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RNI No 71129/98

Volume 14 Issue 4 • April 2019 • Rs 75

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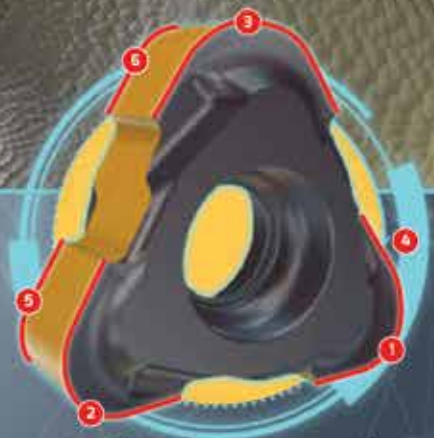

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MAKE IT COUNT!

It is that time again when the common citizens of India assume a lot of significance and power. There are promises in the air. And hope also comes back alive. But there is also fear and apprehension and doubt. Who will? What if? Can they? Questions, arguments, debates, fights and everything else that adds to the overall drama! If one is to understand the true meaning of the term VUCA, then one needs to experience India's election fever! (I understand some tour operators are also selling destination packages internationally to give foreign travellers a taste of the world's biggest democratic activity in India!)

The last few years have seen the Indian economy find its rhythm. There are reasons to believe that the industry is currently on a fairly stable ground. The general estimate is that the industry is robust enough to sustain through the tumultuous election atmosphere. While there is also hope that the elections will provide a stable government at the centre, there is also a wish that there will be consistency as far as the policy roadmap is concerned. Any government

SO, LET'S NOT KEEP OUR FINGERS CROSSED! LET'S OPEN THEM UP AND EXERCISE OUR DEMOCRATIC RIGHT AND DUTY OF CASTING VOTE.

that comes to power must recognise the industry as a creator of wealth and employment. If that happens then there will be consistent economic growth. Equally important is social stability; volatility on the social front can surely destroy all the economic progress. So, let's not keep our fingers crossed! Let's open them up and exercise our democratic right and duty of casting vote. And let's do it conscientiously so that we make every vote count. Long Live the Indian Democracy!

Editor & Chief Community Officer

THE MACHINIST
ULTIMATE GUIDE TO PROFITABLE MANUFACTURING
Volume 14 Issue 4 April 2019

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Printed and published by Joji Varghese for and on behalf of owners Worldwide Media Pvt Ltd (CIN:U22120MH2003PTC142239), The Times of India Building, Dr DN Road, Mumbai 400001. Printed at JRD Printpack Private Limited, 78, Resham Bhavan, 7th Floor, Veer Nariman Road, Churchgate, Mumbai - 400 020. Editor: Niranjan Mudholkar. Published for April 2019.


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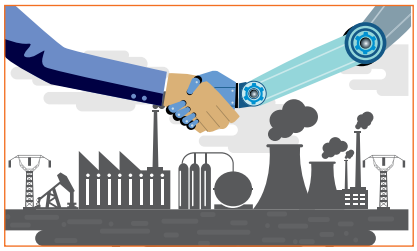

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YOUR GLOBAL CRAFTSMAN STUDIO

JCB to invest Rs. 650 crore in a new plant at Vadodara in Gujarat for exports

JCB is to invest Rs. 650 Crores in a new plant in India as the company prepares to celebrate 40 years of manufacturing in the country.

The new factory will be located in Vadodara in Gujarat and will manufacture parts for global production lines as the company prepares to meet increased demand.

JCB Chairman Lord Bamford laid the foundation stone for the new plant which will be JCB's sixth factory in India – a country which has been JCB's biggest single market since 2007. The announcement follows the start of work on a new £50 million factory to build cabs for JCB machines in Uttoxeter, Staffordshire, UK which will be completed later this year.

JCB Chairman, Lord Bamford said, "With major investment in manufacturing capacity in the UK and India, we are very well placed to grow our business in the future. This year we celebrate 40 years of JCB India and our success over those four decades is down to our continual investment. It's fitting that we mark the 40th anniversary with an investment in a factory which will give us enormous manufacturing capacity."

IAF inducts Chinook into its fleet

RECENTLY, THE IAF formally inducted the CH 47 F(I)- Chinook heavy lift helicopters into its inventory at Air Force Station Chandigarh. Air Chief Marshal BS Dhanoa PVSM AVSM YSM VM ADC, Chief of the Air Staff was the Chief guest and the event was attended by various dignitaries.

IAF had signed a contract with Boeing Ltd in September 2015 for 15 Chinook helicopters. The first batch of four helicopters has been delivered on schedule and the last batch is to be delivered by March next year. These helicopters will be deployed in the Northern and Eastern regions of India.

The addition of heavy-lift CH 47 F(I) helicopter is a significant step towards modernisation of Indian Air Force's helicopter fleet. The helicopter has been customized to suit IAF's future requirements and capability roadmap. The helicopter has a fully integrated digital cockpit management system, advanced cargo handling capabilities and electronic warfare suite that complement the aircraft's performance. The helicopter is capable of airlifting diverse military and non-military loads into remote locations.

Mission Shakti's success makes India space super power

RECENTLY DEFENCE RESEARCH AND DEVELOPMENT ORGANISATION (DRDO) successfully conducted an Anti-Satellite (A-SAT) missile test 'Mission Shakti' from the Dr AP J Abdul Kalam Island in Odisha. A DRDO-developed Ballistic Missile Defence (BMD) Interceptor Missile successfully engaged an Indian orbiting target satellite in Low Earth Orbit (LEO) in a 'Hit to Kill' mode. The interceptor missile was a three-stage missile with two solid rocket boosters. Tracking data from range sensors has confirmed that the mission met all its objectives.

The test has demonstrated the Nation's capability to defend its assets in outer space. It is a vindication of the strength and robust nature of DRDO's programmes.

With this India joins a select group of nations, which have such capability. The test has once again proven the capability of indigenous weapon systems.

ZF acquires WABCO

ZF FRIEDRICHSHAFEN AG has announced that it has entered into a definitive agreement to acquire WABCO for $136.50 per share. The planned acquisition has been approved by ZF's Management Board and Supervisory Board and WABCO's Board of Directors. Together, ZF and WABCO will form a leading global integrated mobility systems provider for commercial vehicles, creating added value for ZF's commercial vehicle customers. The combined company will have sales of approximately €40 billion. WABCO, which is listed on the NYSE, generated €3.3 billion in revenues in 2018 and has some 16,000 employees in 40 countries.

Wolf-Henning Scheider, CEO of ZF, said: "We believe that, together with WABCO, ZF can form the world's leading integrated systems provider for commercial vehicle technology, creating long-term value and security for its customers, employees and owners. For ZF the acquisition of a specialist and leader for commercial vehicle braking systems means adding a stable and growing business segment and enables our existing commercial vehicle division to expand its expertise in vehicle dynamics control. This will create the foundation for ZF to offer comprehensive systems for safe and automated mobility solutions for passengers and goods to our customers."

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Alstom to provide train control and signalling solutions

ALSTOM has been awarded contracts to equip Mumbai Metro lines 2A, 2B and 7, and Pune Metro lines 1 and 2, with Urbalis 400, Alstom's latest generation of Communications Based Train Control (CBTC) technology. The combined value of the two contracts comes to over €90 million.

The contract for Mumbai Metro, awarded by Delhi Metro Rail Corporation Ltd (DMRC), is to provide the CBTC signalling system as well as a state-of-the-art telecommunication system for the three elevated lines. The combined lengths of lines 2A, 2B and 7 make it one of the most extensive signalling projects in the country. The signalling scope includes design, manufacture, supply, installation, testing and commissioning of Urbalis 400 and includes supply and commissioning of on-board equipment for 63 trains. The telecommunications scope includes public address systems, passenger information display systems, fibre optic transmission systems, CCTV, and access control systems.

March 2019 GST collection crosses Rs. One Lakh Crore

THE GST REVENUE collection for the month of March 2019 has created a new record by crossing the Rs. One lakh crore mark. Total Gross GST revenue collected in the month of March, 2019 is Rs. 1,06,577 crore. Of this, CGST is Rs. 20,353 crore, SGST is Rs.27,520 crore, IGST is Rs.50,418 crore (including Rs. 23,521crore collected on imports) and Cess is Rs. 8,286 crore (including Rs. 891crore collected on imports). The total number of GSTR 3B Returns filed for the month of February up to 31st March, 2019 is 75.95 lakh.

The Government has settled Rs.17,261 crore to CGST and Rs. 13,689 crore to SGST from IGST as regular settlement. Further, Rs. 20,000crore has been settled from the balance IGST available with the Centre on provisional basis in the ratio of 50:50 between Centre and States. The total revenue earned by Central Government and the State Governments after regular and provisional settlement in the month of March, 2019 is Rs. 47,614 crore for CGST and Rs. 51,209 crore for the SGST. The collection during March, 2019 has been the highest since introduction of GST. The revenue in March, 2018 was Rs. 92,167crore and the revenue during March, 2019 is a growth of 15.6% over the revenue in the same month last year.

Domestic demand to lift India's growth in 2019 and 2020: ADB

ACCORDING TO a new report from the Asian Development Bank (ADB), recent policy measures by the government to improve the investment climate and boost private consumption and investment will help India to lift economic growth in the next two fiscal years,.

In its Asian Development Outlook (ADO) 2019, ADB projects gross domestic product (GDP) growth in India to rise to 7.2% in fiscal year (FY) 2019 and reach 7.3% in FY2020, reversing two years of declining growth as reforms to improve the business and investment climate take effect. India's fiscal year starts on 1 April and ends 31 March of the next calendar year. ADO is ADB's annual flagship economic publication.

"India will remain one of the fastest-growing major economies in the world this year given strong household spending and corporate fundamentals," said ADB Chief Economist Mr. Yasuyuki Sawada. "India has a golden opportunity to cement recent economic gains by becoming more integrated in global value chains. The country's young workforce, an improving business climate, and a renewed focus on export expansion all support this."

Consumer price inflation is expected to rise to 4.3% in FY2019 and 4.6% in FY2020 as food costs increase slightly and domestic demand strengthens. Given that inflation is expected to average around 4.0% in the first half of FY2019, the central bank would have some room for lowering policy rates.

Imports are expected to rise mainly due to stronger domestic demand while a growth slowdown in India's key export destinations would dent export growth. The current account deficit is expected to widen a bit to 2.4% of GDP in FY2019 and 2.5% of GDP in FY2019. The deficit is expected to be financed comfortably by capital flows, given that India has emerged as an attractive destination for foreign investment.

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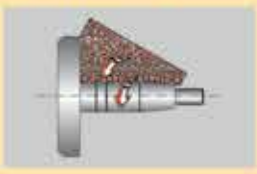

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MARK YOUR DIARY

A list of key events happening between April 2019 to March 2020, both nationally and internationally.

Die & Mould India April 22–25, 2019 Mumbai, India *www.diemouldindia.org*	**BLECH India 2019** April 25–27, 2019 Mumbai, India *www.blechindia.com*	**intec Coimbatore** June 6–10, 2019 Coimbatore, India *www.intec.codissia.com*	**Automotive Engineering Show India 2019 (Chennai)** July 4–6, 2019 Chennai, India *www.automotive-engineering-show.in*
AgriTech India 2019 August 30 –September 1, 2019 Bangalore, India *www.agritechindia.com*	**EMO Hannover 2019** September 16–21, 2019 Hannover, Germany *www.emo-hannover.de*	**Tech India** September 20–22, 2019 Mumbai, India *www.techindiaexpo.com*	**Automation Expo 2019** September 25–28, 2019 Mumbai, India *www.automationindiaexpo.com*
Motek October 7-10, 2019 Stuttgart, Germany *www.motek-messe.de/en/*	**Excon** December 10–14, 2019 Bengaluru, India *www.excon.in*	**IMTEX Forming 2020** January 23–28, 2020 Bengaluru, India *//imtex.in/imtex2020/*	**SIMTOS** March 31-April 4, 2020 Seoul, South Korea *www.simtos.org*

OUR INHOUSE UPCOMING EVENTS

May 29, 2019, ITC Gardenia, Bengaluru

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VINOD K DASARI JOINS ROYAL ENFIELD AS THE CEO

Eicher Motors Ltd (EML) recently announced the appointment of Vinod K. Dasari as the Chief Executive Officer of Royal Enfield, a unit of EML. Vinod will also join the Board of Eicher Motors Ltd as an Executive Director with immediate effect.

Vinod Dasari takes over from Siddhartha Lal who will continue as the Managing Director of Eicher Motors Ltd. At Royal Enfield, Siddhartha will continue to support Vinod and the team on product and brand related areas.

Speaking on the appointment, Siddhartha Lal, Managing Director, Eicher Motors Ltd. said, "After a phenomenal success story in the last decade, Royal Enfield is now building the foundations of its next level of growth. As we commence another exciting chapter, I believe, there is no better person than Vinod Dasari to lead Royal Enfield into its next phase of evolution to a global brand. Vinod is a proven leader who combines business vision and people skills. He has been a catalyst in reviving the fortunes of his previous company and re-shaping the dynamics of a hitherto slow moving industry."

RAJEEV KAPUR IS ASSOCHAM NATIONAL COUNCIL CO-CHAIRMAN

Rajeev Kapur who is the Managing Director of Steelbird has been appointed as Co-Chairman of ASSOCHAM National Council. Rajeev Kapur has started his journey in the Corporate World long time back.

In his new role at ASSOCHAM, Rajeev Kapur will be an asset as he is fully aware of the problems being faced by the manufacturers, whether it is related to R&D, cost reduction, new technology, tax regime, power supply, labour problems, etc.

Being an industrialist, Rajeev Kapur knows how to find a solution related to manufacturing.

PANASONIC ANNOUNCES NEW EUROPEAN CEO

Panasonic Europe B.V has announced the retirement of Laurent Abadie on March 31, 2019 and the appointment of his successor, Junichi Suzuki to take place on 1st April 2019. Suzuki will become Chairman & CEO, Panasonic Europe Ltd. while also inheriting from Laurent Abadie the responsibility as COO, Panasonic Holding (Netherlands) B.V. and as Regional Head for Europe & CIS as well as becoming Managing Director, Panasonic Marketing Europe GmbH.

While in general Europe is in a drastic change phase, the objectives for the 56-year old Junichi Suzuki are clear: "We see two important trends emerging: the need for a carbon-free society and an ever-increasing aging society. I've been living nearly 30 years in Europe and I believe that Europe is already leading the world on both. Panasonic's over-arching mission has always been to contribute to society and I look forward to working with my colleagues in Europe to meet the requirements of these trends to do so."

He further adds, "My personal mission is to ensure that Panasonic is the leading technology and solutions provider in Europe in these areas, with a particular focus on our heating and cooling solutions, Automotive, and on 'Future Lifestyles in the home'. Our efforts in the coming years will therefore focus on further developing local R&D activities and strengthening the organisation to continuously understand and predict the future."

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Ready to **rise**

The focus of Poeir Jets is on small Jet Engines for strategic application and on APUs for Hybrid Drones, says **Devathathan Mookiaha,** the company's Co-founder and Director.

By Niranjan Mudholkar

Poeir is an interesting name. What is its genesis?
We choose four options of word in Sanskrit and one word of French origin synonymous to mean Power / Capability. All Sanskrit titles were not available and only Poeir was possible with Dept of Company Registration. So, we choose Poeir which means Power in French.

Why was this company started and by whom?
Sridhar Balaram MD of Intech DMLS has successfully developed the metal 3D printing of aerospace parts in India. I have been associated with turbine engines for the past 30 years. Both of us joined hands and started Poeir Jets Pvt Ltd to develop technologically challenging Aerospace Products from India.

India's first Heavy lift Hybrid drones

Following the successful launch of the country's first Microjet Engine series, Poeir has moved on to develop India's first Heavy lift Hybrid drones, which was launched at Aero India 2019. With this launch the company aims to establish itself as industry leaders in providing propulsion solutions to UAS (Unmanned Aircraft Systems).
The Heavy-lift Drones are fundamentally unmanned aircrafts with fully customizable payload options that make them suitable for a wide variety of professional applications, from Law Enforcement to Search and Rescue Operations. The company has developed the following models of heavy-lift drones:
These battery and turbine engine powered drones are suited for the global market in the fields of Heavy-Lift Cargo, Civil, Agriculture, Forestry, Defence and other strategic applications. The drones are easy to launch, assemble, service and operate. To ensure reliability they are undergoing rigorous in-house testing.

"In the recent times, Drone technology has well matured and it is gaining widespread acceptance in Industrial, Utility and Military applications. We will be launching our heavy Lift Drones in the market from the year 2021."

Poeir Jets launched India's first Heavy lift Hybrid drones at the Aero India 2019 show. Tell us about the significance of this innovation both from the company perspective as well as from the industry's point of view.
In the recent times, Drone technology has well matured and it is gaining widespread acceptance in Industrial, Utility and Military applications. We will be launching our heavy Lift Drones in the market from the year 2021.

The company is currently also developing an Air Tractor that has wide applications. Tell us about this.
Our focus is on small Jet Engines for strategic application and APUs for Hybrid Drones. Autonomous Drones for heavy lift applications will be the main business in near future. For the future, we have been working on Air Tractor concept for pay load of 500 kg and above.

What is the status on the Microjet engines that the company had announced earlier?
Micro Jet Engines have been tested successfully for the last three years. Engines will be available in 12 months from now for potential customers to buy and use.

What are some other planned innovations?
Sensor Fusion Techniques coupled with low power Artificial Intelligence platforms have made the drones increasing autonomous and we are working on both of these areas.

How is Poeir leveraging on futuristic technologies like 3D printing technology?
3D metal printing is one of the most enabling technology for developing Turbine Engines which otherwise beyond reach for company like us. We use extensive research done in the area of 3D printing to make Turbine parts.

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Taking to the **skies**

Given the size and potential of the opportunity, if India continues its focus on the A&D sector, as it did with information technology some 30 years ago, the country could doubtless produce several marquee billion dollar firms faster than it took to create some of the iconic IT firms.

By Rajeev Kaul

India is the big prize the global aerospace and defense (A&D) industry would be vying for over the next two decades. A reasonable argument could be that their success is pretty much dovetailed with India's success. Thanks to a combination of India's rapidly expanding air traffic (stood at 258.06M till December 2018, according to IBEF.org) and the country's geo-strategic priorities, the opportunities presented by the country's A&D sector is enviable.

According to the report '2019 global aerospace and defense industry outlook' by the services firm Deloitte, "By 2025, India is expected to become the 'third largest' aviation market and supply about 478 million passengers by 2036" surpassed only by China and the US. In the next two decades, this boom in air traffic is likely to result in purchases of over 2000 new aircrafts worth $290B at current prices, dominated by single-aisle aircraft. Over the next five years alone, public and private investments in Aerospace manufacturing and allied infrastructure such as new airports are estimated to top $15B. In the short-term just the maintenance, repair and overhauling (MRO) expenditure for aircrafts will be close to $1.5B. Bear in mind that MRO is the second largest expense head after fuel for airlines. In the defense sector, India's increasing geostrategic stature and ambition already make it one of the world's largest buyers.

"The aerospace sector is heavily dependent on the supply chain and with niche players offering integrated manufacturing capability and capacity, more components can be manufactured within India. This way, there will also be specialization in manufacturing of certain critical components."

"With the economic fulcrum of the world firmly moving eastward to the Asia Pacific region, India becomes an obvious choice with cost of production becoming higher in markets such as Japan, Korea, and even China. India offers not just a huge market but also an attractive pool of trainable workforce."

Over the last two years, the government has undertaken a radical policy shift in the A&D sector. It includes greater international engagement, an overhauled FDI policy, a new defense procurement procedure with amendments in offset policy and the ushering in of the "strategic partnership" model.

The changed policy landscape and growing demand is encouraging global players to either open their branches or form joint ventures with local companies to fulfill the offset obligations. Several Public-Private Partnerships (PPP) are already underway in the defense sector, strengthening indigenous manufacturing in the country by encouraging private players to contribute to the sector. A few Indian firms are also

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eyeing the market and forming strategic alliances with global companies in order to develop capabilities targeting the growing Indian market as well as export potential. India has for long depended on state-run enterprises for the manufacture of A&D hardware. The new emphasis of "strategic partnership" that also includes the private sector would go a long way in fast tracking the maturity curve of the private sector in this space.

The big domestic demand aside, the global A&D players are constantly on the lookout for geographical diversity in their manufacturing and supplier base in their quest for better return on investments. With the economic fulcrum of the world firmly moving eastward to the Asia Pacific region, India becomes an obvious choice with cost of production becoming higher in markets such as Japan, Korea, and even China. India offers not just a huge market but also an attractive pool of trainable workforce.

Not surprisingly, the world's two largest aircraft makers, Boeing and Airbus, are expanding relationships with Indian firms while investing heavily in their own facilities. Cost arbitrage is only one of the benefits of working with Indian partners.

The aerospace sector is heavily dependent on the supply chain and with niche players offering integrated manufacturing capability and capacity, more components can be manufactured within India. This way, there will also be specialization in manufacturing of certain critical components.

Today, a clutch of Indian companies is competing in the global marketplace and manufacturing complex machine parts for almost every plane that is airborne. That's not all. They are having the billing of being 'Prime Reliable' suppliers for these OEMs. The swift progress that Indian firms have made in this area has forced many in the aviation industry to sit up and take notice. Manufacturing experts believe that this could mark the rapid growth of small and mid-sized A&D ancillary firms with highly specialized skills, quite similar to the German mittelstand firms that are small in size but world-class in their output.

"Not surprisingly, the world's two largest aircraft makers, Boeing and Airbus, are expanding relationships with Indian firms while investing heavily in their own facilities. Cost arbitrage is only one of the benefits of working with Indian partners."

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While the government is cognizant of the importance of the A&D sector in creating a large indigenous manufacturing base, and millions of new jobs, what is also needed to let bloom new world-class homegrown firms is a 20-year policy vision that can remains rocksteady even when governments change.

In a relatively short span of time, the Indian private sector firms have proven their ability to punch on par with global competitors when afforded the freedom and the policy attention. But the going hasn't been smooth, and the future will present steeper challenges. The entry barrier for private players in A&D manufacturing is considerably higher than other sectors such as automotive or consumer electronics. It not only requires more capita but also access to very high-end, and, often sensitive technology. The gestation period is longer and access to raw material and talent that is trained in this area dearer.

Given the size and potential of the opportunity, if India continues its focus on the A&D sector, as it did with information technology some 30 years ago, the country could doubtless produce several marquee billion dollar firms faster than it took to create some of the iconic IT firms.

The author is MD, Aerospace & Group CFO, Aequs

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The **Significant** Other!

With 40 percent women in its manufacturing workforce, Eaton's Electrical business in India sees gender diversity as one of its greatest strengths.

By Syed Sajjad Ali

Globally, Eaton is committed to realizing its aspirational goal of being a model of Inclusion and Diversity –a place in which all employees feel valued, respected and included. Eaton believes being diverse and inclusive helps organizations become more successful, and more importantly, it is the right thing to do. At Eaton, gender diversity is a critical area of focus as it brings in unique perspectives to the workplace and enriches the quality of both business and non-business decisions – thus contributing to the overall success of the organization. A resonance of Eaton's gender diversity and inclusion objectives and efforts is tangibly felt at the company's Electrical business in India...where across the business right from shop floor to functional managers, 40 percent of the total employees are women.

At Eaton, we know that the single most important ingredient to our success is our people. We also recognize that each individual is unique – with different perspectives, backgrounds and experiences that influence and inform their ideas and opinions. It is this rich range of individual differences and unique perspectives that lead to innovative ideas and better decisions for our company and our customers, strengthening Eaton's reputation as a thought leader. We believe this outlook helps us attract, retain and engage top talent around the world.

> "Gender parity at work is a subject that is close to the heart of everybody at 'The Machinist'. In alignment with this thought, we are starting a new series called 'Women in Manufacturing' to highlight what the industry is doing in this regard. We are starting off with one of the largest global manufacturing organizations that has substantial presence in India. Look forward to hearing from our readers on this."
>
> **Niranjan Mudholkar,** Editor, The Machinist.

With a commitment to fostering a more diverse and inclusive workforce, Eaton in India has implemented numerous initiatives, practices and policies. The focus is not only on ensuring a healthy work-life balance for employees but also creating an engaging and enriching work environment that facilitates learning, development and career growth. As part of the company policies, Eaton proactively works towards maintaining rich gender diversity across various mid to senior-level positions.

"At Eaton, we make sure that gender diversity is maintained across roles and levels. In the manufacturing industry, we observe that organizations are now making it a priority to recruit and develop women. Having women in the manufacturing workforce clearly brings more creativity, collaboration and conscientiousness to the organizations, which make women great assets for the organization. India's social history sees women as the backbone of the household. With her multitasking abilities and inventive ways of balancing work with the day to day priorities of life, she collaborates with creativity and conscientiousness. We generally see that a woman manages multiple things with ease and demonstrates continued diligence at work. She continuously encourages, motivates and collaborates. Overall, I feel when a woman employee brings these strong fundamentals into practice, she contributes directly to greater success of the manufacturing setup as well as

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the entire business organization," says Devyani Singh, Head HR, Electrical Sector, India, Eaton.

At Eaton, we find women more active as members of different councils and employee groups. They help mobilize and engage other employees for different organizational programs and initiatives. The qualities of being humble and yet firm make them good formal as well as informal leaders.

In India, Eaton has a structured and set strong policies to support women employees through various programs like Education Assistance Program (EAP) – where the focus is on encouraging employees to enhance personal development through advanced educational qualifications. As part of this program, employees have the flexibility to choose programs which are linked to their present role and are directly related to the organization's identified skills and behavior/competencies. Eaton provides maternity benefits that are beyond the government guidelines, where women can take extended leaves or combine their existing leaves for that extra time needed. Eaton understands that balancing parenthood with full-time work can be challenging for women. Eaton ensures an easy transition and supports women to maintain work life balance. In 2016, Eaton's Electrical plant at Pondicherry started a crèche facility to help women employees with an easy access to child care and support systems.

Eaton has introduced specific initiatives and programs to attract women talent to manufacturing. One of several Eaton Resource Groups (ERGs) that Eaton has formed is called WAVE — Women Adding Value at Eaton — which has a strategic focus on the attraction, advancement and retention of women talent. Eaton also runs the global mentoring program – a Mentor-Mentee Program in which women employees, as mentees and get their respective mentors, who professionally guide and help them advance their personal and professional learning and development through constant counseling and learning.

Eaton has also partnered with several organizations including the Confederation of Indian Industry (CII) for their Indian Women Network and reputed engineering colleges for encouraging women students through the trademark corporate grooming program – Garnishing Talent. Eaton provides growth opportunities through leadership development programs (LDP) in which participants receive focused learning and skills development along with exposure to many aspects of the company's business. Women talent joining Eaton through this program continue to demonstrate encouraging performance and thus enable us to quickly integrate them into leadership roles.

"Having women in the manufacturing workforce clearly brings more creativity, collaboration and conscientiousness to the organizations, which make women great assets for the organization. India's social history sees women as the backbone of the household. With her multitasking abilities and inventive ways of balancing work with the day to day priorities of life, she collaborates with creativity and conscientiousness."

Devyani Singh, Head HR, Electrical Sector, India, Eaton.

"I feel that the Indian society is changing rapidly. Women are coming forward. Families are supporting girls for better education. Greater number of women are enrolling for higher education. Changes can be seen in Indian industry as well. But I presume, it will take some time for the complete transformation in the society."

Syed Sajjad Ali, Managing Director – India, Electrical Sector, Eaton

Apart from specific policies and practices meant for focused hiring of women talent, Eaton has special hiring programs that address hiring of women post career breaks. ReLaunch, Eaton's career transition program for women professionals in India, encourages women with career breaks of six months or more to resume their professional career with the company. The program aims to provide women professionals

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> "This change will happen sooner if the industry assumes a far more active role in bringing women into the fold of employment. We, as an industry, need to do our part to attract more women to the manufacturing sector. This requires a shift in attitude and an overhaul to the current Indian corporate culture in order to make it more diverse and inclusive."
>
> **Syed Sajjad Ali**

flexibility, challenge and opportunity to recreate their niche in the professional world.

Eaton is deeply committed to providing a safe work environment to all women employees in the company. All offices of Eaton have dedicated women councils and have strict policies around women safety including Prevention of Sexual Harassment of Women at Workplace (Prevention, Prohibition and Redressal). The women council meets every quarter with internal and external council members.

I feel that the Indian society is changing rapidly. Women are coming forward. Families are supporting girls for better education. Greater number of women are enrolling for higher education. Changes can be seen in Indian industry as well. But I presume, it will take some time for the complete transformation in the society. This change will happen sooner if the industry assumes a far more active role in bringing women into the fold of employment. We, as an industry, need to do our part to attract more women to the manufacturing sector. This requires a shift in attitude and an overhaul to the current Indian corporate culture in order to make it more diverse and inclusive.

Presently many companies are taking meaningful steps toward building this culture, but in order to be successful, such programs need to be monitored and measured from time to time. There must be a commitment from the leadership in order to make this a strategic imperative. It can be done only by establishing a strong business case for Inclusion and Diversity, setting affirmative policies, incorporating continuous improvement and imparting mandatory training and education.

Based on Eaton's focus on diversity and company's commitment to achieving excellence through people, Eaton also runs 'Pratibha', a unique program that aims to encourage multifaceted women engineering talent in India through educational scholarships at both undergraduate as well as post-graduate levels. It's the first of its kind scholarship program that aims to recognize exceptional women engineering students in leading engineering institutions in India, assessing them not only on academic excellence but also on the basis of their co-curricular achievements.

The author is Managing Director – India, Electrical Sector, Eaton

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Strengthening inclusivity!

A steel major is working towards its plans to have women constitute 10 percent of its workforce on the shopfloor by 2025 and to create more avenues for women to grow in the technical / manufacturing domain.

Tata Steel has opened up two shifts at its Jamshedpur steel plant shopfloor for women employees between 6:00 am and 10:00 pm. Starting April 1, 2019, Tata Steel has deployed 52 female employees at its Coke Plant and Electrical Repair Shopfloor in Shifts A & B between 6:00 am and 10:00 pm through the week.

This is also the first major step taken by the company towards its plans to have women constitute 10 percent of its workforce on the shopfloor by 2025 and to create more avenues for women to grow in the technical/ manufacturing domain. The new initiative to include women in the shopfloor follows the 2017 guidelines prescribed by the Government of Jharkhand that allows women to work in some shifts, provided adequate safety measures are put in place by employers.

Suresh Dutt Tripathi, Vice President, Human Resource Management, Tata Steel, said, "We are happy to deploy this first batch of 52 women in the Coke Plant and Electrical Repair shopfloor of our Jamshedpur Plant. This demonstrates our commitment to Diversity & Inclusion and leveraging all opportunities to build high performing diverse teams. Going forward, we hope to expand this further to include more departments that will open-up for women."

Ahead of this new and significant diversity and inclusion initiative, the organisation had conducted sensitisation sessions for the employees, set-up security systems, created women role models as ambassadors and met families of women to seek continued support and make this a success. The Company has created new and augmented existing facilities like creche, special conveyance, availability of lady doctors and attendants, canteen, restroom and washroom facilities, deployment of female security guards, CCTV surveillance systems and more.

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>
> **Suresh Dutt Tripathi,** Vice President, Human Resource Management, Tata Steel

The organisation has also been constantly innovating and pioneering people practices in the realms of hiring, engagement, diversity & inclusion, rewards & recognition and performance management. In keeping with the changing times, the Company has introduced several path-breaking policies, practices and initiatives for various segments of the workforce like 5-day workweek, menstrual leave, paternity leave, adoption leave, satellite office operation and Take 2 (to provide a platform to the partners of the Tata Steel employees and women professionals who are on career break) to name a few.

The Company's Diversity & Inclusion Programme 'MOSAIC' is enabling diversity of gender, hiring & inclusion of PWDs (Persons with Disabilities), inclusion of LGBT and more.

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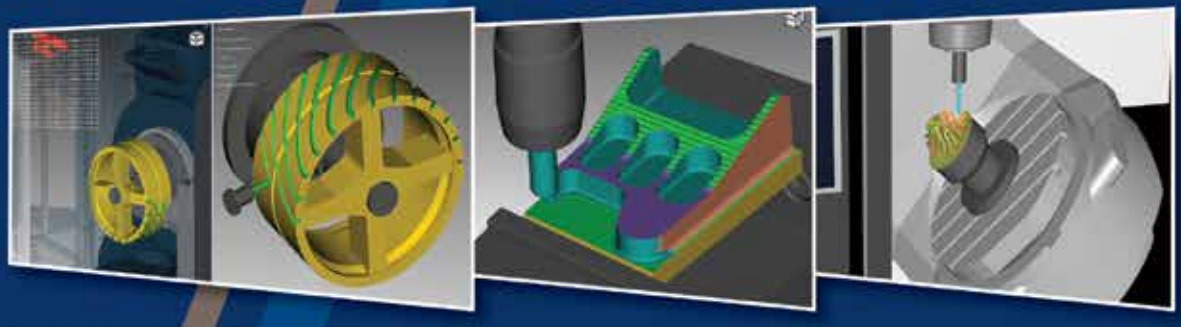

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Guided weapon systems PINAKA test fired successfully

Defence Research and Defence Organisation (DRDO) has recently successfully test fired the Guided PINAKA from Pokhran ranges. The weapon system is equipped with state-of-the-art guidance kit comprising of an advanced navigation and control system. In both the missions, the weapon systems impacted the intended targets with high precision and achieved desired accuracies. Telemetry Systems tracked and monitored the vehicle all through the flight path. All the mission objectives have been met. The indigenously developed Guided Pinaka by DRDO will significantly boost the capability of the artillery to make precision hits.

JAXA & Toyota to make future lunar mobility a reality

The Japan Aerospace Exploration Agency (JAXA) and Toyota Motor Corporation (Toyota) announce their agreement today (March 12, 2019) to consider the possibility of collaborating on international space exploration. As a first step, JAXA and Toyota have reached agreement to further cooperate on and accelerate their ongoing joint study of a manned, pressurized rover that employs fuel cell electric vehicle technologies. Such a form of mobility is deemed necessary for human exploration activities on the lunar surface. Even with the limited amount of energy that can be transported to the moon, the pressurized rover would have a total lunar-surface cruising range of more than 10,000 km.

International space exploration, aiming to achieve sustainable prosperity for all of humankind by expanding the domain of human activity and giving rise to intellectual properties, has its sights set on the moon and Mars. To achieve the goals of such exploration, coordination between robotic missions, such as the recent successful touchdown by the asteroid probe Hayabusa2 on the asteroid Ryugu, and human missions, such as those involving humans using pressurized rovers to conduct activities on the moon, is essential. When it comes to challenging missions such as lunar or Martian exploration, various countries are competing in advancing their technologies, while also advancing their cooperative efforts.

Magellan opens new manufacturing and assembly plant in India

Magellan Aerospace Corporation has announced the opening of the company's manufacturing and assembly facility in India. The new 100,000 sq ft Magellan Aerospace (India) Pvt. Ltd. facility, constructed on seven acres in Hitech Defence and Aerospace Park in Devanahalli, near the Bangalore International Airport, was completed at the end of 2018 and the process of installing and commissioning the high-speed machining centres is underway. Magellan's new cellular machining and assembly plant will specialize in high speed milling and turning of aerostructure and aero-engine components produced from both aluminium and hard metal materials.

Haydn Martin, VP, Business Development, Marketing and Contracts, Magellan Aerospace said, "This new facility offers an exceptional and full range of solutions for our customers in meeting their operational and value requirements."

Need for PPP model in space activities: US Envoy

Maj. Gen. Charles Frank Bolden Jr., US Science Envoy for Space and Former NASA Administrator, recently met with Indian industry leaders and impressed upon them the need for public-private partnership in space activities and provided a glimpse of the benefits that could be reaped for humanity through international space collaboration. Speaking at an interactive session organised by FICCI, Maj. Gen. Bolden said that his primary role as a private citizen now was to encourage international space collaboration and to build upon the robust cooperation between U.S. and Indian scientists and space engineers. He dwelt on topics ranging from commercialisation of space exploration, challenges facing space policy, space engineering and international space law. NASA, he said, could help train Indian astronauts undertake space missions of ISRO.

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Beyond just **prototyping!**

In the aerospace industry, additive manufacturing has become oxygen for manufacturing, and its applications don't only limit to components design but also into ground support and repair.

By Arpit Sahu

The aerospace industry is that industry which other industries look at to see a glimpse of what's on the horizon. The aerospace industry is one of the oldest industries to adopt cutting edge technologies. It is the first industry to bring in carbon fibre, the first industry to introduce CAD/CAM processes into its design chain. There are many other examples and Additive Manufacturing (AM) is no different as it is capturing 12 percent of the total AM market.

Overview

All discontinuous and disruptive innovations follow the same adoption curve, except in this generation. Now exponential technologies and digital connections are causing disruptive innovation and steeper adoption bell-curves as implementation rates accelerate. Additive manufacturing is a disruptive innovation and it is ready for aerospace manufacturing now for both smaller components to an entire fleet.

Very much ideal for small volume and customized production, additive manufacturing is enabling a new, iterative design-build process – allowing lower cost production of lighter weight components, completed products in a small amount of time, which was not possible a few years ago and it is confirmed by the Research and Markets. By disruption, researchers are predicting a substantial growth of 23.01 percent between the year 2017 and 2021.

> "Some leading aerospace manufacturers are already using this technology to fabricate jigs and fixtures, production tooling and final end-use parts for lightweight wing assemblies in small aircraft and UAVs."

Growing Few More Leaves

Aerospace innovators are passively owning additive manufacturing beyond just prototyping and scale models and are aggressively pursuing new use cases for the technology. Some leading aerospace manufacturers are already using this technology to fabricate jigs and fixtures, production tooling and final end-use parts for lightweight wing assemblies in small aircraft and UAVs. It is evident that innovation in aerospace is accelerating, advancing frontiers of understanding at the component/ product level in manufacturing operations, in comprehending supply chains and, in some cases, at the business model level. Parts can now be created with complex geometries and shapes that in many cases are impossible to create using any other technology. Low aerospace volumes and a slimmer supply chain make additive manufacturing an attractive, lower cost alternative to replace conventional CNC machining and other tooling processes for smaller scale parts and finished products and assemblies.

New additive manufacturing design flexibilities encourage simpler, lower cost design and assembly through designing-in fairness. Additive manufacturing poses a competitive threat for laggards wedded to status-quo methods for prototyping,

> "The biggest challenge aerospace industry faces during application of additive manufacturing is the volume of construction and manufacturing large products. Additive manufacturing sets a very strict restriction in building large aero-components and the downside to that is most of the aerospace components are large especially in aircraft fleets and carriers."

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"Very much ideal for small volume and customized production, additive manufacturing is enabling a new, iterative design-build process – allowing lower cost production of lighter weight components, completed products in a small amount of time, which was not possible a few years ago."

tooling and custom part production using CNC machining, aluminium casting, and injection moulding.

Challenges to Face

The biggest challenge aerospace industry faces during application of additive manufacturing is the volume of construction and manufacturing large products. Additive manufacturing sets a very strict restriction in building large aero-components and the downside to that is most of the aerospace components are large especially in aircraft fleets and carriers.

But nowadays, manufacturers like General Electric has done everything in its capacity to make sure that the size of the component to manufacture should not be a setback and they are manufacturing fairly large components. This is not a very complicated obstacle that cannot be overcome and with emerging technologies and expansion to the frontier, in the coming days, not only big manufacturers like GE and Stratasys will dive into the challenge but every other manufacturer in the market will be able to capture their limitations.

Despite popular beliefs, the biggest obstacles in implementing the new manufacturing paradigm today are internal, based on breaking down status-quo beliefs around what's possible and rethinking existing tooling and manufacturing methods.

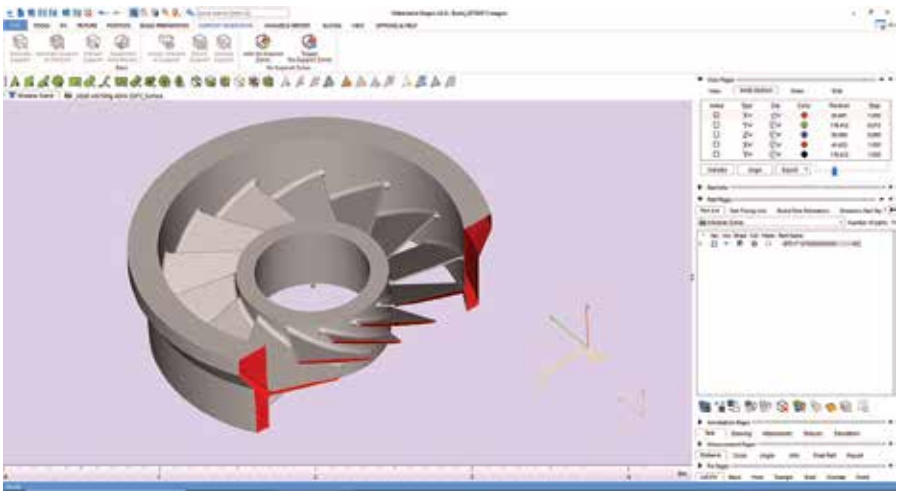
Existing human processes and behaviours are hard to change, however, and manufacturing without a traditional factory is today an unrealistic concept. On the contrary, we are witnessing accelerated adoption in specific applications and industries such as aerospace and a general spread of the use of technology as designers and engineers expand the frontier of the possible.

Unlocking investment capital and resources to adopt new design and manufacturing techniques is difficult for some aerospace OEMs and suppliers, locked into a quarterly driven revenue cycle and budgets.

Top 3D Printed Aeronautical Components/Structures

The ability to create lighter, stronger components under such low budgets have expanded the abilities of the aerospace industry to create complex components. After thorough research, we have found the top 10 applications of 3D printing in the aerospace industry:

1. *Plane Seat* – A lighter plane seat has been 3D printed by Andreas Bastian, an engineer at Autodesk which weighs 40 percent less (766 gm) than a conventional plane seat. He created the ceramic mould after creating the plastic mould using 3D printing to obtain the final piece.
2. *Safran Helicopter Engines* - Safran Helicopters recently launched a new range of helicopter engines. The Anteo-1K engines have 3D printed parts, including parts inside the combustion chamber. Additive manufacturing has enabled Safran to reduce production costs without compromising engine performance. These 3D printed engines created are almost 30 percent more powerful than those previously manufactured. This increased performance helps helicopters in departments such as search and rescue missions.
3. *Fuselage Panel of STELIA* - STELIA Aerospace has recently changed its interest into AM to create their first 3D printed reinforced fuselage panel. They carried out the project using Wire and Arc Additive Manufacturing (WAAM) technology. It's one square meter demonstrator shows that additive manufacturing makes it very easy and flexible to design the stiffeners of the fuselage panels, offering more design flexibilities.
4. *Pratt & Whitney Engines* - Almost twelve parts of a Pratt & Whitney engine has been created using AM, engines that now equip Bombardier aircraft and carriers. These are mainly fasteners and injection nozzles 3D printed from titanium and nickel. Pratt & Whitney has saved almost 15 months over the entire design process and the final weight



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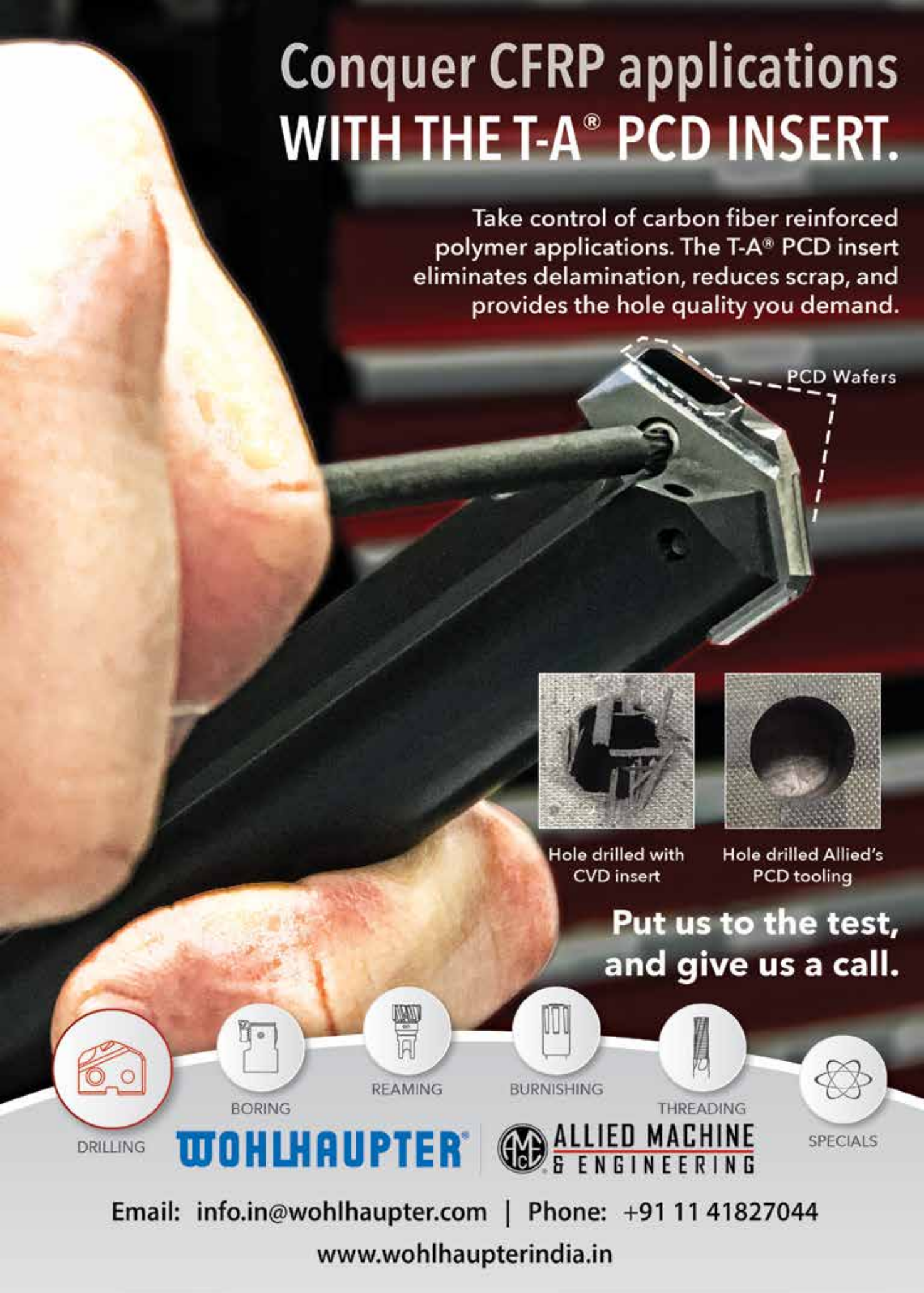

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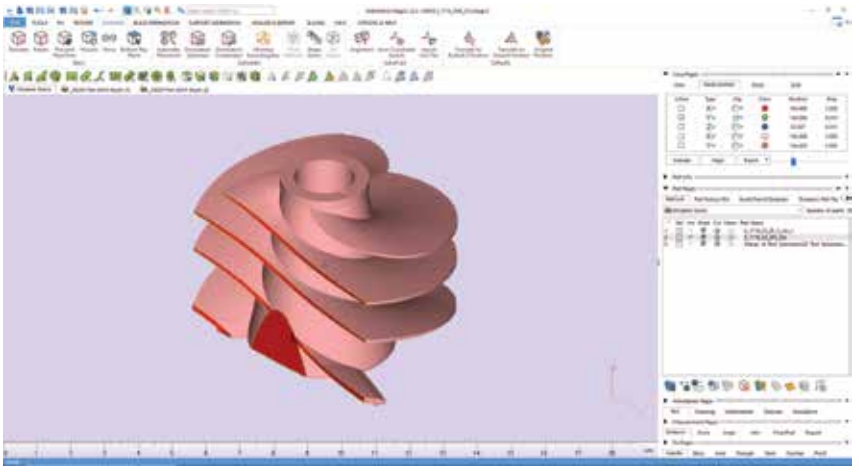
of the part has come out 50 percent less than the conventional. The engine manufacturer has used electron beam melting (EBM) and direct metal laser sintering(DMLS) technologies.

5. Stratasys' Drones - Stratasys collaborated with Aurora Flight Sciences to create an advanced unmanned series of aerial vehicles with jet propulsion in the year 2015 which can fly faster than 150 miles per hour and it is called the UAV. More than 75 percent of the vehicle's parts have been 3D printed manufactured through the fused deposition modelling technique. A lightweight but high-performance material, the ULTEM 9085™ was used in this printing.
6. *Perdix Drones by US Army* - US Army in collaboration with researchers at MIT designed 'Perdix' drones and tested successfully. The US Army are no strangers to AM as they have previously created concrete barracks using 3D printing. 103 drones perform collectively as one brain and don't act individually. In order to avoid crashing, they use sensors to maintain a safe flight distance. They have the ability to jam enemy radars.
7. *Hoversurf's Flying Car* - Hoversurf is known for creating unique hovercrafts, Scorpion-3 being their best development so far which can fly one person. Hoversurf has announced to launch their new car Formula by next year whose parts are all 3d printed. It can attain a speed up to 300 km/h and will carry 5 passengers. The best feature of Formula is it can be parked in a normal parking space as its wings are folded up. It is an electrically driven car.

"Despite popular beliefs, the biggest obstacles in implementing the new manufacturing paradigm today are internal, based on breaking down status-quo beliefs around what's possible and rethinking existing tooling and manufacturing methods."



Production

Apart from prototypes and tooling, 3D printing produces stable end-use and durable parts – thereby bypassing the production line. Stratasys uses a series of materials, including thermoplastics, to create parts with high mechanical, chemical and thermal properties. Sybrant reported that low-volume production being a market segment hasn't been covered well. Outsourcing moulding houses won't accept any order under a certain number or maybe they charge a little too high to keep the profits alive and hence in-house manufacturing made more sense.

Boeing makes aircraft for various airlines. Even if the plane itself is evidently the same from one order to the next, the interiors and its parts vary and as a result, a particular air duct may bend to the right instead of upward, for example. Boeing doesn't want to have to use a $40,000 tool made overseas to manufacture just 25 of these parts. This is where 3D printing comes to play, and they directly make finished multiple products for plane interiors.

The real turning point in the acknowledgment of AM was the extensive application of metal-based AM since 2011. This industrial grade AM provides better reliability in terms of speed, cost, and materials rationalization.

Major companies in the US have subsequently realized the advantages of AM over conventional manufacturing and has been using AM to achieve supply chain efficiencies and lowered time-to-market which resulted in much-needed attention in policy and regulations in the US.

The Future

In the aerospace industry, additive manufacturing has become oxygen for manufacturing and its applications don't only limit to components design but also into ground support and repair.

The outcomes of acknowledgment are clear and simple; AM is accelerating change in this industry and more companies should accept and learn to leverage this technology. Whether in prototyping, tooling or short-run manufacturing, AM is essentially capable to be agile and remain competitive in this modern changing world and technological sprint.

The author is Founder Director of Objectify Technologies.

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The next **sunshine sector!**

Indian aerospace manufacturing sector could become the sunshine sector for India and create thousands of high-end jobs if it is nurtured by the right policies and actions.

There is a great potential for Indian Aerospace sector to grow in coming years. India has a unique advantage of being one of the biggest markets for Commercial Aviation as well as Defence. Major OEMs are now actively looking to develop supply chain in India and source Engineering services as well as components & assemblies. Driven by the Make in India initiative and powered by State Government support, potential for growth is foreseen.

The aerospace sector demands perhaps the highest degree of fail-proof quality standards. This combined with unpredictable demand, lumpy orders and extreme pressure on pricing makes the risk of aerospace business significantly high. Aerospace manufacturing for the defence sector is even tougher given that there's only one ultimate client per country - the Ministry of Defence (MoD); the orders are even more unpredictable and lumpy; and the negotiations, approvals and payments can be really test one's patience.

Coupled with the progress that India has made in space technology and commercial aerospace manufacturing, incentives under the government's Make in India initiative, as well as recent escalation in security concerns, are creating ripe conditions for significant progress in the aerospace sector in India. Global Aerospace sector companies have been directing capital to India to benefit from strong long-term growth prospects. There have been various JV announcements in the sector during 2015–2016, prior to the relaxation of FDI norms. After the relaxation of FDI regulation, the Indian Aerospace sector is likely to record an increase in JVs, as well as a rise in foreign firms establishing manufacturing facilities in India. Major Aerospace companies such as Airbus, Boeing, Lockheed Martin, and Safran already have a footprint in the Indian market, and some of them are planning further investments. As the sector opens up further, there will likely be an increase in global A&D companies entering the Indian market, either through JVs or independently, with 100% FDI now allowed in the A&D sector.

Five Jaguar fighter planes fly over Rajpath, at the 70th Republic Day Celebrations, in New Delhi on January 26, 2019. *Image for representation only. Source: PIB*

Aerospace sector value chain

The aerospace value chain comprises activities ranging from design and assembly to, ultimately, MRO services. As global OEMs and tier-1 suppliers struggle to improve profitability, tier-2 and tier-3 products will likely shift to emerging markets such as India and China. The Indian aerospace supply base is fairly new. While Indian companies have a significant advantage in engineering and design, they do not yet have the capabilities to handle high-end design and development. The government owned Hindustan Aeronautics Limited (HAL) operates across the value chain. However, no other Indian company boasts integrated capabilities.

> "As global OEMs and tier-1 suppliers struggle to improve profitability, tier-2 and tier-3 products will shift to emerging markets such as India and China."

Design

Several Indian information technology firms have been operating in the aerospace sector over the past few years, with HCL, Infosys, TCS, Honeywell and Wipro leading the pack. These firms have been providing design and integrated software for the aerospace sector. Development services to major aircraft companies. Indian IT firms, however, are expected to develop their capabilities to offer higher end complex design services in the near future. Companies such as Honeywell, L&T Infotech, Wipro etc are already gearing up to emerge as aircraft design and development houses.

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Three SU-30 MKI fighter planes fly over Rajpath, at the 70th Republic Day Celebrations, in New Delhi on January 26, 2019. *Image for representation only. Source: PIB*

"Global Aerospace sector companies have been directing capital to India to benefit from strong long-term growth prospects."

Component manufacturing

Indian companies were primarily tier-3 suppliers till the entry of large organized players like Aequs Aerospace and Dynamatic Technologies in the component manufacturing which have significant manufacturing capabilities along with in-house design and development capabilities. However still majority of the manufacture parts as per specifications provided. Further, there are only a few companies' large companies like Aequs Aerospace in this segment, as the component industry is still fairly new. With more business expected to flow into India due to offset agreements, tier-1 and tier-2 players will no doubt have a larger role in the global aerospace value chain.

The emergence of Indian suppliers with integrated tier-1 and tier-2 capabilities will allow global aerospace companies to leverage India as a low- cost option, thus increasing their ability to honor the offset agreements.

Indian aerospace component manufacturers are moving up the value chain from Tier 3 to tier 2/1 suppliers with the entry of players like Aequs, Companies like Tata, Mahindra, Reliance, L&T, and Taneja Aerospace etc. are targeting the aero structures and sub-assemblies segment and have been well received by global OEMs India's skilled labor wage rates are up to 60% lower than the United States and Europe. Key to cost savings is the ability to develop manufacturing processes using automation and labor productivity improvements while ensuring quality standards. For example, tier-2 components suppliers offer a 15 to 30% cost advantage to supply product like landing gear components due to a labor intensive manufacturing process while delivering similar quality levels. In aircraft assembly, assessments indicate a potential cost advantage of 15 to 25%.

"Indian aerospace component manufacturers are moving up the value chain from Tier 3 to tier 2/1 suppliers with the entry of players like Aequs."

It is expected that manufacturing of small structural components, hard metal components - aerospace steel, titanium and Inconel, to be used in manufacturing single aisle, brackets and hinges, avionics racks, wiring harnesses, mountings, blades and vanes, to be the key growth area in this segment. This is similar to the evolution in the Chinese aerospace supply base, which leveraged joint ventures with Boeing and Airbus to supply $1 billion in components from 1995 to 2008.

Aircraft sub-assemblies

HAL is the only company with complete aircraft manufacturing capabilities, and companies like Mahindra Aerospace, Tata Group, Taneja Aerospace are ramping up to compete in the segment. To meet industry demands, several private firms plan to enter the market both organically and via mergers and acquisitions. Moreover, several automotive firms may enter aircraft component manufacturing. Global aerospace majors have started focusing on India to source components for their Indian & Global requirements and Auto component manufacturers in India, with their proven manufacturing capabilities make ideal candidates as supply chain partners in Aerospace & Defence.

MRO services opportunity

India, with its growing aircraft fleet size, strategic location, rich pool of engineering expertise and lower labor cost, has a huge potential to be the global Maintenance, Repair and Overhaul (MRO) hub on a long-time horizon. The current market size of MRO is estimated at about $700-800 million which is expected to reach $1.2 billion by 2020. India has the potential to become the third largest aviation market by 2020 and the largest by 2030. The growth of the industry is being propelled by the development of airports, presence of several low-cost carriers, a liberalized FDI policy, increasing adoption of information technology and focus on improving regional connectivity.

With over 1,000 aircraft on order, India is poised to become the third largest buyer of commercial passenger planes in the world, with only the US and China ahead of it. Having received huge orders from Indian carriers, aircraft manufacturers such as Airbus plan to build MRO facilities in India.

Source: Excerpted from a BDB India study titled 'Trends In Aerospace Sector'

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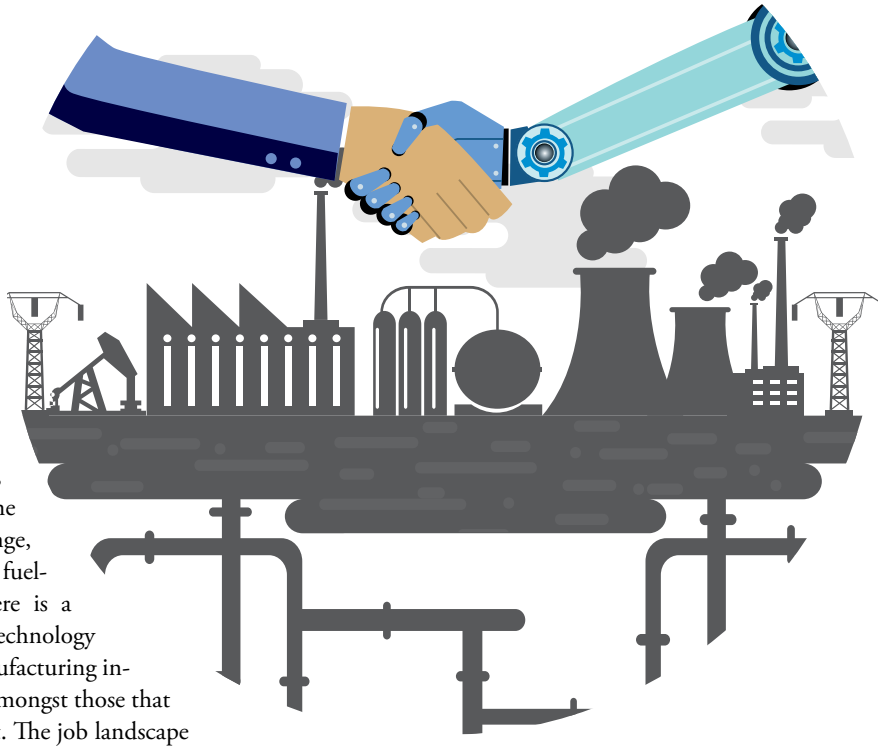
Bridging the gap

India's skill gap can only be addressed if organisations, institutes and individuals themselves work towards the enhancement of their skills in the relevant emerging technology.



By Jaydev V. Sanghavi

The world is now all about convenience and efficiency, and technology has been one of the key drivers of this change, with frequent innovations fuelling the dynamics. As there is a shift to a future dominated by emerging technology such as artificial intelligence (AI), the manufacturing industry and other technical industries are amongst those that have been, and will be, impacted the most. The job landscape in these industries continues to grow and change, with an increasing number of companies using the latest in technology to improve the quality and quantity of production. But technological processes cannot be implemented in isolation. Even with the high number of engineers graduating every year in India, most of these graduates do not have the necessary practical experience that is required on-the-job.

There is, therefore, a need for technicians, managers and aspiring engineers to adopt/familiarise themselves with new processes using Information Technology and Automation. This will ensure they stay abreast with the developments across the industry and keep their roles relevant to the demands of today, even when automation threatens to take over several existing jobs.

Over the last few years, 3-D printing has been a very popular method for the fast production of quality goods. The use of 3-D printing in healthcare for instance, to manufacture artificial limbs has become a boon to soldiers who are fighting in remote areas. For example, the Ratna Nidhi Trust sends a number of Jaipur Foot prosthetics to Afghan soldiers who have suffered injury and amputation as a result of war. All that is required is a photograph of the person's body, and Jaipur Foot is able to manufacture the prosthetic leg in India and ship it to them.

Additionally, various parts of automobiles today are made using 3-D printing. Mercedes Benz is one such company that has achieved the production of accurate parts and their assembly with minimum human staff and increased cost cutting as a result. Now, with the advent of emerging technology, AI tools are also being put to use for driverless vehicles, especially within the agricultural sector. This is largely being implemented with vehicles such as tractors, in order to increase efficiency and output. AI is also beginning to be used to hire trained staff.

> "In the meanwhile, online courses, training programmes, internships and employee upskilling/reskilling is what will help close the skill gap that exists today."

A report by the All India Council for Technical Education (AICTE) found that out of a million people; substantial number of people remains unemployed. As a result of many unemployable people due to a gap in skills, there could be a reduction in the hiring of staff. Similarly, there are huge challenges for existing employees in companies that are going through rapid changes in procedures with the introduction of new technology. Therefore, companies and managers may be left to tackle a labour problem arising out of the redundancy of certain jobs, if the company doesn't prepare its processes and employees for the job requirements of the new-wave in advance. To tackle the issues and curb this threat, companies can use modern management techniques such as the SAP software which facilitates effective

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"Industry experts and academia need to come together and produce curriculum to teach new skills which are relevant to jobs in these times."

Enterprise Resource Planning (ERP) solutions, Stores Management, Spare Parts Inventory and Record Keeping. Most manufacturing units in the country are using software such as SAP, Spine, and Tally. However, the challenge faced by management staff is to learn, adopt and implement the system of choice in their manufacturing units effectively. This can only be done if existing and aspiring employees in this field are trained and equipped with the right skills.

There may be significant financial commitments associated with upgrading processes and skills. However, with the size of manufacturing companies such as Refineries, Petrochemical Plants and Automobile units, finding and implementing the right tools and training will have a long-term benefit and return on investment.

At present, there is a talent pool of highly skilled personnel in electrical, mechanical, turning, welding, fitters & boiler operators, but now new demands pertaining to automation, 3-d printing, sap application, smart-plant software, ERP solutions, digital and cloud technologies have risen. Only few educational institutes have started teaching these subjects and their application; so, the existing skills these professionals have can only be applied to a limited extent, or none at all.

This is why a skill gap has emerged, and it needs immediate action to be able to make use of these resources in the present scenario with the dominance of emerging technology. Industry experts and academia need to come together and produce curriculum to teach new skills which are relevant to jobs in these times. This will enable existing and aspiring professionals to manage new systems and meet new quality standards to attain higher productivity.

For instance, there is a demand for both low temperature welders and high-pressure boiler plate welders for the fabrication of LNG Storage Tanks but not enough skilled labour for the same. The use of remote control valves demands a proper skill set in the field of instrumentation. Additionally, the use of software to detect corrosion and choke in pipelines has recently been implemented in the industry. Due to advancements such as these, the labour that was first carrying out these tasks would now become obsolete. Their skills and training would require a technology-based enhancement, so that they can focus more on the output of value, while other processes are automated.

There is, thus, a need for dedicated I.T. institutes in every state to cater to this ever-increasing need of skilled professionals across specific industry practices and verticals. Within such institutes, the courses need to focus more on career-related experiential learning, rather than theory with limited practical exposure. It is only then that people aspiring towards careers in technical fields can make an impact and channel all they have learnt during the course of their studies into the professional environment.

"At present, there is a talent pool of highly skilled personnel in electrical, mechanical, turning, welding, fitters & boiler operators, but now new demands pertaining to automation, 3-d printing, sap application, smart-plant software, ERP solutions, digital and cloud technologies have risen."

Most companies in the near future will automate processes to a large extent, affecting several jobs across sectors. This is where the relevant hands-on training and skills will help professionals adjust to new processes. Once employees are equipped with these skills, they will be able to work towards implementing them creatively at the workspace contributing to their growth and the growth of the organisation.

India's skill gap can only be addressed if organisations, institutes and individuals themselves work towards the enhancement of their skills in the relevant emerging technology. The overturning of curriculums will be a long process, but in the meanwhile, online courses, training programmes, internships and employee upskilling/reskilling is what will help close the skill gap that exists today. This is when organisations will be able to function at the optimal level, and employees will be able to use their skills for meaningful impact and development – both for themselves and their organisations.

Even with the high number of engineers graduating every year in India, most of these graduates do not have the necessary practical experience that is required on-the-job.

The author is Executive Director, Aarvi Encon Limited

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Factory orders & production expand slowly in March

Softer upturn in sales drags output growth to six-month low

Although operating conditions in the Indian manufacturing industry continued to improve in March, there was a widespread slowdown in growth. Softer increases were registered for new orders, production, input buying and employment. The deceleration was accompanied by subdued inflationary pressures, with rates of increase in input costs and output charges below their respective long-run averages. Concurrently, business sentiment strengthened to a seven-month high.

Registering 52.6 in March, the Nikkei India Manufacturing Purchasing Managers' Index® (PMI®) continued to signal improving operating conditions in the sector. However, falling from 54.3 in February to a six-month low, the latest figure highlighted a loss of growth momentum. Consumer goods was the brightest spot in March, followed by the intermediate and then investment goods categories.

> "Manufacturing sector expansion in India took a step back in March, with metrics for factory orders, production, exports, input buying and employment all moving lower. Still, growth was sustained on all fronts."
>
> **Pollyanna De Lima,** Principal Economist, IHS Markit

Despite being solid, the increase in new orders was the slowest in six months. On the one hand, firms indicated that strong underlying demand, successful advertising and the receipt of bulk orders underpinned sales growth. On the other hand, competitive conditions and the upcoming elections reportedly curbed the upturn.

New orders from external markets rose further, although growth softened from February. Where export sales increased, companies mentioned that marketing efforts bore fruit.

Improved technology, favourable market conditions and ongoing sales growth led to another rise in manufacturing production. That said, the rate of expansion eased to a six-month low due to competitive pressures, relatively subdued sales and shortages of raw materials.

March data pointed to a further rise in manufacturing employment, which panellists attributed to new order growth. The increase was the weakest in eight months, however, as 92% of companies left payrolls unchanged amid adequate manpower to handle existing workloads.

Buying levels grew in March at the slowest pace in the current ten-month sequence of expansion. Still, holdings of raw materials and semi-finished goods rose further. Conversely, post-production inventories declined for the twentieth month in a row. According to manufacturers, some orders had been fulfilled from stocks.

There was evidence of mild capacity pressures at manufacturers as outstanding business increased again. Nonetheless, the pace of backlog accumulation was marginal and the joint-weakest in the current five-month sequence of expansion.

On the price front, softer increases in input costs and output charges were registered. In both cases, rates of inflation were below their respective longrun averages.

Business sentiment strengthened to a seven-month high during March. Companies predicted that marketing initiatives, capacity expansion plans and favourable public policies after the elections would support production growth over the course of the coming 12 months.

Commenting on the Indian Manufacturing PMI survey data, Pollyanna De Lima, Principal Economist at IHS Markit and author of the report, said: "Manufacturing sector expansion in India took a step back in March, with metrics for factory orders, production, exports, input buying and employment all moving lower. Still, growth was sustained on all fronts."

"Although global headwinds and a general slowdown in trade present some concerns for the future health of Indian manufacturers' order books, so far companies have been able to weather the storm and secure healthy inflows of new work from abroad," De Lima says.

"As such, we expect stock-building efforts in the coming months and robust business sentiment to support output growth and further lift payroll numbers. Expansionary public policies such as fiscal stimulus and interest rate reduction should also assist the manufacturing sector in gaining some traction in the near term," he adds.

Source: Nikkei PMI

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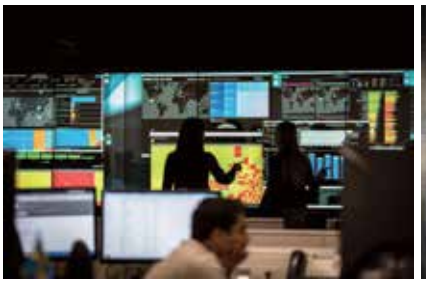


Evolving and Exciting!

India is growing supply chains from both domestic demand and export interest. This combination will require advanced and capable supply chain management professionals now and into the future, says **Tom Linton,** Chief Procurement & Supply Chain Officer, Flex

By Niranjan Mudholkar

Q What are some of the hottest trends in Supply Chain Management currently at the global level?

Global Supply Chains are optimized by speed and agility. To gain competitive advantage companies are constantly looking for ways to accelerate and reduce costs. Often this comes from improved visibility and network optimization. In net: speed wins in supply chains as it improves customer satisfaction, lowers costs and reduces material liabilities.

Q Where do you see the Indian supply chain scenario in the context of what is happening globally?

The 'Make in India' strategy helps increase manufacturing in India. The next important step is to 'Buy in India' as that shift reduces imports which add costs in logistics speed and duties.

Q Would you agree that Indian manufacturing companies today understand the significance of having the right kind of supply chain to enhance their competitiveness? Or are their big gaps?

I see a great amount of eagerness and capability. What is needed is the investment to match that desire. Infrastructure improvements are also needed to match other competitive economies, so logistics are not constrained by the movement of materials.

Q Is the big boom in the e-commerce sector affecting the supply chain management in other industries? In what way?

"To gain competitive advantage companies are constantly looking for ways to accelerate and reduce costs. Often this comes from improved visibility and network optimization."

"Volatility is and should be expected. The modern supply chain demands visibility so that uncertainty, complexity and ambiguity can be overcome."

E-commerce on the Business to Consumer side has been firmly established and is growing globally. What is needed now is increased Business to Business investment to optimize supply chains inter-company, in the same way B2C e-commerce has driven consumer interest.

Q Did you have to make any drastic changes to Flex's SCM after taking over?

Flex is a supply chain driven company. To help optimize supply chains for over 1000 customers operating in 30 countries and over 100 factories we created Flex Pulse which is a real time system for visualizing the material in motion around the world. Most supply chain improvements come from seeing what needs to be improved. From that visibility, things like agility and speed can be derived. This system has been globally recognized as one of the very best at improving supply chain performance.

Q Flex is a kind of one-stop-shop for the connected world providing wide-ranging solutions from design to engineering and from manufacturing to logistics. What kind of supply chain does Flex rely upon to support such diverse functions?

At the core of Flex is a mission to design, build and deliver products around the world. Flex has the added competitive advantage of being able to do that in factories spread across the globe. This allows companies to quickly expand capacity in markets they want to win.

Q In the book "The LIVING Supply Chain: The Evolving Imperative of Operating in Real Time" that you have co-authored with by Robert Handfield, you have spoken about the 'LIVING era of supply chain management'. What exactly is it and why is it important?

Supply Chains are different than other business functions. They are evolving constantly. In our book we refer to LIVING as Live, Intelligent, Velocity, Interactive, Networked, and Good to outline the imperatives driving the modern supply chain. Each of these descriptions outline how supply chains adapt to changing market conditions, locations and requirements. India is growing supply chains from both domestic demand and export interest. This combination will require advanced and capable supply chain management professionals now and into the future.

Q Is there really a "secret ingredient" to leveraging the power of a well-managed supply chain – particularly in the VUCA business environment? If yes, then, what is it?

Volatility is and should be expected. The modern supply chain demands visibility so that uncertainty, complexity and ambiguity can be overcome. That is the competitive advantage of Flex Pulse, our tool for reducing these issues in supply chain management.

Q How do you see technologies like IoT and AI impacting the supply chains?

Supply chains in the future will be increasingly autonomous as applications from various supply chain nodes talk to one another. They are transforming the world and are going to drive supply chains as devices in trucks, trains, planes and ships leverage new ways of communicating content, locations and destinations in the same way mobile mapping apps changed the way we navigate.

> "E-commerce on the Business to Consumer side has been firmly established and is growing globally. What is needed now is increased Business to Business investment to optimize supply chains inter-company, in the same way B2C e-commerce has driven consumer interest."

Q As a supply chain professional, what is it that drives you to continue working in this field?

The "scope of practice" in Supply Chain is not static. It is constantly changing. Supply chains adjust to their environment in the same way the biological world adjusts and evolves to conditions. That's is exactly what makes it exciting. No day is the same and next year will be a step further different than this year.

Image Source: Flex

UPDATE

Passenger vehicle sales in India may reach 5 mn units in FY23: Report

The passenger vehicle (PV) market in India is likely to reach a sales figure of about five million units in FY 2023 from 3.3 million units in FY18 thereby clocking a compounded annual growth rate (CAGR) 7.7%, according to a recent ASSOCHAM-Roland Berger joint study.

"Stronger preference for SUVs (sports utility vehicles) and crossover models is expected to continue in future as well leading to a CAGR of 12 per cent in FY18-23," noted the study titled, 'Moving towards greener transportation,' conducted by The Associated Chambers of Commerce and Industry of India (ASSOCHAM) along with global strategy consulting firm Roland Berger.

The report however noted that significant growth potential exists in terms of penetration of four-wheel vehicles in India which is much lower when compared to global economies such as USA and China. The study also noted that domestic sales of commercial vehicles in India is expected to cross one million units by FY23 from 832,000 units in FY18 thereby clocking a CAGR of 5.6 per cent.

"Implementation of GST will consolidate manufacturing operations resulting in faster turnaround times and an overhaul of the distribution system to a hub-and spoke model," it said. The report further said that stricter enforcement of overloading ban, implementation of scrappage policy from April 2020, and GST are all expected to positively impact M&HCV market demand.

Source: ASSOCHAM

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Royal Enfield to invest Rs.700 crore as capex for FY 2019-20

Royal Enfield, a unit of Eicher Motors Ltd. (EML) has announced its planned capital expenditure of INR 700 crore for FY 2019-20. The planned capex will include completion of the construction work of the Technology Centre, Phase-2 of the Vallam Vadagal plant in Tamil Nadu and towards the development of new platforms and products. Also, for 2019-20, Royal Enfield plans a production of 950,000 motorcycles.

Speaking on the company's investment plans, Siddhartha Lal, MD & CEO, Eicher Motors Ltd. said, "This year Royal Enfield will focus on the upcoming transition to the BS-VI emission norms along with strengthening our product development capabilities and working towards new global platforms. The second phase of our Vallam Vadagal plant near Chennai, Tamil Nadu is progressing well and is expected to commence commercial production in the second half of this financial year. The construction of our Technology Centre in Chennai is also nearing its completion. With a wide distribution network in India, growing international presence and building state-of-the-art capabilities in product development, Royal Enfield is well on its way to grow the middleweight motorcycle segment globally in the coming years."

Daimler Trucks to acquire major stake in Torc Robotics

Daimler Trucks and Torc Robotics are joining forces in a one-of-a-kind combination to commercialize highly automated trucks (SAE Level 4) on U.S. roads. Going beyond an OEM/supplier relationship, the companies signed an agreement today for Daimler AG's subsidiary Daimler Trucks and Buses Holding Inc., to acquire a majority stake in Torc Robotics for an undisclosed sum. Closing of the acquisition is subject to approval from U.S. authorities.

Michael Fleming, CEO of Torc Robotics, Martin Daum, Member of the Board of Management Daimler AG, responsible for Trucks and Buses, and Roger Nielsen, CEO of Daimler Trucks North America LLC, announced the strategic move at Torc headquarters in Blacksburg, Virginia.

"With the ever rising demand for road transportation, not the least through e-commerce, there is a strong business case for self-driving trucks in the U.S. market and I believe the fastest path to commercialization for self-driving trucks is in partnership with Daimler Trucks, the OEM market leader. This move is in line with our mission of saving lives and represents another major milestone for Torc since crossing the finish line in the DARPA Urban Challenge 12 years ago," said Michael Fleming, CEO of Torc.

Altair signs MoU with ICAT Manesar

US based Altair has signed an MoU with International Centre for Automotive Technology of India (ICAT), Manesar. ICAT is an organization set up under the aegis of the National Automotive Testing and R&D Infrastructure Project (NATRIP), and the Government of India in the areas of automotive testing, certification and R&D services.

The MoU states co-operation between the two entities for addressing the simulation and testing needs of the existing and emerging mobility industry. Altair envisions application of its simulation technologies for traction motors of electric vehicles (motor drives or controls), Automated Driver Assistance System (ADAS) enabling technology, optimization driven design technology and processes for both E-mobility and the conventional vehicles industry. The MoU intends to set-up a joint working arrangement to realize their respective visions with the help of mutual support and cooperation. ICAT and Altair endeavor to jointly promote, develop and offer training, competency building solutions, technologies and practices to the industry, which allows each of the entities to utilize their capabilities and strengths in a synergetic way to address the combined needs of simulation & testing for the industry.

JLR's innovative recycling initiative

JLR is developing the next phase of its aluminium closed loop strategy with an innovative recycling initiative to transform the vehicles of today into the cars of tomorrow.

The REALITY project aims to recover aluminium from existing JLR vehicles and reform it into a new high-grade aluminium to create new vehicles.

The process is currently being tested on early, pre-production Jaguar I-PACE prototypes Once separated, the aluminium scrap is melted and reformed.

When operating at full capacity, REALITY is expected to reduce the CO2 impact of production while reducing the amount of virgin aluminium required to produce vehicles.

GM to invest $300 mn in the new EV plant

General Motors is investing $300 million in its Orion Township, Michigan, assembly plant to produce a new Chevrolet electric vehicle that will bring 400 new jobs to the Orion plant. The announcement is part of GM's new commitment to invest a total of $1.8 billion in its United States manufacturing operations, creating 700 new jobs and supporting 28,000 jobs across six states.

The new Chevrolet electric vehicle is in addition to the existing Chevrolet Bolt EV, further advancing GM's commitment to an all-electric future. It will be designed and engineered off an advanced version of the current award-winning Bolt EV architecture. Additional product information and timing for the new Chevrolet EV will be released closer to production.

The new electric vehicle had been slated for production outside of the U.S. The decision to bring it to Orion was based on many factors, including:

- The Orion plant currently builds the Bolt EV, and the new Chevrolet EV will be based off an advanced version of the same vehicle architecture.
- Moving production to a U.S. manufacturing plant supports the rules of origin provisions in the proposed United States, Mexico and Canada Agreement.

GoZero Mobility expands into India

GoZero Mobility, a British electric bike & lifestyle brand is announcing its expansion into the Indian market. After one year of design & technology development in Birmingham, United Kingdom, GoZero is expanding its global reach into India, one of the largest bicycle market in the world.

As an introduction into the market, GoZero Mobility will be launching its flagship products "One" and "Mile" performance e-bikes by mid-march 2019 in New Delhi. To introduce the products in the market, GoZero has partnered up with Kirti Solar based in Kolkata, for the development and manufacturing of current & future products, utilizing the global supply chain to "Make in India". As a part of the association, Kirti Solar has invested US$ 250,000 in GoZero Mobility.

GoZero One is powered with 400Wh lithium battery pack which is optimized to provide 60 Kms of range on single charge & GoZero Mile is powered with 300Wh lithium battery pack which provides 45 kms range. Both are specialized performance e-bikes providing optimum stability and comfort and come with multi-modes of operation giving users freedom to choose the way of riding – Throttle, Peddle Assist, Cruise Mode, Walk Mode and Manual Peddle.

India key to Toyota-Suzuki collaboration

Toyota Motor Corporation (Toyota) and Suzuki Motor Corporation (Suzuki) recently announced their agreement to begin considering concrete collaboration in new fields and interestingly, India is key to the collaboration.

As per the agreement, Toyota will help in widely spreading hybrid electric vehicle (HEV) technologies in India through local procurement of HEV systems, engines, and batteries.

Suzuki will supply two compact vehicles built on its platforms (Ciaz and Ertiga) to Toyota in India. It will also supply India-produced vehicles (Baleno, Vitara Brezza, Ciaz, Ertiga) to Toyota for the African market.

There will also be a joint development of a Toyota C-segment MPV, which will be then supplied to Suzuki. Agreement will also include production of the Suzuki-developed compact SUV Vitara Brezza at Toyota Kirloskar Motor Pvt. Ltd. (TKM) from 2022.

Faurecia Clarion Electronics launched in Japan

Faurecia has announced the official launch of its fourth Business Group "Faurecia Clarion Electronics", based in Saitama, Japan. This activity has the ambition to become a global leader in cockpit electronics and low-speed ADAS.

Last year in October, Faurecia had announced a project to acquire the Japanese company Clarion. On March 28, 2019 Clarion became a wholly-owned company of Faurecia. The new Business Group, Faurecia Clarion Electronics, combines Clarion with Faurecia's previous acquisitions of Parrot Automotive and Coagent Electronics.

With 9,000 people including 1,650 engineers, this new Business Group will generate over €2 billion of sales by 2022. Significant synergies are confirmed through leveraging the combined product offer and the complementary customer, geographic and industrial footprints.

Atsushi Kawabata is appointed Executive Vice President of Faurecia Clarion Electronics and joins the Faurecia Executive Committee. He was previously President and Chief Executive Officer of Clarion.

Electrifying Possibilities!

According to a report by the NITI Aayog and the Rocky Mountain Institute, if FAME II and other measures are successful, India could realize EV sales penetration of 30 percent of private cars, 70 percent of commercial cars, 40 percent of buses and 80 percent of two and three-wheelers by 2030.

The NITI Aayog and the Rocky Mountain Institute (RMI) released a report on opportunities for the automobile sector and government under the Faster Adoption and Manufacturing of Electric Vehicles II (FAME II) scheme.

The technical report titled 'India's Electric Mobility Transformation: Progress to Date and Future Opportunities', quantifies the direct oil and carbon savings that the vehicles incentivized under FAME II will deliver. RMI is an Indian and global non-profit organisation focused on driving the efficient and restorative use of resources.

The report also quantifies the catalytic effect that FAME II and other measures could have on the overall Electric Vehicle (EV) market. According to the analysis, if FAME II and other measures – in public and private space – are successful, India could realize EV sales penetration of 30 percent of private cars, 70 percent of commercial cars, 40 percent of buses and 80 percent of two and three-wheelers by 2030.

> "The FAME II scheme, which was notified by the Union Cabinet in February 2019, aims to further accelerate the government of India's commitment to a clean mobility future, sees the electrification of transportation as a primary focus area."

Extrapolating from the same, the lifetime cumulative oil and carbon savings of all electric vehicles deployed through 2030 could be many-fold larger than the direct savings from FAME II. For example, achieving these levels of market share by 2030 could generate cumulative savings of 846million tonnes of CO2 over the total deployed vehicles' lifetime.

The FAME II scheme, which was notified by the Union Cabinet in February 2019, aims to further accelerate the government of India's commitment to a clean mobility future, sees the electrification of transportation as a primary focus area. FAME II intends to catalyse the market for faster adoption of EVs to ensure durable economic growth and global competitiveness for India's automotive industry.

Key highlights from the report

Effects of FAME II will go beyond the vehicles that are eligible under the FAME II. There is considerable energy and CO2 savings associated with the two, three, and four-wheeled vehicles and buses covered by FAME II over their lifetime, as well as the potential savings associated with greater adoption levels by 2030.

The electric buses covered under FAME II will account for 3.8 billion vehicle kilometers travelled (e-vkt) over their lifetime.

In order to capture the potential opportunity in 2030, batteries must remain a key focal point as they will continue to be the key cost driver of EVs.

Vehicles eligible under FAME II scheme can cumulatively save 5.4 million tonnes of oil equivalent over their lifetime worth Rs 17.2 thousand crore.

EVs sold through 2030 could cumulatively save 474 million tonnes of oil equivalent (Mtoe) worth INR 15 lakh crore and generate net CO2 savings of 846 million tonnes over their operational lifetime.

India needs auto industry's active participation to ease electric mobility transition. The auto and battery industries could collaborate to enhance customer awareness, promote domestic manufacturing, promote new business models, conduct R&D for EVs and components, consider new business models to promote EVs.

Government should focus on a phased manufacturing plan to promote EVs, provide fiscal and non-fiscal incentives for phased manufacturing of EVs and batteries. Different government departments can consider a bouquet of potential policies, such as congestion pricing, ZEV credits, low emission/exclusion zones, parking policies, etc. to drive adoption of EVs.

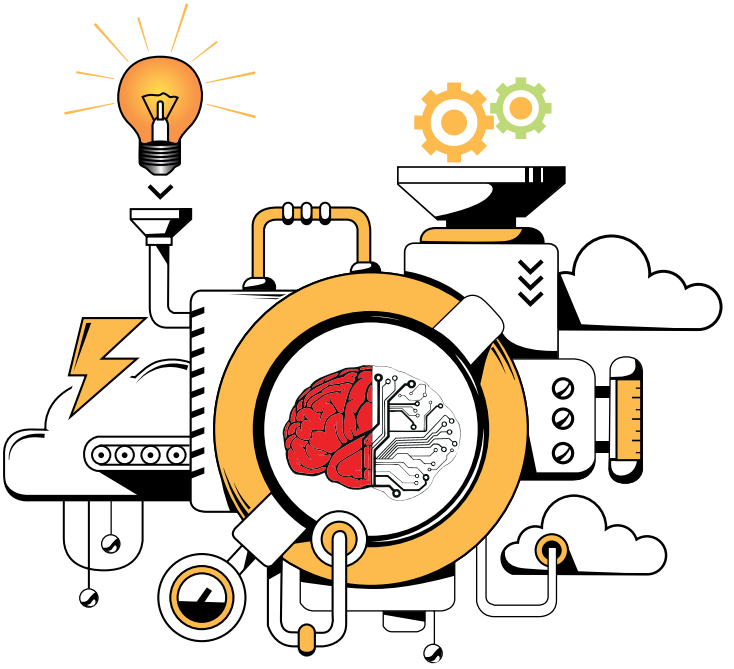
India's electric vehicle market is poised for growth with a blend of policies, such as FAME II, and the automotive industry's willingness to provide new mobility solutions to the citizens of the country. Such a transformation will create enormous economic, social and environmental benefits for the citizens of India.

Source: PIB

'Smart' is the way forward

Technology is an enabler to improve productivity says **Kaustubh Shukla,** Chief Operating Officer of the Industrial Products Group, Godrej & Boyce

By Swati Deshpande



Q Can you please tell us about your experience of implementing Industry 4.0/Smart Factory?

The implementation of Industry 4.0 / Smart factory is a Work in Progress for us. Godrej is present across a wide range of businesses and thus the array of manufacturing capabilities is vast.

From light engineering and mass manufacturing set ups to heavy engineering and low volume, as well as from ultra-precision in in humongous jobs ranging from small to high precision requirements. In all these scenarios, we are increasingly deploying technology that ranges from low cost automation, robotics, IoT enabled machines etc. in varying scales, and are deriving great benefits.

Our factories are smarter than before as we continue our journey and fully evolve into Smart factories.

Q How does the technology make sense in Indian context where labour is available in abundance?

The judicious use of technology to achieve the right balance is the answer. Technology is an enabler to improve productivity, yields, quality and safety and thus should be embraced and nurtured. India is presently in a good position. Good demographics (large population of young Indians between the age group of 25-28), supported by good policies promoting skilling and entrepreneurship, good thrust on building infrastructure, a massive programme to uplift the lives of the poorest, provides huge opportunities for gainful employment. Doing this with the aid of technology can only make things better.

Humans are said to resist change. Actually, they resist inconvenience. So, the best way is to prepare the minds of people to encourage adoption of new technology.

Technology will aid economic development and spur new types of jobs. A better output with the aid of technology will move the jobs to India and will provide more opportunities.

Even a business such as food delivery, which is very much human dependent, enjoys spectacular results when enabled with technology. The same goes for manufacturing. Technology will aid economic development and spur new types of jobs. A better output with the aid of technology will move the jobs to India and will provide more opportunities. The skill gap needs to be bridged.

Q Technology upgradation calls for disruption as well. What disruption does Smart Factory technologies

Disruption caused by technology is reducing the reliance on humans to be able to achieve better, repeatable and reliable results. And this is happening across sectors like travel (ticketing), navigation, distribution, entertainment, health and thus will engulf all spheres of life.

cause at the operations level? How do you deal with such disruption?

Disruption caused by technology is reducing the reliance on humans to be able to achieve better, repeatable and reliable results. And this is happening across sectors like travel (ticketing), navigation, distribution, entertainment, health and thus will engulf all spheres of life. Disruption in all the cases described above has provided more opportunities of livelihood by creating new sets of jobs.

Disruption is a good word. It only changes the way we do things. Best way is to adapt to the new reality – embrace change, learn new skills and teach them to others. So even disruptive technological change can spur creative jobs where those who are good at it, can lead purposeful, meaningful jobs by enabling others to adopt new technologies.

The way to deal with disruption is to view it as a new reality and have the mindset of embracing and mastering it.

The future smart factories will be productive, cost effective and sustainable. Smart factories will ensure that consumers and manufacturing units both benefit from low cost but high-quality products and bring larger good to the society.

Q. Any technology upgradation calls for new skills set. How to deal with the challenge of skill upgradation?

One way is to create excitement about newness. Humans are said to resist change. Actually, they resist inconvenience. So, the best way is to prepare the minds of people to encourage adoption of new technology. Besides a change in mindset, it is needed that we provide the right kind of skilling. Helping people learn the new technology and getting them to realise the benefits of it would be the right approach.

Adapting to new technology has been done before, so I have the confidence that it can be done again. Knowing what to teach and making it interesting to learn will overcome this challenge.

UPDATE

Toyota produces fuel from renewable sources for forklifts

A station for the production and supply of hydrogen from renewable energy at Motomachi Plant

SimpleFuel™ is a simplified hydrogen station that uses electricity from solar panels at the plant site to produce low-carbon hydrogen from the electrolysis of water, which is then supplied to fuel-cell forklifts (FC forklifts) after it is compressed and pressurized.

Toyota Motor Corporation (Toyota) recently announced that it has newly introduced SimpleFuel™ to its Motomachi Plant in Toyota City, Aichi Prefecture. SimpleFuel is a small water electrolysis-based machine for hydrogen generation and filling that can produce, store, and supply hydrogen by making use of electricity generated from solar power, a renewable energy resource.

SimpleFuel™ is a simplified hydrogen station that uses electricity from solar panels at the plant site to produce low-carbon hydrogen from the electrolysis of water, which is then supplied to fuel-cell forklifts (FC forklifts) after it is compressed and pressurized. It can produce up to 99 Nm3/day (approx. 8.8 kg/day) of hydrogen, enough to fuel seven or eight FC forklifts. Its compact size means it can be installed in small spaces, making it suitable for refueling FC forklifts within the plant.

A hydrogen station has been running at Motomachi Plant since March 2018, in conjunction with the increasing numbers of FC forklifts in use there. By working to support fueling through the use of SimpleFuel™, with an eye toward the rising demand for hydrogen, Toyota aims to reduce CO2 emissions at the Motomachi Plant and intends to support the accumulation of new technologies and knowledge.

Source: Toyota Motor Corporation

Flying **high**

It is the right time to enter in the aerospace manufacturing segment says **C. S. Prakash,** MD, Pushpak Products India Pvt. Ltd. and Chairman, Defence supplier group - Federation of Small and Medium Enterprises (FISME)

By Swati Deshpande

The company began in 1992 when manufacturing was not a focus area in the country. How has your journey in the initial stages?

We had a humble beginning in 1992 with general fabrication. Since then we have come a long way and ventured into designing, manufacturing and delivering high-end precision products for the Aerospace, Defence, Automobile, Industrial and Institutional.

Since then, we have closely partnered with ISRO, HAL, BEL, DRDO and the Indian Defence forces for many landmark projects. We have also acquired technology from DRDO-DFRL to serve the armed forces.

In addition to Aerospace, we are also one of the preferred engineering products company for top automobile and engineering brands. We have long standing partnerships with with Toyota, Honda, L&T, Scania, Volvo, BHEL, BEL, Bosch, etc.

Our Electrochemical processes are used in spacecraft onboard components in the Aerospace and Defence sectors.

Other divisions of Pushpak include, Pre-fab structures for industry, commercial and home, furniture for the industrial and civilian sectors, and global sourcing of Aero-space and Defence products.

I feel this is the right time for Indian start-ups and other manufacturing companies to enter into aerospace and defence manufacturing. The gestation period for this industry is high. If one invests now, the industry will definitely pay back in years to come.

The company has contributed towards various space projects of ISRO. Can you please tell us about it?

We are partners to ISRO, for some of the successful ambitious space projects. We have contriibuted towards GSAT-15,16,17 and Project PSLV-C37- that successfully launched 104 satellites in a single flight. Additionally, the company has been part of the Moon and Mars mission.

In fact, Pushpak is the only qualified company for coating processes for satellite thermal treatment.

Apart from ISRO, our partnership with HAL also stands tall amogst the rests. We have worked with them on several projects including LCA, GTRE GTX-35VS Kaveri Engines, etc.

Please tell us about your manufacturing plants.

Currently, we have couple of plants in Bidadi and Jalahalli. We have three divisions of business metal working, wood working and for the electrochemical. Bidadi plant is spread across the area of 2 acres and is equipped with state-of-the-art German and Japanese machines. Electrochemical division is located at Jalahalli. The facility in Jalahalli has been delivering products with 100% success, and zero defect since more than 15 years. The company is qualified and certified electrochemical processing partner for over 14 processes, for ISRO, HAL, BEL, L&T, Astra, Centum and more.

Additionally, one more plant is coming up in KIADB Aerospace Park.

Government of Karnataka has immense emphasis on the growth of the aerospace industry in the state. The state government has set up Karnataka Aerospace Policy, which encourages the industry players.

Q How has been government's support to the aerospace industry?

Government of Karnataka has immense emphasis on the growth of the aerospace industry in the state. The state government has set up Karnataka Aerospace Policy, which encourages the industry players inclusing SMEs. Additionally, Aerospace Park is also being set up in the state, where all the glopal aerospace players have invested. As I mentioned before, even Pushpak will have an facility in this park.

Q Aerospace industry seems to be gaining momentum in India. How do look at it and how do you it growing in the years to come?

You rightly said that the aerospace industry has gained momentum. In 3-5 years, you will be able to see the difference. The aerospace industry's contribution towards the economy will increase in coming days. And in 15-20 years, it is likely to be booming a booming industry in true sense due to internal consumption. In the aerospace and defence manufacturing, the domestic consumption is predicted to grow exponentially, which will, in turn, boost SMEs and MSMEs in the sector.

Today, all aerospace and defence giants are looking at investing in India.

In this scenario, I feel this is the right time for Indian start-ups and other manufacturing companies to enter into aerospace and defence manufacturing. The gestation period for these industries is high. However, looking at the market situation, it will definitely pay back in years to come.

Unmanned Aerial Vehicles (UAV) also known as drones is yet another industry is expected to take a leap in the years to come.

Q Do you plan to explore UAV manufacturing segment?

Yes, as I said this industry has bright future. We have collaborated with a Czech company to bring Unmanned Aerial Vehicles and Drones. I believe they will play an important role in various industries for applications such as remote sensing, urban area monitoring & surveillance, commercial aerial surveillance, oil, gas & mineral exploration, disaster management and relief, forest surveillance, sea and port monitoring & surveillance, videography & photography, etc.

UPDATE

Airbus begins trials of shore-to-ship deliveries

Airbus has begun shore-to-ship trials in Singapore with its Skyways parcel delivery drone. This marks the first time drone technology has been deployed in real port conditions, to deliver a variety of small, time-critical maritime essentials to working vessels at anchorage.

The maiden shore-to-ship delivery flight was made to the Swire Pacific Offshore's Anchor Handling Tug Supply vessel 'M/V Pacific Centurion', 1.5km from the shoreline of Singapore's Marina South Pier, carrying 1.5kg of 3D printed consumables. Landing safely on the ship deck and depositing its cargo to the shipmaster, the Skyways unmanned air vehicle swiftly returned to its base, with the entire flight taking within ten minutes.

During trials, the drone will lift off from the pier with a payload capability of up to 4kg, and navigate autonomously along pre-determined 'aerial corridors' to vessels as far as 3km from the coast.

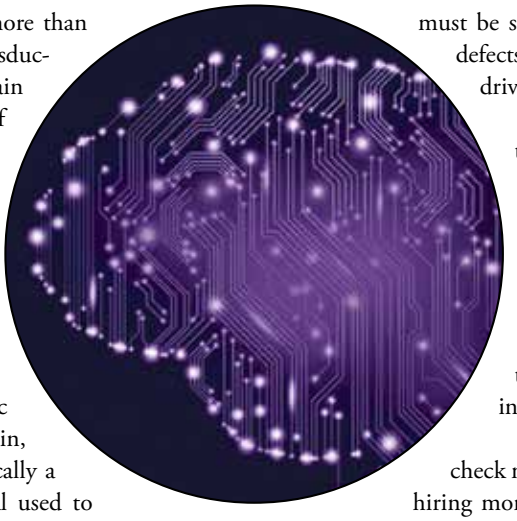
The trials are being undertaken in conjunction with partner Wilhelmsen Ships Services, one of the world's leading maritime logistics and port services company. During the trials, Airbus' Skyways drone will lift off from the pier with a payload capability of up to 4kg, and navigate autonomously along pre-determined 'aerial corridors' to vessels as far as 3km from the coast.

Airbus' Skyways lead, Leo Jeoh shared, "We are thrilled to launch the first trial of its kind in the maritime world. Today's accomplishment is a culmination of months of intense preparation by our dedicated team, and the strong collaboration with our partner, as we pursue a new terrain in the maritime industry."

Inside **Project Athena**

A global player in the data storage field has built an AI platform, which it has successfully deployed to improve production line efficiencies and product quality.

Seagate factories produce more than one billion recording transducers every year. To maintain the highest standards of quality, these transducers must be analyzed and tested to detect manufacturing defects. But what are transducers—and what do they have to do with wafers and drives? The design starts with the raw material that is, essentially, a thin semiconductor substrate. Over the course of a photolithographic process, the substrate becomes a thin, flat, crystalline wafer. A wafer is basically a small slice of semiconductor material used to create the read-and-write heads on hard drives. The wafer, when sectioned, and with further processing, becomes a transducer (also known as a slider)—a part capable of reading and writing data onto a rotating magnetic disk recording surface.



The testing process is long, complex, and manually intensive. There are 100,000 sliders in every 200mm wafer that need to be checked. The Normandale factory takes millions of microscope pictures every day, generating 10TB of data that must be sifted to detect potential production defects before wafers are assembled into drives.

Because of the sheer volume of transducers that need analysis, engineers cannot possibly test them all. Even with a lengthy manufacturing process, there simply isn't enough time to check every image. This means that defective units can—and do— escape immediate detection occasionally and are caught later in the process, with much higher cost.

Seagate's teams needed a way to check more pictures in less time. But simply hiring more image analysis experts would still not be enough to process all 17 million pictures.

> "As the cost of microscopic cameras and IoT sensors falls, the same technologies can be used for other applications, too. This is a game-changing first step in smart manufacturing and a foundational architectural piece that can be expanded across the rest of our factories."
>
> **Jeffrey Nygaard,** Executive Vice President of Operations, Products, and Technology at Seagate.

The teams had achieved a degree of automation using rules-based image analysis. This approach meant that it was possible to identify some anomalies—as long as the system knew what it was looking for first. The rules had to be built manually, a time- consuming process that had to be constantly tweaked and refined.

The rules-based system was slow to set up, slow to refine, and produced variable results. Aside from generating plenty of false positives, the rules could only detect known issues. This resulted in a potential risk—that faulty wafers could escape detection before being assembled into read-and-write heads.

Thanks to advances in AI, machine learning, and Internet of things sensors, a new solution eliminates that risk. That's Seagate's Project Athena.

The Solution

The solution had to deal with two main problems: the huge volume of data that needed to be processed every day and the

Opening the gate to AI

Seagate has built – what it calls – a working, practical AI platform for its Normandale, Minnesota, wafer fabrication facility to improve production line efficiencies and product quality. Code named Project Athena, this AI edge platform could provide up to 20 percent reduction in new cleanroom investments required for manufacturing and could lead to up to 10 percent reduction in hours spent on the process. It can process millions of microscope photographs every single day! By deploying deep learning, Athena has trained itself to identify defects faster and more accurately than a human subject-matter expert. Seagate can now resolve irregularities and process problems more quickly and at a lower cost than ever before. Seagate expects to see up to 300 percent ROI from efficiency improvements and better quality processes. The Project Athena technology has a broad range of applications in the manufacturing industry. It's a significant first step in smart manufacturing and an example of Industry 4.0 happening right now.

shortcomings of the current rules-based analysis engine. Traditional big data programs operate on a batch process—completely inappropriate for a production line operating 24×7×365.

The first step was to build a deep neural network (DNN) that could generate insights to improve automation and detection of transducer failures. Neural network processing was built using Nvidia V100 and P4 GPUs*, and high-performance Nytro® X 2U24 storage to underpin the deep learning and AI elements of the Athena system. Wafer images were then fed into the DNN to train the AI system to distinguish between "good" and "bad" wafers. Athena learns in exactly the same way as a human engineer does—by examining thousands of photographs. But thanks to the raw processing power of the DNN, Athena can learn much faster—and more accurately than a human.

Over time, Athena has acquired the ability to spot potential process defects. The AI assistant flags anomalous images for manual assessment by a subject-matter expert. Athena can build and refine its own rules based on anomalies detected during the image analysis operation.

"Project Athena may be excellent at identifying defects, but it does not—and cannot—completely replace factory subject-matter experts. The most powerful upshot of Project Athena is the way it opens up new opportunities for Seagate's wafer experts to innovate and remedy larger problems."

Most importantly, Athena accepts, and analysis images generated by the electron microscope in real time. The DNN is capable of processing every picture as it is created. Seagate is now able to process all three million images generated every day— and can identify tiny defects that may otherwise be missed by a human engineer.

Real-time processing also allows the teams to identify and correct manufacturing issues early. The quicker problems can be identified, the more effectively Seagate can minimize their impact on the production process and costs. "This is a game-changing first step in smart manufacturing and a foundational architectural piece that can be expanded across the rest of our factories," says Jeffrey Nygaard, EVP, Operations, Products, and Technology.

Seagate's manufacturing tools each contain between 30 or more sensors, each of which records machine health and other measurements every second. This information represents an important opportunity to better understand low-level operations. Fed into the Athena DNN, the data helps to identify production issues earlier. This offers the chance to take proactive action in repairing and preventing failures.

Way ahead

Project Athena may be excellent at identifying defects, but it does not—and cannot—completely replace factory subject-matter experts. The most powerful upshot of Project Athena is the way it opens up new opportunities for Seagate's wafer experts to innovate and remedy larger problems.

Of course, Athena does provide a template for solving a far wider range of problems beyond the factory. Its ability to detect anomalies in a faster, more adaptive, and more meaningful way can extend beyond the smart factory and prove useful in domains as varied as public safety, autonomous vehicles, and smart cities.

Source: Seagate

Data explosion

Project Athena requires a huge amount of data processing to work effectively—10TB of daily wafer picture data needs to be processed rapidly in order for anomalies to be detected quickly.

Athena exists as part of a trend that will see global levels of data creation skyrocket in the coming years. According to IDC forecasting sponsored by Seagate, the global datasphere will grow to 175 zettabytes by 2025. The demand for speed in this new data-intense world requires a new kind of solution. Edge computing, one of Gartner's ten strategic technology trends for 2018, is a reaction to demands for reduced latency and the rise in applications that demand real-time critical processing. It delivers services faster to the end user by moving computing closer to the source of data.

If data is processed closer to the source, real-time insights can then be generated closer to the end user, greatly reducing the load on network resources and opening up a whole world of potential new applications. In this model, data center technologies—the compute and storage model—are moved to the edge of the network to enable a new generation of applications. For Project Athena, processing data in the smart factory itself allows anomalies to be identified in real time.

Immense opportunities for growth

V. Anbu, Director General and CEO, IMTMA speaks about the growth of the machine tools industry.

Q How has been last year for the machine tools industry considering manufacturing industry is been growing gradually? What are the projections in the coming year?

Indian machine tool industry has been coasting well over the last one year. As per Gardner's 'World Machine Tool Output Survey 2018', India was ranked 8th in consumption and 10th in production globally for the year 2017.

In FY 2017-2018 machine tool production was valued at Rs. 7,300 crore and consumption was valued at Rs. 14,700 crore. It is estimated that production and consumption will grow by around 30 percent during FY 2018-19 and the industry may grow around 20–25 percent in FY 2019-20 as well. This however is only a projection and result may vary depending on market movement and economy.

Q Which industries are driving the growth of the industry?

Automotive sector is the main driver of growth for machine tool industry. However, the industry also serves many emerging user sectors such as aerospace, defence, medical equipment, railways, power and energy, etc. All these sectors provide immense opportunities for growth.

Q Do you see any technological disruption in the machine tool industry? If yes, which technologies are being disruptive?

Additive manufacturing and Industry 4.0 are the core trends changing the dimensions of machine tool industry. With additive manufacturing offering several advantages over CNC machining there is a general belief that it would replace subtractive manufacturing process in select areas. Additive manufacturing will also work together with CNC machines to deliver productive solutions. Manufacturers who have understood the benefits of this have merged these technologies to create 'hybrid machines'. In this process the machine will undertake additive process as well as metal cutting process with quick changeover from metal cutting to additive process and vice versa.

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With Industry 4.0 industries are ramping up their shopfloor efficiencies to deliver quality products. The connectivity established between machines and operators knowing machine language have led to seamless operations for the end product. Advancements in software, hardware and control technologies are resulting in machines gaining intelligence. Machines take care of predictive maintenance, prescriptive maintenance, storing of information for future usages, etc. This has led to transparency in the production process as real time data is available on fingertips for the top management, middle management and the machine operators working on shopfloors without any blockages. With Industry 4.0 technologies a lot of thinking features have been inbuilt into the machine minimizing the human interventions.

Down the **memory lane**

Super Heroes of the Indian manufacturing industry

The Machinist Super Shopfloor Awards is turning FIVE. What began as a humble beginning in 2015 has turned into a grand, glamour awards platform.

Since the first edition, what has been the highlight of The Machinist Super Shopfloor Awards is – PEOPLE Awards.

The noble intention behind this initiative has been to recognise individual's contribution in taking their companies and hence Indian manufacturing to the next level.

The four categoories – Super Next Generation Leader, Super Entrepreneur, Super CEO and Lifetime Achievement Awards have remained the highlight of all the editions of The Machinist Super Shopfloor Awards.

Let's take a walk down the memory lane to know who bagged which title.

2015

2016

2017


2018

Next Generation Leaders

- In 2015, Amit Kalyani, ED, Bharat Forge Ltd. was announced as The Machinist Super Next Generation Leader.
- Nishant Arya, ED JBM Automotive bagged this award in 2016. It's his dynamic contribution to the growth of the company in terms of diversification & internationalisation that made him stand above the rest.
- Anshul Goel, MD, Duroshox Pvt. Ltd. was the next gen leader who grabbed the Machie in 2017. His relentless focus on quality, value addition, diversification & growth is what helped him won the title .
- In the year 2018, Sriram Viji, Dy. MD, Brakes India the won the Machie for his constant efforts in revolutionising the braking system by leveraging technology expertise & global partnerships.

Super Entrepreneurs

- RK Behera, Founder and Chairman, RSB Group was declared as The Machinist Super Entrepreneur of the Year in 2015.
- In 2016, Harish Sheth, Founder & Chairman, Setco Automotive won this award for his Super entrepreneurial skills.
- Ayush Lohia, CEO, Lohia Auto Industries Ltd grabbed the Machie in 2017. He started his entrepreneurial journey in 2008 with an objective to provide clean, efficient, reliable & affordable inner-city.
- In 2018, Sudhir Mehta, CMD, Pinnacle Industries Ltd. was bestowed upon this award for his entrepreneurial skills. With these set of skills, he has transformed many ideas into businesses.

2015


2016

2017


2018

2015


2016


2018

Super CEO

- Distinguished scientist Dr. Sudhir Kumar Mishra, MD & CEO, BrahMos Aerospace was announced as the Super CEO of the Year in 2015. His contribution in India's quest to achieve excellence in the missile technology remains undisputed.
- Guillaume Sicard then President of Nissan India Operations was declared as The Machinist Super CEO of 2016.
- Dr. Pawan Kumar Goenka, Managing Director of Mahindra & Mahindra was announced as the Super CEO of 2018. Apart from taking his company to the next level, he has also played an exemplary role in the development of The Indian Automotive Industry and the Farm Equipment Sector!

Lifetime Achievement

- In 2015, Farrokh N. Cooper, CMD, Cooper Corporation Pvt. Ltd. was bestowed upon The Machinist Lifetime Achievement Award.
- Ravi Chopra, then Chairman & Managing Director, Piaggio Vehicles Pvt. Ltd, a veteran in the industry, was conferred with this award in 2016.
- Sandeep Singh, Managing Director, Tata Hitachi Construction Machinery Company was awarded with this title in 2017. With more than three decades of experience across a variety of functions in different industries Singh has a penchant for turning around the fortunes of manufacturing companies.
- The Machinist Lifetime Achievement Award 2018 was bestowed upon Dr. Andreas Lauermann who was the then President and Managing Director of Volkswagen India Pvt Ltd.


2015


2016


2018


2017

MFTBC opens Product Center and Design Center in Japan

Daimler Trucks further improves its Japan-based subsidiary Mitsubishi Fuso Truck & Bus Corporation (MFTBC) and has officially opened the new Product Center building and Design Center at the Kawasaki Plant (K1) recently. The new building encompasses the corporate headquarters, R&D and design functions of the company, and is part of a large-scale modernization at MFTBC. Daimler Trucks has invested approx. € 74 Million (94 Oku JPY) since 2017 into this building, known as Campus Plus. The new building offers a modern working environment on 10,000 sqm and is also home of the new, state-of-the-art Design Center.

"The FUSO brand is an essential and successful member of Daimler Trucks. In 2018, it contributed about one-third of total sales and plays a vital role when it comes to future topics such as electric driving. The new Product Center and Design Center in the Kawasaki Plant manifests that we are continuously investing in the future of FUSO and Japan" says Martin Daum, board member of Daimler AG responsible for Trucks & Buses, on the occasion of the opening in Kawasaki.

On the occasion of this event, Daimler Trucks Asia announced that – additionally – up to € 40 Mio (50 Oku JPY) will be invested in 2019 in the FUSO own retail network. This investment kicks off a seven year initiative called Project Mirai (Japanese for 'Future').

Mercedes-Benz Cars starts production in Russia

Mercedes-Benz Cars is starting production for the local market in the new passenger car plant Moscovia with the Mercedes-Benz E-Class Sedan. SUV models will follow the E-Class. Mercedes-Benz Cars is investing more than 250 million euros in the plant in the Moscow region. Over 1,000 employees will work in production and administration. The Moscovia plant is characterized by a flexible and green production and will use modern industry 4.0 technologies.

"The Mercedes-Benz plant Moscovia is another component of our strategy of producing where our customers are. And both partners benefit from this: Russia and Mercedes-Benz," said Dieter Zetsche, Chairman of the Board of Management of Daimler AG and Head of Mercedes-Benz Cars.

Production at the Mercedes-Benz Moscovia plant is characterized by the most modern and innovative Industry 4.0 technologies. Driverless transportation systems convey the bodies between the subsections. Automated shopping cart systems are also used in assembly. Additionally, there are forward-looking solutions for improving ergonomics and efficiency, such as human-robot cooperation when installing the windscreen without a protective fence.

ZF establishes tech center for AI & Cybersecurity

ZF is establishing a Technology Center for Artificial Intelligence (AI) and Cybersecurity in Saarbrücken. As part of a worldwide network, the technology group is already developing AI applications for systems and components as well as for making production and services safer, more intelligent and efficient. With the new "ZF AI & Cybersecurity Center," ZF will now expand its activities in the area of AI research and will coordinate and control the company's future AI activities from here. Wolf-Henning Scheider, Chief Executive Officer of ZF Friedrichshafen AG, announced the location for the Technology Center today in the presence of Saarland Minister-President Tobias Hans. Scheider also announced that as a new shareholder of the German Research Center for Artificial Intelligence (DFKI) and strategic partner of the Helmholtz Center for Information Security (CISPA), ZF will cooperate closely with these leading research institutions in the future. This deal is expected to be finalised in the second quarter of 2019 and is subject to formal approval of all current shareholders.

"With the new Technology Center for Artificial Intelligence and Cybersecurity, we are taking our Group-wide expertise in these key digital technologies to a new level. We are also in close proximity to the most respected research institutions in these disciplines which will strengthen our cooperation," explained Wolf-Henning Scheider. "We plan to recruit around 100 new, highly qualified people in Saarbrücken – and work with them to drive forward sophisticated developments for new, digitally connected and automated mobility solutions," continued Scheider.

PSLV-C45 successfully launches EMISAT and 28 customer satellites

India's Polar Satellite Launch Vehicle (PSLV-C45) today successfully launched EMISAT and 28 international customer satellites from Satish Dhawan Space Centre (SDSC) SHAR in Sriharikota. This flight marked the first mission of PSLV-QL, a new variant of PSLV with four strap-on motors.

PSLV-C45 lifted off at 9:27 Hrs (IST) from the Second Launch Pad and injected India's EMISAT into a 748 km sun-synchronous polar orbit, 17 minutes and 12 seconds after liftoff. After separation, the two solar arrays of EMISAT were deployed automatically and the ISRO Telemetry Tracking and Command Network at Bengaluru assumed control of the satellite. In the coming days, the satellite will be brought to its final operational configuration.

Following the separation of EMISAT, the vehicle's fourth stage engines were restarted twice to place the 28 international customer satellites precisely into a sun-synchronous orbit of 504 km height. The last customer satellite was placed into its designated orbit 1 hour and 55 minutes after lift-off.

About 3 hours after lift-off, the fourth stage (PS4) of the vehicle was moved to a lower circular orbit of 485 km after two restarts to establish it as an orbital platform for carrying out experiments with its three payloads.

EMISAT is a satellite built around ISRO's Mini Satellite-2 bus weighing about 436 kg. The satellite is intended for electromagnetic spectrum measurement.

PRODUCTS

Major efficiency gains made through machining insights

Digital solution delivers monitoring of equipment utilization to drive workshop productivity improvements

Using digital solutions for monitoring of equipment utilization makes workshops far more efficient and profitable than would otherwise have been possible, which is why Sandvik Coromant has introduced CoroPlus® MachiningInsights. More than a monitoring system, the solution gathers data, calls attention to issues and provides the insights required to take action. It is an easily attainable step for manufacturers that are looking to reduce waste in production and make a smooth transition into a digital way of working.

Sandvik Coromant strives to identify where improvements can be made, and this digital solution was developed in recognition that a machine that stands idle is not making money. For many manufacturers and workshops, knowing when a machine has stopped – and identifying the underlying reason for the stoppage – can be a major challenge and digital solutions are creating new possibilities to overcome this issue. Replacing the traditional ways of manual tracking, manual data aggregation and manual time studies, collecting data directly from a connected machine tool as well as from operators makes it possible to visualize the machine-, and even tool-, utilization levels and create improvements within the factory.

Manufacturers are able to make substantial efficiency gains from this digital solution through the ability to analyze equipment utilization and act to optimize production processes. The analysis itself is facilitated by digital connectivity and by adding the capability of operator input into the system, Sandvik Coromant has ensured there are also opportunities for increased collaboration and greater efficiency by combining data from the operator with data from the machine.

Transparency is ensured through the visualization being carried out online and, therefore, accessible by a web browser. This means there is no need for a complicated IT project to get up and running and there is a rapid and simple method of incorporating digital manufacturing intelligence into a production site to drive improvements.

Sandvik Coromant is introducing the CoroPlus® MachiningInsights digital solution for visualization of workshop efficiency, available from Q2 2019.

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Industrializing4 Die and Mold Making

Grades, methods, and digital options for production effectiveness

For ISCAR, as for any cutting tool manufacturer, die and mold making is a highly important customer segment. This industrial branch not only consumes more and more tools but constantly puts forward new demands, which have a significant impact on advances in cutting tools. These demands are typical for every metalworking sector: the customer is always interested in more productive, reliable, and accurate tools. However, specific features of die and mold manufacturing necessitate special design considerations beyond the general requirements. Materials, machined shapes, and machining strategies are three distinctive hallmarks of die and mold making, and have a substantial influence on cutting tool demands. According to ISCAR, only a holistic tool development concept based on these features, combined with integration of Industry 4.0-inspired digitalization developments, will lead to successful solutions for the die & mold sector.

Challenging Materials

The main material for the die & mold industry is steel that is often hard. Workpiece hardness is a principal factor in influencing tool material and cutting geometry. Various repair methods for worn or damaged molds and dies use welding,

The main material for the die & mold industry is steel that is often hard. Workpiece hardness is a principal factor in influencing tool material and cutting geometry.

thermal metal spraying, and laser treatment, etc., which are applied to the affected surfaces. Further machining of these surfaces requires a cutting tool to remove a material stock combining very hard and relatively soft layers. This condition significantly reduces tool life and requires tool manufacturers to make extra efforts to compensate and ensure the necessary durability.

Intricate shapes

Molds and dies feature complex shapes. A three-dimensional (3D) profile is typical for the working surfaces of a mold (die) set, and the ability to machine 3D surfaces effectively is an important requirement for cutting tools. A tool is expected to provide the required parameters for shape accuracy and surface finish, and to ensure the appropriate level of tool life needed to complete machining the shape or its pattern in one operation.

Machining

Manufacturing molds and dies requires various machining

Figure 1

processes: turning, milling, drilling, reaming and others, although cutting tools for die and mold making are associated primarily with mills. The specific character of the die & mold industry - predominance of non-rotating parts, the complex shape of machined surfaces, the necessity to produce a lot of cavities that require considerable material stock removal, etc. - positions milling cutters in the first place among tools utilized by this branch.

In their constant need to boost productivity in manufacturing molds and dies for new products, the die & mold industry was one of the first adopters of advanced machining methods such as high speed milling (HSM) and high feed milling (HFM), and to develop efficient machining strategies.

The progressive methods and techniques that were introduced impacted greatly on cutting tools, leading to new requirements for tool manufacturers. Over the years, these requirements have become increasingly tighter; today die and mold makers represent one of the most exacting cutting tool consumers and expect cutting tool manufacturers to be responsive to the industrial trends.

ISCAR has cooperated successfully with the die & mold industry over the years, and constantly improves its solutions for die and mold manufacturing by introducing new products and upgrading the existing ones, as well as providing complex tooling projects and consultations.

Cutting tool grades

In die and mold making, indexable extended flute (also referenced as long-edge) milling cutters are often applied to

rough machining cavities and wide edges. The cutters work in high-load conditions, and the material of the indexable insert is a key factor for improving tool life. In the last few years ISCAR has introduced IC845, a cemented carbide grade that features a new tough substrate and a new nanolayer PVD coating with applied SUMO TEC post-coating treatment technology. The grade was designed especially for cutting at significant impact load. The inserts made from IC845 demonstrate substantially better tool life, which in turn improves performance of the extended flute cutters and slot milling cutters carrying the inserts.

ISCAR's solid carbide endmill line has been enhanced by adding the IC702 carbide grade, which is intended for efficient machining of hard materials (up to HRC 65).

Advanced profiling

In machining complex surfaces, the real workhorses are milling cutters of toroidal- (button-) and ball-nose shapes. ISCAR offers die and mold makers an extensive line of these cutters in the following designs: tools with indexable inserts, endmills with exchangeable cutting heads, and solid carbide endmills. They differ in nominal sizes, accuracy, mounting method (shank- or arbor-type) and application range, according to whether the workpiece hardness is low, moderate or hard.

Mold and die making is characterized by a large proportion of small- and medium-size producers. For these manufacturers, tool versatility (multifunctionality) is an important factors in tool choice.

ISCAR's recent LOGIQ campaign introduced a new product targeted especially to this challenging market - the TOR6MILL family of indexable milling cutters. A TOR6MILL cutter (Fig. 1) can carry inserts in four different geometries. Mounting the appropriate insert in the cutter transforms it to a toroidal, 90°, 45° or high feed milling tool. The cutter can be applied to machining 3D surfaces, square shoulders, plane faces, chamfers, or use as a productive high feed rougher.

High feed milling and high speed milling proved to be powerful methods for dramatically increasing machining productivity while reducing manual operations, consequently shortening production time significantly.

Innovative technologies

High feed milling and high speed milling proved to be powerful methods for dramatically increasing machining productivity while reducing manual operations, consequently shortening production time significantly. Due in no small part to timely introduction of these efficient methods, the die & mold industry succeeded in filling the sharply increased demands for molds and dies that occurred in the 1990's.

Figure 2

High Feed Milling

Today, cutting tool producers provide a great choice of high feed milling cutters, and ISCAR's range of high feed (also known as fast feed or FF) milling tools seems to be the widest. ISCAR's standard high feed milling line comprises more than 10 tool families that differ in their design principle (indexable, solid, with replaceable heads), nominal diameter, cutting geometry, mounting method and applicability (machining faces, pockets, deep cavities). This diverse range enables die and mold makers to select the optimal cutter for their needs.

ISCAR views high feed milling tools as important productivity boosters and continues to develop the line by introducing new families and improving the existing ones. Not surprisingly, the leading milling products presented in ISCAR's recent LOGIQ cutting tool marketing campaign were related directly to fast feed cutters.

NAN3FEED and MICRO3FEED, two of the latest ISCAR families of indexable high feed milling tools, feature an 8-16 mm (.315-.625 in) diameter range. Even though solid carbide endmills traditionally dominate this range, ISCAR's specialists believe that the advantages of the indexable-insert concept for rough machining will position the families as serious cost-effective alternatives to the solid carbide designs.

The LOGIQ4FEED family of fast feed cutters (Fig. 2) features "bone-shape" double-sided inserts. This unusual insert profile provides four cutting edges, with an exceptional ramp-down capability that defines the main application of the family: high-efficiency rough milling of cavities, particularly deep cavities.

The cutters are suitable for machining workpieces with hardness up to HRC 50.

Figure 3

High Speed Milling

Expanding the range of products intended for high speed milling, ISCAR introduced multi-flute solid carbide endmills in 2 - 20 mm diameters (.250-.750 in) for high speed finish and semi-finish milling. The endmills are produced from the ultra-fine IC902 carbide grade, which was developed to machine hard materials, and have a cutting-length-to-diameter ratio of up to 6. They are operated at rotational speeds up to 20000 rpm. The application of solid carbide endmills for rough milling of slots and open pockets - by trochoidal technique and at high metal removal rate (MRR) - has also reached the attention of die and mold makers.

MULTI-MASTER options

The need to customize molds and dies to products is why die and mold manufacturing is often low-volume or even single-piece, which results in a large number of small- to medium-size shops involved in die and mold making. For these manufacturers, efficient utilization of cutting tools and well-run tool stock management is of key importance. However, customization often requires a specific tool configuration in order to machine hard-to-reach part areas. Not every cutting tool in a tool stock is optimal for this type of machining but "customizing" the tool by ordering a tailor-made design is far from the best solution.

ISCAR's MULTI-MASTER (Fig.3) family of assembled tools with exchangeable cutting heads helps to overcome these difficulties. According to the MULTI-MASTER concept, the head is suitable for mounting in different tool bodies (shanks), and the shank can carry different heads. The heads are varied in shape, cutting geometry and sizes and are designed for machining 3D surfaces and shoulders, faces and slots, chamfers and holes. The cylindrical and taper-neck shanks feature different dimensions for a broad-ranging overhang; their design options ensure clamping in toolholders, collet chucks or in a machine tool spindle directly.

The MULTI-MASTER, with its rich variety of heads, shanks, reducers and extensions, enables over 40,000 possible tool configurations. The MULTI-MASTER tools wholly meet the requirements of the important "no-setup time" principle, as replacing a worn head does not require additional setup operations. The head can be changed without removing a tool from a machine, which significantly decreases downtime. These features make the MULTI-MASTER family extremely popular in the die & mold industry.

Digital tool assembly

The low-volume character of die and mold manufacturing and highly precise machined shapes make any deviation from die (mold) specifications an Achilles heel. Even a small error threatens rejecting a whole product. Driven by Industry 4.0 developments, digitalization in modern manufacturing is providing die and mold makers with an effective instrument for overcoming this obstacle - computer modelling of machining processes. This ensures the implementation of productive machining strategies, tool path and cutting data optimization, and prevention of possible collisions.

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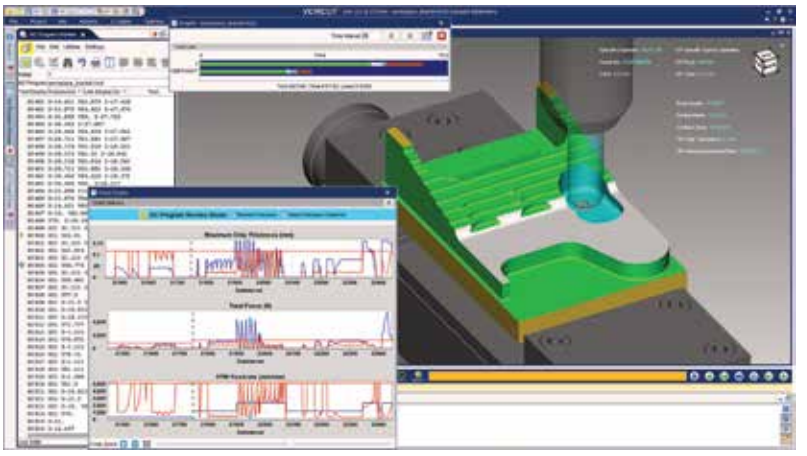
ISCAR expanded its world of digitalization by introducing a milling tool assemblies option in its electronic catalog, which contains accessible and accurate tool data for digital pre-machining. Creating a digital tool representation of a tool assembly, based on standard ISO 13399, facilitates accurate communication of tool information between software systems. Integrating this new function into the CAD/CAM system of a die and mold manufacturer can prevent errors on the shop floor during machining, while the ability to plan multiple assemblies saves time and costs in the planning process. The company plans to expand its Industry 4.0 data-driven products and to connect the digital and virtual worlds of modern manufacturing for die and mold makers.

Many products around us are manufactured using molds and dies, and demand for these products grows constantly. Advances in industrial branches such as the automotive industry, a leading consumer of molds and dies, have a great impact on die and mold making. More requests for molds and dies will lead to a new level of requirements for the cutting tools that die and mold makers need. ISCAR holds that cutting tool manufacturers should anticipate these demands and act accordingly by providing the necessary solutions.

Source: ISCAR

Optimization module tackles tough materials

An NC program that's both safer and more predictable



Anyone who's worked in a machine shop for any length of time has at some point attended a trade show or machine tool distributor's open house. There, they see canned demonstrations of CNC machines busily carving up chunks of brass, mild steel or aluminium into business card holders and tic-tac-toe games. While these giveaways are fun stuff, wouldn't it be refreshing to see some real parts being machined, preferably from a difficult-to-machine material?

That's what took place at the Okuma Winter Showcase, an annual event the machine builder hosts for 600+ attendees. At the event, attendees were treated to more than two-dozen CNC machine tools under power, most of them making chips. These included an MU-8000V LASER EX super multitasker with laser metal deposition and the GENOS M460V-5AX, a trunnion-style, five-axis vertical machining center offering high productivity, a small footprint, and a surprisingly low-price tag.

There was also an LB3000 EX-II lathe with barfeed vibration detection, a MULTUS B300II turn-mill center with collaborative robot part handling, MA-500HII horizontal and MCR-A5CII double-column machining centers, and a MULTUS U3000 multitasking machine.

An impressive line-up, to be sure, but there was one demo that had a large number of show attendees talking, even those responsible for setting it up. "It was pretty cool to see, especially when you consider that we were cutting titanium, a very hard and difficult-to-machine material," says Okuma Applications Engineer Lee Johnston.

He's talking about CGTech's Force, a physics-based NC program optimization module that works within the company's flagship VERICUT toolpath simulation software. Working with representatives from CGTech and Sandvik Coromant, Johnston programmed a Ti-6Al-4V titanium bracket being made for an aerospace customer, then optimized its toolpaths with VERICUT Force.

> "We reduced cycle time from an hour to just under 40 minutes, and you could also hear and see the difference in how the tools were cutting and tell that the optimized program was easier on the machine. This is probably the best thing to happen to programming since trochoidal toolpaths."
>
> Okuma Applications Engineer **Lee Johnston**

"We had the same demo on two vises and ran them side-by-side, one with the standard program and one that was optimized," said Johnston. "We reduced cycle time from an hour to just under 40 minutes, and you could also hear and see the difference in how the tools were cutting and tell that the optimized program was easier on the machine. This is probably the best thing to happen to programming since trochoidal toolpaths."

VERICUT Product Specialist Pete Haas explained that Force works by analyzing the NC toolpath, evaluating the changing cutting conditions, and increasing or decreasing the feed rate to achieve the ideal chip thickness for any given material. Compared to CAM systems and online machining calculators, which attempt to determine average chip thickness and base the feed rate on that, Force calculates the optimal feed rate for every single line of machining code.

"As an example, think about driving to work each morning," Haas said. "You encounter straight sections, curves, and

How can a third-party software package make a top-notch machine tool perform even better? There are several answers:

Force has the ability to break up the NC code into smaller bites, adjusting feed rates to maximize chip thickness and keep it constant.

Its optimization capabilities are proactive, not reactive, so everyone knows what to expect before pushing the cycle start button.

Performance issues are clearly identified up front, and the programmer can examine the Force Charts that illustrate projected cutting forces, chip thickness, feed rates, tool deflection and more.

sharp turns, and have to slow down or speed up depending on the road conditions. Machining also involves constantly changing conditions, but some CAM systems don't account for this. They generate a single feed rate that may be too aggressive on tight turns and too slow on the straightaways. Force, on the other hand, uses physics to calculate cut-by-cut throughout the changing conditions and determine the optimal feed rates."

The result, according to Haas, is greatly reduced cycle time, improved tool life, better part quality, and less wear and tear on CNC machine tools. It works on any material and any machine, and can even be used on legacy programs.

Johnston wasn't the only one surprised by Force's capabilities. Even CGTech Technical Support Engineer Chris Davala—someone with 20 years of experience as a machinist and programmer who now works with VERICUT customers across the country—said the demo was an eye opener. "To be honest, I was a little sceptical," he said. "This was my first hands-on experience with the product, and it's not that I didn't have faith in the people who developed it, but there were some bold claims made about the potential gains. I can truly say that, after seeing Force in action, it's made a believer out of me."

That's an easy thing to say for someone employed by the product's developer. But Sandvik Coromant MTS specialist Richard Howard, who worked alongside Davala and Johnston setting up the demo, backs it up. He supplied the cutting tools and toolholders used for the demo and specified the initial machining parameters.

"As a tooling specialist, I am extremely impressed with how 'spot on' the Force software is," he said. "CGTech has done an amazing job of optimizing programs while taking into consideration tooling geometries and resulting loads. Anyone interested in higher efficiency and prolonging tool life should look into this."

Anyone familiar with Okuma machine technology might consider Force unnecessary. That's because the OSP control offers advanced features such as Machining Navi, SERVO-NAVI, Super-NURBS, and adaptive machining technology.

"Machining also involves constantly changing conditions, but some CAM systems don't account for this. They generate a single feed rate that may be too aggressive on tight turns and too slow on the straightaways. Force, on the other hand, uses physics to calculate cut-by-cut throughout the changing conditions and determine the optimal feed rates."

VERICUT Product Specialist **Pete Haas**

For new materials, new machine tools and cutters, or even new programmers, Force eliminates the guesswork that would otherwise occur.

The result is an NC program that's both safer and more predictable, with low risk of tool breakage or scrapped parts. Operators have more confidence. Lights-out machining is performed with confidence. Profit margins are improved. And Force-optimized toolpaths "save a great deal of time during roughing," says Sandvik's Howard. Parts are machined faster and cutting tools last longer.

Haas summed it up like this: "Force charts provides NC programmers with useful information they never had before. They can quickly and easily visualize what's happening cut-by-cut as the tool moves through the material, and it's now possible to visualize excessive forces, inefficient cutting parameters, metal removal rate, power consumption, torque, and tool deflection. Force charts also expose cutting condition improvement opportunities. With one click on the Force chart, the user is taken to the exact location in the program and to the graphical review window for further analysis. The end result is full utilization of the cutting tool and the machine tool."

Okuma's Lee Johnston agreed. "At the event we were cutting titanium and saw significant improvement, but I think Force is just as suitable for machining easier materials like aluminium, and for other general purpose work. I look forward to using it on future projects."

Source: CG Tech

A universal link between machines, cloud and IoT platforms

Retrofit sensors for problem-free Plug & Play condition monitoring

Data from machines and processes are the basis for performance increases and an optimised material flow. Together with partner companies and customers, HARTING was at the HANNOVER MESSE to demonstrate how data from processes, sensors and controllers can be used to get the best out of production.

When it comes to the production environments of automotive suppliers, the traceability (track & trace) of individual parts as they make their way through processes – e.g. in CNC machining – is playing an increasingly important role. Collected data must be thoroughly analysed to effect process optimisation and quality control. This is where the HARTING Edge Computer MICA® comes into play in conjunction with the AIS Automation "FabEagle® Line Control" line controller and forms the core component for production control within this constellation. The Dresden-based company is one of 15 partner companies that is presenting its expertise with regard to Industry 4.0 and IIoT at the HARTING stand within the MICA.network user organisation.

Retrofit sensors for easy plug-and-play condition monitoring in one package

The Munich education startup University4Industry has used a steam-driven engine, symbol for Industry 1.0, as an example of a brownfield machine and equipped it with sensors, a controller and the MICA . University4Industry provides digital teaching and learning content in the area of Industry 4.0 and digitalisation and helps companies to close critical knowledge and capability gaps with employees in these areas.

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AKQUINET is using a simple example to present how process relevant sensor data is integrated with MICA® as an edge computing device in order to exploit the potential of digitalisation for intelligent production planning and controlling. That vibrations not only go into your legs but can also go into the cloud as data will be demonstrated by the SIEVERS GROUP on a vibration board which visitors can try out live at the stand. The vibrations are detected by the Bosch CISS sensor and the data processed and visualised in MICA.

Infotecs is also bringing a similar demonstrator that enhances the condition monitoring with its security solution that protects the communication using the ViPNet coordinator for MICA. Data transmission is securely encrypted and controlled. This allows an external technician to securely access plants and machines in production and safely read out data from different sensors. Furthermore, visual access to, for example, video cameras can also be encrypted.

Digitization requires appropriate infrastructure

The digitalisation of business operations is not a sure-fire success and above all also requires a corresponding infrastructure in the form of a high-performance IoT platform, along with multifunctional Edge devices such as MICA and experienced partners. Firstly, this is where the Connected Things Hub, which is the cloud-based IoT platform from Telekom based on Microsoft Azure, enters the equation. All types of sensors can connect to the platform regardless of the device type, data type, the protocol and transmission path. Together with HARTING, T-Systems is developing a solution package for the acquisition and pre-processing of sensor data in industrial applications and a data connection to the IoT platform via mobile communications.

Also Amazon's Cloud Service AWS offers comprehensive services for data processing, IoT management and for business processes. Here SIC Software, a certified AWS consulting partner and the newest member of the MICA.network, is demonstrating how MICA is suitable as a data pre-processor and gateway for AWS applications.

Uniform, standardised cloud connectivity is the goal of the standardisation initiative "Industrial Cloud Federation" in which Expleo is active and demonstrating with a demonstrator at the HARTING stand in an exemplarily way. A second

The company m2Xpert develops platforms which brings together information from different corporate divisions and analyses them in their respective customer context. Data from ERP systems, machines and other applications are correlated.

demonstrator at the HARTING stand, the HAII4You smart factory is also connected as part of the Cloud Federation. The use case is to record the data from the installed robots and the subsequent condition monitoring within the SmartANIMO application from Expleo. MICA functions here as a gateway to provide machine data preprocessed in the standard protocol for OPC UA cloud systems. Expleo was born from joining the well-known IT service provider Assystem and SQS into one global brand with over 14,000 employees in 25 countries.

The company m2Xpert develops platforms which brings together information from different corporate divisions and analyses them in their respective customer context. Data from ERP systems, machines and other applications are correlated. The strengths of MICA are used in the use case shown by m2Xpert. MICA connects machines of different manufacturers as data sources for secondary analyses. This ensures the expandability of the platforms.

With the server- or cloud-based IoT platform pst from M2MGo, B2B2C portals and applications can be made by drag & drop without programming effort.

Source: Harting

New pair shield design

Saves installation times by 30 percent

The objective of the four-year development and testing conducted by the cable specialists at igus, was the easy processing of cables, simple installation of complex pair shield and, at the same time, increasing the service life of the energy chain. The result is a new pair shield for the chainflex servo cables of the CF 21, 27 and 29 series. This ensures maximum electromagnetic compatibility of the control pair and a faster shielding of the cable. This enables the user to save up to 30 percent of the processing time for the pair shield and thus also installation costs.

If the converter and drive need to be connected, servo cables are used. For their assembly, the user must first strip the cable. The CFRIP thread, the innovation introduced by igus in 2012, helps to do this. The tear-proof ripcord in the cable jacket makes the pulling easy, like a zipper, providing up to 50 percent faster cable stripping. As the latest design advancement, igus presented at the SPS IPC Drives its well-known and proven servo cables of the CF21, CF27 and CF29 series for use in the energy chain with a new pair shield. The covered shielding increases the electromagnetic compatibility of the control pair and simplifies the connection of the pair shield. This allows users to save up to 30% on the installation of the pair shields and therefore reduce costs. "This special covering method significantly increases the service life of the servo cable families," explains Rainer Rössel, Head of chainflex cables division at igus. "We were able to prove this in the test in the in-house test laboratory with more than 45 million strokes."

"This special covering method significantly increases the service life of the servo cable families."

Rainer Rössel

Head of chainflex cables division, igus.

Servo cables with 36 months guarantee

The UL-approved igus servo cables of the CF21 series are available with a highly flexible, oil-resistant PVC jacket for high stressing capacity and the smallest bend radii in the energy chain of down to 7.5 x d. The CF27 cable series with an oil-resistant PUR outer jacket is flame-retardant and has the EAC and CTP certificate for the Russian market. Whereas the CF29 cable with a TPE outer jacket is suitable for applications with a bend radius of down to 6.8 x d, even at extreme temperatures of -35 to +100 degrees Celsius. All 1,350 or more chainflex cables for the movement are tested by igus in the 2,750 square metre in-house test laboratory. This makes igus the only manufacturer on the market to offer a 36-month guarantee on its entire cable range.

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Autonomous gripping

A gripper with artificial intelligence gripper can classify future combinations and arrangements of workpieces on its own.

The gripping industry is undergoing radical changes. In the past, gripping processes were primarily geared toward boosting productivity and process reliability. With the advent of smart factories, flexibility is becoming an increasingly important factor. According to SCHUNK'S vision, tomorrow's grippers will enable flexible operations and even autonomous handling scenarios.

Until recently, industrial gripping has been relatively rigid: the geometry of the parts must be known, as well as the exact pick and place position. A reliable handling process can be ensured by predefining traverse paths and specifying target point coordinates based on repeatable parts feeding operations. With the rise of digitalization, the trend is now moving towards highly automated, fully networked and autonomous manufacturing systems.

Artificial Intelligence

Against this backdrop, artificial intelligence (AI) is becoming increasingly important. The first cognitive intelligence applications for grippers in combination with cameras are already possible. This allows for intuitive training by the operator and autonomous handling of gripping tasks by the robot. For these applications, SCHUNK deliberately designs practical, industry-oriented handling processes by limiting the number of component variations. This streamlines the classification and training process. In an initial use case that makes use of machine learning approaches for workpiece and gripping process classification, interlocking building blocks are randomly combined and presented to a lightweight robot in a random arrangement on a work surface. The robot's task is to pick up and transport the blocks. By interacting with 2D or 3D cameras, the self-learning system rapidly increases gripping reliability after only a few learning cycles. With each grip, the gripper learns how to successfully pick up and transport the workpiece.

Effective learning through continuous optimization

After only a few training sessions, the network classifies how to handle the range of workpieces and the resulting combination options. The gripper knows how to pick up and transport the workpiece based on learned experience. Due to the intelligence of the algorithm, the gripper can classify future combinations and arrangements of workpieces on its own after only a short period of training. In this way, the system is capable to handle parts autonomously and with sensitivity to the situation. The algorithms are continuously adapted using AI methods. This makes it possible to reveal previously unrecognized correlations and further refine the handling process.

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AEROSPACE UPDATE

HAL records turnover of Rs. 19,400 cr

Hindustan Aeronautics Limited (HAL) recorded a turnover of over Rs. 19,400 crores (provisional and unaudited) for the financial year ended on March 31, 2019 (corresponding figure for the previous year was Rs. 18,284 crores). The Company has posted a revenue growth in excess of 6% during 2018-19 as compared to 3.8% during 2017-18.

The performance of the Company in 2018-19 has encouraged us to focus more on design and development of indigenous products and technologies, develop aerospace and defence manufacturing eco-system and to be more dedicated towards meeting the current and future requirements of customers, says R. Madhavan, CMD-HAL. This strategy will also help HAL to be on the growth track in meeting the expectations of the shareholders, he adds.

The HAL expects continued 'Excellent' MoU rating for the FY 2018-19 from Government of India for meeting all the relevant parameters related to its performance. In the FY 2018-19, HAL has produced 41 new aircraft / helicopters and 98 new engines and has carried out overhaul of 213 aircraft / helicopters and 540 engines. HAL's R&D projects are on track and are tailor made for the requirement of the armed forces.

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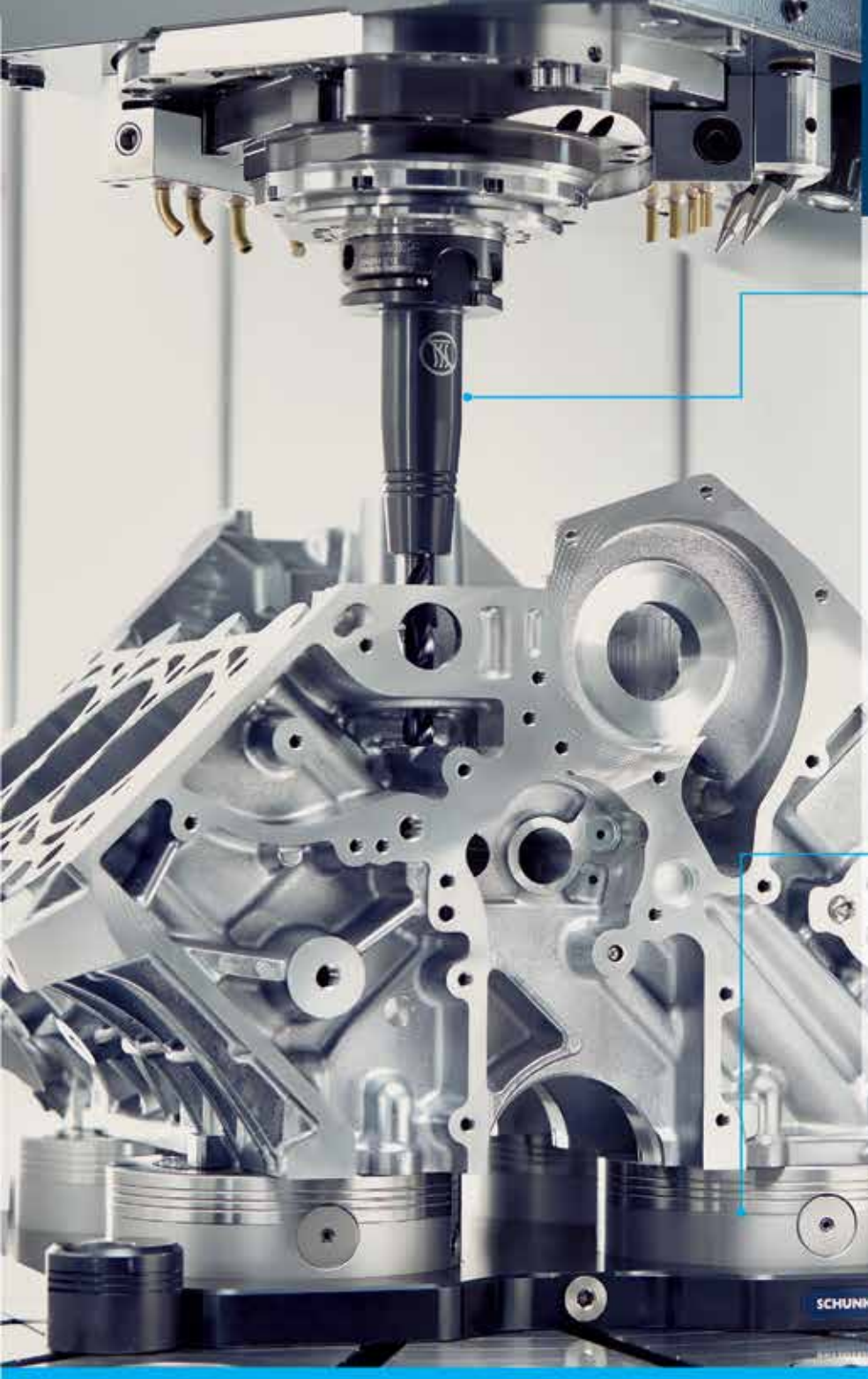

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Planning for availability in a workshop requires transparency of all manufacturing operations. While manual collection of machine tool data and documentation become time-consuming, a connected machine offers possibilities for transparency, optimized planning and streamlined production. With CoroPlus® MachiningInsights, you get instant access to your machine performance and the opportunity to optimize your production processes. The solution allows you to collect data, gain insights and take action to optimize and improve.

From data to insights

1. Collect data

2. Get insights

3. Take actions

CoroPlus® MachiningInsights can be a suitable solution for you if one or more of the following statements are true:

- We have started initiatives around Industry 4.0 and digitalization in our workshop.
- We have investigated connecting our machines to let them automatically deliver utilization and downtime information.
- Our machines are today connected to a factory network via ethernet.
- We have a lean program that still utilizes manual data collection for information on machine and tooling utilization.

To know more, contact your Sandvik Coromant representative or visit sandvik.coromant.com/machininginsights Or call on 1800-103-9321