisation of resources is maximised.

Four CEFC (Common Engineering Facility Center) Projects are:

- ▶▶ Kirloskar Centre for Learning in Industry 4.0
- ▶▶ IITD-AIA Foundation for Smart Manufacturing
- ▶▶ I4.0 India at IISc Factory R & D Platform
- ▶▶ Smart Manufacturing Demo & Development Cell at CMTI

Apart from this, programs like 'Make in India' have provided a boost to the investment in the country. While global players are setting up manufacturing facilities in India, more and more Indian conglomerates along with SMEs are embracing automation. This trend will certainly drive the future of the Indian IIoT market.

Department of Electronics and Information Technology, (DeiTY) has come out with a draft IOT Policy document which focuses on following objectives:

- ▶▶ To create an IoT industry in India of USD 15 billion by 2020. It has been assumed that India would have a share of 5-6% of global IoT industry.
- ▶▶ To undertake capacity development (Human & Technology) for IoT specific skill-sets for domestic and international markets.
- ▶▶ To undertake research & development for all the assisting technologies.
- ▶▶ To develop IoT products specific to Indian needs in all possible domains.

The Policy framework of the IoT Policy has been proposed to be implemented via a multi-pillar approach. The approach comprises of five vertical



■ Various components of industry 4.0

pillars (Demonstration Centres, Capacity Building & Incubation, R&D and Innovation, Incentives and Engagements, Human Resource Development) and 2 horizontal supports (Standards & Governance structure).

Talking about the current state of Indian IoT industry, Hemant says, "India has huge opportunities for IoT solution providers like us and we are very excited to be part of this growing IoT ecosystem in the country. Even though this technology is in a very nascent stage in India, we believe in the next 5 years there would be a huge demand for the embedded system, connected devices, cloud platform, data analytics services and high-end sensors among others. We welcome the move of the Indian government to further boost the adoption and development of IoT system in India."

### Future ahead

Experts believe that the Industrial IoT market is going to be bigger than consumer IoT. According to General Electric, by 2020, revenues generated from the IIoT market will be about \$225 billion. In comparison, GE forecasts that consumer IoT will only generate about \$170 billion by that time. This clearly shows the opportunities in IIoT.

With companies investing in IIoT, more devices will be connected to the internet in the coming future and India is not going to be left behind. Indian companies, be it small, medium or large OEMs, have realised the potential of IoT and ready to be part of the growth story.

As Indian mould makers are witnessing huge demand, they should come ahead and embrace the change. Many believe, that the Indian tooling companies are still struggling to increase their capacity, while some of them are yet look beyond the conventional processes. In such a situation it will not be feasible for them to look for smart factory concept which is high level of automation backed by intelligence. However, industry experts unanimously agree that Industry 4.0 is the future and we have to be prepared for it. 🌈

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National Centre for Advanced Industrial Research

 We need to create indigenous IoT devices that are cost effective and reliable 

During an interaction with Nishant Kashyap, **Asim Tewari**, Professor (Mechanical Engineering), Indian Institute of Technology Bombay (IITB) and Professor-in-charge, NCAIR talks about IoT in manufacturing, creating awareness and the need to look at indigenous solutions which can serve the purpose and are cost effective at the same time.



**Q What is IoT and Smart Manufacturing according to you?**

Smart manufacturing is a bigger set of activities as compared to IoT (Internet of Things). IoT is basically a sensing and communication device (with limited computing capabilities), integrated with various sensors to communicate with other devices and share information. On the other hand, smart manufacturing (or as some call it Industry 4.0) is a combination of IoT devices and Machine learning (ML) applied to manufacturing sector.

ML helps to process the data. However, the data will not be useful without domain knowledge of manufacturing science and technologies.

While, IoT comes from electronics and communications, ML and deep learning comes from computer science and mathematics. However, manufacturing is hardcore mechanical engineering, if you don't understand the basics of manufacturing you cannot generate value out of it. So for smart manufacturing to be rewarding, we need to have all these three components in place.

**Q Please tell us about National Centre for Aerospace Innovation and Research Centre (NCAIR) and the solutions you are working on for machining and tooling industry?**

NCAIR essentially works in advance manufacturing technologies. Here we focus on aerospace components machining & composites manufacturing, and metal forming to some extent. Looking at the demand, we added a new group in our centre focusing on smart manufacturing about four years ago. The group was started with an aim to close the gap between conventional and smart manufacturing. Unfortunately, there aren't any definite standards in the industry when it comes to smart manufacturing or Industry 4.0. Every group, company or country is promoting their way of smart manufacturing. We are working to create indigenous IoT devices that are cost effective and reliable.

Industrial IoT differs for each application. For

example, the IoT device required for the Tool and Die industry would be very different from the IoT device required on a CNC machine. In a CNC machine, we may need high frequency vibration and acoustic data on a continuous basis. However, in a forging press, the data acquisition would be less frequent (depending on the press frequency) and would differ in the property it would capture. So, there is not a single IoT that can cater to all the demands, it must be customised as per the application. In that reference we have developed a complete solution to address all the industrial needs in the domain of smart manufacturing. We have designed and manufactured our own IoT devices. The IoT device captures data based on the requirement of the industrial application and runs an embedded program designed for the application. Each IoT device works in conjunction with a backend machine learning algorithm which provides the intelligence (artificial intelligence) to the solution.

**About NCAIR**

National Centre for Aerospace Innovation and Research (NCAIR) is a collaborative consortium of the Indian aerospace manufacturing sector providing research and technology to its members with a vision to create a world class aerospace manufacturing ecosystem in India. It serves as a catalyst for collaboration between Industry, Academia, Research & Development organizations, and Government with an aim to provide economically viable and sustainable solutions to the Indian aerospace manufacturers by promoting Innovation, Knowledge Creation, Entrepreneurship, and Dissemination of know-how. The Boeing company and Hindustan Aeronautical Limited are the founding partners of the center.

**Q What are the various components of smart manufacturing? How can tooling suppliers benefit from IoT and smart manufacturing?**

The definition and use of smart manufacturing differs from company-to-company and country-to-



“For smart factory implementations, the investment does not have to be very high, there are excellent solutions which are very cost effective.”

**Asim Tewari**, Professor (Mechanical Engineering), Indian Institute of Technology Bombay (IITB) and Professor-in-charge, NCAIR

country. At our centre, with our research, we have classified smart manufacturing into four slabs called information control, reactive control, predictive control and prescriptive control.

*Informative control:* The first component of smart manufacturing is to generate information that can be utilised by the management. Informative control does exactly the same. It provides information which otherwise was not available. It helps the management by informing about the health of the machine, the current condition of the shop-floor and the manufacturing status in real time. This stage is all about discovering data and transmitting it to the management.

*Reactive control:* In this level IoT takes control of the machine and reacts to certain eminent signals in real time. In reactive control, the IoT device doesn't really wait for the operator to take any action. For example, if you are working on a continuous caster and there is a breakout, and you have only 0.5 second to stop the continuous caster. You cannot wait for human intervention here, as a small delay will result in metal flow all over the place. This is where reactive control comes into the picture. It makes sensors very important where real time action is required.

*Predictive control:* It is one step before the reaction. A reaction is something that occurs with a certain event. Let's make it simple. When you touch a hot metal, you immediately take your hand off, that's

reaction. But if you are aware of the metal being hot and it might hurt you, you will not touch it or take precautions, that is predictive control. Under this, as the name suggests we predict something before it happens, it becomes very specific to the problem. For example, we can predict tool wear and die finish conditions. I would say tool and die industry can benefit phenomenally by this as it allows the user to foresee a problem before it actually arises.

*Prescriptive control:* Under this, we not only provide prediction but also offer an overall general prescription for the better health of the machine. In this slab, you can possibly suggest the future outcomes and take corrective measures. For example, you have a spindle which has a bearing that is breaking down and has only 100 hours of bearing life remaining. This is predictive control. Prescriptive control will go ahead and tell you the possibilities. For instance, you can now order bearing in advance, but it might take five days to reach your premises (105 hours). But as you know you have bearing life only for 100 hours, with the help of prescriptive control you can run the bearing at a different frequency or RPM to prolong the life of the existing bearing till the new order arrives. All this can be decided by the machine with the help of IoT devices and ML algorithms. This is the ultimate goal of smart manufacturing where machine does the planning.

Currently, in India in 99% of the cases we are not even at informative control. However, there are several high-end machines in the industry that are already equipped with technologies that has informative as well as some part of reactive control algorithm.

## Q Challenges involved in implementation...

Not having a standard process or technology is the biggest hurdle in realising the benefit and implementing smart manufacturing. Standardisation is the need of the hour.

Awareness is also very limited. There are companies coming up with solutions that require huge investment. India being a cost sensitive country,

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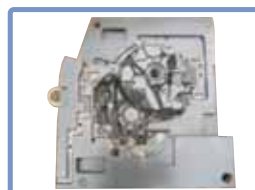
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I feel, there is a need for an indigenous and basic level of IoT device that can serve the purpose.

**Q In India, tooling suppliers are still struggling to enhance capacity, how feasible it is for them to opt for such high-end technologies?**

SMEs in India are facing three challenges—enhancing capacity, quality and capabilities. They need to enhance the capacity while matching the capabilities and qualities of their global counterparts. I would say, all the three things are interrelated.

I believe, they have undercapacity and that's why they are continuously working on the shop floor without conducting any research, pilot study or making any changes in the production. They can not afford to continuously do the same. It's in a way good that they have good orders but somewhere they must realise that they have to opt for futuristic technologies.

This is where such devices could be a non-intrusive way of collecting data without manufacturers really affecting their day-to-day activities. They can deploy such devices in a non-intrusive way and the management can get actionable insight from the data to improve the Overall Equipment Effectiveness (OEE) and decrease downtime. This would, in general, result in improving productivity, quality and capabilities. So, I believe there is a lot that these technologies can offer to SMEs which can help them take deterministic decisions.

**Q What can help these technologies gain popularity?**

It is the most critical part. We need to explain Indian manufacturers what IoT is. There is a notion that it's a very costly affair, which is not exactly true. So, awareness is very necessary, the management needs to be aware what IoT really is and what all it can bring to the table.

Secondly, there is concern regarding investment. For this, as I mentioned before, we need to look at indigenous solutions which can serve the purpose and is cost effective at the same time.

**Q How can a tool room implement these?**

Let's say we have a company that has a tool room that repairs, manufactures and stocks dies. They could implement sensors such as temperature sensors, shock and load sensors in presses which are using these dies. It can help to gather data based on temperature, frequency and load among others. These data will enable to forecast as to what to expect in the near future. Also, with the help of these data companies can understand that with certain temperature or frequency the life of die or mould will change. It will further help to know when the mould repair is required.

Secondly, a company can install an IoT device in their production environment and analyse the operation. With the available information the company will be able to predict losses if any and take corrective measures. For example, with few months data it can know the whereabouts of wear and tear in the mould and that preventive measures to avoid future damages.

**Q What measures can be taken or have been taken to create awareness about IoT?**

The industry, academia and the government will have to work closely to create awareness about IoT. The government is already working towards increasing awareness about smart manufacturing. '*Samarth Udyog*', an initiative by the Ministry of Heavy Industries is one such measure. Under this initiative, they are funding centres that promote activities related to smart manufacturing. There are several initiatives being taken in institutions across India that will definitely help create awareness about these technologies.

**Q What you would like to say to the Indian tooling suppliers?**

For smart factory implementations, the investment does not have to be very high, there are excellent solutions which are very cost effective. We need to think big and bring a change in the way we have been working for years. The dawn of smart manufacturing is upon us, it would be prudent to not ignore it but to embrace it. 🌈



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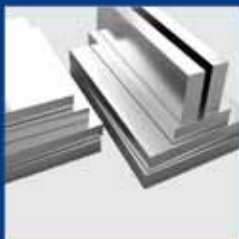
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1. A majority of people (87%) have not heard of the term 'Internet of Things'.
2. ATMs are considered some of the first IoT objects and went online as far back as 1974.
3. By 2008, there were already more internet-connected devices than there were human beings on the planet.
4. One of the first internet-connected appliances was a Coke machine at Carnegie Mellon University. Sensors allowed students to see if the machine was stocked and whether drinks were cold.
5. According to the IHS, there were 15.41 billion devices connected to the internet in 2015. By 2020, IHS expects that number to swell to 75 billion.
6. Machine-to-machine (M2M) connections will grow from 5 billion at the beginning of 2015 to 27 billion by 2024, with China taking a 21% share and the U.S. 20%.
7. Wearable technologies also comprise a large portion of IoT devices. Worldwide in 2016, retailers shipped approximately 28 million connected wearable devices. By 2020, IDC expects annual sales will have reached nearly 90 million units, an increase of 31%.
8. Business Insider forecasts that by 2020, 75 percent of new cars will come with built-in IoT connectivity.



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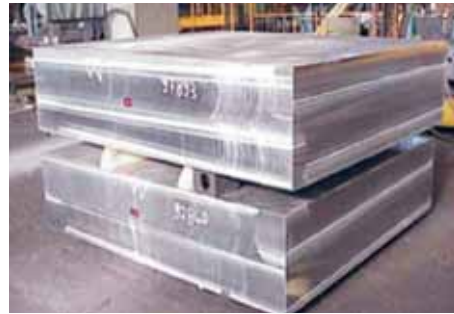
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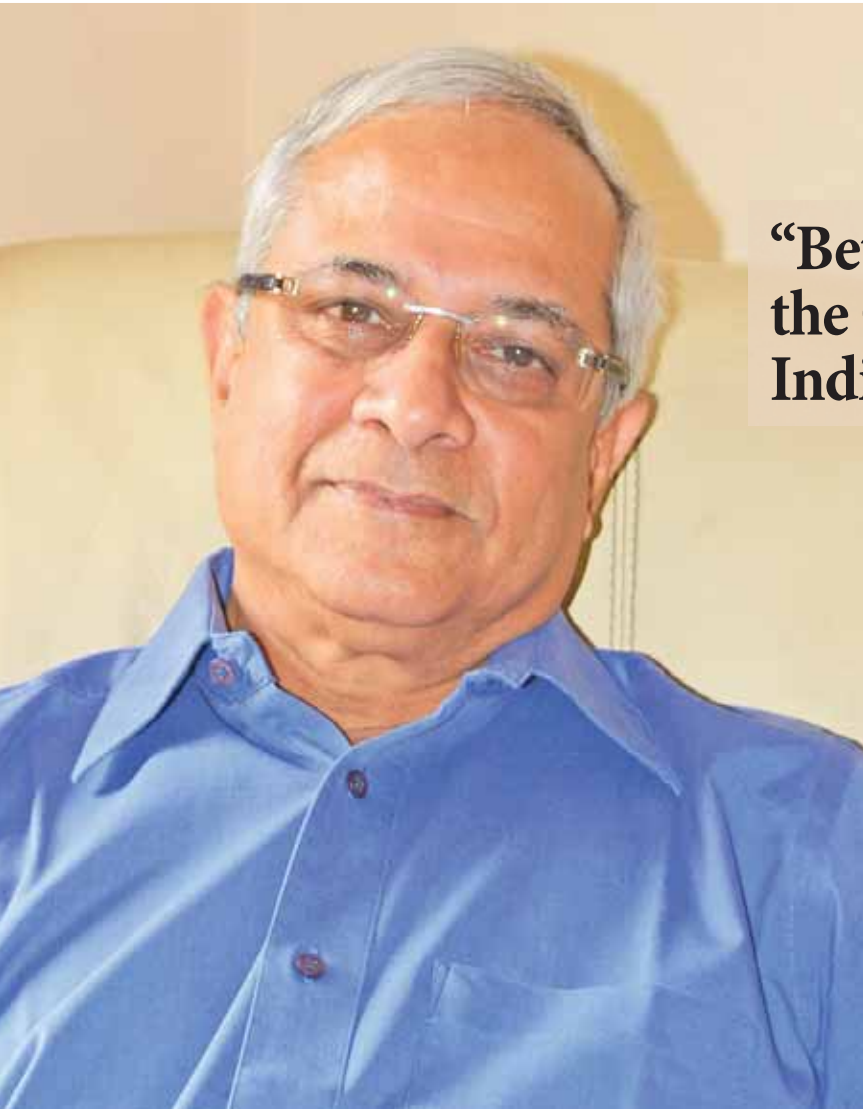
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### “Better hand-holding from the OEMs might help the Indian tool rooms”

OEMs and Indian tool rooms should come under a platform to discuss the need gap. While OEMs can highlight the challenges, they face while sourcing from the Indian tool rooms, the tool rooms can put across their expectations from OEMs and understand their requirement better,” says **Chandramohan Natarajan**, Whole-time Director, Craftsman Automation Ltd, India.

**Q Please tell us about the current scenario of the Indian tooling industry...**

The Indian tooling industry is fast growing backed by the demand coming from the automotive industry. Industries like consumer electronics, home appliances, plastics and packaging are also creating good demand.

However, several tools are still imported. Indian tool rooms are working to transform themselves to match their global counterparts, while they continue to cater to the small and medium scale enterprises. In India, there are only a handful of tools rooms that fall in the revenue bracket of ₹100 - ₹150 crore. For a fast-growing market like India, having only a handful of players with such capacity is something to be worried about.

**Q What are the challenges faced by the tool rooms?**

Unfortunately, the tool rooms do not attract investment from big players. Instead of setting up their own tool rooms these players depend on imports to meet their requirement.

Also, in India, we do not have a proper ecosystem in place which leads to the import of machine tools, softwares and raw materials. Lack of mould steel manufacturers in the country, cost of steel and the commodity price not being stable adds to their woes. On the other hand, if you look at China, the production of steel is much higher, which brings down the cost of their raw materials.

The third and one of the most important factor is

payment. The tool room companies are not well compensated by the OEM's. In other parts of the world, one cannot get the tools without opening an LC, when importing. Whereas in India, at times, the tool rooms do not get paid in advance by the OEMs and have to invest to buy the material.

Producing tools usually takes time, and the payment cycle is so fragmented that the waiting period payment for the tooling supplier is very high. Until all these issues are addressed, the Indian tool room industry will not be able to perform to its actual potential.

**Q Are these the reasons why we do not see many entrepreneurs or young businessmen entering starting their own tool room?**

Most of the tool rooms in India are started by individual, however, very few of them have tasted success. At present, I feel we do not have a conducive environment for the new-age entrepreneurs to set up business in this domain. Very recently, large tool rooms from Japan and some other countries are setting up their base in India, which is a good sign. We will be able to learn a lot from them and the eco-system will also improve; we hope to see several new age entrepreneurs joining the industry in the future.

**Q What can the government do to help the Indian die mould industry?**

I believe the government has done enough in terms of financial support and infrastructure. They have also set up several institutions to help in terms of skill development. Going ahead, the government can increase the import price of the tool and die to support the Indian tool rooms, like what they have done for mobile phones.

As I said, only the OEMs can do something to ensure that the tool rooms are healthy. They are the final beneficiaries of the growing tool room in this country.

**Q Do you expect industries like electronics, consumer goods and home appliance to play a larger role in the tool room industry in the future?**

In this area, we have already lost the competitiveness to China, it's an uphill task now.

**Q How can we ensure a healthy relation between the OEMs and tooling suppliers?**

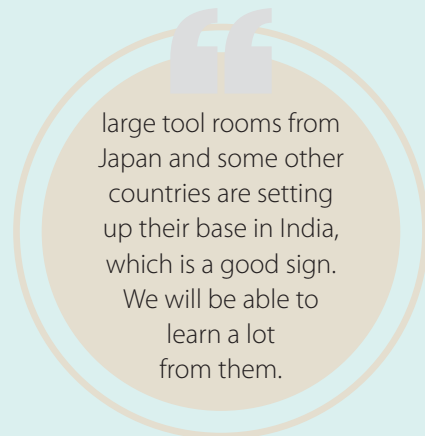
OEMs and Indian tool rooms should come under a platform to discuss the need gap. While OEMs can highlight the challenges, they face while sourcing from the Indian tool rooms, the tool rooms can put across their expectations from OEMs and understand their requirement better

**Q Are the Indian tool rooms capable enough to fulfil the complex demands of the OEM's?**

Talking about technology, yes, we are capable, but we still need to work on the capacity. Capacity will grow when the tool rooms are healthy.

**Q Are the Indian companies embracing futuristic technologies like Industry 4.0?**

I believe, the Indian tool rooms are not ready for industry 4.0. May be a couple of companies are working on the concept but more than 95% of them are not.



Industry 4.0 is the future of manufacturing. However, Indian tool rooms are not there yet. Once they are out of the survival mode everything will happen in its due course. But technologies like Industry 4.0 might not be a feasible option for the Indian tooling industry at present.

**Q Future of the Indian tooling industry...**

I think it is growing at a steady pace. The automotive industry will continue to provide the required boost. We should work together to create awareness about campaigns like Make in India. According to me, the number of foreign players investing to set up their tool rooms in India will witness a rise, leading to a positive business environment. 🌈



**S M Nayak,**  
Asst Vice President – Engineering & Automation Industrial  
Product Group, Godrej & Boyce Mfg Co Ltd

# “IoT can help collaborating each department by getting right data in right time”

## **Q What is smart factory?**

Smart factory is a highly digitized and connected production facility that relies on smart manufacturing. Smart factory means visibility, connectivity and autonomy. Factories have long relied on automation, but smart factories take this concept much further and are able to run without much human intervention using modern technologies. The smart factory systems can learn and adapt in real time, enabling factories become more flexible than ever before.

## **Q IoT in tooling industry**

Extensive use of sensors and devices connects machines and enables visibility into their condition as well as into factory processes, creating an

industrial internet of things (IIoT). Increasingly sophisticated analytics and applications based on AI and machine learning handle many of the routine tasks, allowing people to focus on handling exceptions and making higher-level decisions. In addition, production machines can be used in the manufacturing execution system's local network to receive orders, report progress, access work instructions and interact with quality and traceability systems. Plant floor workers can more readily see important information such as instructions, schedules, quality data, inventory status and demand changes.

## **Q Benefits of IoT in Tooling Industry**

*Digital/connected factory: IoT enabled machinery*



can transmit operational information to the partners like OEMs and to field engineers. This will enable Operation Managers and Factory Heads to remotely manage the factory units and take advantage of process automation and optimisation.

*Facility management:* The use of IoT sensors in manufacturing equipment enables condition-based maintenance alerts. There are many critical tools that are designed to function within certain temperature and pressure ranges. IoT sensors can actively monitor machines and send alerts when the equipment deviates from its prescribed parameters. By ensuring the prescribed working environment for machinery & tools, manufacturers can conserve energy, reduce costs, eliminate machine downtime and increase operational efficiency.

*Production flow monitoring:* IoT in manufacturing can enable the monitoring of production lines starting from the refining process to the packaging of final products. This complete monitoring of the process in (near) real-time provides scope to recommend adjustments in operations for better management of operational cost. Moreover, the close monitoring highlights lags in production thus eliminating wastes and unnecessary work-in-progress inventory.

*Inventory management:* IoT applications permit the monitoring of events across a supply chain. Using these systems, the inventory is tracked and traced globally on a line-item level and the users are notified of any significant deviations from the plans. This provides cross-channel visibility into inventories and managers are provided with realistic estimates of the available material, work-in-progress and estimated the arrival time of new materials. Ultimately this optimises supply and reduces shared costs in the value chain.

*Plant Safety and Security:* IoT combined big data analysis can improve the overall safety and security in the plant. Effective monitoring ensures better safety. Lagging indicators, if any, can be addressed thus ensuring proper redressal Health, Safety, and Environment (HSE) issues.

*Quality control:* IoT sensors collect product data and other third-party syndicated data from various stages of a product cycle. This data relates to the composition of raw materials used, temperature and working environment, wastes, the impact of transportation etc. on the final products. Moreover, if used in the final product, the IoT device can provide data about the customer sentiments on using the product. These inputs can later be analysed to identify and correct quality issues.

## Ways to implementing IoT in shop floor

IoT can be implement in three ways.

1. IoT in production area for monitoring process and equipment utilisation. Tracking each operation and optimising the delivery schedules
2. IoT in maintenance for condition monitoring of equipment's, notification through SMS for faster action
3. IoT in quality for online quality data capturing & control the quality parameter of product to reduce the defects. Under Industry 4.0, massive amounts of data will be available to quality personnel in real-time, and from multiple sources simultaneously, and that data must be used to enable quick, situational decision-making.

### Q Challenges that can be addressed by IoT

*Managing Stakeholder Expectations:* It's always tricky to manage a disparate set of demands, visions and expectations on any project; but it's even trickier in manufacturing. A common problem is that stakeholders tend to set unrealistic deadlines and make unreasonable demands.

*Ownership:* A project has many different departments involved during the project lifecycle,

from market research, R&D, production to sales, marketing and distribution. And for the project to be delivered successfully these departments need to collaborate instead of operating within each of their silos. IoT can help collaborating each department by getting right data in right time.

*Managing Supply Chain Complexity:* Adding contractors, vendors and additional third parties to the production process increases the risk of error and miscommunication. Not only do you have production work occurring in different locations by different teams, each team might be using their own tracking software for their scope of work. With implementation of IoT, all these can be monitored in single platform.

*Environmental concerns:* Manufacturing is inherently a harsh environment, so ensuring the safety and health of workers with proper care and equipment is of crucial importance. Disposing of waste products and recycling programs for scrap and returned materials add costs and complexity to manufacturing.

*Balancing maintenance with throughput:* Keeping equipment functioning is an essential part of running a manufacturing facility. Adopting IoT for condition monitoring & use it for regular preventive maintenance, including replacing worn wires and cables, can help increase throughput and ensure customer satisfaction with delivery lead times.

### **Impact of smart factory in overall quality of end products**

The self-optimization that is characteristic of the smart factory can predict and detect quality defect trends sooner and can help to identify discrete human, machine, or environmental causes of poor quality. This could lower scrap rates and lead times, and increase fill rates and yield. A more optimised quality process could lead to a better-quality product with fewer defects and recalls.

### **Q What can the government do to spread awareness about IoT?**

- Focus support around network features, maintenance and cyber security for Building Management Systems.
- Alter the curriculum and drive its vision across educational institutions. Enable and support students, in using IOT devices as part of their curriculum.
- Encourage & support industries on the use of cloud services in the IoT environment.

- Continue to raise awareness on the security and privacy aspects of IoT.
- Provide a detection and mitigation system around IoT and cyber security.
- Encourage infrastructural investments in rural India. The aim to connect India's 2.5 lakh village digitally is a step in the right direction.

### **Q Hurdles in adoption of IoT in India...**

*Security:* As more people and companies get on the IoT network, there would be a significant amount of critical data passing from one device to another. With more connectedness comes an even more serious security threat and it is not clear if we have what it takes to contain it efficiently.

*Lack of uniform standards:* Lacking in data, security, integration and wireless protocols. It will be a key deterrent as IoT systems mainly target environments with a heterogenous mix of technologies. It will take some time for a de-facto industry to emerge. Conflicting standards can inhibit innovation as resources would have to be diverted from product innovation to managing unanticipated and varied compliance requirements.

*Low business justification:* At present, we see that there are concerns related to demand and supply economics of IoT. For OEMs, the business justification is improvement in equipment design and a corresponding increase in market share, followed by increase in revenues for services after sale. For end users, the business justification is in avoiding unplanned downtime and revenue losses due to equipment related issues. For all other sectors, such justification is not clear.

*Limited internet connectivity:* The Internet is the backbone on which India's IoT will be rolled out and the IoT-aspiring businesses are no exception. Already, there is a huge urban-rural divide in the availability of functional internet. As digital India's goals keep getting pushed down the years, Indian IoT dream would also remain unfulfilled.

*Lack of skilled workforce:* IoT being a new technology, the gap is likely to be even more. Since a successful implementation of IoT systems involves cutting edge expertise in big data, cloud and security. What's the use of churning out Engineers year after year without seeing that they are also going to be gainfully employed? It makes sense for the Government to alter the curriculum and drive its vision across educational institutions. 🌈



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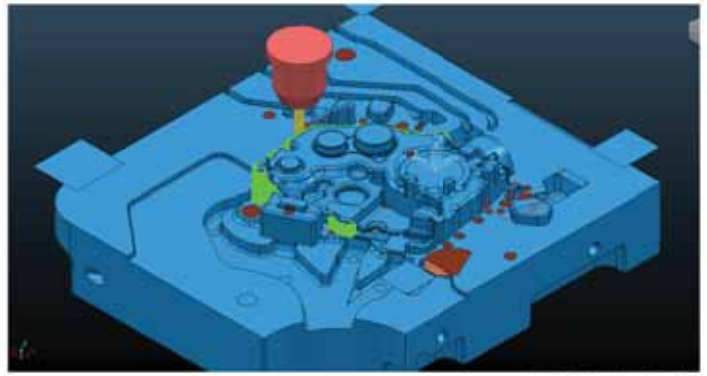
“We started a company under the name Pars Industrial Works in 2002 and were handling small jobs from clients in and around Tamil Nadu and Sri Lanka. As we saw an increase in the revenue, we registered a Private Limited company, Pars Tekhnologies Pvt Ltd in 2006,” said lyappan.

The road was not easy for lyappan, as the industry was plagued by recession in 2008. Very soon the other three co-founders left the company one-by-one, but this did not deter lyappan. The hard work paid off and he sailed through the tough time while taking up small projects. Things started getting better after 2010, that’s when he decided to invest in a new Vertical Machining Centre (VMC) and design & manufacturing software.

Keeping this in mind he visited IMTEX exhibition 2011 held in Bengaluru and invested in a VMC from DMG MORI. During this visit he also came across the solutions provided by Autodesk. Satisfied with the features of Powershape® and Powermill®, he purchased the software even before the VMC could reach his premises.

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**Mr. P.IYYAPPAN MOHANRAJ**  
**Director, Pars Tekhnologies Pvt. Ltd.**



## The Challenge:

The manufacturing industry has been introduced to several new technologies that triggered various innovations in the production process. The industry is constantly growing giving rise to the development of more complex geometries and cutting down the product development cycle. To reduce the time-to-market, customers are inclined towards vendors who can provide solutions at one go in a desired time-line.

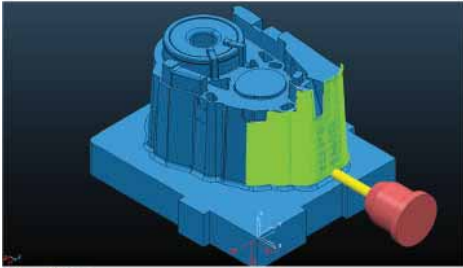
In-line with the industry trend, Pars Tekhnologies, too, started receiving such enquiries and some of them converted into orders. Though the company had the right skill set, lyappan knew that there was a requirement for the right design and manufacturing software.

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Pars Tekhnologies was facing issues like:

- Handling complex geometries: There was demand for large mould manufacturing with micron level of accuracy. It was difficult using the then existing software or conventional methods.
- Achieving timely delivery: Designing and programming process was time consuming for Pars Tekhnologies with conventional methods and other software.

- Reducing rejections (time and cost): There were times when the customers sent the product back for correction after inspection, which is very common in the industry. This not just increases the time taken but also impacts the overall development cost.



### The Solution

To cater to the industry demand and enter new markets there was only one way demands, investing in the right technologies. One of the investments that Pars Tekhnologies is happy about is Autodesk Design and Manufacturing software.

In case of complex projects that demand accurate surface finish, predicting all factors determining the final quality of a part is often possible only after carrying out a series of analysis.

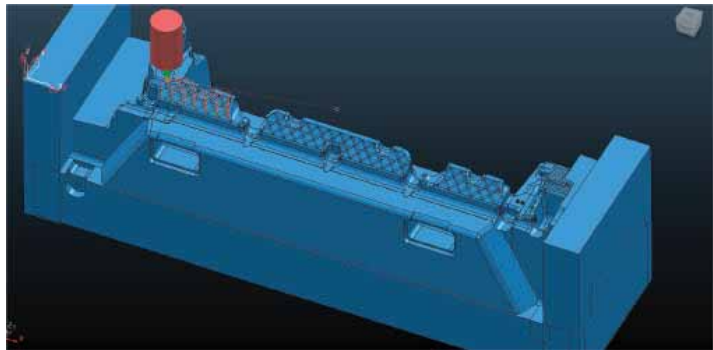
Collision and gouge checking options in Powermill® help to analyze tool gouges, holder collisions and machine tool collisions. With the detailed list of issues documented in the software that allows fixes to be made on a case-by-case basis, it's very simple to generate a safe program in Powermill®. Talking about the feature, senior programmer of Pars Tekhnologies said, "Earlier, I was not able to calculate the collision and gouges accurately or select the appropriate tools and holders, now with the help of Collision Analysis check in Powermill®, I am able to select the best tool with optimal machining parameters and can also easily check if the toolpath can safely run on the selected machine tool."

Pars Tekhnologies also used the finishing strategies extensively. High-speed finishing requires constant tool loading and the fewest possible sudden changes in direction. To meet these requirements, a combination of strategies is necessary. Powermill has several strategies for high-speed machining which results in smooth and consistent cutting conditions required to ensure rapid stock removal and excellent surface finish.

"The software automatically selects all the flat areas

in the mould and finishes it, so I don't have to select or pick any flat areas manually," said the Programmer. "Another feature which is very useful for us is 'Vortex Strategy'. Compared to the conventional high-speed roughing method, we were able to reduce a minimum of 60% of our roughing time using Vortex technology available in Powermill. We use this very extensively by using solid carbide cutters."

The Vortex area-clearance strategy produces safe toolpaths with a much deeper cut by using a controlled engagement angle that maintains the optimum cutting conditions for the whole tool path. As a result, higher material-removal rates are possible in less time.



### Complex Projects

Pars Tekhnologies has handled various challenging projects; however, there were some projects which were extremely demanding. This is where Autodesk software helped the team.

#### Pressure Die casting mould:

The company had received a project to manufacture pressure die casting mould from Dietech India Pvt Ltd. The mould was for one of the major Japanese automotive manufacturers for their plant in Indonesia. Talking about the project Iyappan said, "The complexity of the profile and size of the mould coupled with aggressive delivery time of seven days was very challenging."

Since the mould was large and complex, maintaining the same tool overhang in a specific finishing tool path was not sufficient. "There were few areas where we needed tool overhang of 20 mm and there were some areas where we had to hold 2-3 mm overhang

If there are sharp corners, flash will appear into sight in the end product. There was very minute radius that was to be achieved as well. With the help of Powermill's efficient finishing strategies we could overcome these challenges,"

**Mr. P.IYAPPAN MOHANRAJ**  
**Director, Pars Tekhnologies Pvt. Ltd.**

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for the same diameter tool. Calculating different tool overhangs precisely for complex 3D profiles are not possible manually. We used collision checking option in PowerMill® and used variable tool overhang precisely with optimal feed rates for machining," added the Programmer.

Plastic moulds: The mould was supposed to be very precise and the sharp corners had to be maintained in certain places. Maintaining the sharp corners and minute-radius were a challenge in this project. "If there are sharp corners, flash will appear into sight in the end product. There was very minute radius that was to be achieved as well. With the help of Powermill's efficient finishing strategies we could overcome these challenges," says lyappan.

**By using Powermill® and Powershape®, Pars Tekhnologies is able to handle complex geometries and reduce the delivery time by 30%.**

### The Result

By using Powermill® and Powershape®, Pars Tekhnologies is able to handle complex geometries and reduce the delivery time by 30%. With a vast library of strategies and features like rapid toolpath calculation, high-efficiency roughing, toolpath editing and optimization the company has been able to do unmanned machining.

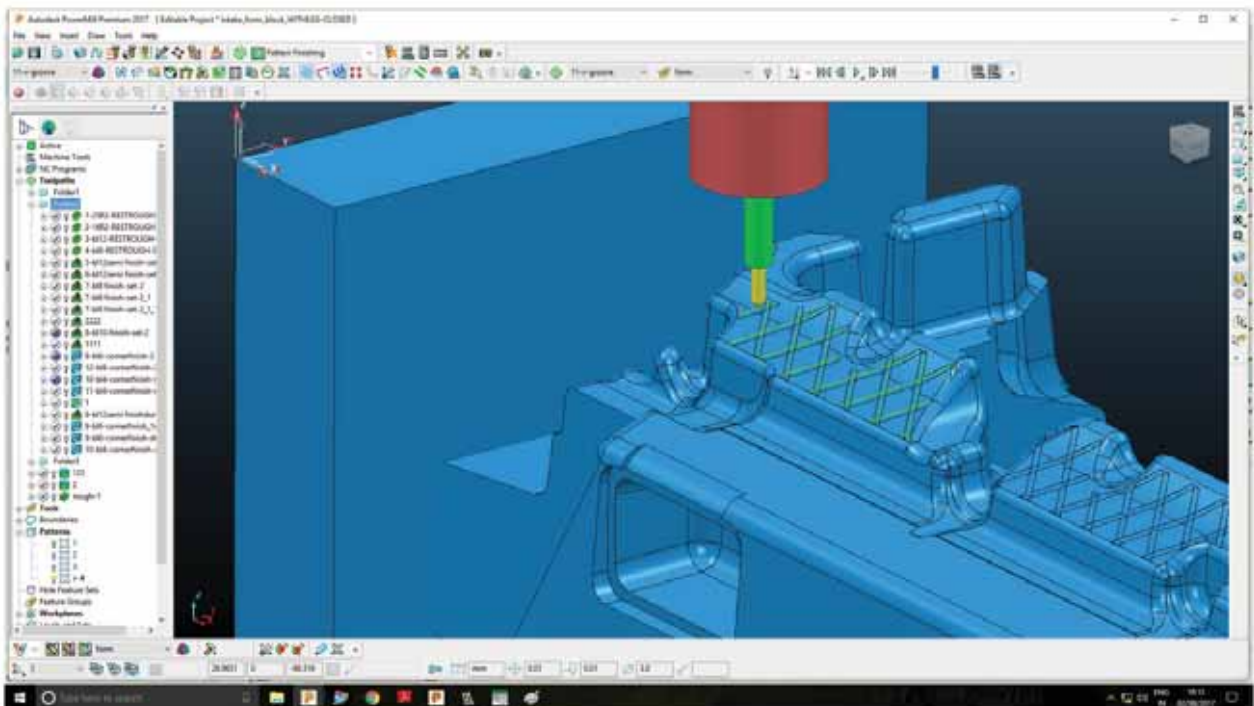
Earlier, I was not able to calculate the collision and gouges accurately or select the appropriate tools and holders, now with the help of Collision Analysis check in Powermill®, I am able to select the best tool with optimal machining parameters and can also easily check if the toolpath can safely run on the selected machine tool."

**Senior Programmer  
Pars Tekhnologies Pvt. Ltd.**

"I have used other CAD/CAM software and I can say that the CNC Program generation and design time is very less in Autodesk software, also it is very user friendly," added the Programmer.

After achieving considerable reputation in manufacturing complex automotive moulds, the company is now looking to foray into aerospace components. "The real benefit of Autodesk software is that our Designer, Programmers and Operator are confident to handle complex geometries, parts rejections have reduced drastically, we are able to achieve micron level accuracy and have gained the confidence of our customers," concluded lyappan with a smile.

With a strategy that emphasizes customer service, Pars Tekhnologies has immeasurably improved its ability to make smarter decisions and deliver better products, and thereby is well-placed to venture into more challenging industries like aerospace and medical. 🌈



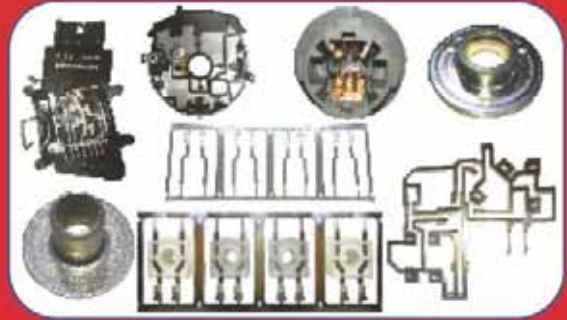
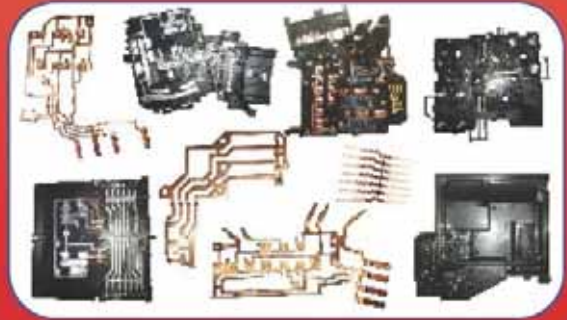
All Images courtesy: Pars Tekhnologies Pvt. Ltd.



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## KOMET® GROUP innovates cutting tools using metal 3D printing technology

**K**OMET® GROUP is using Renishaw metal additive manufacturing technology to produce new ranges of innovative cutting tools. As well as allowing special cutters to be produced more quickly, the use of additive manufacturing enables more complex shapes to be generated, both for the external shape of the tooling and for the internal cooling channels.

### Background

Germany's KOMET GROUP is one of the world's leading suppliers of precision cutting tools and has supplied innovation to the machining industry for almost 100 years. The Group, which has its headquarters in Besigheim, currently employs more than 1,500 people, including its subsidiaries, and is represented in around 50 countries.

KOMET GROUP is a global technology leader in the fields of high-precision drilling, reaming, milling, threading and process monitoring.

In addition to developing, manufacturing and distributing high-quality premium products, the company uses its years of technical know-how to analyse customers' production processes, right down to the smallest detail, and then develop tailored solutions to help them achieve greater efficiency for all stages of their machining.



Image Credit: KOMET GROUP

KOMET JEL screw in cutter.

### Challenge

With such a strong focus on innovation and continuous development, it was perhaps inevitable that KOMET GROUP staff would come up with some tooling designs that were too expensive, or even impossible, to make with conventional manufacturing methods.

As a result, Dr. Reinhard Durst, Research and Development Manager for hard metal tools at KOMET GROUP, has been investigating the potential of additive manufacturing for tooling production and the equipment available on the market for several years.

### Solution

"We are aiming for a win-win situation," explained Ralph Mayer, the manager responsible for additive

Dr. Durst has been working with Renishaw for the last year, "because its offer has convinced us from a technical as well as an application point of view." This transfer of knowledge and know-how is inherent throughout Renishaw's new and growing network of Additive Manufacturing Solutions Centres. Before buying the machine outright, customers can lease the latest Renishaw equipment at a Solutions Centre and work independently on their projects. Renishaw staff are always available to provide advice on the use of the machines. In this way, potential customers can familiarise themselves with additive manufacturing technology, with expert help on hand, and discover how it might meet their specific requirements, without the need for a large up-front investment.



Dr. Reinhard Durst, R&D manager for hard metals, KOMET GROUP

manufacturing services at Renishaw GmbH. "With our support, the customer shortens their learning curve and reduces the number of potential mistakes to a minimum. We only raise the question of purchasing a system when the customer is clear that it will provide added value for them. At the same time, we gather valuable information about the needs of the industry, which we can use to develop our machines and technology further."

"Parts produced with additive manufacturing can reach an up to 99.9 percent consistent structure, just like rolled or cast metal components," explained Mr. Mayer. "However, the correct strategy must be applied for every component. Our strength lies in our skill in analysing the technical challenges of our customers' components and working with our customers to find the most effective solution."

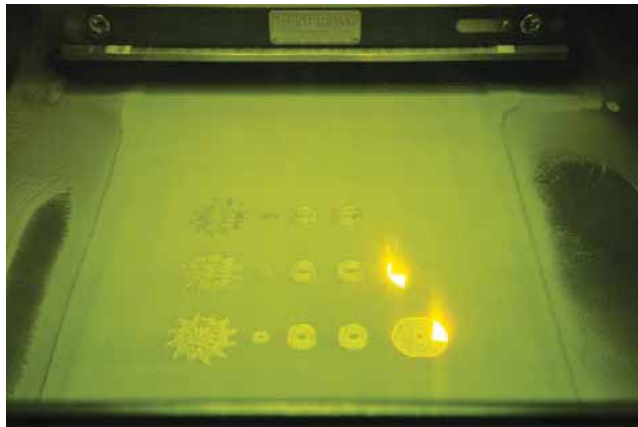
Renishaw's metal additive manufacturing system uses laser powder bed fusion technology in an inert argon atmosphere. An extremely thin bed of metal powder is laid down and areas that will form the component are melted using a high performance ytterbium fibre laser and then solidified on cooling. This process is repeated with layers of metal powder, typically between 20 and 60 µm thick, until the part is finished. The thinner the layers, the better the accuracy and surface quality of the finished part.

## Results

The first of the projects handled jointly between Komet and Renishaw was the development of a new range of PCD (Poly-Crystalline Diamond) screw-in milling cutters. The main bodies of the cutters are manufactured on a Renishaw metal additive manufacturing system, with multiple bodies produced during each cycle of the machine, and then fitted with PCD blades and screwed onto their tool holders.



Multiple AM cutter parts produced on a single build plate.



Renishaw laser powder bed fusion technology

The use of the Renishaw technology to manufacture the tools allows geometries to be produced that would be almost impossible by conventional means. "Thanks to the additive process we have been able to place many more PCD blades on each tool," explained Dr. Durst.

"We have changed the arrangement of the blades and achieved a substantially greater axis angle. Compared to conventional milled tools, we have greatly shortened the grooves. These changes mean that the tool is a lot more productive for the user." For example, with a 32 mm screw-in head, the number of grooves and blades has been increased from six to ten, achieving a feed rate that can be up to 50% higher.

In addition, the ability to optimise the paths of the coolant channels ensures that each cutting edge is supplied precisely with coolant through a separate channel, while the external design of the bodies helps to ensure that chips are removed reliably from the face of the tool.

AM also offers the potential to reduce component weight since material can be used only where it is necessary for the optimum functionality in the component. It also outperforms conventional production methods in terms of delivery time for any special or experimental tools needed by Komet's customers.

"The ability to freely design the internal and external tool geometry alone means that excluding this additive process from our future plans would be inconceivable," predicted Dr. Durst. "It gives us the ability to increase tool performance and productivity to such a great extent that it creates considerable added value for our customers."

Dr. Durst considers the decision to work in partnership with Renishaw to be fully justified. "It is not easy for a company that is new to metal additive manufacturing technology to work out the best laser parameters on its own," he claimed. "Renishaw has contributed a wealth of knowledge to help us find the parameters that are needed to produce a good tool. The new design freedom from additive manufacturing technology and the cooperation with Renishaw is helping us to develop even more innovative tool solutions." 🌈

Author: Wolfgang Klingauf

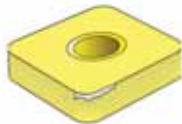
# 8 Common Insert Failures and How to Address Them

If you don't know much about insert failure and its negative impact on your manufacturing equipment, it's similar to an athlete exhausting a good pair of running shoes. Much like a shoe under the weight of the runner wearing it, an insert endures tremendous stress over and over again; creating wear and tear. If not addressed, wear can cause pain for an athlete and inaccurate processes or poor productivity for a manufacturer.

Manufacturers, however, can analyze their used tooling to achieve maximum tool life and predict tool usage; thereby maintaining part accuracies and reducing equipment deterioration. By understanding the various mechanisms (listed below) that contribute to insert failure, you can take the appropriate course of action to ensure optimal cutting performance at all times.

## Flank Wear

Normal flank wear, which occurs uniformly, is the most predictable of all failure mechanisms because it is largely due to normal abrasion. Similar to a jackknife blade that dulls over time, flank wear happens over time as the work material wears the cutting edge.



Rapid flank wear, on the other hand, happens faster, especially when cutting abrasive materials, such as ductile irons, silicon-aluminum alloys, high temp alloys, heat-treated PH stainless steels, beryllium copper alloy and tungsten carbide alloys, as well as

non-metallic materials, such as fiberglass, epoxy, reinforced plastics and ceramic.

You can reduce rapid flank wear by lowering your cutting speeds or, better yet, using a more wear resistant, harder or coated carbide grade.

## Cratering

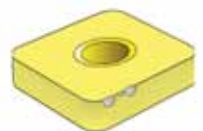
Cratering is a heat/chemical problem that often occurs when machining iron or titanium-based alloys because the tool dissolves into the workpiece chips.



You can avoid cratering by using a coated grade (preferably coatings with aluminum oxide), applying coolant, utilizing a freer cutting geometry to reduce heat, increasing lead angle, and reducing cutting speeds and feeds. The last corrective action can be counter-productive so it should only be used as a last resort.

## Built-up Edge

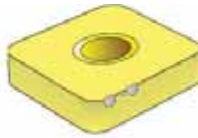
Built-up edge occurs when fragments of the workpiece are pressure-welded to the cutting edge. This failure mechanism commonly occurs with gummy materials, low speeds, high-temperature alloys, stainless steels and nonferrous materials, and threading and drilling operations.



You can control built-up edge by increasing cutting speeds and feeds, using nitride (TiN) coated inserts, applying coolant, and selecting inserts with force-reducing geometries and/or smoother surfaces.

### Chipping

Chipping originates from mechanical instability often created by non-rigid setups, bad bearings or worn spindles, hard spots in work materials, or powder metallurgical (PM) materials.



You can deter chipping by ensuring proper machine tool set up, minimizing deflection, using honed inserts, controlling built-up edge, and employing tougher insert grades and/or stronger cutting-edge geometries.

### Thermal Mechanical Failure

A combination of rapid temperature fluctuations and mechanical shock can cause thermal mechanical failure. It is most often experienced in milling and interrupted-cut turning, facing operations on a large number of parts, and operations with intermittent coolant flow.



You can prevent thermal mechanical failure by applying coolant correctly or, better yet, removing it from the process completely, employing a more shock-resistant grade, and using a heat-reducing geometry.

### Edge Deformation

Heat and pressure are two sources of edge deformation, which commonly occurs with high-heat operations, high speeds and feeds, or machining hard steels, work-hardened surfaces and high-temperature alloys.

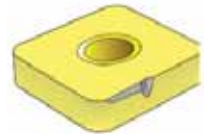


You can control edge deformation by applying coolant, using a more wear-resistant grade with a

lower binder content, reducing speeds and feeds, and employing a force-reducing geometry.

### Notching

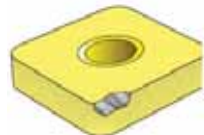
Notching happens when there is a difference in hardness or abrasiveness within a workpiece. It often occurs in materials with surface scale or oxidation as well as work-hardened, cast and irregular surfaces.



You can control notching by varying the depth of cut when using multiple passes, using a tool with a larger lead angle, increasing cutting speeds when machining high-temperature alloys, reducing feedrates, carefully increasing the hone in the depth-of-cut area, and preventing build-up, especially in stainless steel and high-temperature alloys.

### Mechanical Fracturing

Mechanical fracturing occurs with any kind of excessive wear. Therefore, when the mechanical load is great enough, the insert breaks during the first moments of a cut.



You can avoid mechanical fracturing by correcting all other failure mechanisms besides normal flank wear, utilizing a more shock-resistant grade, selecting a stronger insert geometry, using a thicker insert, and reducing feedrates and/or depth of cut. 🌈

### Author details:



Don Graham is the manager of education and technical Services for Seco, responsible for all educational activities for the NAFTA market, new product testing and various other technical functions. Outside of work, he enjoys making maple syrup, restoring antique

tractors and farming. Don can be reached at [dgraham@secotools.com](mailto:dgraham@secotools.com).

# TAGMA and MAZAK organises seminar on 'Latest Trends in manufacturing'

Leading CNC manufacturer Yamazaki MAZAK and Tool and Gauge Manufacturers' Association (TAGMA) jointly organised a seminar, 'Latest trends in manufacturing'. Held on August 23, 2018 at Vasai in Mumbai, the event aimed to bring together the tool and die makers in the nearby areas. The event highlighted the latest technologies available for die mould manufacturing. Technologies like complex surface finish machining solutions, Industry 4.0 and additive manufacturing solutions formed a major part of the seminar.



The event started with the national anthem followed by a welcome note by Paresh Panchal, CEO, CAM Tools India Pvt Ltd and Sunil Desai, Director, Director, Designcell CAD/CAM Solutions Pvt Ltd and Partner, SubAero Precision Machining.

Going ahead, DK Sharma, President, TAGMA, highlighted the opportunities available in India and initiatives taken by TAGMA to bring together the die mould professionals for larger good.

"As tool makers, we are blessed with great business prospects available in the country at present. Along with automotive, the consumer industries are witnessing growth which is a good sign for us. We need to come together and help each other to enhance our capabilities and productivity. The world is looking at India with optimism, we cannot miss these opportunities. There are companies from China and Japan who are setting up shop in India to tap the growing demand. We should also embrace the



positive sentiment and work together," he said.

The event was followed by a presentation from Prashant D Ghugare, Senior Manager, Yamazaki Mazak India Pvt Ltd. He spoke about the range of products MAZAK has to offer for various operations, especially for the die mould industry. It was followed by a case study presentation.

Anil Bhardwaj, Managing Director at Yamazaki Mazak India Pvt Ltd said, "Mazak has been supplying machines to the Indian die mould industry for years. We have solutions that can help mould manufacturers achieve high precision. Mazak is happy to collaborate with TAGMA for this event to talk about the latest trends in manufacturing and also showcase our capabilities."

The event was attended by more than 75 professionals from 50 companies. Sridevi Tools, Godrej Tooling, Abhijeet Dies & Tools, Purohit Steels, Anand Mould Steels, Designcell CAD/CAM Solutions, SolidVision, Yudo Hot Runner India, Kalyani Mould, Vinayak Enterprises and ACC Moulds also made their presence felt.

The informative seminar came to end with a closing note from Panchal. He welcomed everyone present there to the upcoming International Tooling Summit 2019, scheduled to be held during February 7-8, 2019 at Hyatt Regency, Pune.

The event was followed by networking dinner party. 🇮🇳

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## TAGMA TECHNOLOGY CENTRE

TAGMA INDIA announced opening of its Tool Trial Centre at Chakan, Pune from June 2014 for Members and the Tooling Industry.

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### (i) Maxima Servo 500 :-

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### (ii) Maxima Servo 850 :-



- Injection capacity=3288 Gm • Injection pressure=1896 Bar • Injection rate=585 CC/Sec • Injection screw stroke=440 MM • Screw diameter=100 MM • Screw speed=160 RPM • Screw torque@172 bar=6550 NM • Clamp stroke=1850 MM • Maximum Daylight=2250MM • Minimum mould thickness=400 MM • Maximum mould thickness = 1200 MM • Platen size(H×V)=1790×1470 MM • Distance

- between Tie rods (H×V)=1390×1070 MM • Tie rod diameter=195MM • Ejector stroke=250 MM • Ejector force=18.2 Tons • Maximum mould weight=17.2 Tons • Air Ejection 2 Stage • Hydraulic Core Pull 3 Stage • Hydraulic Mould Gate Valve 8 Stage • Pneumatic Mould Gate Valve 8 Stage

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## 3D Laser Scanner

**L**eica Absolute Scanner LAS-XL, a new ultra-large scale portable laser scanner from leading metrology and manufacturing solution specialist Hexagon Manufacturing Intelligence. Designed for industries and applications where both speed of measurement and metrology-level accuracy are indispensable, the expanded measurement field and point acquisition rate of the LAS-XL means large parts and surfaces can be fully digitised in far less time than ever before.

Operating on the same flying-dot scanning technology as the Leica Absolute Scanner LAS, the LAS-XL benefits from a scan-line width of up to 600 millimetres and a measurement stand-off distance of up to a full metre. The extreme flexibility this delivers makes the LAS-XL as ideal for mapping large blade surfaces as it is for digitising aircraft and rail carriage interiors. Accurate to within just 150 microns, the LAS-XL is suitable for the wide range of applications for which increased measurement speed is extremely valuable.

*For more details:*

**Hexagon Manufacturing Intelligence**

Shropshire, United Kingdom

Tel: +44 870 446 2667

Web: [www.hexagonmi.com](http://www.hexagonmi.com)



## Cutting off and Grooving System

**T**he GW series is new kind of cutting off and grooving tool that delivers highly reliable insert clamping, provided by a unique system that maximizes usability without sacrificing performance. Additionally the blade can supply through coolant simultaneously from both the rake and flank faces to the cutting edge. Also available is a blade clamping block with a coolant hose kit to provide the coolant for the through capability, as well as providing a conventional coolant system.



*For more details:*

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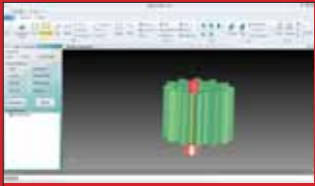


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 www.cadmacro.com

## Coordinate Measuring Machine

A REVO® system delivers high performance scanning, non-contact inspection and surface finish analysis on a single CMM. The REVO system uses synchronized motion and 5-axis measurement technology to minimise the dynamic effects of CMM motion at ultra high measurement speeds.

This is achieved by letting the REVO-2 head do the fast demanding motion while the CMM moves in a linear slow fashion. The use of a flexible tip-sensing probe further adds to the system's accuracy and performance. The removable probe system, used in conjunction with a low cost changer, provides added system flexibility.

The REVO system change rack is designed to allow automatic probe and stylus holder changing on a CMM. The primary purpose of the system is to improve flexibility with the ability to use and store longer styli and large star stylus configurations. For optimum metrology, REVO probes and stylus holders should be changed automatically using REVO change ports (RCP TC-2, RCP TC-3 and RCP2) and a flexible change rack (FCR25). These ports are mounted on the modular rack system



*For more details:*

### **Renishaw plc**

New Mills Wotton-under-Edge

Gloucestershire

United Kingdom

GL12 8JR

Tel: +44 1453 524524

Fax: +44 1453 524901

Email: [uksalesupport@renishaw.com](mailto:uksalesupport@renishaw.com)

Web: [www.renishaw.com](http://www.renishaw.com)

## Vertical Machining Center

The VL series from S&T Machinery Pvt Ltd is an ideal machine for die mould industry. The VL-610 comes with optional spindle speed: 10,000 / 12,000 / 15,000 / 24,000 / 30,000 RPM. Hardened & Ground C3 Double-Nut ballscrews (Φ32mm) are pre-tensioned to minimize backlash, provide high precision movement, and reduce heat deformation on all axes. The machine is 100% balanced with low vibration performs high precision machining. Air blow function is standard to keep chips from falling into Spindle. It provides positioning accuracy: ± 0.005mm / 300mm and repeating accuracy: ± 0.003mm / 300mm. The machine travels 610 / 460 / 510 mm in X-Y and Z-axis respectively. It is equipped with table size of 800 X 450 mm

*For more details:*

### **S & T Machinery Pvt Ltd**

22, Vasanth Nagar, Singanallur,

Coimbatore, 641005 INDIA.

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## National:

### Rajkot Machine Tool Show 2018

**RMTS** 2018 shall unveil the latest manufacturing technologies and machine tools solutions which would enable large industries and other small and medium enterprises (SMEs) to leverage and enhance their manufacturing capabilities; Nov 28 – Dec 1, 2018; NSIC Ground, AJI GIDC, Rajkot, Gujarat.

#### Contact Details:

#### K and D Communication Limited

3rd Floor, Kailash-A,  
Sumangalam Society, Above HDFC Bank,  
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### Automation Expo 2018

**Automation** Expo, one of the largest Automation & Instrumentation exhibition in South-East Asia is all set to showcase latest in automation technologies, August 29, September 1, 2018, Mumbai.

#### Contact Details:

#### Ied Communications Ltd

64, Empire Building D N Road,  
Fort, Mumbai 400001  
Email: arokiaswamy@  
iedcommunications.com  
Web: www.automationindiaexpo.com

### IMTEX 2019

**AN** initiative of IMTMA, IMTEX is a flagship event for the Indian metal cutting industry. The mega event attracts visitors from a wide spectrum of manufacturing and ancillary industries including key decision and policy makers; January 24 – 30, Bangalore International Exhibition Centre (BIEC)

#### Contact Details:

IMTMA  
Tel: +91 80 6624 6600  
Email: imtma@imtma.in  
Web: www.imtex.in

### International Tooling Summit 2019

**THE** tooling industry in India needs a platform to voice its efforts, showcase its contribution towards our rising economy and much more. TAGMA India that has always taken up issues that is important for the industry is organising a two-day International Tooling Summit on February 7-8, 2019 at Hyatt Regency, Pune.

#### Contact Details:

#### TAGMA India

A-33, Nand Jyoti Industrial Estate  
Safed Pool, Andheri-Kurla Road  
Tel: 022 28526876  
Email: tagma.mumbai@tagmaindia.org  
Web: www.diemouldindia.org

## International:

### Mold & Die Industry Fair

**The** Taipei Int'l Mold & Die Industry Fair is one of the veteran manufacturing industrial shows in Taiwan, integrating diverse themes to create comprehensive Industry 4.0 solutions and lay solid foundation for the manufacturing industries, August 29 - September 1, 2018; Taipei, Taiwan.

#### Contact Details:

#### CHAN CHAO INTERNATIONAL CO., LTD.

3F, No. 185, Kangchien Rd., Neihu Dist.  
Taipei, Taiwan  
Tel: +886-2-2659-6000  
Fax: +886-2-2659-7000  
Email: show@chanchao.com.tw  
Web: www.odm-dmi.com

### IMTS 2012

**AMERICA'S** largest manufacturing show—the International Manufacturing Technology Show (IMTS) 2012—is one of the largest global industrial trade shows,

with over 2,500 exhibitors & 115,000 visitors; September 10 – 15, 2018, at McCormick Place, Chicago, USA.

#### Contact Details:

#### The Association for Manufacturing

#### Technology John Krisko

AMT Director – Exhibitions 7901  
Westpark Drive, McLean,  
VA 22102-4206,  
USA  
Phone: +1-703-893-2900  
Fax: +1-703-893-1151  
Email: AMT@AMTonline.org  
Web Site: www.AMTonline.org

### BI-MU 2018

**THE** 31st international event will showcase latest in metal forming, metal cutting machines, robots, automation and auxiliary technologies; October 09-13, 2018; fieramilano, Italy

#### Contact Details:

#### BI-MU c/o CEU-CENTRO ESPOSIZIONI

UCIMU SPA, viale Fulvio Testi 128,

20092 Cinisello Balsamo MI (Italy)

Tel: +39 0226 255 234/860  
Fax: +39 0226 255 897  
Email: bimu.esp@ucimu.it  
Web: www.bimu.it

### EuroBLECH 2018

**EuroBLECH** has been serving the sheet metal working industry as their leading international trade exhibition for almost fifty years. The event is a showcase for technological developments, an economic and trend barometer as well as a marketplace for business on a global scale, October 23-26, 2018; Hanover, Germany.

#### Contact Details:

Mack Brooks Exhibitions EuroBLECH 2018  
Romeland House, Romeland Hill  
St Albans Hertfordshire, AL3 4ET, UK

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**Tel:** 080-28369930 / 42111402

**Email:** krupatech11@gmail.com /  
jaggu@krupatechnologies.in

**Website:** www.krupatechnologies.in

**Contact Person:**

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**Email:** virupax@visattools.com /  
satishkumar@visattools.com

**Contact Person:** Mr. Virupax M.S. / Mr.

Satish Kumar P. - Managing Director

**Activities:** Product design, Injection  
Moulds, Press Tools, Jigs Fixtures &  
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115, Pune - Nagar Road, Sanaswadi,  
Pune - 412208, Maharashtra

**Tel:** 0213766880

**Fax:** 02137668829

**Email:** marketing@mazak india.com

**Website:** www.mazakindia.in

**Contact Person:** Mr. Anil Bhardwaj -  
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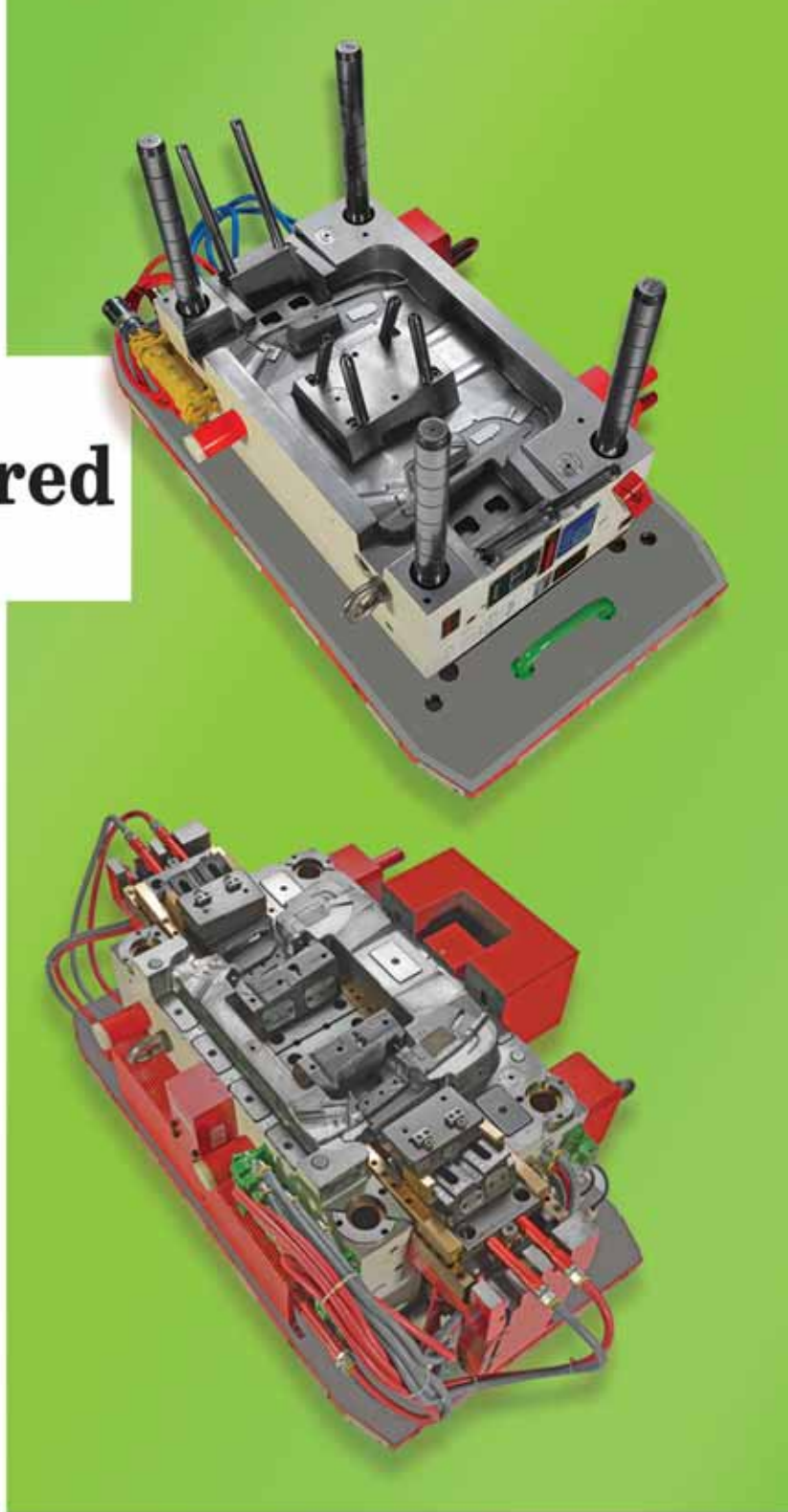
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