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ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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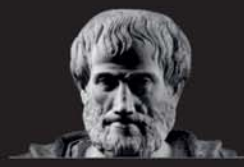

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Aristotle

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Back in action!

The month of August has been a busy one for me as the Editor of The Machinist magazine. With facility tours from Rajkot to Jaipur and Ahmedabad as well as from Pune to Hosur and Bengaluru, it has been a tiring but exciting period. Tiring because of the sheer amount of travel in a short span of time. And exciting because it has shown me the industry in absolute action! In fact, every time I hit the bed after a long day during these trips, I would still hear the sweet murmur of machines echoing in my ear! Well, exaggerations apart, it has been a great feeling to see the Indian manufacturing industry doing so well at present. One might argue that the few regions I have travelled to do not constitute the complete country. Nevertheless, they do represent a good cross section of the country's manufacturing geography. And they surely reflect the buoyant economic environment in the country. Incidentally, the CII ASCON

"IT HAS BEEN INDEED A GREAT FEELING TO SEE THAT THE MANUFACTURING INDUSTRY IN INDIA IS DOING SO WELL AT PRESENT."

Industry Survey, which tracks the sectoral growth trends in the country, also reflects steady progress in the nation's economic growth.

In this context, I would also like to draw attention to a tweet by posted on August 31 by Dr Hasmukh Adhia, Finance Secretary, Government of India. Adhia says: "The GDP growth rate of 8.2% for the Q1 (April-June) of fiscal year 2018-19 indicates clearly that several structural reforms introduced such as GST have started giving rich dividends. The growth in manufacturing sector (13.5%) also indicates broad based recovery of demand." This is definitely great time for our industry. The need of the hour is to ride on this momentum while staying focused on innovation, quality, delivery and efficiencies!

Editor & Chief Community Officer

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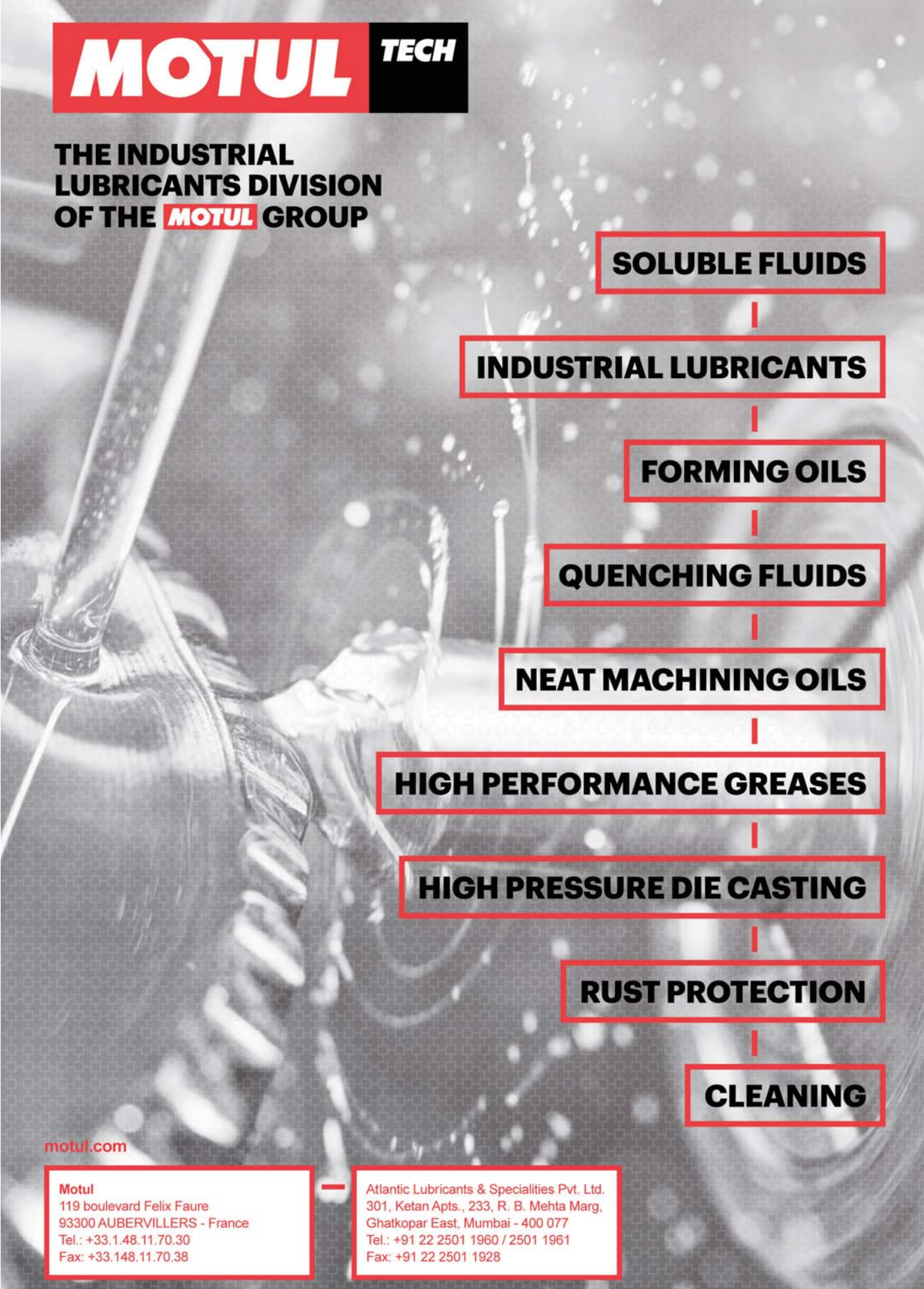

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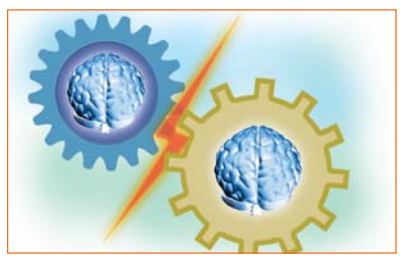

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Godrej Aerospace hands over first airframe assembly of BrahMos Missile

GODREJ AEROSPACE, a unit of Godrej & Boyce Mfg. Co. Ltd., recently handed over the first airframe assembly of the Air Launched version of the prestigious BrahMos missile to Defense Research Development Laboratories (DRDL) for qualification of the indigenously manufactured assembly. This continues the company's tradition of contributing toward augmenting India's defense capabilities. In a ceremony marking the occasion, the completion documents were handed over to Dr. Dasharath Ram, Distinguished Scientist & Program Director (BrahMos), DRDL by Jamshyd Godrej, Chairman and MD, Godrej & Boyce. The missile section manufactured by Godrej Aerospace will undergo stringent testing processes set by DRDL. Godrej is poised to deliver the next set of these airframe assemblies by December 2018. They also aim to produce the first indigenous missile booster which up till now was imported. In December 2017, Godrej Aerospace had won an order for 100 sets of airframe assemblies for the Air Launched version, production for which started soon after. Till date they have also supplied over 100 sets of the land version of the missile to BrahMos Aerospace Pvt. Ltd.

Dr. Sudhir Mishra, DS, Director General, CEO & MD, BrahMos Aerospace while appreciating the contribution said, "We have always believed that India should become self-sufficient in its defence capabilities and the Make in India platform provides the much-needed boost. Indigenous manufacturing of defence equipment brings down costs and enhances the know-how about critical technologies while ensuring reliability of spare parts. I am confident that our partnership will continue to set new benchmarks for the indigenous development and production of sophisticated weapon systems."

Escorts and Tadano Group form joint venture

ESCORTS LTD AND TADANO GROUP, Japan's biggest and world's leading mobile crane manufacturer, have announced their joint venture to manufacture rough terrain cranes and truck mounted cranes. The joint venture will strengthen Escorts technology leadership and market presence in the material handling equipment space. The JV will leverage the cost effective frugal Indian engineering excellence of Escorts and world leading Japanese technology from Tadano to cater to an expanding market for heavier capacity and efficient Truck & RT Cranes and sophisticated truck mounted and rough terrain cranes in the 20 to 80 tonnage category. The 51:49 joint venture between Tadano and Escorts respectively will enable both partners to optimize their current and future capabilities in the segment globally. The JV will aim to take leading position in the high tonnage crane segment in medium to long term.

Speaking on the occasion, Nikhil Nanda, CMD, Escorts Ltd., said, "Escorts vision has always been to bring the world's best to India & take India's best to the world. The new JV is a step towards catering to market demand for smarter, safer and bigger mechanized infrastructure solutions in the higher tonnage category. We are confident that the joint venture will enable us to tap the opportunity market segments and reinforce our leadership in construction equipment space." Koichi Tadano, President and CEO, Tadano Ltd. said, "We are pleased to announce our partnership with Escorts group. It has a strong technology legacy & diversified portfolio in construction equipment market. Tadano has a proven global technology & together we will cater to India & other growing economies that need safe, efficient & quality products and smarter construction technology."

SEZ for US will revive US-India partnership: Prabhu

THE UNION MINISTER FOR COMMERCE & INDUSTRY AND CIVIL AVIATION SURESH PRABHU has said that India shares an excellent and forward-looking relationship with the USA and that we will continue the constant dialogue with the US to promote greater partnership between the two nations in all avenues for mutual growth. The Minister proposed that India can set up a Special Economic Zone for US industry which will help make US-India partnership greater again.

Speaking about the World Trade Organization, Prabhu said that WTO needs reform, and that India can play the role of a facilitator in bringing about this reform, given its good relations with the world's countries. He added that India, the US and other countries need to work together in creating a new dynamic agenda for the multilateral institution.

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India to generate 100 GW solar energy by 2022: Suresh Prabhu

UNION MINISTER OF COMMERCE & INDUSTRY AND CIVIL AVIATION, SURESH PRABHU said that demand for energy will increase due to rapid development taking place in India and fossil fuel is not going to last forever and therefore there is need for renewable energy. He further said that fossil fuel is not going to last for ever even if its resources are managed in the best possible manner. He said that the use of shale gas and oil is limited and it adversely impacts the environment. The threat of climate change has become a reality and it has affected bio-diversity of the planet. Imbalanced use of energy is the root cause of many environmental problems in different parts of the world. It is causing unprecedented heat wave conditions in Europe, intensity and frequency of typhoons have also increased.

Referring to variations in Monsoon rainfall in India, the Minister said that India is in no way responsible for what is happening in the atmosphere over Indian Ocean, but it has to bear the consequences of ocean warming. He said that the time has come when we will have to switch over to the clean form of energy like solar power.

The Minister stated that the idea of solar alliance was conceived by PM Narendra Modi, in 2015 as a treaty based international intergovernmental organization. ISA stands for co-operation among 121 solar rich countries lying fully or partially between the tropics in order to promote massive deployment of solar energy and make solar energy affordable. He said ISA provides an opportunity to all countries to bring prosperity, energy security and sustainable development to their peoples. He said that once the generation of solar energy goes up, its prices will come down. Suresh Prabhu stressed on joint efforts required to reduce the cost of finance and technology for massive production of solar energy. He said many firms of Australia & Japan are keen to invest in India in solar energy sector. He emphasized on the need for sending market signals so that more funds are invested in R&D in solar energy. India has set a target to generate100 GW solar energy by 2022 for increasing share of carbon free energy in the energy mix.

Tata, Lockheed Martin to build F-16 wings in India

TATA ADVANCED SYSTEMS (TASL) AND LOCKHEED MARTIN CORP. have signed an agreement to commence production of F-16 wings in India for export. This strategic initiative positions TASL to become the provider of wings for all future customers and strengthens its role in the F-16 global supply chain.

Production of F-16 wings in India will further strengthen TASL's capability to address global aerospace requirement of fighter aircrafts and support 'Make in India.' The planned F-16 wing production move to India is not contingent on the Government of India selecting the F-16 for the Indian Air Force.

Sukaran Singh, chief executive officer and managing director, TASL, said, "We are delighted with the decision made by Lockheed Martin to select Tata Advanced Systems Limited for the production of F-16 wings in India. This positions TASL as a global provider of F-16 wings in future. TASL and Lockheed Martin, through a long-standing joint-venture, have been manufacturing airframe components of the C-130J aircraft and S-92 Sikorsky helicopter at the Hyderabad facility. This development now again gives us an excellent opportunity to showcase our technological expertise and advance our capability development, as we reinforce our commitment to both the Indian and global aerospace industry. The production of the F-16 wings in India, for global application, is set to place the country at the centre of the world's largest fighter aircraft ecosystem and make it a preferred destination for aerospace manufacturing."

Smart anti airfield weapon successfully tested

INDIGENOUSLY DESIGNED and developed guided bombs Smart Anti Airfield Weapon (SAAW) were successfully flight tested from IAF aircraft at Chandan range. The weapon system was integrated with live warhead and has destroyed the targets with high precision. The telemetry and tracking systems captured all the mission events. This weapon is capable of destroying variety of ground targets using precision navigation. A total of three tests with different release conditions were conducted during 16 to 18 August 2018 and all the mission objectives have been achieved.

The weapon has undergone eight developmental trials till date and performance of system for different ranges under multiple launch conditions has been demonstrated. Senior officials from DRDO, HAL and Indian Air Force participated and witnessed the flight tests. Raksha Mantri Nirmala Sitharaman congratulated the DRDO, IAF and HAL on the successful flight tests for further boosting the defence capabilities of the country.

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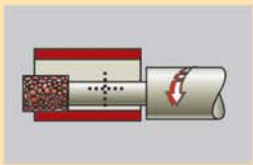
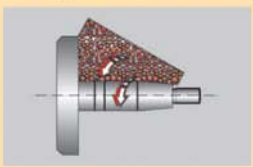


FIG-200 SPL CNC
BIG BORE GRINDER

FIGT-300 CNC
FOUR STATION TURRET

FIGE-150 CNC
ID / OD GRINDER

CNC Cylindrical Grinding



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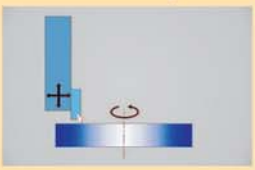

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MARK YOUR DIARY

A list of key events happening between September 2018 to September 2019, both nationally and internationally.

IMTS 2018 **September 10–15, 2018** Chicago, USA *www.imts.com*	**Renewable Energy India Expo** **September 18–20, 2018** Greater Noida *www.renewableenergyindiaexpo.com*	**Pune Machine Tool Expo** **September 27–30, 2018** Pune, India *www.mtx.co.in*	**International Mining & Machinery Exhibition** **October 31– November 3, 2018** Kolkata, India *www.immeindia.in*
Wire India Show **November 27–29, 2018** Mumbai, India *www.wire-india.com*	**Metallurgy Show** **November 27–29, 2018** Mumbai, India *www.metallurgy-india.com*	**IMTEX 2019** **January 24 –30, 2019** Bengaluru, India *www.imtex.in*	**Taipei International Machine Tool Show** **March 4–9, 2019** Taipei, Taiwan *www.timtos.com.tw*
Bauma **April 8–14, 2019** Munich, Germany *www.bauma.de*	**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*	**EMO Hannover 2019** **September 16–21, 2019** Hannover, Germany *www.emo-hannover.de*

OUR INHOUSE UPCOMING EVENTS

The Economic Times BMC BEST METAL CUTTING BRANDS 2018

September 21, 2018, Le Meridien Bangalore

The Economic Times POLYMERS Global Conference on Plastics in Automotive

October 26, 2018, Pune

MACHINIST GLOBAL MANUFACTURING SUMMIT Inspire • Integrate • Innovate!

December 5, 2018, Hyatt Regency, Pune

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R MADHAVAN – NEW CMD OF HAL

R Madhavan has taken over as Chairman and Managing Director of HAL from T. Suvarna Raju, recently. Prior to this, he was heading the Accessories Division of HAL at Lucknow as an Executive Director.

"Maintaining the numero uno position of HAL in aerospace industry while delivering world class products and services through increased indigenisation would be my key focus areas," says Madhavan. The emphasis would be to build on the core competence of the Company and emerge as the preferred supplier in the aerospace industry, he adds.

Born in 1962, Madhavan is a Mechanical Engineer from NIT, Raipur and a post graduate in M. Tech. from IIT Madras. He joined HAL as a management trainee in July 1982 and has comprehensive management and engineering experience. His diverse skill sets in varied fields like production, quality, customer services and management fetched him key positions within the organization.

Madhavan is a firm believer that technology is one of the key determinants for the future success of any organization in today's cutting edge tech-world. He spearheaded successful absorption of technology for production of Su-30 airframe and engine accessories from raw material phase at HAL's Accessories Division, Lucknow. He has contributed to `Make in India' drive by developing MSME vendors for aerospace manufacturing.

The new CMD's focus areas would also include Design & Development, order book position and product mix which meets the customer requirements. Partnership, collaboration and support of all the stake holders is the key for HAL's success in future, he says.

BOMBARDIER TRANSPORTATION ANNOUNCES NEW AUSTRALIA MD

Bombardier Transportation has announced senior rail industry leader, Paul Brown, as the new managing director for its operations in Australia (ad interim). "This management change is made as Bombardier undertakes a number of positive transformation initiatives to strengthen its business in key rail ecosystems," said Per Allmer, President, Western Europe, Middle East, Africa, South East Asia and Australia, Bombardier Transportation. He added, "We are delighted to bring Paul into this role, to reinforce our management team, accelerate our transformation, and increase our focus on satisfying our customers in Australia." As Managing Director, Paul will focus on the competitiveness of Bombardier's operations in Australia. His priorities include strengthening stakeholder relations, delivering projects and services to the highest standards, as well as business development and securing new business in a highly competitive market.

This month Paul celebrates 35 years in the rail industry with Bombardier. As a proven senior leader experienced in commercial management, sales and project management, he has successfully delivered assignments in the UK, Europe, Asia and Australia. In addition to the managing director for Australia role, Paul will also continue as project director for the Queensland New Generation Rollingstock project.

Paul Brown succeeds Andrew Dudgeon, who has decided to pursue other career opportunities outside of the business. Bombardier wishes to thank Andrew for his service and for his efforts in developing our business.

BRENDAN CURRAN TO HEAD BOEING AVIONX

Boeing has named Brendan Curran president of Boeing AvionX, an organization formed last year to pursue the development and production of avionics and electronics systems. Curran, who has more than 20 years of aerospace industry leadership, joins Boeing from Crane Co., where he served as president of the Aerospace & Electronics Group.

In this newly-created position, Curran will work across Boeing's commercial, defense and services businesses to further mature the company's aftermarket strategy. He will help advance overall capabilities of the Boeing AvionX organization to provide greater value to customers while driving long-term services growth.

Curran will report to Stan Deal, president and CEO of Boeing Global Services.

"The success of Boeing AvionX depends on aftermarket technologies and innovations that exceed our customers' needs, as well as developing avionics products that add value to our commercial and government platforms," said Deal. "Brendan's extensive expertise, especially as it relates to aftermarket strategies, will enable us to harness incredible opportunities so we can provide our customers more value throughout the lifecycle of their investments."

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Passion for Precision!

RS India has recently started its Swiss precision and assembly facility in Jaipur to address the growing demand for precision parts.

By Niranjan Mudholkar

A Switzerland based octogenarian Indian scientist decided to give something back to his country. Being a scientist, he did a fair amount of research to identify the areas where he could contribute meaningfully. He realized that the youth of the country needed jobs and they also first needed the skills to do these jobs. This was the basic premise on which this scientist - Dr. Rajendra Joshi - and his wife Ursula Joshi founded the RUJ Group in 2016 in Rajasthan. The RUJ Group now operates six companies and one university - Bhartiya Skill Development University.

Skill and employ

Having closely studied the Swiss, German and Austrian economies, Dr. Joshi realized that the success of these economies has been primarily driven by the development of skilled workforce as well as their passionate pursuit for precision and excellence.

"Investment in manufacturing of precision parts is essential to further develop and expand prime sectors of the economy, including the automotive, healthcare, logistics and electronic industries."

Dr. Rajendra Joshi, Founder-Chairman, RUJ Group

"Skill development has a pivotal role in shaping the destiny of India. Our belief is that only skilled and efficient workforce with their expertise can produce quality products and can enable the nation grow in global competition. Our key objective is to contribute towards skill development of Indian youth, make them job ready and assimilate them into different companies including the RUJ Group companies," he says.

Precision manufacturing

Taking ahead the thought of providing jobs to the skilled youth and of creating a manufacturing facility to provide high-quality precision products, the RUJ Group established RUJ & SRM Mechanics Pvt. Ltd. (RS India) through a joint venture with a Swiss Company SRM Technologies AG. RS India inaugurated its Swiss precision and assembly plant at the Mahindra World City in Jaipur in March 2018. Speaking about this plant, Dr. Joshi pointed out that various sectors in India today witness a great demand for precision parts and despite the relatively high number of precision parts manufacturers, the sector is challenged by import reliance. "Investment in manufacturing of precision parts is essential to further develop the prime sectors of the economy, including the automotive, healthcare, logistics and electronic industries. Seeing the opportunity in India, we are offering the Swiss precision and assembly solutions with the world class plant equipped with international machineries and technology in India."

Capabilities

The Machinist recently visited this new plant in Jaipur to understand its capabilities. Jayant Joshi, MD, RS India said,

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19th Indian Metal-Cutting Machine Tool Exhibition with International participation

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24 - 30 January 2019, Bangalore, India

Organiser

Indian Machine Tool Manufacturers' Association

Venue

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"Our mission is to provide best of the solutions to the manufacturing industry for their need of high precision metal parts with value addition of metal anodizing, painting and heat treatment etc."

Herbert Rosenast, Jaipur Plant Head and GM - Engineering Units, RS India

"The precision manufacturing industry could prove favorable for the suppliers and manufacturers of high quality parts with an interest in exporting to the domestic and global market, especially since local producers cannot fulfill the demand."

Jayant Joshi, MD, RS India

"The RS India Jaipur plant is a highly technical and zero error precision parts manufacturing unit." The manufacturing processes and techniques like milling, turning, Swiss style lathe and turning, surface grinding, cylindrical grinding, punching, laser cutting, heat treating, anodizing, planting, powder coating, direct material laser sintering, injection molding etc. processes are available with advanced machineries imported from Austria, Switzerland, Germany and Japan. According to Herbert Rosenast, the Plant Head and the GM of Engineering Units for RS India, these machines are equipped with programmable visual systems that complement and enhance process control capabilities. "These systems help reduce inspection time, eliminate human error, and generate statistical data in real time to keep a check allowing constant quality monitoring. Our machines are capable of unattended production time of up to 24 hours daily," he says.

RS India can produce high quality precision parts from small to midsize dimensions and quantities, pre-assembled and tested components, medical devices for surgery etc. The site also includes a training centre, where up to 90 trainees at a time can complete basic training as polytechnicians. It will be soon obtaining ISO 9001 and 13485 (medical services) certification along with ISO 14001 (Environmental Aspects) and OHSAS 18001 (Health and Safety) certifications.

The Scientist entrepreneur

Dr. Rajendra Joshi is both a scientist and an entrepreneur. He is mainly credited for invention of a revolutionary drug Tecfidera (BG 12), a medicine against multiple sclerosis (MS). Tecfidera is sold globally by Biogen Idec and is considered to be a blockbuster product. Dr. Joshi married Ms Ursula in 1989, a pharmacist from ETH, Zurich who was running her own pharmacy. Together they are working towards the benefit of Indian youth by bringing in new technology in the country from Switzerland. Dr. Joshi has had great faith in the methodology of apprenticeship education prevailing in the Switzerland, Germany and Austria. Today, through the RUJ Group, he is striving to introduce this methodology called "Swiss Dual System" to India.

Importance of manufacturing

RS India management believes that the manufacturing sector is especially important for the Indian economy and is considered to be one of the main driving forces of the Indian economy. "In the domestic and international machine industry opportunities exist in supplying of the high quality and high precision machined parts and components to increase quality and durability of their products. Therefore, the precision manufacturing industry could prove favorable for the suppliers and manufacturers of high quality parts with an interest in exporting to the domestic and global market, especially since local producers cannot fulfill the demand," says Jayant Joshi.

RS India aims to offer manufacturing solutions to the sectors like Health and Medical, Automotive, Polymechanical, Machine Automation, Laboratory Technology, Photo Technology and Aerospace, etc., where high precision parts play a crucial role for the end products. "Our mission at RS India is to provide best of the solutions to the manufacturing industry for their need of high precision metal parts with value addition of metal anodizing, painting and heat treatment etc.," says Rosenast.

Business roadmap

Initially, the RS India Jaipur facility will be working on orders received from SRM Technologies. "SRM's Switzerland facility is operating at its optimum production capacity. In fact, it already has two years orders pending in advance. Many globally acclaimed companies like Siemens, Roche, Schneider Electric, Sika, Leica, Audi, and Metalaire are regular clients of SRM Technologies in Switzerland," says Jayant Joshi.

"Now in India, with the same excellence, the newly constructed plant will be also manufacturing precision parts for the same companies and exporting as per the orders," Rosenast adds. Total investments at the RS India Jaipur facility are to the tunes of Rs.300 crore.

The production capacity is 5650 MT per annum and it promises employment generation for 250 workers. Of course, the Company is also open to exploring the domestic market to utilize its full production capacity.'

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An **unconventional journey!**

Designing for additive often requires breaking the mold of conventional design and bringing the functionality of the component into sharp focus.

By Atha Ur Rahman Khan & Dr. Jan Radtke

Additive Manufacturing (AM), used interchangeably with '3D Printing', is witnessing explosive growth and adoption. Increasing number of businesses around the world now view additive manufacturing as an essential link in their value chain. AM of metal parts and components is fast gaining prominence for its potential to disrupt traditional supply chains by reducing inventory and digitalizing production. Furthermore, the ability to manufacture complex parts using AM is finding widespread application across industries with aerospace, medical and automotive industries predicted to account for near 51 percent of total spend on industrial AM by 2025[1]. The metal AM market is estimated to be worth $10 billion[2] by 2030.

Additive Manufacturing processes offer designers with the flexibility to push the limits of engineering design beyond the constraints of traditional manufacturing methods. But, AM, like any other process, works well when applied judiciously.

Let us look at some of the basic factors required to evaluate while Designing for Additive Manufacturing (DfAM).

Part & Design objective selection: Often assessed independently, part selection and design objective are closely linked. Parts portfolio can be evaluated based on parameters like part size, production volume, lead time, weight, surface finish requirements, functionality, traditional cost of manufacturing, and criticality. Parts most suited to additive can then be shortlisted. Often during the selection exercise, the best suited design objectives for each part become evident. These objectives can include weight reduction, performance improvement, lead time reduction etc.

"At the design stage itself, engineers need to be cognizant of the limitations of the production environment, the direction of the build and the deviations (like warping) that are likely to occur."

Value Additions with Additive Manufacturing

Availability of material: Designers need to be aware if the product material is available in powder or filament form for metal or plastic production. Most commonly used metals, such as, Aluminium alloys, Titanium alloys, Stainless Steel, Maraging Steel, Cobalt Chrome and Nickel based alloys are easily available. For non-metals, ABS, PLA, Nylon, Polypropylene and Polycarbonate are being offered by most machine & filament manufacturers. New materials are being progressively added to these options ensuring greater flexibility for designers. In some cases, when a suitable material is not available, a higher end material may be used for manufacturing the product provided the end cost and performance are acceptable.

Solving the right problem: The Additive approach is increasingly being used in New Product Development (NPD) right from the initial stages. It is also used to re-design existing parts for deriving greater value in terms of cost or performance. In either case, the parts manufactured with Additive need to perform safely and reliably in their operating environments. It is therefore necessary to look at the trade-offs between performance parameters. For example: There might be significant weight saving achieved for a given component by using a topology optimized design for static loading condition. But, it is also likely that the stiffness of the component may be adversely

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affected resulting in a deteriorated or unsafe performance under vibrational loads. A thorough understanding of the operating environment and an accurate selection of the problem to be solved is therefore essential.

Cyient engineers re-designed GE Bracket to achieve 80 percent reduction in weight *(Courtesy: GE Jet Engine Bracket Challenge)*

Understanding Process Parameters: Additive Manufacturing involves a layer by layer deposition of material to build a part. The quality of the finished component and its acceptance parameters like tensile strength, porosity, dimensional integrity, microstructure etc. are sensitive to the process parameters used on the machines during the production process. At the design stage itself, engineers need to be cognizant of the limitations of the production environment, the direction of the build and the deviations (like warping) that are likely to occur. Ideally, the designer should also identify the critical load cases for the component so that the build can be planned to ensure highest structural integrity in the direction of critical loads.

Post Processing, Testing & Qualification: Almost in all cases, parts produced with Additive Manufacturing would require some kind of post processing. The post processing activities may involve support removal, cleaning, machining to desired tolerances and heat treatment. It is useful for the designer to be aware of these processes. For example: Consider the case of the fuel manifold shown below. If the diameter of circular channel is greater than 5 mm (approximately) then internal support structures would be needed to print the circular channel in a metal printer. However, once the production is completed, these internal support structures would need to be removed to avoid blocking of the flow channel. Therefore, the designer must accommodate this requirement at the design stage to allow easy access to flow channels for making the support removal feasible. Furthermore, the designer can also modify the shape of the circular hole to a tear-drop shape or any other shape that may not require the support structure during printing.

"For qualification, most parts that have been re-designed using Additive approach are being qualified using the same criteria that conventionally designed parts are required to meet."

Fuel Manifold re-designed by CYIENT engineers to achieve 42 percent flow performance improvement and 70 percent reduction in weight. Left: Original Fuel Manifold. Right: Fuel Manifold designed for Additive Manufacturing. Original model *courtesy: GrabCAD*

Testing and Qualification also require a designer's attention. Organizations such as ASTM, ASME and SAE are working towards establishing design and testing standards for Additive approach. Some standards are available as draft versions for evaluation and feedback. For qualification, most parts that have been re-designed using Additive approach are being qualified using the same criteria that conventionally designed parts are required to meet. Process standardization for each make and model of additive machines still remains a challenge.

Hiring for Additive: One of the biggest challenge in re-thinking 'design' for 'Additive Manufacturing' is hiring. Designing for additive requires breaking the mold of conventional design and bringing the functionality of the component into sharp focus. It also requires some exposure to manufacturing processes and an ability to work in a rapidly evolving technical domain. This means that creative flare, innovative thinking and innate curiosity become some of the most essential traits required in a potential hire. It would perhaps be prudent to follow the hire and train approach to build internal expertise along with bringing in external competence in the team.

Thus, Additive Manufacturing is rapidly becoming a tool of choice for businesses and it is finding a variety of use cases across several industries. Designing for Additive Manufacturing is a much sought after skill set in engineers. The subject is already a part of curriculum in leading research universities across the globe. Partnerships in various forms can help advance the field further along its journey. No doubt though, this journey would be anything but conventional!

Atha Ur Rahman Khan is Program Manager Entrepreneur for Additive Manufacturing & Dr.Jan Radtke is VP of New Business Accelerator at Cyient.

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The **New Frontier!**

Agriculture is the new hot industry and technology serves as a backbone of every growth centric industry, says **Srinivas P Kamisetty,** Founder, Paama Agrico.

By Niranjan Mudholkar

Q Tell us about the origin of Paama Agrico. What was your key objective behind starting this organisation?

On the personal front, I was rearing a passion to do something that would add sheen to the agricultural landscape of the country. In terms of experience, having the opportunity to lead, globally acknowledged organizations like LAPP India Pvt. Ltd. and CLASS and playing decisive roles in Rittal India and Karnataka Telecom in the past, my knowledge about the manufacturing domain and in particular about the loopholes of the agri-equipment industry had grown very wise. Besides, from a business point of view, in an economy that is predominantly agrarian, it made immaculate sense to venture into an agri-equipment space. Thus, in the year 2015, I decided to culminate my passion, experience and business acumen to launch Paama Agrico, an innovative, agri-equipment research and development organization that would work tirelessly to revolutionizing traditional and time intensive farming processes with sustainable technology.

> "In pursuit of reducing our carbon footprint we have taken several measures, we do not use servers, we are completely dependent on cloud, similar to global IT firms."

Today, Paama Agrico is one of India's fastest growing and innovative, agri-equipment research and development organization that bears the credentials of substantially elevating the standards of Made-in-India agri-equipment. Paama's research centric approach, cutting edge product features, direct communication and distribution touch-points with farmers, after sales services, dynamic leadership and ability to provide invincible quality and pricing has earned it the status of being best-in-class among the rotavators and cultivator industry.

Q Tell us about the manufacturing capabilities and capacities of Paama Agrico

In tune with Paama Agrico's founding objective of enabling every Indian farmer with best-in-class agri-equipment that will in-turn help cater to the huge 159.6 million hectares arable land resource of India (World Bank estimate in 2015), a high-end manufacturing apparatus structured on the philosophy of automation and empowered with most sophisticated technology was set-up in the year 2015. Quite aptly, it is also referred to as the 'Agri-Equipment Design House of India'. The revolutionary make in India brand with a state-of-art manufacturing facility is spread over 30,000 sq. feet of factory space on 100,000 sq. ft plot of land in the Dod-

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Approximately 12,000 blades are manufactured on a daily basis in a single line in comparison to 4000-5000 blades which is the industry standard. An individual rotavator takes no more than 15 minutes to come off the line in Paama Agrico's premise. It is the only agri-equipment manufacturer to deploy robots in the facility for welding and handling purposes. Adamantly, batch processes are not followed at the organization; be it designing of the blade or the machine, the philosophy of doing one at a time is strictly followed.

Q. How are you differentiating Paama Agrico in terms of its product and technology offerings? Tell us something about Paama's R&D activities.

The founding vision of Paama Agrico has been to transform the Indian agriculture scenario by 'sustainably increasing farm productivity'. Hence a scientific, R&D based approach is followed to increase the productive hours of the farmer by eliminating cumbersome and inefficient processes while augmenting the productivity of land which will in turn support the food and supply situation of Indian's growing population:

Product Innovation: Best quality materials are used in Paama Agrico rotavators that have a design life of over five years in comparison to three years of others available in the industry. 'Quality Sealing' defines the effective life of rotovators. Thus, while other rotavators require the seal to be replaced in every 100-150 hours, Paama rotavators have a zero market for seals.

Process Innovation: We are the only blade manufacturer milling the blades to ensure consistency in every blade, irrespective of the temperature it is subjected to. Hence the wear and tear is bare minimum in our blades and they last 50 percent longer than others available in the market.

"Approximately 12,000 blades are manufactured on a daily basis in a single line in comparison to 4000-5000 blades which is the industry standard. An individual rotavator takes no more than 15 minutes to come off the line in Paama Agrico's premise."

Design Innovation: We lead the market in this; we have practically made it possible for the rotavators to be assembled with minimalistic fixtures. It's almost like a Lego. This methodology was adopted to post a drill down analysis of machines performance related to fixtures that were unnecessary and caused several maintenance inefficiencies.

Operational Innovation: We follow best industry practices at every level of the organization. At our shopfloor we engage robots to do welding and handling work which is hazardous to humans. In pursuit of reducing our carbon footprint we have taken several measures, we do not use servers, we are completely dependent on cloud, similar to global IT firms. We have one of the most sophisticated CRM in the industry

"A slew of agro-tech start-ups will be here to stir the agricultural revolution. If there are is any start-up that will help us serve the India farmers any better, Paama Agrico is more than happy to associate with them."

to connect with customers. The sales team works efficiently through mobiles to connect with out 4,000 plus retailers speared across three states.

Q. Farm mechanization will play a key role in helping India meet its agricultural production requirements. Can you elaborate on the role of technology and machines in facilitating India's agriculture growth?

While the population of the world is projected to touch 10 billion that of India alone is expected to reach 1.7 billion by 2050. Besides this population is projecting a constantly growing pattern with land, one of the most crucial resources remains fixed. Unlike few other countries that are predicting food shortage and acquiring land in Africa, and parts of Asia to secure their future food provision Indian is not doing that at the moment. From being a country dependent on imported food-grains to one that exports its surplus production we have done well. Had we not adapted to green revolution and technological advancements food deficit situations would have prevailed.

In tandem with this thought of adopting to progressive thinking, in a situation where land is a constant factor catering to population that is consistently growing; the simple solution is to optimize the capacity of land to increase production to meet the growth proponent. This is where technology, mechanization or automation of process comes into picture. For example, Paama Agrico blades lasts 50 percent longer than the average blade available in India. If any other common blade lasts 80 hours, our blades function seamlessly for 120 hours. Thus, the farmer only has to spend one day replacing the blade saving him time and avoids resource wastage.

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"Adamantly, batch processes are not followed at the organization; be it designing of the blade or the machine, the philosophy of doing one at a time is strictly followed."

How would you analyse the socio-economic impact of increased mechanisation in the view of abundant farm labour supply available in India?

To begin with, I would like to bust the myth that farm labour availability is abundant in India. Migration from villages to towns is so high that automation has become the need of the day to replace the missing labour. For instance, 15 people are required to transplant a paddy field of about an acre and it is extremely difficult to find them during the Kharif and Rabi season as they are either occupied in their own fields or working for those who pay them highest; creating a dearth of labour. Whereas, paddy transplanters are able to do the same work in 1.5-two hours and most importantly make the farmer self-sufficient.

An example in this framework is that of a farmer who would traditionally use bullocks to till the soil, that would take days together just to level the soil while a rotavator is able to do so in about 1/10th of the time. So, it is important that we view mechanization as the means of enabling a person to work more efficiently as opposed to the thought where it is perceived to replace humans. China is doing this very effectively, though the area of paddy harvest alone if lesser than India, it posts an annual requirement of 75,000 paddy transplanters.

Indian agriculture is dominated by small farmers, whose weaker economic status is a big hurdle to ownership of high-value agricultural equipment. How can this issue be comprehensively addressed?

The small farmers are really the lifeblood of Indian agricultural landscape and I am delighted to let you know that increased automation and farmer-friendly government and corporate efforts have changed the liquidity and ownership status of even small-time farmers at least a tad-bit. Also, initiatives such as cooperative farming, custom hiring centres with the provision to hire smallest machines and tools, well developed network of contract farming are not only being encouraged but operating successfully based on the on the buy-in received from the farmers. Paama Agrico has established its network that supplies the most high-end rotavators to basic yet essential spares across geographies present.

There is a strong need to develop an agricultural-technology ecosystem in the country. In this light, do you also see more agro-tech start-ups joining the fray? Will you collaborate with them, if required?

Yes, you are correct; there is a strong need to develop an agricultural-technology ecosystem in the country. The diversity of soil, the crop, the seasons and even cultivation methods itself makes agriculture one of most dynamic industries of our nation. Having a sophisticated agricultural-technology ecosystem with aerial satellite imagery, greenness sensors, soil maps and millions of weather data points will go hand-in-hand in garnering its progress.

Agriculture is the new hot industry and technology serves as a backbone of every growth centric industry. Though smart farming technologies to check soil nutrient levels or detect crop damage are present, Indian agricultural industry is still quite naive to them. This is primarily because of awareness, accessibility and availability issues. The need to bridge these gaps rather 'market demand' is evident. Therefore, it can be safely said that a slew of agro-tech start-ups will be here to stir the agricultural revolution.

If there are is any start-up that will help us serve the India farmers any better, Paama Agrico is more than happy to associate with them.

What is your vision for Paama Agrico?

Paama Agrico is inspired by the ambitious mission of making every farmer of India self-sufficient within the next five years. We aim to do so by supplying them with efficient, durable and reliable farm equipment that are 'Made in India and Best for India'. This will enable super-efficient farming process -- that will save labour, time and material resources and most importantly have no 'downtime', one of the most important terminologies in the book of automation.

Having a strong foothold in Karnataka, Andhra Pradesh and Tamil Nadu and keeping in pace with its mission Paama Agrico will expand its presence to the rest of the nation; now that is a huge task on hand.

According to India Brand Equity foundation, "Agriculture being the primary source of livelihood for about 58 per cent of India's population and the total area in India, sown with rabi crops reached 64.29 million hectares in February 2018." To meet such numbers, Paama Agrico has to quintuple its capacity and we are working meticulously to pump our production and capabilities to cater to the market.

Given our market response we are quite positive to lead the nation's agri-equipment market by 2023!



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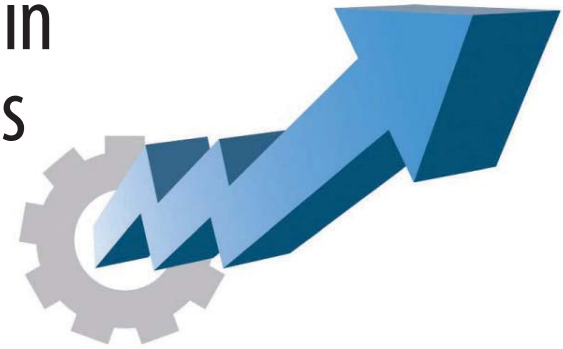

Read on to know more about operating conditions in the Indian manufacturing.

August survey data indicated that operating conditions improved at the slowest pace since May, mainly reflecting slower gains in output and new orders. On the price front, input cost inflation eased further from June's multi-year high and registered below the series trend. Subsequently, firms raised their output charges at the slowest rate since April. Meanwhile, business optimism towards the 12-month outlook for output softened from July's three month high.

The Nikkei India Manufacturing Purchasing Managers' Index® (PMI®) registered at 51.7 in August from 52.3 in July. The latest data pointed to a modest improvement in manufacturing conditions compared to July.

Output rose further in August, thereby extending the current period of expansion to 13 months. Strong underlying demand was the key factor behind the latest upturn, according to panellists. Although solid, the rate of expansion eased for the second successive month.

New orders placed at Indian manufacturers rose for the tenth month in succession during August. Where an increase was reported, firms commented on strong market demand. Despite being solid, the rate of growth softened from the preceding month.

Orders from abroad rose for the tenth consecutive month during August. Moreover, the rate of expansion was marked and accelerated to the strongest since February. Greater demand from international markets underpinned the latest rise in new export orders, according to panellists.

In response to sustained periods of expansion in output and new orders, firms were encouraged to raise their staffing levels during August. That said, job creation remained marginal and broadly similar to the previous survey period.

Indian manufacturing companies raised their purchasing activity for the third month in succession during August. Panellists generally commented on greater inflows of new orders. However, the rate of expansion was modest and the weakest in this sequence. Subsequently, pre-production stocks rose at a marginal and softer pace compared to the preceding month. Meanwhile, post-production inventories were depleted at a marked rate in August.

New orders placed at Indian manufacturers rose for the tenth month in succession during August. Where an increase was reported, firms commented on strong market demand. Despite being solid, the rate of growth softened from the preceding month.

On the price front, Indian manufacturing companies continued to face higher input costs during August. There were reports that currency weakness contributed to higher raw material costs. Although sharp, input cost inflation moderated to the weakest since May.

As part of ongoing efforts to protect margins, Indianmanufacturers raised their own selling prices for the thirteenth consecutive month in August. That said,the latest rise was marginal and the slowest since April.

Indian manufacturing companies retained optimistic projections for output in the next 12 months. That said, the level of sentiment eased from July's three month high and remained below the historical average.

Commenting on the Indian Manufacturing PMI survey data, Aashna Dodhia, Economist at HIS Markit and author of the report, said: "August data signalled a further loss of growth momentum across India's manufacturing sector, reflecting slower gains in output and new orders. That said, reflective of strong demand conditions, the rates of expansion were solid. PMI data suggested that external demand for Indian goods was also robust, with new export orders rising at the fastest pace since February.

"Following rises in domestic interest rates, manufacturing companies gained some breathing space as input cost inflation moderated to the weakest since May and further from June's multiyear peak. That said, the rupee depreciation against the US dollar continued to place strong upward pressures on input prices.

"Indian manufacturers retained positive projections for output over the next 12 months, but the level of sentiment eased in August. Indeed, some of the key headwinds facing the economy include high global oil prices, monetary policy tightening, and capital outflows from emerging markets."

Source: Nikkei India Manufacturing PMI

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Picture **Perfect!**

Super Plastronics has re-introduced the Kodak brand in India. **Avneet Singh Marwah,** its Director and CEO, speaks about the challenges and opportunities in enabling the customer to relate digital picture with a digital screen.

By Niranjan Mudholkar

"We have our own in-house paint shop as well. Apart from the 'big four', we are the first manufacturer in India to do SMT of Smart TV PCB."

How has your journey been so far in India? What was the reason behind choosing Kodak as a brand licensee for a partnership?

The journey so far has been great. There are very few companies in the world that still exist even after 130 years, especially in electronics. We want to thank all our customers who have welcomed us back in India and who have bought our televisions.

Bringing Kodak back to India wasn't easy as Kodak is a digital picture brand and it was very challenging to make people realize that our main motive was for the customer to be able to relate Kodak digital picture with a digital screen. Also, there is always a challenge when you enter a new market. We all know India is a very price competitive market and having come back we have gained market share. The reason for choosing Kodak was that it is one of the oldest brands in the world. Kodak has a history of 125 years and the kind of love, affection and nostalgia that the brand has garnered globally makes it one of the most recalled brands in the world after McDonalds, Apple and Pepsi. Also, the kind of brand equity it holds in the market, it is good for India.

Tell us about the machines that have been used and the manufacturing process that goes into creating a Smart TV at SPPL's manufacturing unit?

We have in house molding machines from 90 tonnes to 1500 tonnes where we do all the plastic injection molding for all the TV LED cabinets from 20 inches to 50 inches. We have our own in-house paint shop as well. Apart from the 'big four', we are the first manufacturer in India to do SMT of Smart TV PCB. We also have a clean room for assembling the panel and the display glass for the backlight as well as a fully automatic line for assembling LED televisions.

What are the latest trends in the Smart TV market? What is latest trend that Kodak would like to capitalize on?

As you know, the market share of smart TVs, especially online, has increased to about 75 percent. Quarter by quarter, there is a growth of about 20 percent for smart TVs. All thanks to the internet availability that has improved immensely in

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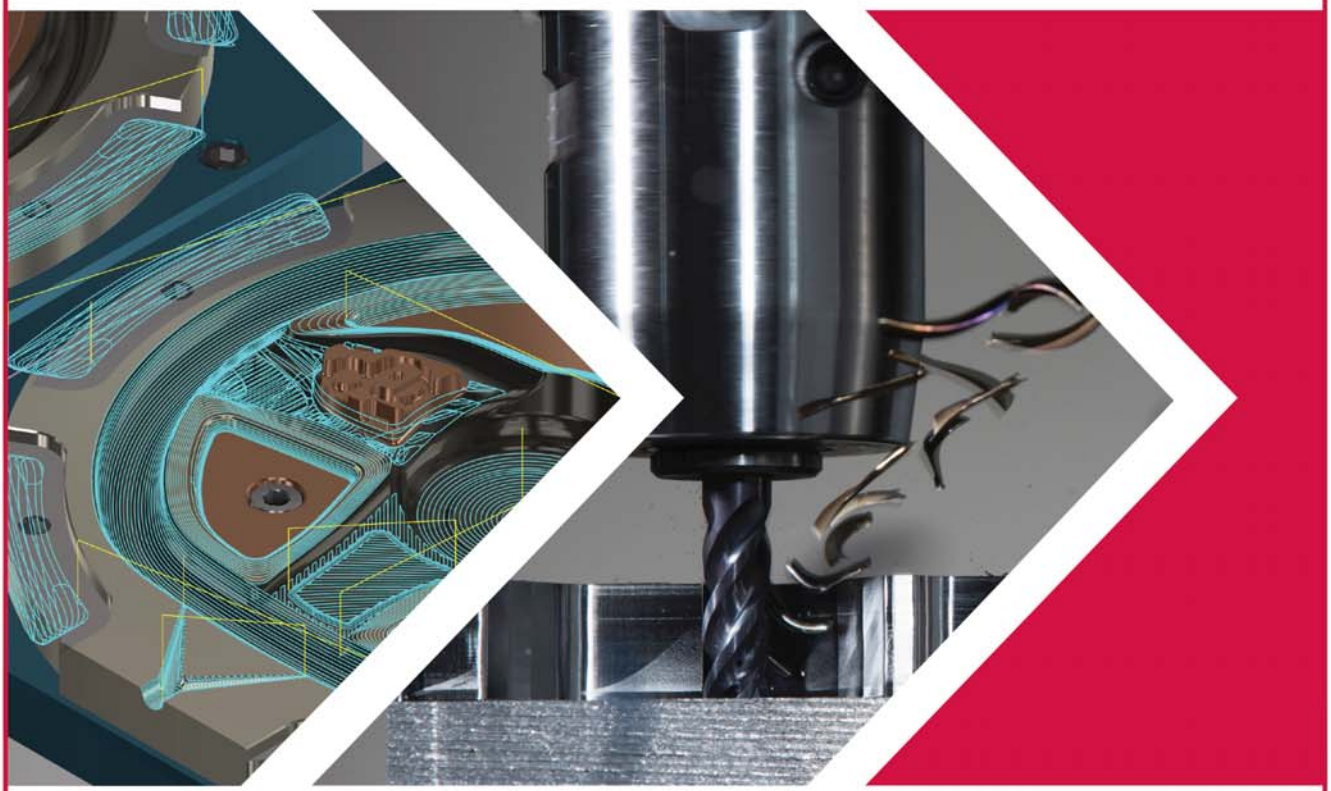

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our country, due to which the demand for smart TVs has also increased. Today, people want to watch more content on their television. That is why, they are opting for smart TVs. Witnessing this trend, we are launching our new wall for smart TVs which will have 10 million hours of content. It will be fully focused on content, plus you can download your favourite smart TV apps. So, our future is focused on our smart TV and 4K TVs. We will be observing and mapping the consumer behaviour in India and will endeavour to provide them more Indian content in different languages.

What are your plans for offline market, since Kodak HD LED TV has been ecommerce focused?

After a successful launch with the big three online portals and with Flipkart being one of our strategic partners for Kodak, we have launched in nine states and we are doing business with best LFR (large format retails) in the country.

What are the after sales services that you provide to your customers?

We have more than 350 company service centers plus we have our service franchise, which in total makes it more than 500 service centers across India. Our installation SLA is about 24 hours to 48 hours and our service call is under 48 hours. We cover 14,000 pin codes across India.

Why does SPPL support the Make in India initiative? How is Make in India helping the indigenous brands?

We completely endorse Make in India. As mentioned earlier, we have everything in-house and for the last 30 years we have been trying to make televisions in the country. Therefore, we understand the consumer behaviour of the market. With those changes, it is always better that whatever our Indian customer wants, we develop those kinds of products only. Make in India has always been an advantage for the manufacturers as keeping a check on the quality of the product is in house. We make sure that we follow all the global standards. We know what kind of products Indian consumers want. An example is

> "The Indian market is very focused on sound. That is why in all our SKUs, the sound is more than 20 watts. If we talk about western countries, it is about 12 watts."

that the Indian market is very focused on sound. That is why in all our SKUs, the sound is more than 20 watts. If we talk about western countries, it is about 12 watts. So, these are the minor things that we always keep in mind before developing the product.

How much focus Super Plastronics Pvt Ltd (SPPL) have on R&D? Please elaborate.

We have R&D labs both in-house and outside the country. Just because the market share of smart TV is around 75 percent, we tend to develop more software in house for our Indian customers where customers can enjoy more Indian content on their smart TV app with a glitch-free experience. We are also trying to develop a software library in India. In future, you will see a more updated version of smart TV applications for our customers. We have two different R&D centers, one is for hardware and other is for software. In hardware, we keep on developing new mold designs because we have in-house plastic injection molding machines. As I mentioned about the sound, we try to make quality sound output through our hardware changes. Kodak also has one of the best backlight panels and we will continue our focus on R&D to keep harnessing the best of technology for our customers.

Tell us about the new production line which will be started at your Noida plant?

We will be inaugurating the line soon this month (September 2018). It is a fully automatic line which will be focusing on bigger sizes of 40", 50", 60" and 75".

We will be inaugurating the line soon this month (September 2018). It is a fully automatic line which will be focusing on bigger sizes of 40", 50", 60" and 75".

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With 2.5 million SCVs on the Indian roads, Piaggio Vehicles Private Limited is now further consolidating its position says **Diego Graffi,** the company's MD & CEO.

By Niranjan Mudholkar

Piaggio India recently reached an interesting milestone with the rollout of its 2.5 millionth small commercial vehicle (SCV) from the assembly line of the Baramati manufacturing plant. Diego Graffi, MD & CEO, Piaggio Vehicles Private Limited, definitely looked a very happy man when I started the conversation talking about this milestone at his office in Pune. I was actually keen to know what the next milestone would be on Piaggio's horizon. Graffi was equally happy to answer that but only after talking about the first milestone. "It is very exciting, and a matter of pride for us at Piaggio. Piaggio started its journey in India in 1998. So, reaching this milestone in a timespan of two decades is indeed a big achievement. Not many automotive companies are able to do this. For us, it does not just mean that we are capable of producing 2.5 million vehicles, but it also means that we are able to satisfy 2.5 million customers. Therefore, this is definitely a very big feat. It is also a big motivation for us to try and reach the next goal of 3.5 million vehicles in the shortest time possible. I think with the base that we have created so far, it will be much faster than what it took to reach us 2.5 million vehicles," he shared with a lot of energy and enthusiasm.

Balancing act

Piaggio is also known as a premium two-wheeler brand while being a leader in the SCV segment in India. These two are completely different ends of the spectrum. So, I wanted to understand how difficult it would be to balance between these two roles. Graffi had a good explanation. He said: "If you look at the two major product brands representing these two segments – Vespa and Apé, these have been present not just here in India but also across the world. These two brands and the products have been produced by us since a very long time with the same aim and same mission of satisfying customers. It is true that both products entered India at different times – Apé came about twenty years ago while Vespa arrived just a few years back. However, while we have introduced these brands at two different historical moments, they come with the same legacy. But you are right in saying that it must difficult to balance between the dual role since they have different usages and they are serving different customer base. What is important for us is to manage the customer experience with regards to both the segments and I think we have been doing it well." So, what remains common between the two brands is the level of technology, Italian design and styling as well as Piaggio's aim to provide great customer experience.

> "One of the strengths that Piaggio has not only here in India but also at the Group level globally is the expertise and know-how related to powertrain."

Power of powertrain

When it comes to the small commercial vehicles market in the country, Piaggio has a clear lead in the diesel engine segment with more than 40 percent market share. So, how is the company dealing with the shift towards renewable fuels and electric mobility? Graffi pointed out that one of the strengths that Piaggio has not only here in India but also at the Group level globally is the expertise and know-how related to powertrain. "You are right when you say that the main part of our business here in Indian SCV segment is driven by diesel application. However, given the changing scenario with regards to fuel, we have been investing quite heavily for the last 24 months in new applications in this context," he shared.

Graffi also highlighted that at the recent celebration of the 2.5 millionth vehicle roll out, Piaggio also launched the new series of Apé CNG/LPG fuel vehicles in the Indian market. The Apé Xtra LDX and Apé Auto DX are part of the new water-cooled engine technology range. "This is a strategic initiative to ensure our customers that our three-wheeler vehicles will now be equipped with very efficient, very clean and with high-performance alternate fuel engines – mainly CNG and LPG. In our product investment plan, we are also planning to invest a lot to develop new powertrain that is more suitable for future applications," he shared. Of course, Piaggio's scooter (two-wheeler) business is on petrol and not on diesel application. "The technology is available, and we are leveraging that know-how and expertise at the Group level," Graffi said.

With regards to electric mobility, Piaggio has already introduced the Vespa electric for the Europe and US markets. "The production has started in our Pontedera plant in Italy. The powertrain has been completely developed and produced

"Reaching the 2.5 million mark is also a big motivation for us to try and reach the next goal of 3.5 million vehicles in the shortest time possible."

in-house by Piaggio. In fact, here in India also we have an electric bicycle which is also fully developed and designed in-house by Piaggio. So, we have the technology available and we will be introducing it here in India quite soon," Graffi remarked.

Exports market

Piaggio has also been building its India operations as an export base besides developing the domestics market. Graffi remarks that the export market has been booming for the last few years for Piaggio India as well as for the overall industry. "I have seen quite relevant business growth in 2017 as well as in 2018. We have quite a few importers in India's neighbouring countries like Nepal, Sri Lanka and Bangladesh with whom we are doing quite good business. Recently, for the last 18 months, we have also started to export to some African markets like Kenya, Tanzania, Nigeria, Uganda, and also through our colleagues in Pontedera, we are exploring the Egypt market. My perception is that Africa is a booming market for two wheelers. A lot of other markets are opening up and we are looking at those markets as well. For example, the South East Asia market is also quite fertile. We have recently launched the Apé in Cambodia. We have been exporting to Philippines for the last two years and now we are also looking at Indonesia. We are basically looking at a lot of geographical areas, not to mention South America where we are present since a long time," he shares.

Piaggio India's export revenue share is roughly around 15 percent to 20 percent of its total revenue. Graffi plans to increase the percentage of export as his perception is that the year on year growth will be higher in the export market. "Of course, we have had a very good year in 2018 compared to 2017. Obviously, 2017 is not a very good base to compare to due to demonetisation and GST. So, we are looking at very good growth in the domestic market in 2019 as well as 2020 but I believe that the growth will be much more in the export market. I am hoping that the revenue share of exports will cross 25 percent in the next 18 months to 24 months," he explains.

Pioneering new technology

Piaggio has introduced the new water-cooled engine technology in India recently. Graffi is quite excited about this as Piaggio is the first player to introduce this kind of technology in the Indian three-wheeler market. "This engine has been developed in partnership with our long-term partner Greaves Engines. This is a state-of-the-art technology, which offers a lot of advantages to the customers in terms of performance as well as total cost of ownership. It offers 10 percent to 15 percent better fuel efficiency compared to the regular CNG / LPG. While we are the first one to introduce this technology in the market, my expectation is that others will soon follow," he says. Of course, earlier, there used to be some kind of psychological

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"I am hoping that the revenue share of exports will cross 25 percent in the next 18 months to 24 months."

barrier with regards to using this technology. "However, today we can say that in terms of efficiency, performance and total cost of ownership, this technology is at par with diesel or is even better. Therefore, my perception is that more customers will reconsider their diesel choice and will decide to go for water-cooled engine technology," Graffi explains.

Transition to Bharat Stage VI

Graffi acknowledges that it is definitely a big challenge for the overall automotive industry including for the two-wheeler segment. "We are working on and are on track to take our complete powertrain range to Bharat Stage VI homologation well in advance of the deadline of April 2020. We are planning to have our entire range ready for production by November 2019," he says with confidence.

Graffi knows that this is a huge challenge from the technology point of view. "I am sure you are aware that the reduction of pollutants from Bharat Stage IV to Bharat Stage VI is much higher than what we experienced from Bharat Stage III to Bharat Stage IV. So, we will require an advanced kind of fuel injection technology that has not been used so far at least in the two-wheeler industry. But overall, I look at this change quite positively as it will provide the customer not only with a clean and much more efficient powertrain solution but will also be beneficial to the environment," he says.

Baramati manufacturing plant

At Baramati near Pune, Piaggio India has three key manufacturing assets. One is for the small commercial vehicles where it produces the three-wheelers and the four-wheelers. Its annual capacity is about 50,000 vehicles per year. "It is quite flexible and at the moment we do not have any plans to increase our capacities there. The plant is quite technologically advanced. For example, it has an automatic welding line and it is a big step ahead in terms of production efficiency as well as accuracy with regards to tolerances. With that unit, we are fully covered for the next three years for our manufacturing needs," Graffi informs. The second asset in Baramati is the engine plant, which is relatively recent. "It was originally meant for the production of our scooter applications. Then, we also produced our four-wheelers there followed by the diesel engines for the four-wheelers. We plan to expand this unit's capacity in the next 24 months. I do not have the exact figure with regards to the investment planned for expansion, but I can say that it is more than Rs.100 crore," Graffi shares. The third asset is the two-wheeler plant where Piaggio manufactures its Vespa and Aprilia brands. The installed production capacity at this plant is 1.5 lakh vehicles per year. "We are not so far from that number at present and we hope to reach saturation in the next three years. Then, we will see what is required," he says.

R&D and new products

It was interesting to know that the concept, design and production for all Piaggio commercial vehicles is done here in India. "We do have some support from our Italian plant because we have some production happening there. However, the main R&D center for commercial vehicles is located here in India. Part of our R&D activities happen here in Pune and

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part of it happens in Baramati. Of course, the R&D for four-wheeler and two-wheeler happens in Italy," Graffi states.

With regards to the existing product mix in the SCV segment, Graffi says that Piaggio India has already done a lot of things in this context in the last 14 months. "I would say that we have done good renewal of our product line. Yes, we do have some products in the pipeline for the next 12 months not just in terms of renewal of products but also in giving more variety to our customers in terms of applications. Of course, our existing product line is definitely state-of-the-art in comparison with our competitors," he says.

In the two-wheeler segment, Graffi does acknowledge that Piaggio India still has a long way to go. So, a lot of new products can be expected on that front. "Some of these products were already showcased at the Auto Expo 2018. Although we are a little behind in the two-wheeler segment since we started a bit late, but we will soon have a complete product gamut within the next 24 months," he adds.

Personal journey

It has been just over 14 months since Graffi has taken charge as the MD & CEO of Piaggio India. And he calls his personal journey so far - completely amazing! He points out that he comes from a completely different background – that is manufacturing and procurement and hence this has been a new and good experience. "India is not new to me as when I joined Piaggio in 2005, I started travelling here quite frequently. I was partly responsible for building our local base in India not only for the domestic market but also for the exports market. So, I also have a good relationship with the local vendor base for the last eleven years. Getting appointed as the Managing Director was a pleasant surprise for me as my affection and interest for India is quite high. Of course, I cannot say that I am feeling at home but it is nearly like that! Luckily, the team we have here is quite young and motivated. The good thing is that India is growing as an economy. So, what more can you ask for?"

Baramati and Pontedera

Since Graffi has significant experience with manufacturing, I could not resist the temptation of asking him to compare the manufacturing infrastructures in Baramati (India) and Pontedera (Italy). I was quite happy with the honesty with which he answered the question. Of course, he started off by highlighting the very strong partnership between Italy and India during the last twenty years. "So, if you visit our manufacturing facility in Baramati then you will find many assets similar to our Pontedera plant in terms of technology, machinery and so on. This is mainly because of the strong bond between these two locations. However, my personal experience is that the levels of technology and the manufacturing assets in Baramati are very high. I also have a lot of experience in China and Vietnam and I see that the level of preparation and technology application in the last three to five years with the vendor base here is quite high too. Our overseas plants are now importing a lot of important components from India as the level of technology, quality and value-added is the same." Baramati's high level of manufacturing sophistication definitely is in line with Piaggio's vision of developing the India operations as an exports base.

Vision 2020

Finally, I ask him about his vision for Piaggio India and where he would want to see it by 2020. "My first goal is definitely to match this big challenge of Bharat Stage VI transition very effectively in terms of technology, cost and competitiveness. I want the organisation to be able to take advantage of this transition and to give something more to the customers. I would also like to see more and more high level of Indian managers taking charge at Piaggio India," he says.

Graffi also sees a positive time in 2018 as well as in 2019 for both of its business pillars. "I also want this organisation to become more fast and effective in terms of decision making in all aspects. I would also like to give more opportunities to our young talent to understand what Piaggio makes and the kind of legacy we have," he signs off on a positive note.

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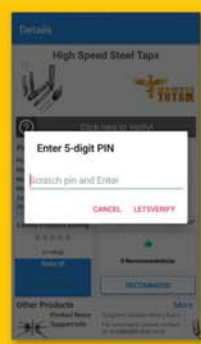

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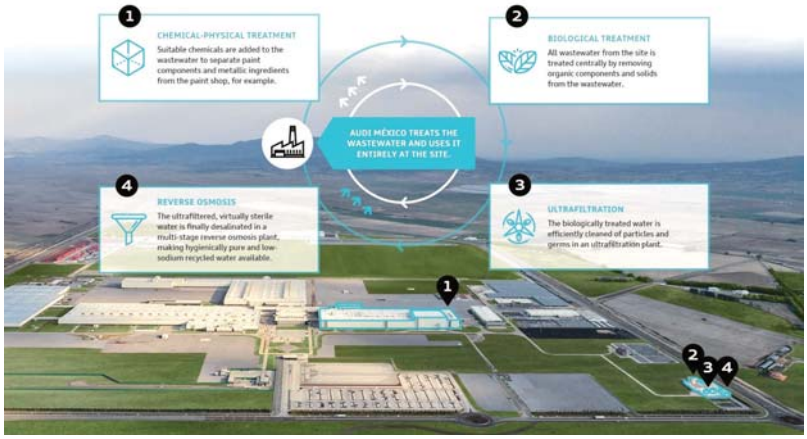
Audi is one of the world's first premium manufacturers to produce automobiles completely free of wastewater. At its site in San José Chiapa, Mexico, the company is using a new water treatment process that collects 100 percent of the wastewater produced there, purifies it and feeds large volumes of clean water back into the plant's water supply system. In this way, Audi México ensures the sustainable use of the water as a resource and minimizes the environmental impact of its car production.



From the paint shop to leak tests – water is necessary in the entire process of automobile production. The wastewater generated at Audi México first undergoes chemical-physical treatment, which neutralizes the water and removes particles and heavy metals, from the paint shop for example. This pretreated water is then further processed together with the remaining wastewater from the site in a biological wastewater treatment plant, where organic components are decomposed. Finally, a combination of ultrafiltration and multistage reverse osmosis separates the remaining contaminants, including bacterial germs and alkalis. Audi reuses the hygienic and high-quality recycled water directly at the site. The concentrated matter from reverse osmosis is evaporated and the dehydrated solids are disposed of. The company is thus assuming a pioneering technological role for wastewater treatment.

"We are pursuing the vision of producing cars at all our sites completely CO_2 neutral and free of wastewater. We have reached a major milestone in this respect at our plant in San José Chiapa," stated Peter Kössler, Board of Management Member for Production and Logistics at AUDI AG. "As an automobile manufacturer, we have an obligation to ensure the careful and environmentally compatible use of valuable resources such as water. With the new reprocessing method, we are also making a significant contribution to combating water shortages in Mexico."

Audi México uses the treated water as process water in production and to irrigate the green areas on the plant grounds. With this innovative process, Audi is already saving around 100,000 cubic meters of water per annum, equivalent to about a quarter of the plant's total requirement. In the long term, the company actually plans to save more than 300,000 cubic meters of groundwater every year.

> "With the new wastewater treatment system, Audi is taking an important step towards an autonomous water cycle."
>
> **Rüdiger Recknagel,** Head of Environmental Protection at AUDI AG

"With the new wastewater treatment system, Audi is taking an important step towards an autonomous water cycle," said Rüdiger Recknagel, Head of Environmental Protection at AUDI AG. "By the end of 2025, we want to reduce the Audi Group's environmental impact by 35 percent per car produced compared with the reference year 2010. This measure brings us closer to that goal."

To further reduce the use of groundwater, a reservoir with a capacity of 240,000 cubic meters is located on the site. It fills up during the rainy season of approximately six months from April to September. The rainwater is collected and treated and also used in the plant. "Audi México is the youngest site in the Audi Group. We are all the prouder to play a pioneering role in the sustainable use of water as a resource," said Alfons Dintner, Chief Executive of Audi México.

The Audi México plant was opened in 2016 and produces the Audi Q5 for the world market.

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Farm Equipment market to reach $321.32 billion by 2026

According to Stratistics MRC, the Global Farm Equipment market is accounted for $179.25 billion in 2017 and is expected to reach $321.32 billion by 2026 growing at a CAGR of 6.7% during the forecast period. Population growth has escalated the demand for food and growing mechanization trend in agriculture industry are some of the key factors fueling the market growth.

However, factors such as increasing subsidies provided by government to purchase farm equipment and support farming practices for improved quality crops inhibit the market growth. One of the major opportunities in the market is rising implementation of technology-driven agriculture equipment.

The agricultural sector is changing its practices from traditional farming to modern farming and this equipment are essential tools that enhance yield and improve the maintenance of soil and have easy approach in farming.

By Geography, Asia Pacific is expected to hold largest market share due to increasing demand for quality food grains, fruits and vegetables. Major players have been focusing on high growth markets such as India and China, to reap the benefits from increasing mechanization.

Asai Nursery and DENSO to establish Joint Venture

Asai Nursery, Inc. and DENSO Corporation has announced a joint venture to create a next-generation model for horticulture using large-scale greenhouses and agricultural technology. The company, titled AgriD, Inc., will build one of Japan's largest agricultural greenhouses and develop technologies to improve cultivation productivity for growing vegetables. Construction of the greenhouse will take place in Inabe City, Mie Prefecture which offers ideal amounts of solar radiation for greenhouse cultivation and is scheduled to begin in 2019.

AgriD aims to increase the efficiency of agricultural practices through large-scale cultivation. Through agricultural production management, the venture will develop technologies for better controlling the environment in greenhouses, improve efficiency through automation and ensure growth and cultivation control. The model plans to employ a variety of development technologies from both Asai Nursery and DENSO including national distribution channels, air conditioning systems, engine control and robot technologies.

DENSO has long been developing products for controlling environments within greenhouses to improve productivity and reduce climate risks in agriculture. In 2015, DENSO released its "Profarm-Controller" product and has supported cultivation in collaboration with Toyotane Co., Ltd. In December 2018, DENSO will establish another joint venture with Daisen Co., Ltd. and Toyotane. In May 2019, the company will release "Profarm T-cube", which is a semi-closed agricultural greenhouse.

Sonalika Tractors registers growth of 23.2%

International Tractors Limited (ITL), makers of Sonalika & Solis tractors, has registered an overall sales growth of 23.2% with 7369 tractors in August'18 as compared to 6036 tractors same period last year. Exports recorded a robust growth of 90% with sales of 2082 units as compared to 1095 units same period last year.

Commenting on the same, Raman Mittal, Executive Director, Sonalika Group said, "We are delighted with the overall growth of 23.2% which was driven by phenomenal growth of 90% in exports. The growth in exports is resultant of our wide distribution network across different markets. All time high performance of Asia and Europe markets has helped to achieve this extraordinary growth".

He added, "In the domestic market, with the onset of festive season, we are optimistic that the industry should continue to grow at healthy pace, driven by positive farmer's sentiments."

Mahindra's Farm Equipment sector sells 16,375 in August 2018

Mahindra & Mahindra Ltd.'s Farm Equipment Sector (FES), announced its tractor sales numbers for August 2018. Domestic sales in August 2018 were at 16,375 units, as against 15,356 units during August 2017. Total tractor sales (domestic + exports) during August 2018 were at 17,785 units, as against 16,641 units for the same period last year. Exports for the month stood at 1,410 units.

Commenting on the month's performance, Rajesh Jejurikar, President - Farm Equipment Sector, Mahindra & Mahindra Ltd. said, "We have sold 16,375 tractors in the domestic market during August 2018 a growth of 7% over last year. The announcement of higher MSP for Kharif crops will drive positive sentiments in the upcoming festive season. In the exports market, we sold 1,410 tractors with a growth of 10% over August 2017."

Enabling **MSMEs**

An industrial park at Navi Mumbai promises to go beyond providing just an industrial space by creating an ecosystem that facilitates smooth operations.

Artist's impression of how the completed project will look like.

The Machinist was recently invited to an interesting industrial park at Juinagar in Navi Mumbai. Developed by Raheja Universal, this industrial park is part of a bigger project called as the Raheja District. Recently renamed as Tesla Industrial (from Raheja District II), this industrial space is spread over 27 acres. Building 1-A in Tesla Industrial has received BCC and is ready for operations.

According to Ashish Raheja, Managing Director, Raheja Universal, Tesla Industrial is the perfect ecosystem for the development of a new wave of MSMEs to deliver the right product, the right quality, the right solution and the right service at a competitive price, in domestic and international markets. "Industrial parks are globally acknowledged for economic growth and development of the country. Development of these parks attracts investments from private and MNC's companies' and gives a boost to several flagship initiatives of the Indian government leading to proliferation of job opportunities," he says.

Ashish Raheja also shares that Tesla Industrial goes beyond providing an industrial building that fits the needs of MSMEs. "It also guides businesses through Indian customs, tax programs, government incentives, and connects them to legal advisers to incorporate companies at the Industrial park, as a turnkey service." This industrial park is open to non-polluting industry sectors like packaging, printing, pharmaceuticals, logistics, warehousing, food processing and so on.

Tesla Industrial boasts of modern infrastructure, common service facilities as well as all basic amenities. Its features like loading unloading bays and vehicle lifts for speedy transportation facilitate smooth and hassle-free material handling inside the park. The park is well connected with several significant Mumbai Metropolitan Region (MMR) locations.

Escorts launches India's first automated concept tractor in India

At Esclusive 2018, Escorts' annual innovation platform, Escorts Limited, announced its unique Automated Farming Solutions with the launch of Automated Concept Tractor that brings the power of next generation digital vehicle technologies aimed at precision-based farming. To be able to deliver this, Escorts has collaborated with seven technology giants namely Microsoft, Reliance Jio, Trimble, Samvardhana Motherson Group, WABCO, BOSCH and AVL. The partnerships and relationships will enable development of a range of farm machines with electric transmissions, autonomous applications, remote vehicle management, data-based soil and crop management, and sensor based guided farm applications.

Indian Agriculture & Farming practices requires extensive mechanisation and precision based agro solutions for maximized output and improved farmer income. Escorts has collaborated with AVL for electric driveline technology, with Trimble for sensors, controls, water level management system and automated e-steering, with Samvardhana Motherson Group for Smart Interface Cabins & Care Plus - a two-way voice interface for real time service, with WABCO for Vehicle Controls & Automation Technology, with Microsoft for its Cloud & AI technology enabling precision agriculture capabilities to help farmers make informed decisions and get more from their farms, BOSCH for future emission readiness and last but not the least, with Reliance Jio for enhancing farm machinery life cycle with networked platform providing top-notch service and genuine spare parts across the country.

Escorts also pioneered the platform of Shared Services and Agri Solutions with 'Escorts Crop Solutions' to offer end-to-end, state of the art equipment for paddy farming under pay-per-use rental model, TRAXI as a service platform to aggregate farm equipment owners to rent out their equipment to small and marginal farmers, SMART PARTS to offer genuine parts and skilled service at an affordable price, DIGITRAC as a front-end farmer interface for agri inputs and customized agri information & FARM POWER, to provide advanced implements and equipment for efficient and productive farming.

Speaking on the occasion, Chairman and Managing Director of Escorts Ltd., Nikhil Nanda, said, "Esclusive is our annual innovation platform which showcases unique innovations and disruptions in agriculture, construction and railways segments in collaboration with global technology players. Last year we launched world's first electric compact tractor concept and this year we have pioneered autonomous farming solution platform in association with seven strategic technology tie-ups which will transform agricultural practices for better returns to farmers. This event portrays Escorts commitment to continue to develop and launch technologies for national development and community elevation. Escorts is proud to have collaborated with Microsoft, Reliance Jio, Samvardhana Motherson Group, Bosch, Trimble, AVL, Tadano & WABCO to co-create technologies for autonomous agriculture and smart infrastructure.

Aeris, Hello Tractor tie up

Aeris, a technology leader in the Internet of Things (IoT), along with its partner, Hello Tractor, has launched of 'Tractors-as-a-Service' in India and the ASEAN region at a session on 'India-Africa- ASEAN: Internet of Things (IoT) in Agriculture', organised in association with The Federation of Indian Chambers of Commerce and Industry (FICCI). Industry leaders and diplomats from Indian, ASEAN and African embassies in New Delhi participated in the event.

With the Aeris IoT platform, called Aeris Mobility Platform, (AMP), tractor tracking, utilisation time and billing is simplified, based on time in the field and area covered. The partnership enables the pay-as-you-use model for small holding farmers to use tractors with innovative commercial models. Hello Tractor's innovative use of IoT simplifies complex data to ensure transparency, profitability, and accountability across the ecosystem of farmers, tractor owners, tractor dealers, original equipment manufacturers, banks, and governments.

Aerospace & defense industry to drive **3D printing metals market**

Market is projected to be worth $2,089.7 mllion by 2023

According to a new market research report "3D Printing Metals Market by Form (Powder and Filament), Type (Titanium, Nickel, Stainless Steel, Aluminum), End-Use Industry (Aerospace & Defense, Automotive, Medical & Dental), and Region (APAC, North America, Europe, MEA, SA) - Global Forecast to 2023", published by MarketsandMarkets, the global market is projected to grow from USD 590.4 million in 2018 to USD 2,089.7 million by 2023, at a CAGR of 28.8% from 2018 to 2023. Technological advancements, capacity expansion, new product developments, and expiry of key patents for powder-based selective laser sintering are factors influencing the overall demand for 3D printing metals.

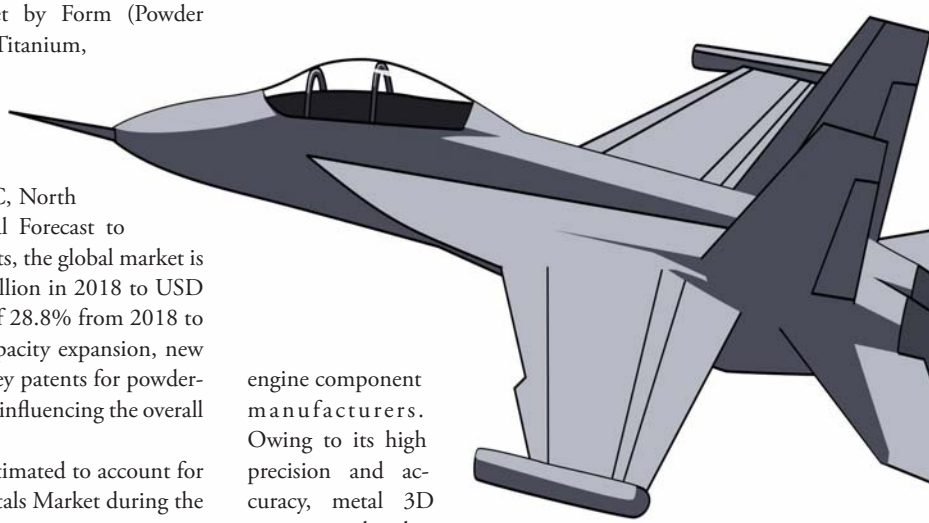
By type, the titanium segment is estimated to account for the largest share of the 3D Printing Metals Market during the forecast period.

Metal 3D printing has been widely adopted by the aerospace & defense industry across major regions. Titanium and its alloys are mainly used in aerospace engineering applications, such as engine component manufacturing, owing to their high strength, lightweight, and superior corrosion resistance properties. Due to their biocompatibility, they are also used in biomedical applications, such as orthopedic and dental implants as well as artificial knee and hip replacement surgeries. The titanium metal offers greater strength than other materials and is thus preferred for metal 3D printing activities in critical applications.

The aerospace & defense industry is estimated to be the fastest-growing end-use industry segment of the 3D Printing Metals Market during the forecast period.

The volume of 3D printing metals consumed by the aerospace & defense sector constitutes more than one-third of the total 3D printing metals end-user market. This high consumption is mainly attributed to the huge demand for 3D printing metals from aircraft manufacturing companies and

Titanium and its alloys are mainly used in aerospace engineering applications, such as engine component manufacturing, owing to their high strength, lightweight, and superior corrosion resistance properties.



engine component manufacturers. Owing to its high precision and accuracy, metal 3D printing with a large print box is used to print larger aircraft components measuring around 15 kilograms. Availability of new materials for tooling and prototyping, demand

The volume of 3D printing metals consumed by the aerospace & defense sector constitutes more than one-third of the total 3D printing metals end-user market.

for prosthetic and dental implants, and high investments for new product development will significantly contribute to the growth of the 3D Printing Metals Market in the automotive, medical & dental, and other industry verticals.

North America is expected to hold the largest share of the 3D Printing Metals Market during the forecast period.

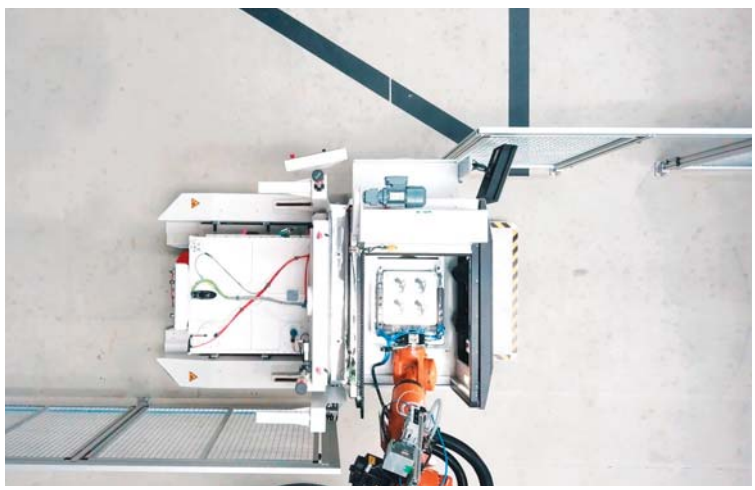
North America is considered as the major regional market for 3D printing metals. With most of the research activities and new product developments confined in this region, North America will be the most dominant market for 3D printing metals as compared to other regions. The 3D Printing Metals Market in Asia Pacific is, however, projected to witness the highest CAGR during the forecast period, followed by North America and Europe.

Source: MarketsandMarkets

Next generation of **industrial 3D printing**

Project for series production using 3D printing technologies reaches new milestone.

A year ago, Premium AEROTEC, Daimler, and EOS jointly initiated the NextGenAM project to develop the basis of a future system for series production using 3D printing technologies. Now, the first pilot plant has been put into operation at Premium AEROTEC in Varel, northern Germany – a key milestone.



Additive manufacturing (AM) is becoming an increasingly important factor in the industry, also with regard to series production. Against this background, the aerostructures supplier Premium AEROTEC, the automotive manufacturer Daimler, and EOS, the leading technology supplier in the field of industrial 3D printing, have joined forces in the NextGenAM project to fundamentally develop the next generation of additive manufacturing. Since the project officially began in May 2017, the NextGenAM team has checked the entire AM process to assess its potential for automation. Now the first pilot plant has been put into operation at Premium AEROTEC's technology center in Varel.

Goal of the project is to develop a complete production cell capable of manufacturing aluminium components for the automotive and aerospace industries. The purpose-built pilot facility currently consists of various machines for additive manufacturing, post-processing, and quality assurance. The innovation about the production chain is that the individual steps and the interaction of all additive and conventional process steps are fully automated and integrated, and manual steps have been eliminated. As a result, complex, lightweight and at the same time robust components can be manufactured and the high level of automation forms the basis for profitable production going forward.

> "3D printing is well on the way to establishing itself in the automotive sector as an additional manufacturing method with great versatility. With this collaborative pre-development project, we are taking a significant step towards achieving cost-effectiveness in metal 3D printing throughout the process chain."
>
> **Jasmin Eichler,** Daimler AG, Head of Research Future Technologies

The pilot plant in detail

Center of the pilot production chain is the EOS M 400-4 four-laser system for industrial 3D printing with metal materials. The system is used in combination with the peripheral solutions of the EOS Shared-Modules concept. The EOS M 400-4 in Varel is therefore equipped with a powder station and connected to a stand-alone setup and unpacking station. As a result, filling and emptying the system with the aluminium material, setting up the system to prepare a new build job, and unpacking the built components from the powder bed can be carried out independently of and parallel to the actual AM build process. This significantly increases productivity. The additively manufactured components are transported between the individual stations fully automated and under protective gas in a container on an automated guided vehicle.

The downstream post-processing has also been extensively automated: A robot takes the build platform with the parts from the setup station and places it in a furnace for subsequent heat treatment. The same robot then removes the platform again and takes it to a three-dimensional optical measurement system for quality assurance purposes. Finally, the build platform is conveyed to a saw, which separates the parts from the platform, making the components ready for further use.

Working together to design the future of additive manufacturing in series

The successful development of the automated process chain is the result of fruitful cooperation between all the project partners, each contributing their various skills and experience: EOS is the global technology and quality leader for high-end

solutions in the field of industrial 3D printing. Premium AEROTEC was the first manufacturer in the world to supply serial 3D-printed structural components for Airbus aircraft. Up to now, titanium powder has been used as material for this. However, one of the aims of the NextGenAM project is also to qualify aluminium for use. The automotive manufacturer Daimler contributes its experience in the field of mass production – an essential aspect if the pilot plant is to be used to manufacture parts on a large scale.

"In this project we have already succeeded in significantly reducing the production cost per part, thus creating an economic perspective for large-scale digital 3D printing factories," says Dr. Thomas Ehm, CEO of Premium AEROTEC.

Dr. Tobias Abeln, Chief Technical Officer (CTO) at EOS, says: "The integration of the AM process in an automated production line is an important milestone for the broad application of our technology in series production scenarios."

Jasmin Eichler, Daimler AG, Head of Research Future Technologies: "3D printing is well on the way to establishing itself in the automotive sector as an additional manufacturing method with great versatility. With this collaborative predevelopment project, we are taking a significant step towards achieving cost-effectiveness in metal 3D printing throughout the process chain. The project lays the cornerstone for the future realization of larger quantities in the automotive series production process – with the same reliability, functionality, longevity, and economy as for components from conventional production."

Goal of the project is to develop a complete production cell capable of manufacturing aluminium components for the automotive and aerospace industries.

Outlook

In the coming months, the pilot process chain will be further tested at the technology center in Varel and parts of the facility will be audited. In addition, production data will be collected and analysed with the aim of collating precise data on process times, profitability, and cost optimization. The NextGenAM project is therefore moving continuously closer to its goal of producing highly complex aluminium components in series production in a particularly economical additive manufacturing process.

Source: Daimler

UPDATE

Winners of the **Re-invent Turning contest 2018** announced

The 'Re-invent Turning with Sandvik Coromant' contest organized by Sandvik Coromant, Pune, successfully concluded on August 13, 2018 with the announcement of the winner. The contest was launched in the first week of June, in India, and the last date of submission was on August 5, 2018. Jury members met on August 13, 2018 at the Sandvik Coromant Center to assess the entries for their merit and to choose the winner. The winner was selected by the jury members after judging the entries on various parameters.

The contest received an overwhelming response as more than 325 participants registered for the contest. The application process was stringent as it was mandatory to innovate and show actual results in terms of savings. The jury that comprised of leading names from various spheres of the industry, studied each application in detail, before selecting the best one.

The strong contenders for the contest were:

- Suresh Ashok Pawar & Abhinandan Dole from IGW Involute Technologies Ltd., Pune
- Dharmesh Patel & Dipesh Patel from Harsha Engineers Ltd., Ahmedabad

Jury members having expertise in metal cutting, machining and material technology evaluated both the entries on various parameters. The winning factor was the innovative idea used for meticulous planning and in achieving great savings for the company by using Sandvik's PrimeTurning™ technology.

Dharmesh Patel from Harsha Engineers, Ahmedabad won this contest with flying colors. Heartiest congratulations to Harsha Engineers, Ahmedabad. The contest winner gets a fully sponsored 5-days trip to Sandvik Coromant head office in Sweden.

The jury was impressed with the results delivered by using PrimeTurning™. They believe that the contest created a platform which motivated production managers to use Sandvik's cutting-edge technology to boost their productivity.

Ashok Leyland wins a tender for Defence Tracked Combat Vehicle

Ashok Leyland has won a tender in the Tracked Vehicle space. This tender is for developmental work and marks Ashok Leyland's foray into tracked vehicle business. As per the scope of work, the Company will collaborate with Combat Vehicles Research and Development Establishment (CVRDE), Chennai for manufacture, assembly and testing of light weight clutch for the design and development of weight optimized 1500 hp Automatic Transmission for Main Battle Tanks. Sharing his views on this win, Amandeep Singh, Head - Defence, Ashok Leyland, said, "For over three decades, Ashok Leyland has been a vital part of our Defence forces through our mobility solutions. As part of our strategy to enhance our contribution to our Defence Forces and to expand our business scope within our focus area of 'Solutions for Mobility on Land', we have been working on Tracked Vehicles. With this win, we mark yet another milestone where we start working on the Tracked Vehicles that our soldiers use.

"We see huge potential in repowering and upgrading of existing BMPs/Tanks of the Indian Army. We have the expertise to develop indigenous solutions for power packs and running gear for upgrade of existing ICVs as well as for the new FICVs. We are proud that we are the only vehicle manufacturer in India having indigenously designed, developed and manufactured power packs beyond 350 HP. The tracked combat vehicle opportunity also exists in several other countries which use Russian made combat vehicles."

Hyundai joins hands with Revv — self-drive car sharing company

Hyundai Motor Company has partnered with Revv, India's fastest growing self-drive car sharing company to develop an innovative car sharing service and conduct creative marketing activities in the country. The strategic partnership including Hyundai Motor's investment to Revv sees innovative future mobility services gain the company's first foothold in the Indian mobility market.

The strategic investment and partnership will enable both Hyundai Motor and Revv to build competency and the technology necessary for leading the future mobility market in India; an evolving market showing exponential growth, expanding from USD 900 million in 2016 to USD 1.5 billion in 2018, and projected to expand to USD 2 billion by 2020. India's 15,000 car sharing vehicles are expected to grow to 50,000 by 2020, and 150,000 by 2022.

Furthermore, millennials, who are heavy users of car sharing services, comprise 35 percent of the total population of India. The market growth potential for mobility services is stronger than that of any other global market.

Eicher Trucks & Buses bags a new order

Eicher Trucks & Buses, part of VE Commercial Vehicles, has bagged an order for 350 heavy duty trucks from Bangladesh Road Transport Corporation (BRTC). BRTC has bought 350 units of Eicher 20.16, which is a 16 tonnes GVW haulage truck. Keeping customer profitability in mind, the Eicher 20.16 has been designed to deliver best-in-class fuel efficiency, superior uptime with modern ergonomics. This development will further drive VECV's vision of modernizing the commercial vehicle industry in Bangladesh. The delivery of the order is expected to take place within 8 months. Commenting on this development, SS Gill, Senior Vice President and Head, International Business, VE Commercial Vehicles said, "The commercial vehicle industry in Bangladesh has been growing rapidly in the past few years. This market is a key export region for us and there is a growing demand for fuel efficient, reliable trucks to fulfil customer requirements. Eicher Trucks & Buses has led the introduction of modern technology in Bangladesh with best-in-class fuel efficiency, superior reliability and a host of features to enhance the comfort and safety of drivers and profitability for transporters. This order further strengthens our position in Bangladesh, where we have been growing by over 37% CAGR for the last 5 years."

Mahindra unveils the Marazzo

Mahindra & Mahindra Ltd. has launched the Marazzo. The Marazzo has been engineered for excellence and comes with a smooth ride, agile handling, quiet cabin and fast cooling. Marazzo's shark-inspired design is evident in its sleek and streamlined silhouette, in the front grille inserts which resemble the teeth of a shark, in the tail lamps that are inspired by a shark's tail and a shark-fin antenna. It has a world-first architecture that provides drivers with a nimble "car-like" feel, being lighter than other similar vehicles, and also the toughness of a body-on-frame configuration. The rear suspension has a lightweight twist beam construction, which provides excellent ride.

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Initiative by THE TIMES GROUP

Spark Minda sets up lockset sub assembly unit

Spark Minda, Ashok Minda Group has collaborated with Yerawada Central Prison, Pune for installing and setting up a manufacturing automotive lockset sub-assembly unit at female prison inside jail premises. Setting up of automotive lock parts in jail will facilitate female inmates to earn basic livelihood and learn skill sets required in manufacturing and finishing of automotive locks.

A special female cell of Yerawada Jail has identified around 25 – 30 female jail inmates as per the criteria laid down by Minda Corporation Limited, a flagship company of Spark Minda, Ashok Minda Group. The female inmates will be trained to work on a shop floor for producing automotive locksets. The Group will also pay the compliance wages to the Jail Authorities, which will subsequently be paid to the inmates by the Jail Authorities. Other than the supply to the customer, these products will be also sold in after-market.

The memorandum of understanding was signed between Minda Corporation Limited "MCL" and Yerawada Central Prison, Pune on 15th February 2018. The MoU key highlights includes installation of automotive manufacturing assembly for producing lock sets. Basic product awareness and basic training will be provided by MCL at Yerawada Jail. The Prison projects under public-private partnership is an extension of unremitting CSR activities which "the Group" has installed at Aurangabad, Tihar and Yerawada Jail until now.

Scania invests in carbon fibre start-up

Swedish material tech start-up Corebon AB has developed a revolutionary method for producing carbon fibre components. Scania's corporate venture capital fund is investing in the patented innovation. The start-up has developed a ground-breaking method for producing components of carbon fibre reinforced plastics which is applicable to a wide range of products in industries such as automotive, telecommunication, aerospace and robotics. The patented process is based on induction heating and enables Corebon to produce carbon fibre components at significantly higher speed than through existing established methods. The quality of the produced carbon fibre component is also improved, and energy consumption in production is considerably lower.

Mazda, Saudi Aramco, AIST begin joint research project

Mazda Motor Corporation has announced that it will begin a joint research project with Saudi Aramco and Japan's National Institute of Advanced Industrial Science and Technology (AIST) aimed at making internal combustion engines more efficient and reducing carbon dioxide emissions. Saudi Aramco will develop a fuel with a refinery process that results in lower carbon dioxide emissions, and Mazda and AIST will research and develop a high-efficiency engine that uses the fuel. The initiative is expected to yield technologies that effectively reduce carbon dioxide emissions on a well-to-wheel basis.

Henrik Fisker joins forces with motec ventures in an advisory role

Henrik Fisker, has joined forces with Berlin-based motec ventures in an advisory role. The entity is a collaboration between German automotive and mobility consulting firm, e&Co. AG and Venionaire Capital, one of Austria's leading venture capital firms. In addition, Fisker Inc. will engage in co-investment opportunities that may be synergistic with the OEMs upcoming vehicle lineup, as well as the proprietary Fisker Solid-State Battery program.

With a robust combination of industry expertise and resources for investment, motec is a driving force in discovering and cultivating new, agile and innovative technology companies that will usher in a new wave of experiences inside and outside of a vehicle. From mass electrification across the globe, EV architecture to ride sharing applications and everything in between, the project is aimed at tapping into the hotbed of engineering and tech talent in Germany, Europe and abroad.

Fisker – famous for having designed some of the most stunning vehicles in history, from the BMW Z8, the Aston Martin DB9/V8 Vantage, the Fisker Karma to the new Fisker EMotion luxury electric sedan – will support managing directors Berthold Baurek-Karlic and Geza Brugger through regular discourse on technical and entrepreneurial issues. The group's focus will also center on increasing collaboration between small and medium-sized enterprises, global OEMs and promising new suppliers to help drive down manufacturing costs and to enable smarter scaling. SMEs are the strong backbone of Europe's manufacturing industries.

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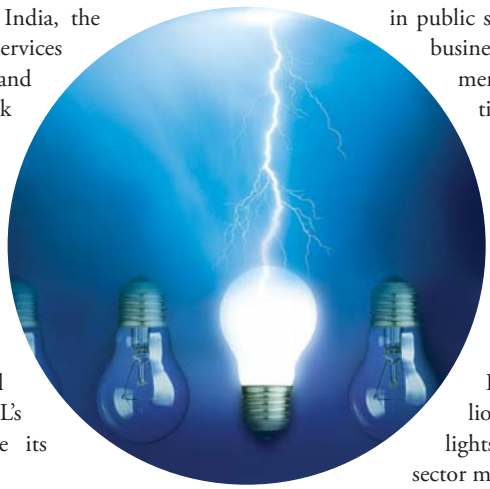
Energy Efficiency Program to be scaled up

Government of India, EESL and World Bank sign $300 million agreement.

The Government of India, the Energy Efficiency Services Limited (EESL), and the World Bank have signed a $220 million Loan Agreement and a $80 million Guarantee Agreement for the India Energy Efficiency Scale-Up Program. The Program, to be implemented by EESL, will help scale up the deployment of energy saving measures in residential and public sectors, strengthen EESL's institutional capacity, and enhance its access to commercial financing.



The investments under the Program are expected to avoid lifetime greenhouse gas emissions of 170 million tons of CO2, and contribute to avoiding an estimated 10 GW of additional generation capacity. This would be over 50 percent of the National Mission for Enhanced Energy Efficiency target of 19.6 GW indicated in India's Nationally Determined Contributions (NDCs) under the Paris Accord.

The investments under the Program are expected to avoid lifetime greenhouse gas emissions of 170 million tons of CO2, and contribute to avoiding an estimated 10 GW of additional generation capacity.

"The Program will help tackle the financing, awareness, technical and capacity barriers faced by new energy efficiency programs and support the UJALA program of the Government of India," said Sameer Kumar Khare, Joint Secretary, Department of Economic Affairs, Ministry of Finance. "This is one of the several steps being taken by the Government of India to meet its climate change commitments to reduce carbon intensity by 33-35 percent by 2030," he added.

The agreement for the Project was signed by Sameer Kumar Khare, Joint Secretary, Department of Economic Affairs, Ministry of Finance, on behalf of the Government of India; S Gopal, Chief General Manager (Finance) EESL, on behalf of EESL; and Hisham Abdo, Acting Country Director, World Bank India, on behalf of the World Bank.

The key components of the operation include: creating sustainable markets for LED lights and energy efficient ceiling fans; facilitating well-structured and scalable investments in public street lighting; developing sustainable business models for emerging market segments such as super-efficient air conditioning and agricultural water pumping systems; and strengthening the institutional capacity of EESL. Moreover, the Program will help to increase private sector participation in energy efficiency, including through private sector energy service companies. Under the Program, EESL will deploy 219 million LED bulbs and tube lights, 5.8 million ceiling fans, and 7.2 million street lights, which will be supplied by private sector manufacturers and suppliers.

As an integral part of the operation, the first-ever IBRD guarantee in India will help EESL access new markets for commercial financing in line with the Bank's approach of maximizing finance for development. The guarantee is expected to leverage some $200 million in additional financing, to help EESL with its growing portfolio and future investment needs.

"This energy efficiency Program for Results will help India meet its NDC commitments and move further towards a more resource-efficient growth path," said Hisham Abdo, Acting World Bank Country Director in India. "The additional guarantee from the World Bank will support EESL to access new sources of commercial funding, diversify its investor base, and establish a track record for future access to financial markets," he added.

"India's energy efficiency market, estimated to be over $12 billion per year, continues to face implementation barriers, particularly in the residential and public sectors, which have some of the largest untapped potential for energy efficiency improvements. Building upon its experience of UJALA and SLNP, EESL is now expanding its initiatives to other energy efficiency measures," said Ashok Sarkar, Senior Energy Specialist and World Bank's Task Team Leader for the Program. "The financing under the India Energy Efficiency Scale-Up Program will not only help EESL to continue achieving the results under its existing initiatives but also strengthen its institutional capacity and ability to meet its future expanding needs by leveraging private ESCO industry and increased access to a wider range of external commercial financing sources," he added.

Source: World Bank

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Continental inaugurates new R&D facility in Gurgaon

Continental has announced the inauguration of a new facility for its R&D center in Gurgaon. The new facility, located within its existing Gurgaon Plant premises, will cater to global and regional R&D requirements for its brake systems businesses.

The new facility is aligned to the company's strategy of increasing its R&D footprint in India. Currently the capabilities of the R&D center at Gurgaon include design and testing for brake systems, and offshore engineering activities for the Continental's Italy and Japan regions. The company also operates a full-fledged R&D center - Continental Technical Center India (TCI) - in Bangalore, catering to Continental's entire Automotive business, globally.

"As a technology company, it is Continental's priority to invest in the technologies of tomorrow. India is an important R&D hub for Continental, and we plan to increase our R&D footprint in the country. With focused R&D, innovations and ongoing improvement of our components and systems, both at this new center dedicated to brake systems and at TCI, India's contribution to Vision Zero – a future with zero accidents – will be significant," says Prashanth Doreswamy, Head of Continental India and Managing Director, Continental Automotive India.

GM breaks ground of a new facility

General Motors Customer Care and Aftersales (CCA) broke ground on an all-new $65 million ACDelco and Genuine GM Parts processing center on a vacant 141-acre lot near the intersection of Genesee and Davison roads in the City of Burton. It is the company's largest single investment in a warehousing and logistics facility in the United States in nearly 40 years. Key collaborators in the project, including Burton Mayor Paula Zelenko, Scott Henry representing UAW Local 651, and Chad Meyer the president of NorthPoint Development, joined Tim Turvey, GM Global Vice President, Customer Care and Aftersales, for the ceremonial event.

"GM is executing a focused and disciplined strategy to improve our core business and position the company for the future, guided by our vision of a world with zero crashes, zero emissions and zero congestion," Turvey said. "Our new facility in Burton will help us deliver that future. And projects like this only become a reality when you have great teamwork and true collaboration, like we have with the City of Burton, the UAW & NorthPoint Development."

When the facility opens in early 2019, it will be the company's main induction point in the US for ACDelco and Genuine GM service parts that need to be unitized and packaged for sale.

Lear opens new seat manufacturing facility in US

Lear Corporation recently celebrated the grand opening of a new manufacturing seating facility in Flint, Michigan (US). The world-class 156,000-sq. ft. facility will employ approximately 600 team members by the end of 2019, with over 400 being new hires to Lear. This facility will build seats for just-in-time delivery to the nearby General Motors Flint Assembly plant, as well as the General Motors Fort Wayne plant in Indiana.

The vision for the new facility was focused on building a high-performance work team structured organization and fostering employee engagement. Plant associates will be managing many aspects of their teams, from hiring to providing quality assurance to supporting their peers.

Erasing the traditional view that plants are unattractive places to work was an area of central focus in designing the facility. From modern, employee-friendly amenities utilizing Michigan products and vendors to open meeting spaces for active employee collaboration in dynamic groups, each aspect of the facility was carefully constructed.

Waste and recycling efforts will ensure this facility is a zero waste to landfill. Additional elements that will further contribute to the plant's environmentally friendly footprint include energy-efficient lighting and an area dedicated for green space—30-percent of the 33-plus acre site.

Lear's Flint seating plant is the first major automotive supplier manufacturing facility constructed in Flint in more than 30 years.

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Wabco opens Global Technology and Innovation Center in Germany

WABCO Holdings Inc. has officially opened its new state-of-the-art Global Technology and Innovation Center in Hanover, Germany. Significantly expanding WABCO's global product development and engineering capabilities, the nearly $30 million facility will play an important role in ensuring WABCO's technology leadership is sustained through future generations of innovation. This includes developing pioneering technologies to support the industry's migration towards increasingly autonomous, connected and electric commercial vehicles.

The 11,500 square meter (124,000 square feet) facility, inaugurated recently, includes contemporary workspace for over 420 employees based in Hanover, as well as visiting engineering project teams from across the world. As WABCO's largest Research and Development hub, the new Global Technology and Innovation Center will fulfil a central role within WABCO's integrated network of product development and engineering centers that now spans four continents. Specifically, it will provide center of excellence and domain expertise for WABCO's global engineering team as it collaborates to design and develop WABCO's advanced safety and efficiency systems for trucks, buses and trailers.

"WABCO engineering team's unique ability to anticipate industry dynamics and innovate ahead of others is a key pillar of our differentiation," said Jacques Esculier, WABCO Chairman and Chief Executive Officer, speaking to an audience of WABCO employees, guest customers, and representatives from city authorities and central governments at the opening ceremony.

BMW Group builds new Driving Simulation Centre in Munich

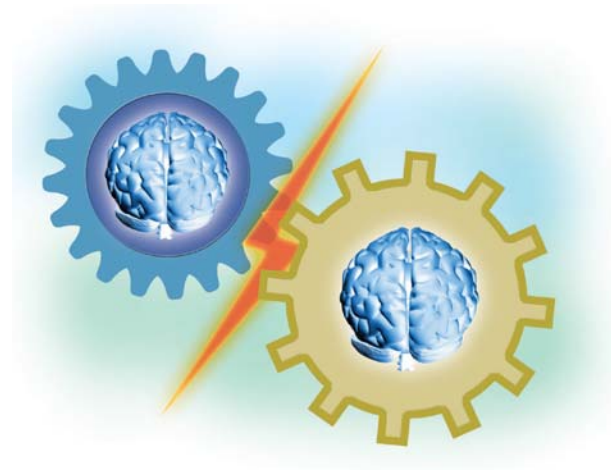
The BMW Group's new Driving Simulation Centre is taking shape in Munich's Milbertshofen district. Recently, the company began construction of the world's most advanced facility for the simulation of real-world driving situations at the FIZ Research and Innovation Centre in the north of the city. The new building provides unique possibilities for virtual testing of advanced driving assistance systems and innovative display and control concepts. This will, above all, strengthen the development expertise of the BMW Group in the field of autonomous driving. A unique feature of the facility is the high-fidelity simulator, in which longitudinal, transverse and rotational movements of a vehicle can be represented simultaneously and therefore very realistically. This allows the BMW engineers to "bring the road into the lab," in order to conduct studies just as if they were taking place in real-world road traffic. For the first time, urban driving situations – which represent a particular challenge in the context of autonomous driving – can now also be reproduced realistically, allowing vehicle responses to be constantly enhanced.

The new Driving Simulation Centre is ideally placed to meet the ever greater requirements arising from the growing complexity of systems for automated driving. In future, it will allow different driving situations to be reproduced in significantly greater numbers and in more detailed form. Individual aspects of a particular scenario can be varied and combined freely. This means, for example, that the configuration of a new driving assistance system can be tested under different conditions at an early stage in order to find the ideal balance between a dynamic and comfort-oriented profile before the first road test has taken place. New display and control systems can also be tested in a wide variety of situations in order to analyse the risk of the driver being distracted or the effect of visible, audible or haptic signals.

For pillars **to succeed** in the IoT era

Learn more about the strategy that manufacturing segment can adapt for digital transformation

By Sudip Singh



We live in the age of ideas – and thanks to the advancement of technology, these ideas come to life faster than ever before. For business entities ranging from legacy corporations to start-ups, these ideas present several opportunities. As prevailing business models face obsolescence and new ones replace them at breakneck speed, industries that have had higher touch points with the end consumer such as hospitality, transportation and retail are taking the Internet of Things (IoT) in their stride. But for industries with more of a Business-to-Business (B2B) legacy such as manufacturing, adoption and innovation rates need to be higher than ever to survive.

Given the lifecycle of classical heavy industry products, the manufacturing industry has had to embrace a range of legacy technologies leading to a complex web of brownfield technologies in the ecosystem. IoT in manufacturing, or Industrial IoT (IIoT), is an opportunity for this segment to embrace these different generation technologies keeping business value at the center. And since the manufacturing sector effectively forms the backbone for plenty of other industries, any enhancements in the supply chain, productivity and efficiency space does have a cascading effect on the economy. A study by the McKinsey Global Institute has identified IIoT as one of the most important technologies to create economic transformation. The study estimates that the economic impact of IoT can reach up to $11 trillion by 2025 and that it also has the potential to influence productivity and operating costs across multiple industries – with manufacturing being a prominent one.

The twin benefits of technology – enhanced capability and better affordability – are thus coaxing manufacturing enterprises to navigate their next steps by deploying IoT in legacy processes. Some are adopting simple plug-and-play solutions whereas some are building customized platforms that can change the entire lifecycle of their operations from product conception to growth.

IoT in manufacturing, or Industrial IoT (IIoT), is an opportunity for this segment to embrace these different generation technologies keeping business value at the center.

These investments are not just aimed at providing omnichannel experiences to customers and generating data from customer interactions. In fact, for manufacturing enterprises to gain complete benefits of IoT, they need to process continuous real-time data through digital sensors, innovate products and services accordingly, and accelerate legacy processes to cover modern customer preferences. While looking at these processes in the context of effective digital transformation strategies for the manufacturing sector, this can manifest itself in the 4 following ways:

Agile Digital at Scale

Succeeding in the IoT era requires manufacturing companies to reimagine their DNA and purpose at a time when customer expectations are becoming highly personalized. In some cases, this can mean altering technologies, processes and business models to be responsive to market changes and customer demands. Amalgamating diverse technologies such as machine learning, Big Data, automation and sensor data can also make it possible to scale up at speed. As a result, more and more manufacturing enterprises are adopting agile digital solutions.

Energizing the Core

The manufacturing industry is now becoming increasingly open to introducing AI and robotics at the heart of its setup. This is aiding industry players to make legacy systems smarter and more productive. With the help of IoT, manufacturers are thus able to extract greater value from the supply chain, eliminate the possibility of defects in products and minimize

the usage of energy and resources during product lifecycles. Centralized command centers also make predictive and proactive maintenance easier than ever, and along with benefits such as real-time monitoring, asset optimization and remote diagnosis, offers benefits that prepare the industry for the next wave of industrialization.

Reskilling Employees

Changing times require evolving skills; unfortunately, not all manufacturers are prepared for that. New skills in the fields of AI, robotics and automation are more relevant than ever for blue-collar and white-collar workers alike – so the time to upskill and reskill employees is now. In fact, a significant portion of the manufacturing workforce will need to actively change competencies in the near future. Automation is changing the very nature of work, and this McKinsey Global Institute report states that in this state of workforce transition, as many as 375 million workers (roughly 14 percent of the global workforce) will need to modify their occupational categories to include digitization, automation and AI.

Localization

The manufacturing industry functions on degrees of localization that are difficult to replicate from one region to another. Therefore, developing generic IoT solutions that can work across global plants is a counterproductive task. This generates a need for manufacturers to better understand customer needs on a local level so that they can deploy unique technology solutions faster and better. For suppliers involved in the manufacturing and distribution of modern sensors and digital devices, this is a key consideration. As a result, localized training is very critical and requires special attention and resources.

Some are adopting simple plug-and-play solutions whereas some are building customized platforms that can change the entire lifecycle of their operations from product conception to growth.

The ultimate purpose of true transformation is to embrace the past and build on it to prepare for the future. Applying IoT to the manufacturing sector is akin to that – but on a much larger scale as the world's industries depend on the sector for their sustenance. A joint report by IDC and SAP states that 60 percent of all enterprises will be using an organization-wide digital transformation strategy based on connected devices to optimize processes by 2020. This heralds a brave new age wherein improved visibility can reduce the complexity of the manufacturing industry, thus leveling the playing field for one and all.

The author is the Global Head– Engineering Services & IoT, Infosys.

AUTOMOTIVE

Lightweight, recyclable thermoplastic liftgates

New liftgates provide up to 25 percent weight savings

The continuing growth of sport utility and crossover vehicles – which made up roughly one-third of global sales in 2017 – combined with changing global emissions standards has many automakers adopting lightweight, thermoplastic liftgate modules. Magna offers automakers unique expertise in delivering these recyclable modules, which provide up to 25 percent weight savings compared to steel versions and allow for broader design flexibility.

"Magna's thermoplastic liftgate modules answer the growing demand for products that help automakers cut vehicle weight, improve fuel efficiency, reduce CO2 emissions, extend electric vehicle battery range, and improve aerodynamics," said Magna Exteriors President Grahame Burrow. "They also enable greater design freedom, which means our customers are better able to shape their brand image and perform more frequent and cost-effective mid-cycle refreshes."

Magna began producing thermoplastic liftgates in 1999 for a premium European automaker, followed by several more European launches. The first North American thermoplastic liftgate was on the 2014 Nissan Rogue, and two more launched this year on the 2019 Jeep Cherokee and 2019 Acura RDX. Magna will launch two more later this year in China. In total, more than 3 million thermoplastic liftgate modules have rolled off Magna production lines around the world.

In addition to mass savings and design freedom, key benefits of Magna's full-system assembly and delivery approach include reduced complexity of the total liftgate module, lower tooling investment and increased throughput at the assembly plant.

IHS Markit estimates the global SUV/compact SUV market will grow from 34 million units in 2018 to almost 43 million units by 2025. Magna sees a considerable growth opportunity to provide thermoplastic liftgates for this growing segment.

Source: Magna

Additive manufacturing in veterinary surgery

In a recent procedure, Renishaw helped to produce an implant designed by Voxelmed in Germany that was fitted in Canada, to replace the hard tissue lost due to tumour removal.

More than 50 per cent of dogs over ten years of age are likely to develop a tumour. Often, tumours can be shrunk with chemotherapy and removed with surgery without excessive long-lasting trauma. However, in some cases the placement of the tumour is too difficult to operate on without severely impacting the quality of life for the dog.

In the human world there has been a significant shift towards surgeons using customised implants to help improve the results of surgery and reduce patient recovery times.

In the past, hospitals would only use patient specific implants (PSIs) for complex cases, but now — thanks to advances in technology — they are becoming part of standard practice.

One of the most effective ways of producing a custom PSI is by using additive manufacturing (AM) with medical-specific CAD tools for the custom design.

Challenge

A seven-year-old Bernese Mountain Dog with a tumour on the left side of his maxilla (upper jaw) had few options other than total excision of the growth followed by reconstruction. A customised 3D printed titanium implant supporting the dog's bone structure was the most appropriate treatment due to the complexity of the region, requiring significant design and manufacturing freedom.

PSIs have predominantly been used in human cases to date, but global engineering and healthcare technologies company, Renishaw, and 3D design experts, Voxelmed, hope that this case will highlight the benefits of additive manufacturing in veterinary surgery.

Solution

The procedure, which was carried out by Julius Liptak, veterinary surgeon at Alta Vista Animal Hospital in Ottawa, Canada, used an additively manufactured titanium maxillofacial implant designed by Voxelmed, based in Germany. Using Digital Imaging and Communications in Medicine (DICOM), a standard that enables the integration of medical imaging devices, a digital 3D model of the dog's affected area was generated. The model was used to design a custom implant with input from Dr. Liptak.

> Without additive manufacturing technology, it would have been impossible to reconstruct the dog's maxilla after tumour removal, because the area was extremely complex in geometry.
>
> Alta Vista Animal Hospital, Ottawa, Canada

During the design of the implant, Dr. Liptak reviewed the design repeatedly to compare it to 3D scans and models of the dog's skull. This made the process of manufacturing and placement much more straightforward, as it met the surgeon's specifications for how the implant would fit.

The implant was manufactured at the Additive Design in Surgical Solutions (ADEISS) centre in London, Ontario, Canada.

ADEISS is the result of a partnership between Western University, the London Medical Network and Renishaw. The centre will focus on the research, development and commercialisation of additively manufactured medical devices and surgical instruments. It will also aid in the development of additively manufactured medical technology to address healthcare issues across the globe.

"During surgery, the affected areas, along with clean tumour margins, were removed," explained Jan Klasen, veterinary surgeon, 3D designer and CEO of Voxelmed. "Because

the tumour occurred in the skin, rather than the maxillary bone, resection involved a revision maxillectomy with excision of the 45 mm x 50 mm mass, with 30 mm lateral margins. The implant was then put into place and fixed with surgical screws. A facial axial pattern skin flap was prepared and used to cover the affected area and the implant. This left the dog with a particularly impressive physical outcome as the nose structure did not have to be altered to account for the missing tissue."

The design and manufacture of the implant took just two weeks to complete. In this particular case, the dog was suffering with ongoing tumour growth. So, if the implant had taken too long to be produced it would have no longer been fit for purpose as the affected area would have grown.

The design and manufacture of the implant took just two weeks to complete. In this particular case, the dog was suffering with ongoing tumour growth.

Results

"Without additive manufacturing technology, it would have been almost impossible to reconstruct the dog's maxilla after tumour removal, because the area was extremely complex in geometry," Klasen commented. "The implant had to have a similar shape and functionality as the dog's existing bone structure. Using additive manufacturing to maintain the original shape and function of the oral and nasal cavity ensures a high quality of life for the dog, just as a naturally shaped skull

and maxilla helps the dog to breathe and eat easily.

"To my knowledge, this is the first implant of its kind. Prior to this case, the majority of veterinary surgeons were unaware that the technology was even available. Similar reconstructions are now being planned in Germany and there is ongoing research into how animals can benefit from this procedure."

The seven-year-old Bernese Mountain Dog was able to leave the hospital just one day after surgery. While he spent a little time taking pain medication and antibiotics he was able to breathe normally through his nose and has since made a full recovery. Without the advancements in additive manufacturing, this dog would not have such a long and happy future ahead of him.

Source: Renishaw

UPDATE

Employment-intensive manufacturing expanded by 13.5 per cent

The best part about an impressive GDP growth of 8.2 per cent for the first quarter of the current fiscal is that it is being led by employment-intensive manufacturing which expanded by 13.5 per cent. Same is true about the construction which again is job-generating sector and grew by 8.7 per cent, said ASSOCHAM President Sandeep Jajodia.

It said 5.3 per cent growth in agriculture and allied sectors is equally impressive and would lead to further pick up in the rural demand, as the impact of good Monsoon would be reflected in the second and third quarters of the fiscal 2017-18.

There has been an uptick in the Gross Fixed Capital Formation, which means the investment revival is very much visible. Against 31.0 per cent in the first quarter of the previous fiscal, the GFCF at constant prices is 31.6 per cent.

The first quarter GDP numbers augur very well for the entire fiscal 2017-18. While it is early days, the Indian economy seems back to a solid trajectory for further gains in the next few quarters, the chamber said.

Source: ASSOCHAM

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ASSOCHAM President **Sandeep Jajodia**

Practical approach to **control waste** in **manufacturing**

A critical reality in the manufacturing process is presence of uncontrolled waste

By Patrick De Vos

Manufacturing consists of a series of transformation processes. A shop forms raw material into finished or semi-finished workpieces through a series of individual transformation operations like forging, welding or machining. A number of individual elements comprise each operation. The basic elements of machining, for example, include the cutting tool, machine tool, fixtures and coolant supply. Together these elements form a machining system that gets support from related equipment and components in a production system.

Planning, programming and economic management functions surround the production system to form a production environment. The key element of a production environment is people. Although manufacturing today widely utilises computers, robots and other advanced technology, people make the decisions that control the environment overall.

The machining process is based on technical application details regarding tool selection, cutting conditions, programming and workpiece material and fixturing. Other key details include production volume requirements and the specified quality of finished workpieces.

Linking technical application details with economic concerns is called production economics. The goal of the science of production economics is to balance all the factors involved. While technical elements produce desired results in terms of workpiece quality, quantity and timeliness, the operations must be carried out at a cost that enables a business to thrive.

Achieving the balance of output and cost in machining progresses through three phases. The first phase is establishing a reliable machining process. It is essential to minimise unexpected occurrences like broken tools, uncontrolled chips and resulting destroyed workpieces. A workshop establishes operational reliability by choosing tools with load capacity that meets or exceeds the mechanical, thermal, chemical and tribological loads generated in the machining process.

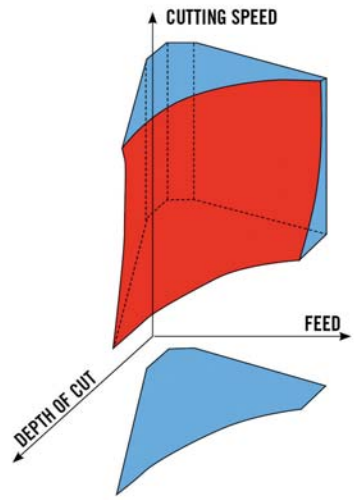


Figure 1: 3D illustration that shows the collection of all cutting condition combinations that can be used within the constraints coming from the cutting environment.

Phase two is choosing cutting conditions that reflect the constraints put on the machining process by real-world circumstances. The theoretical capabilities of a cutting tool are broad. But specific workshop realities constrain the range of effective application parameters. E.g., the capabilities and performance of a tool vary according to the amount of power possessed by the machine tool that is applying it; the machining characteristics of the workpiece material; or the configuration of a part that may be prone to vibration or distortion. Although there is a vast selection of cutting conditions that will work in theory, unfortunately constraints posed by reality will narrow the range of trouble-free choices.

Figure 1 illustrates a large selection or volume of cutting speeds, depths of cut and feeds that has been carved into a smaller selection and reduced volume in recognition of various realities of a specific cutting application.

Applying cutting conditions outside the application constraints of the specific situation will have negative economic consequences, including higher costs and lower productivity. Perhaps 90 percent of the problems experienced during machining result from a lack of respect for the constraints that workshop realities place on the cutting process.

When cutting conditions do not exceed the constraints imposed by workshop realities, the operation is safe from a technical perspective. However, not every technically safe combination of cutting conditions will produce the same economic result. Changing cutting conditions changes the cost of the machining process. Moving to more aggressive but still technically safe cutting conditions will increase the output of finished workpieces, but after a certain point however, productivity will decline because the aggressive cutting parameters also will result in shorter tool life. The output of parts over time then will decline as well, because more time will be spent changing worn tools.

Somewhere there is a combination of cutting conditions that result in a balance of productive output and manufacturing cost. Figure 2 shows the

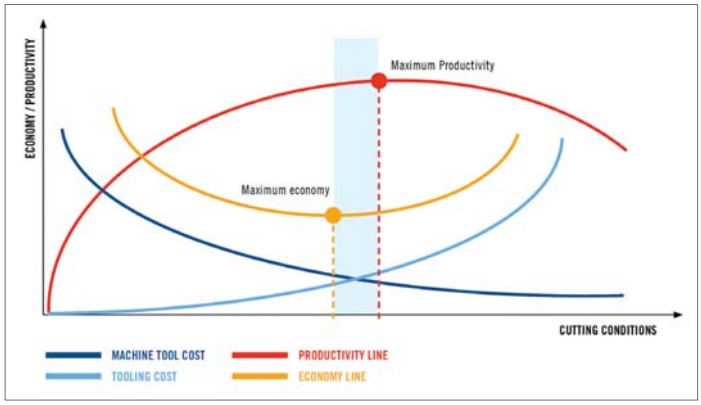


Figure 2 – Relationship between cutting conditions, productivy and machining costs. This figure shows a simplified model, not taking into account waste factors.

relationship between cutting conditions, productivity and tool and machine costs. (The graph concentrates only on elements that vary as cutting conditions aggressive conditions are at the right of the axes and higher productivity at the top. The pale blue band at the middle of the graph indicates where cutting conditions produce a balanced blend of productivity (highest output) and economy (lowest cost).

Accordingly, the third phase involves determining the optimal combination of cutting conditions for a given situation.

The effect of waste on production economics

Unfortunately, the elegant scientific methods of balanced production economics operate at the mercy of waste in the manufacturing system. Waste destroys the balance and occurs in many ways. E.g., it is a waste of energy and power when a 60kW machine tool is used in an ongoing application that requires only 15kW. In another situation, when finished workpieces do not meet required levels of quality, the time, money and resources invested in the process are wasted in pursuit of an unacceptable result.

A less obvious and less understood occasion of waste is the underuse or misuse of intellectual resources. Certain personnel in a company may possess knowledge or skills that will help the company achieve its goals, but for reasons ranging from poor communication to intra-company politics, the knowledge and skills are not shared and therefore go to waste.

Waste reduction tools

After waste is identified and categorized, a shop should create a plan to reduce or eliminate it. There exists a wide range of tools that enable a manufacturer to pinpoint, quantify, and minimise wasteful practices. E.g., analysis of tool usage, manipulation and deterioration will point out trouble areas. Such analyses have shown that at some times 20–30 percent of the tools that personnel defined as worn out were still viable – hence tool life was wasted. Establishing clear tool wear criteria and communicating the standards to shop personnel will significantly reduce wasted tool life. Similarly, machine downtime analyses quantify the time spent in activities such as setup, programming and tool changing. These analyses often indicate that as much as 50–60 percent of machine downtime is avoidable through a better understanding, execution and coordination of these necessary but time-consuming activities.

The use of interviews, surveys and training programs can uncover a lot of useful information when dealing with personnel issues that lead to waste of intellectual resources as well as unrealized knowledge and skills. As a result, employees perform their jobs better and build capabilities that maximise personnel productivity.

Management of value-adding, value-enabling, and unneeded activities

In machining operations, the only true value-adding activity occurs when the tool is actually cutting metal and making chips. Other actions like part loading and fixturing, termed value-enabling activities, do not directly add value to the manufactured product but are required to allow the value-adding activity to occur.

A third group of activities in the machining system are those that are unneeded. These activities neither create value nor enable creation of value, but rather consume resources with no benefit. They are purely occasions of waste. Problem solving is an example of unneeded activity. If a process is properly designed and controlled in the first place, there will be no problems and no time wasted solving them.

Conclusion

For much of the past, unneeded activities were accepted as part of the manufacturing process and not recognized as significant disruptors of the achievement of balanced production economics. Presently, attention is turning to the elimination or minimisation of unneeded activity. The focus of productivity or capacity planning is on eliminating unneeded activities, minimizing value enabling activities and optimising value adding activities.

When waste is eliminated, theoretical production economics become practical production economics. At that point, progress in production economics can be applied directly to company success. However, in the effort to eliminate every occasion of waste, caution is necessary. It is important to quantify the return on investment of waste reduction activities. Totally eliminating a certain incidence of waste might involve an investment that is so large that from an economic perspective it may be better to accept the waste, or a portion of it, and live with it. Such decisions are made following appropriate quantitative analysis as well as intra-company discussions regarding how the decisions will affect company goals and philosophies.

The author is Global Business Manager at Seco Consultancy Services

E-mobility to be preferred mode of **road transport** by next decade: Amitabh Kant

"The stage is set to address the dire need for creating sustainable mobility solutions with e-mobility emerging as the preferred mode of mobility for the future. India's vehicular transportation scenario will undergo a sea change by the next decade as the country will emerge as the biggest passenger car market by 2030, where every second car sold will be in India," said Amitabh Kant, CEO, NITI Aayog, while speaking on 'Promoting Sustainable Mobility Solutions'. The event was co-hosted by the Federation of Indian Chambers of Commerce and Industry (FICCI) and NITI Aayog.

Kant said that at present 76% of all vehicles sold were 2-wheelers which consumed 64% of fuel and accounted for 30% of pollution, while 3-wheelers caused 5% of pollution. In addition, 70% of goods transportation was on lorries, which too were a major contributor to vehicular pollution.

He said that the challenge for the country was to battery-charge all modes of road transport vehicles, and therefore, it was imperative to substitute fossil fuels with cleaner alternative fuels for both inter-city and intra-city movement of vehicles.

Businesses, he said, need to be aware of and seize the opportunities that are set to emerge from the e-mobility and sharing of vehicles space and rise to the challenge of R&D for developing technologies for harnessing renewables and efficient battery storage.

Strengthening partnership with the United States

Minister of External Affairs Sushma Swaraj and Minister of Defence Nirmala Sitharaman recently welcomed Secretary of State Michael R. Pompeo and Secretary of Defense James N. Mattis, in New Delhi for the inaugural India-U.S. Ministerial 2+2 Dialogue. This platform is a reflection of the shared commitment by Prime Minister Narendra Modi and President Donald Trump to provide a positive, forward-looking vision for the India-U.S. strategic partnership and to promote synergy in their diplomatic and security efforts. They resolved to continue meetings in this format on an annual basis.

Recognizing their two countries are strategic partners, major and independent stakeholders in world affairs, the Ministers committed to work together on regional and global issues, including in bilateral, trilateral and quadrilateral formats. The two sides further decided to establish secure communication between the Minister of External Affairs of India and the U.S. Secretary of State and between the Minister of Defence of India and the U.S. Secretary of Defense, to help maintain regular high-level communication on emerging developments.

The Ministers reaffirmed the strategic importance of India's designation as a Major Defense Partner (MDP) of the U.S. and committed to expand the scope of India's MDP status and take mutually agreed upon steps to strengthen defense ties further and promote better defense and security coordination and cooperation. They noted the rapid growth in bilateral defense trade and the qualitative improvement in levels of technology and equipment offered by the U.S. to India in recent years. They welcomed the inclusion of India by the U.S. among the top tier of countries entitled to license-free exports, re-exports and transfers under License Exception Strategic Trade Authorization (STA-1) and also committed to explore other means to support further expansion in two-way trade in defense items and defense manufacturing supply chain linkages. They welcomed the signing of a Communications Compatibility and Security Agreement (COMCASA) that will facilitate access to advanced defense systems and enable India to optimally utilize its existing U.S.-origin platforms. The Ministers also announced their readiness to begin negotiations on an Industrial Security Annex (ISA) that would support closer defense industry cooperation and collaboration.

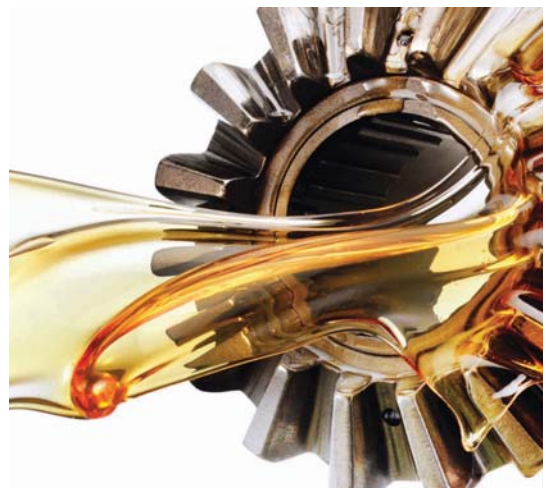
Recognizing their rapidly growing military-to-military ties, the two sides committed to the creation of a new, tri-services exercise and to further increase personnel exchanges between the two militaries and defense organizations.

Acknowledging the unique role of technology in the India-U.S. defense partnership, the Ministers reaffirmed their commitment to continue to encourage and prioritize co-production and co-development projects through the Defense Technology and Trade Initiative (DTTI) and to pursue other avenues of defense innovation cooperation. In this regard, they welcomed the conclusion of a Memorandum of Intent between the U.S. Defense Innovation Unit (DIU) and the Indian Defence Innovation Organization – Innovation for Defence Excellence (DIO-iDEX).

Breakthrough lubricants that deliver excellent performance

The Mobil SHC™ line of synthetic lubricants boost productivity and profitability, while enhancing safety and environmental care.

India is witnessing a new industrial age. With the renewed thrust on 'making in India' and strong impetus from the government, fresh investments are pouring into the core industrial sectors and India is witnessing a new wave of global benchmarking in all forms of economic activities. The positive developments in the industrial sector are a harbinger of new opportunities for the lubricants market.



New opportunities

The growing industrial lubricants market in India is encouraging for multinational companies to consolidate their position in the country. The increasing demand for high quality, high performance lubricants is encouraging global majors like Mobil™ to focus in the Indian market, bringing cutting-edge, technologically superior specialty lubricants for the Indian customers. As newer manufacturing technologies gain momentum, the lubricant industry is gearing up to meet the need for customised specialty products, giving Indian customers best-in-class products developed through global expertise of decades. India is a key market on the global manufacturing map and given its relatively low per capita consumption of lubricant, there is immense potential for growth in line with global trends for years to come. Manufacturers in India are waking to the benefits of technologically superior world-class lubricants that yield huge dividends in terms of improved productivity, significant cost savings and enhanced profitability. Companies like ExxonMobil™ are bringing their decades of legacy and next generation technologies in delivering lubrication solutions to help customers optimize their maintenance programs, improve equipment performance, ensure safety and enhance sustainability of their operations.

The Mobil advantage

As an industry leader in lubricants, ExxonMobil has specialised lubrication products across industries, sectors and applications. From general manufacturing, metal working, food and beverage processing to pulp and paper, cement, construction, plastics, metals and mining, Mobil is enabling industrial companies to achieve excellence in their manufacturing operations.

Even as OEMs and manufacturers are switching to the superior synthetic oils vis-à-vis the conventional oils for their advanced lubrication needs, Mobil has brought its Mobil SHC™ line of latest lubricants that far exceed the capabilities of conventional oils. Under severe operating conditions, such as high temperatures, loads and pressures, frequent starts and stops, wide operating temperature ranges, and even contamination, Mobil SHC lubricants become even more critical to ensure reliable operations – be it gears, compressors, bearings or air compressors. For instance, the upper operating limit for Mobil SHC lubricants is a full 50°C higher than the maximum operating temperatures for high-quality conventional oils. These synthetic lubricants offer long oil life and extend equipment life, creating less waste and potential energy savings while helping increase worker safety by minimizing potentially hazardous maintenance.

The SHC portfolio

The Mobil SHC line of products are recognized and appreciated around the world for innovation and outstanding performance. These synthetic products, pioneered by Mobil's research scientists, symbolize the continuing commitment to using advanced technology to provide lubricants with excellent balanced performance.

The state of the art Mobil SHC range includes:

Mobil SHC™ 600 Series lubricants are exceptional performance gear and bearing oils designed for problem-free operation and increased productivity. These scientifically engineered oils are formulated using the latest proprietary and patent pending Mobil SHC technology. The Mobil SHC 600 products feature improved air release performance in the lower viscosity grades. These products are resistant to mechanical shear, even in heavily loaded gear and high shear bearing applications, so that there is virtually no loss of viscosity.

Mobil SHC™ Gear Series is a line of performance synthetic industrial gear oils designed to provide outstanding protection of gears and bearings, extended oil life even under extreme conditions, helping to enable problem-free operation of equipment and increased customer productivity. These

scientifically engineered synthetic lubricants are formulated from base fluids that have exceptional oxidation and thermal properties and excellent low-temperature fluidity. The high viscosity index of these oils deliver less change in viscosity with changes in temperature, enabling wider operating temperature range and improved low temperature startup. Mobil SHC Gear Series lubricants contain an advanced proprietary additive system designed to provide protection against conventional wear modes such as scuffing, micro-pitting fatigue, rust and corrosion. The reduced fluid friction produces lower operating temperatures and helps improve gear efficiency.

Synthetic lubricants offer long oil life and extend equipment life, creating less waste and potential energy savings.

Mobilgear™ SHC XMP Series synthetic gear oils, with Mobil's polyalphaolefin (PAO) technology, are designed to provide optimum equipment protection and oil life under extreme conditions. The SHC XMP series is selected for its exceptional oxidation resistance and thermal properties, naturally high viscosity index, excellent low temperature fluidity and absence of undesirable compounds that are often found in mineral oils. The high viscosity index and low traction coefficient of this oil combine to help provide significant reduction in power consumption in many gear drives. In addition, compared to conventional gear oil chemistries, they offer the potential for improved lubrication of gearbox rolling element bearings. Mobilgear SHC XMP Series products offer outstanding rust and corrosion protection in applications where salt water and acidic water protection are required.

Mobilith SHC™ Series greases are superior performance products designed for a wide variety of applications at extremes of temperature. They combine the unique features of synthetic base fluids with those of a high quality lithium complex thickener. The wax-free nature of synthetic fluids and the low coefficient of traction provide excellent low temperature pumpability and very low starting and running torque. These products offer the potential for energy savings and can reduce operating temperatures in the load zone of spherical roller and ball bearings. The lithium complex thickener contributes excellent adhesion, structural stability and resistance to water. Mobilith SHC Series greases are available in seven grades - from ISO VG 100 to 1500 and in NLGI grade from 2 to 00. The benefits of this series include longer grease life, enhanced bearing protection and bearing life and improved efficiencies.

Mobil SHC™ 500 Series oils are exceptional performance hydraulic oils formulated from synthesised, wax-free hydrocarbon-base fluids combined with a carefully engineered super-stabilised additive system. They are exceptionally high quality, wide-temperature, shear-stable hydraulic oils with controlled low-temperature pumpability properties and maximised anti-wear protection for high-pressure vane, piston and gear pumps. The Mobil SHC 500 Series oils exhibit outstanding shear stability allowing their use in high-pressure, high-temperature operating environments for extended periods of time without the loss of critical lubrication characteristics, reducing maintenance as well as product disposal costs.

Mobil SHC™ Rarus Series synthetic air compressor oils are formulated to deliver up to three times longer oil drain intervals than other synthetic air compressor lubricants. In fact, Mobil SHC Rarus oils have even demonstrated the ability to perform for up to 24,000 hours in field tests, protecting vane and rotary screw air compressors. They are designed for severe service – such as high final compression temperatures or extended oil drain intervals – where other synthetic oils do not meet service life expectations. These oils can help minimize need for maintenance and downtime, enhancing safety through exceptional durability, while supporting sustainability efforts with extended oil drain intervals.

Mobil SHC™ Polyrex Series greases deliver high-performance lubrication through advanced poly-urea thickener technology. The Mobil SHC Polyrex Series greases are designed to offer high-temperature performance, excellent water resistance and balanced wear protection for a wide variety of industrial and food processing applications. These greases are NSF H1 registered for incidental food contact, assisting in HACCP facility programs, and making them particularly valuable for use in the food and beverage industry. They have demonstrated outstanding performance with excellent load-carrying capabilities in steam-saturated conditions and dusty environments, providing protection from rust and corrosion with uncompromised grease life. This lubricant has resistance to water washout and oil bleeding at high temperatures.

Mobil SHC™ Grease is recognized around the world for its innovation and outstanding performance. Developed after working closely with equipment builders, the Mobil SHC Grease delivers exceptional results. Compared to conventional greases, the benefits of this synthetic grease include longer grease life, enhanced false brinelling protection and bearing life, wide temperature range of application and improved mechanical efficiency.

Source: ExxonMobil

New iglidur material for smart plain bearing designs

If the user is looking for a safe lubrication-free bearing, then igus offers a wide range of solutions: In addition to the extensive catalogue product range for cylindrical standard plain bearings, these also include the so-called clip and flanged bearings. These are used because of their ease of installation and design, especially in sheet metal feedthroughs. In order to withstand high edge loads even under extreme conditions, igus has now developed a new material. The wear-resistant material iglidur K230 is highly elastic, chemical resistant and withstands moisture influences.

Sheet metal structures usually do not offer an option to press a plain bearing in a mounting hole or in a housing and fix it. Instead, a bearing must line the punched hole, which is usually quite rough and thus guide the shaft safely. Fast assembly, manual and automated, as well as self-retention are further requirements. For such cases, igus has the "clip bearing" in its range. The name derives from the simple assembly, in which the slotted plain bearing is guided through the hole using the smaller of the two flanges and then "clipped". In addition to the standard range of clip bearings, there are numerous customized solutions. There are also bearings in which the second flange is formed by flanging after inserting into the hole. These solutions have proven themselves millions of times over the years. For example, reducing friction and noise in car seats. All designs have the common requirement of high flexibility and toughness. For quick installation and to withstand the high edge loads in the sheet metal feed throughs. The new igus material iglidur K230 has exactly these properties.

High elastic material for easy installation

The lubrication-free material iglidur K230 is highly elastic and flexible, making it ideal for flange and clip bearings. Extensive tests in the in-house igus laboratory also show that the high-performance plastic newly developed by igus fits seamlessly into the best iglidur standard materials in terms of wear resistance. It absorbs moisture only in extremely small quantities and has a very good universal media resistance. It can even be used for applications with humid environment. The new material can also demonstrate its advantages in applications with high temperatures of up to 130 degrees Celsius. Initially, igus offers the material iglidur K230 especially for clip and flanged bearings in customized designs. On request, the flexible material is also available as plain bearings in standard sizes.

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Low-maintenance power lathe chuck with permanent lubrication and through-hole

Constant clamping forces, minimal maintenance costs as well as high energy efficiency, and productivity are assured with the versatile SCHUNK ROTA NCA power lathe chuck. With its large dimensioned through-hole for automated bar loading and its convenient clamping range, the weight-reduced lathe chuck covers an extremely wide range of applications. The special geometry of the chuck body makes it easy to access tools, meaning that the ROTA NCA is especially suitable for use on modern turn/mill centers. In addition, the weight-reduced design ensures high energy efficiency as well as reduced acceleration, and deceleration times.

The special sealing increases process reliability

The special seal system located on the fine-serrated base jaws prevents grease from being flushed out and the clamping force from being lost gradually. Compared to conventional power lathe chucks, the lubrication intervals are extended by a factor of twenty. In addition, the seal prevents chips or dirt from penetrating the chuck body. To ensure maximum process reliability, all functional components are hardened and ground. The fine-serrated power lathe chuck (1.5 mm x 60° or 1/16"x 90°) is available in five sizes from 160 mm to 330 mm diameter with maximum clamping forces of 45 kN to 160 kN and through-holes of 32 mm to 104 mm for speeds from 3,500 rpm up to 5,500 rpm. The jaw stroke is a uniform 5.3 mm. The lathe chuck can be directly adjusted to the machines via an integrated interface.

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