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THE MACHINIST

ULTIMATE GUIDE TO PROFITABLE MANUFACTURING

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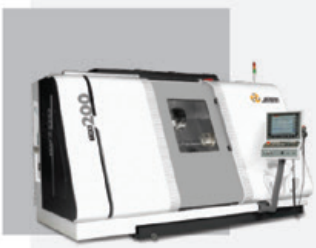

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A JOURNEY OF A THOUSAND MILES – THE FIRST STEP

These words of Lao Tzu have probably been repeated millions of times in probably several more million different contexts. These words are sometimes used to express insight about determination and avoiding procrastination; sometimes to express a focus on taking initiative. I break it down more simply – setting small goals to achieve the greater vision.

It is with this hope that I join the team of The Machinist – to add and contribute in my small way to the magazine and see it soar to greater heights.

The quote is also relevant for the times we are in – where uncertainty and caution in all activities is still a factor. But if we can condition ourselves to look at the bigger picture and adapt our day to day activities to fit that, then just like another one of Lao Tzu's maxims, 'This too shall pass!"

"A JOURNEY OF A THOUSAND MILES BEGINS WITH A SINGLE STEP- SETTING SMALL GOALS TO ACHIEVE THE GREATER VISION"

In this issue we take a comprehensive look at the impetus being given to the domestic defence manufacturing sector as our cover story. Being March, we also had the privilege of featuring some of the women in manufacturing through our empowerment articles. Catch up with our Best Brands in Metal Cutting and Forming event which took place in Bengaluru, through the post-event coverage. We have also added a pioneer segment in this issue – wherein we look back at the trail blazers in the manufacturing sector and the power of their innovative spirit which endures even today.

This would only be words on paper, if you, our readers were not part of it all. As an integral part of our vison, we always want your feedback. Do reach out and share your thoughts, comments, queries on kruti.bharadva@wwm.co.in – I look forward to hearing from you.

Lastly, putting together a magazine is a team effort, a heartfelt thank you to all my colleagues!

Stay safe!

KRUTI BHARADVA

Kruti Bharadva

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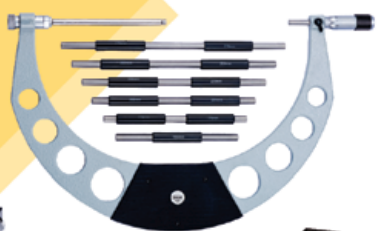
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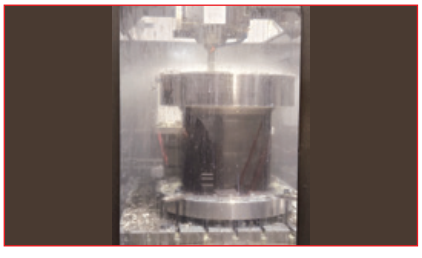

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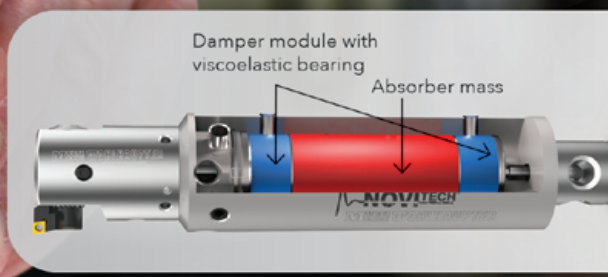

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Mahindra & Mahindra takes Farming down the Digital Road

MAHINDRA & MAHINDRA LTD'S Farm Equipment Sector (FES) division has launched its 'Farming as a Service' business in Karnataka by rolling out the Krish-e centres in five locations across the State.

The Krish-e centres, set up in Jamkhandi, Mysore, Bijapur, Bidar and Gulbarga, provide a range of solutions to farmers including agronomy advisory, access to advanced farm equipment rentals and new age precision farming solutions.

"Krish-e is an innovative new business vertical conceived with the idea of ushering in a new digital age of farming in India. It aims to transform the lives of farmers, by helping them adopt better more effective farming techniques powered by Artificial Intelligence, Internet of Things and digital solutions that are affordable and accessible paving the way for increased productivity and profitability," said Hemant Sikka, President, FES, M&M Ltd.

"Through Krish-e, we have already impacted over 1 lakh farmers, with solutions tailored to demonstrate impact on cultivation costs, crop health and productivity," added Ramesh Ramachandran, Senior VP, FES Strategy & FaaS, M&M.

Besides Karnataka, the Krish-e centres are now operational across all major States including Maharashtra, Andhra Pradesh, Telangana, Gujarat, Madhya Pradesh, Uttar Pradesh and Bihar.

Dassault Systèmes Introduces New 3DEXPERIENCE SOLIDWORKS Offers

DASSAULT SYSTÈMES recently announced the upcoming launch of two offers that deliver new ways to design, collaborate, share and excel: 3DEXPERIENCE SOLIDWORKS for Makers and 3DEXPERIENCE SOLIDWORKS for Students. The offers, which were unveiled during Dassault Systèmes' 3DEXPERIENCE World 2021 virtual event, will provide makers and students with cloud-based access to the world's most powerful digital environment for design, engineering and collaborative innovation.

3DEXPERIENCE SOLIDWORKS for Makers brings makers, mentors and ideas together to create, connect and collaborate. Digital hobbyists can innovate using 3DEXPERIENCE SOLIDWORKS Professional, 3D Creator and 3D Sculptor applications, and share their personal projects with the global Makers Community Madein3D – curated by Dassault Systèmes with the participation of makers, influencers and innovators – for help and inspiration.

3DEXPERIENCE SOLIDWORKS for Students helps prepare students for employability in a highly competitive job market by developing the engineering, collaboration, project management and data intelligence skills that are highly sought after by industry today. The offer, which can be used from anywhere, features 3DEXPERIENCE SOLIDWORKS Student, 3D Designer Student and Collaborative Business and Industry Innovator applications, access to a global online community of peers and experts on the 3DEXPERIENCE platform, and two industry-recognized certifications.

"From products to platform, from connections to relationships … 3DEXPERIENCE SOLIDWORKS transforms how students and makers learn, collaborate and innovate," said Gian Paolo Bassi, CEO, SOLIDWORKS, Dassault Systèmes. "Students can use the right tools early on to develop the skills sought after by industry and thrive in the workplace. Makers can be part of a community that shares their passion for making products and is ready to help with its expertise and desire to collaborate. Both gain the knowledge and know-how needed to excel in creating game-changing experiences."

3DEXPERIENCE SOLIDWORKS for Students will be available in May 2021 and 3DEXPERIENCE SOLIDWORKS for Makers will be available in the second half of 2021, through an easy online purchasing experience on the 3DEXPERIENCE platform.

Clariant and India Glycols Tap into the Green Renewables Trend through JV

CLARIANT, a specialty chemical company, and India Glycols Limited (IGL), a leading manufacturer of green technology-based chemicals, have announced a strategic partnership to establish a 51-49 per cent joint venture in renewable ethylene oxide (EO) derivatives.

By combining production and distribution capacity, the joint venture is expected to become a leading supplier of renewable materials to the rapidly growing consumer care market in India and neighbouring countries, while providing Clariant the ability to leverage the EO derivatives globally across the home care, personal care and industrial applications segments of its Industrial and Consumer Specialties business. The partnership is subject to customary regulatory approvals.

Under the terms of the proposed agreement, India Glycols will contribute its renewable Bio-EO Derivative business to the joint venture, which includes a multipurpose production facility including an alkoxylation plant located in Kashipur, Uttarakhand. In return, Clariant will contribute its local Industrial and Consumer Specialties business in India, Sri Lanka, Bangladesh and Nepal.

Christian Vang, Global Head of Clariant's Business Unit Industrial & Consumer Specialties, added: "By partnering with India Glycols, Clariant will become one of the established players for ethylene oxide derivates in India and provide products on a renewable basis. By working closely together and leveraging the unique capabilities of both parties, we see opportunities for profitable growth based on strong local organic demand as well as the global megatrend for renewable products." At its inception, the joint venture will have approximately 200 employees.


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Low Emission and Zero-Emission Mobility for Continental

THE TECHNOLOGY COMPANY Continental has announced a new strategy for its hose and line business revolving around two primary objectives: "On the one hand, we are more strongly targeting eMobility as a major growth market. On the other hand, we are committed to helping automotive manufacturers further reduce emissions and meet increasingly strict emission standards," explains Philip Nelles, Head of Mobile Fluid Systems – the business unit at Continental responsible for automotive hoses and lines. "Hoses and lines are essential factors in achieving emission-free and low-emission mobility. This is where we are stepping in to make an important contribution to sustainable mobility, and our order books are already reflecting this. Last year, alone, we received orders worth roughly 275 million euros for hoses and lines to be used in battery and hybrid drives for vehicles produced by German, Asian and North American manufacturers," he continues. The reason for this trend is rising global demand for zero-emission electric and

hybrid vehicles.

A major feature of Continental's lines and hoses is sophisticated thermal management. This is driven by the fact that batteries in electric vehicles are most efficient when operated at temperatures ranging from 20 to 40°C. Battery life can be increased by either cooling or heating batteries in response to ambient temperatures. This leads to complex circuits which place significantly greater demands on individual components, including hoses and lines. Hoses and lines help to keep batteries and highly sensitive control circuits cool in electric and hybrid vehicles. Among other things, this has a beneficial impact on the range of battery-powered vehicles.

Another promising application for Continental's high-tech lines is for air conditioning systems utilising R744 as the most climate-friendly refrigerant available today. These next-generation lines help to save weight while regulating the temperature of the passenger compartment in a highly efficient and climate-friendly way. As an integral part of a vehicle's temperature management system, they contribute to increased efficiency and range.

Continental also helps automotive manufacturers in the quest to meet increasingly stringent exhaust and emission standards. "Our efficient hose and line systems are helping customers to consistently and sustainably lower emissions of hydrocarbons, carbon and nitrogen oxides and particulates, for example by means of exhaust purification technologies involving particulate filters or selective catalytic reduction (SCR)," explains Nelles. Lower weight also translates into lower emissions.

Jindal Aluminium Adopts Sap Technology

JINDAL ALUMINIUM LIMITED, India's largest producer of downstream aluminium extruded products, is leveraging digital solutions as part of its business strategy.

Over the next twelve to eighteen months, the company with the state-of-the-art manufacturing facility for producing downstream aluminium extruded and flat-rolled products will undergo a management-driven initiative implementing a digital ecosystem across its business functions- SAP Technology enabled systems

This technology has helped many businesses successfully optimise their resources in the digital age. Earlier, the company had launched an order management system, UDAY – Rise with Aluminium, for the convenience of its dealers in sending their orders.

Commenting on the digital transformation journey, Pragun Jindal Khaitan, Vice Chairman and Managing Director, Jindal Aluminium, said, "We are using technology to extend our experience of over five decades to the benefit of everyone involved in our business ecosystem - people, planet and community. It will advance our environmentally conscious, safe, innovative, efficient and inclusive working environment to delivering optimum value to our customers."

Indian Spacetech Startups Get into Gear

HOPING THAT THE country would soon become a manufacturing hub of space assets, Prime Minister Narendra Modi said in December last year that the decision to unlock India's potential in the space sector has heralded a new age of public-private partnership.

Inspired by these words, the spacetech start-ups in India have kicked off the journey to take a big leap soon.

The government opened up the space sector in June last year and created the Indian National Space Promotion and Authorisation Centre (IN-SPACe) that is working as a link between the ISRO and private companies who wants to participate in space-related activities or use India's space resources.

While homegrown private earth imaging company Pixxel has closed $7.3 million (nearly Rs 53 crore) seed round and is working on two satellites to send to space this year, the Department of Space (DoS) has signed a pact with Chennai-based small rocket company Agnikul Cosmos to access the facilities and technical expertise available at the ISRO (Indian Space Research Organisation) centres. According to Awais Ahmed, Founder and CEO, Pixxel, with the radical liberalisation of space reforms, the government is providing growing impetus to spacetech startups like Pixxel.

"Pixxel's rich satellite imagery will help tackle multiple issues across sectors like agriculture, environment, natural disasters, urban monitoring etc. that the government itself will be a beneficiary of. In addition to the high-quality imagery our satellite will provide, we are also building a platform for customers to analyse this data for various purposes, enabling them to become self-reliant," the 23-year-old entrepreneur told IANS.

The Bengaluru-based start-up plans to deploy a total of 30 satellites by December 2022 for its global constellation.

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New Head of Sales for Kia Motors India

KIA MOTORS INDIA on Monday said it has appointed Hardeep Singh Brar (48) as National Head of Sales and Marketing, with immediate effect. Brar, who brings over two decades of experience in the automotive industry, will be responsible for enhancing the automaker's position in the Indian market and for enabling the next wave of growth, Kia Motors India said in a statement.

He holds a Mechanical Engineering degree from Thapar Institute of Engineering and Technology, Punjab and is also an alumnus of Harvard Business School.

"We are delighted to welcome Hardeep Singh Brar to the Kia Motors India family as we accelerate our growth strategy to expand to newer regions in India," said Kookhyun Shim Managing Director and CEO, Kia Motors India.

"With Brar onboard, we are confident of consolidating our position further through a more consumer focused approach," Shim said.

Tesla Assured of Lower Cost of Manufacturing Vehicles in India

INDIA IS READY TO offer incentives to ensure Tesla's cost of production would be less if the carmaker commits to making its electric vehicles in the south Asian country, informed Nitin Gadkari, Minister for Transport.

Gadkari's pitch comes weeks after Tesla registered a company in India in a step towards entering the country, possibly as soon as mid-2021. Sources familiar with the matter have said Tesla plans to start by importing and selling its Model 3 electric sedan in India.

"Rather than assembling (the cars) in India they should make the entire product in the country by hiring local vendors. Then we can give higher concessions," Gadkari said in an interview.

"The government will make sure the production cost for Tesla will be the lowest when compared with the world, even China, when they start manufacturing their cars in India. We will assure that," he said.

India wants to boost local manufacturing of electric vehicles (EVs), batteries, and other components to cut costly imports and curb pollution in its major cities. This comes amid a global race by carmakers to jump-start EV production as countries work towards cutting carbon emissions.

Circular Economy update

THE ADOPTION of circular economy practices combined with accelerated electrification in the automotive industry has the potential to reduce carbon emissions by up to 75 per cent and non-circular resource consumption by up to 80 per cent per mile by 2030.

The report, "Raising Ambitions: A new roadmap for the automotive circular economy," is based on an Accenture analysis that finds mobility demand — in terms of both passenger miles and predicted vehicle stock — is expected to increase 70 per cent globally by 2030. The automotive industry can prepare for this demand, while also decarbonizing to contribute to limiting global warming to less than 1.5°C, by achieving circularity through the lens of energy, water, waste, materials, vehicle lifetime and use.

"Circular economy can not only help to serve the growing mobility demands of our country but also help in reducing resource consumption to a level that is truly sustainable. As the fourth largest automotive market in the world, the recent sustainable guidelines announced by the Government of India such as voluntary vehicle scrapping policy for subsidizing scrappage of old vehicles, implementation of BS-VI emission norms and FAME II policy to incentivize and fund EV manufacturing, ushers in the next era of circular cars. To achieve circularity, automotive companies need to embrace a consistent and holistic approach leveraging best-in-class technology tools that requires collaboration with the broader ecosystem over the coming years," said Raghu Gullapalli, Managing Director and Lead APAC and Middle East for Industrial & Mobility, Accenture.

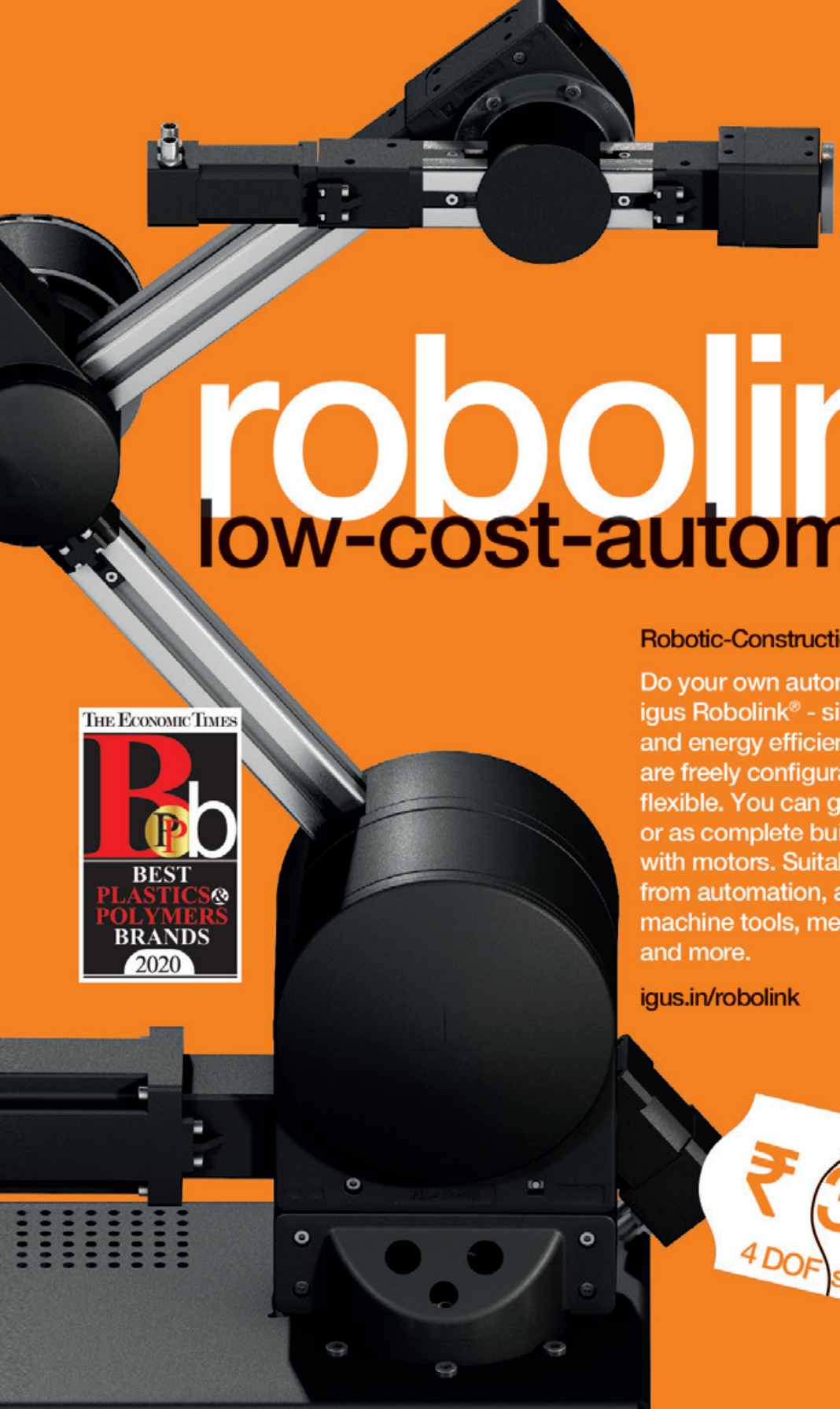
Semi- Conductors in shortage

INDIA'S LEADING AUTOMOBILE manufacturers have written to the government seeking urgent intervention to address the semi-conductor shortage

Vehicle makers have urged the government to rope in Indian embassies abroad to help the auto sector in meeting its production targets. They have highlighted that the sector has just started witnessing a demand revival and any further disruption will hurt the industry. The auto sector representatives have requested help from Indian embassies in Germany, USA, Japan and Taiwan. Indian missions can approach suppliers to ensure adequate allocation of semi-conductors to the Indian automotive industry.

Almost all of India's passenger car makers and commercial vehicle manufacturers have been impacted due to the global shortage of semi-conductors which are used in making electronic control units, anti-lock braking systems, electronic brake systems and sensors. According to estimates, the shortage is likely to impact production schedules in the first quarter of FY22 as well.

Since the beginning of the year, car and truck manufacturers have been unable to meet the market demand due to disruptions in supplies of semi-conductors. This has increased waiting times for popular models by several months in some cases.



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By Kruti Bharadva

OSKAR LAPP – A CENTURY OF INNOVATION

In this segment, we look at the true pioneers of our industry – who through their veracity and acumen, have carved a niche for themselves.

20 March 2021 would have marked a historical day for Oskar Lapp – his hundredth birthday! A great inventor and passionate entrepreneur, Oskar Lapp, along with his wife Ursula Ida Lapp, were the founders of a globally reputed company. His inventions continue to shape connection technology around the world, even today.

The Lapp family and employees all over the world honoured this great entrepreneurial personality by laying a wreath at the old cemetery in Stuttgart-Vaihingen and by holding various commemorative events. "Our father is still a major role model today. The LAPP company would not exist without Oskar Lapp. We continue his life's work with the deepest gratitude. The fact that the third generation has now taken over the running of LAPP would definitely make him very proud", said Andreas Lapp, Chairman of the Board, LAPP Holding AG.

From a prisoner of war to fleeing the former communist GDR, Oskar had seen it all. He showed an impressive talent for all things technical from an early age and came from a family of craftsmen. Fleeing to west Germany, Oskar initially worked for Harting and his innovative ideas soon earned him deserved attention- He was the first one to develop a rectangular connector for the industry.

Next came the electrical connection was quite a laborious process: The cores were all black or grey and the electrical engineers had difficulty assigning the cores to the correct ends when connecting. This required a complex process, known as continuity testing. Oskar LAPP invented a flexible cable made of coloured cores. And thus ÖLFLEX® was born. It was the first industrially manufactured power and control cable - an invention that revolutionised connection technology. It was innovative in another way too: Oskar Lapp was the first entrepreneur ever to give an industrial product a brand name. Today, the ÖLFLEX® brand still stands for exceptionally oil-resistant and flexible control cables across the world.

In 1959, the Lapps founded their company with the assistance of a 50,000 Mark bank loan. As Oskar Lapp was still employed at Harting, Ursula Ida Lapp was entered in the commercial register as the company's founder. The company name was created at the kitchen table: U.I. LAPP KG - U.I. Stands for Ursula Ida. As with so many start-ups today, the Lapps' business began from the garage of their house in Stuttgart-Vaihingen. Oskar Lapp took care of sales while Ursula Ida Lapp looked after the accounts, orders and logistics from home, while taking care of their young children.

The LAPP company would not exist without Oskar Lapp. We continue his life's work with the deepest gratitude. The fact that the third generation has now taken over the running of LAPP would definitely make him very proud

With ÖLFLEX®, Oskar Lapp set quality standards that are still applicable all over the world in cable production today. He was even offering readymade cable harnesses with up to 130 coloured cores- and demand for the product soared. LAPP was also one of the first suppliers to offer and cut the cable harness length to customer requirements. ÖLFLEX® was the right product at the right time and sales grew rapidly. Later, UNITRONIC® data transmission systems, HITRONIC® fibre optic cables, SKINTOP® screwed cable glands, SILVYN® cable protection and guiding systems, EPIC® industrial connectors, ETHERLINE® data transmission systems for ETHERNET technology and FLEXIMARK® marking systems were added.

Oskar positioned his company as a one-stop shop in connection technology and this principle remains a successful formula to this day. "Our father led our company to success with hard work and ambition and with a clear view of what is really important. He exhibited persistence, entrepreneurial spirit and innovation and these are still part of LAPP's DNA today", said Siegbert Lapp, Chairman of the Supervisory Board, LAPP Holding AG.

In memory of Oskar Lapp, the founding family set up the Oskar Lapp Foundation in 1992. This provides young scientists with incentives to effectively engage them in cardiovascular research. The Oskar Lapp Research Prize, worth Euros 12,000, is presented annually, while the Oskar Lapp Grant, which provides up to Euros 20,000 for equipment, is awarded every two years.


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Barry Callebaut sets up Manufacturing Facility

The Barry Callebaut Group, a leading manufacturer of chocolate and cocoa products, has announced the official opening of its new chocolate and compound manufacturing facility, located in Baramati, India.

Barry Callebaut's new factory is located about 250 km south-east of Mumbai and represents its biggest investment in India to date. The new chocolate factory and warehouse includes an R&D lab and assembly lines capable of manufacturing chocolate and compound in different delivery formats.

Once fully operational, Barry Callebaut says the 20,000 square metre facility will employ between 100 to 120 people, thus creating new skilled jobs, mainly in engineering and production. The new plant also features a variety of energy and water-saving solutions in the areas of infrastructure, production equipment and the overall facility energy control system.

In addition to the new chocolate factory in Baramati, Barry Callebaut's production network in India includes another chocolate factory in Pune (Maharashtra) and a specialties and decorations factory, also located in Baramati. These new production facilities join the company's Chocolate Academy Centre and sales office in Mumbai to represent significant investment in India from the manufacturer.

"The opening of our new flagship chocolate factory marks an important step forward in advancing our business across more regions of India," said Dhruva Jyoti Sanyal, Managing Director, Barry Callebaut India.

COSMOS to set up the Technology Park in Vadodara

Cosmos has started the Phase-I construction of its state-of-the-art technology park at Ranu village, in the Vadodara district of Gujarat.

The entire project, which is targeted to be completed in three phases, is expected to be operational by 2022.The technology park will have its various plants producing key components to manufacture CNC machine tools. It will also have a R&D Division, which will be the growth driver for the company's future business.

The company is investing close to Rs. 100 crores to set up this technology park which will cover 15 acres of land area. Also, the company is dedicated towards their efforts for social and environmental issues to enrich the quality life of the community they serve. The tech-park will therefore take a lead in several green initiatives. Another aim is to improve the synergy among its various divisions and bring many of its operations to a single campus.

"The technology park will enable interaction of our group companies to work in harmony, to evolve new technologies and inventions. A lot of employment generation will take place too due to set up of this tech park. The 15-acre park will offer single point design, engineering and development solutions to the core sector industry," stated Nagesh Velaga, Director, COSMOS.

3M to consolidate Pune Manufacturing Facilities into Single Unit

3M India has decided to consolidate its Pune manufacturing facilities into a single unit. This will enable the company to operate more efficiently, simplify supply chains, leverage scale, and enhance customer support The consolidated single facility will be at Ranjangaon, Pune and the company will discontinue production at its Pimpri facility during the quarter Oct-Dec 2021.

The company has taken care and consideration to offer employment to all workmen in Pimpri at the Ranjangaon plant. 3M will work closely with employees and all stakeholders for a smooth transition.

Autoliv to Build Inflator Manufacturing Plant

Autoliv Inc has announced its plan to build a new inflator manufacturing plant in India, focused toward supporting its strong Indian market position. This is the latest development in Autoliv's long commitment to the Indian market through its world class life-saving solutions for mobility and society.

The new inflator plant will be built close to Chennai and will cater to the Indian market. The localisation of inflator production will meet customer requirements while mitigating global supply chain disruptions and fluctuations. The new inflator plant will further encourage sustainable market growth in India from global and local OEMs.

"The establishment of the new inflator plant is another milestone of Autoliv's development in India, demonstrating our strong commitment to customers and to the Indian market," said Joydeep Roy, President and Managing Director, Autoliv India. "We are optimistic about the business prospect here. We will continue our dedicated work of leading the way to saving more lives in India and being a trusted supplier and partner to our customers," he added.

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I, Joji Varghese, hereby declare that the particulars given above are true to the best of my knowledge and belief.

(Joji Varghese)

Date: March 1, 2021

Signature of the Publisher

By Kruti Bharadva

BRINGING ZEN INTO MANUFACTURING THROUGH COLLABORATION

The Japan-India Institute for Manufacturing (JIM) project is aimed at bring Japanese shop floor finesse and expertise to India. Toshiba Transmission & Distribution Systems (India) Pvt. Ltd, Telengana, now becomes the 15th such facility to receive this prestigious accreditation

Toshiba Transmission & Distribution Systems India Pvt Ltd, (TTDI), a Toshiba Group company located in Telangana, has recently been certified by Japan's Ministry of Economy, Trade and Industry (METI) as a Japan-India Institute for Manufacturing (JIM).

The JIM Project is a part of the Manufacturing Skill Transfer Promotion Program, a joint program by METI and India's Ministry of Skill Development and Entrepreneurship, launched in November 2016. The project aims to establish Japanese-style institutes in India for training Japanese standard shop floor leaders and engineers, focusing on areas such as kaizen and the 5S (sort, set in order, shine, standardize and sustain). Kaizen is a lean manufacturing tool that improves quality, productivity, safety and workplace culture. Kai means 'improvement' while Zen means 'good.' These institutes will develop human resources that will play central roles in the manufacturing sites of the future.

Interior of the TTDI Skill Development Center (JIM) *Image Source: Toshiba*

DEVELOPING A SKILLED LABOUR FORCE

Since 2020, the company has been providing fundamental skill training to newly hired personnel and multi-skill training to existing employees at its human resource development facility, the TTDI Skill Development Center. It is in recognition of these efforts that METI certified it as a JIM. From April 2021, TTDI JIM will be inaugurated in the TTDI Skill Development Center, the 15th accredited Japan-India Institute for Manufacturing.

The new TTDI JIM will accept up to 120 under-graduates of local industrial training schools as technical trainees each year. They will receive training regarding welding, coil winding, assembly, painting, and more.

Tomohiko Okada, Managing Director, Toshiba India Pvt. Ltd, commented, "Toshiba has identified India as a global manufacturing base and export hub. We are committed to supporting the government's initiatives of 'Make in India' and 'Skill India' and the setting up of TTDI JIM is a very positive step in that direction, to build a better and stronger India."

Hiroshi Kaneta, Chairman and Managing Director, Toshiba Transmission & Distribution Systems India Pvt Ltd, added, "We are very proud of this accreditation. Through TTDI JIM, we wish to contribute to the development of the manufacturing industry by developing human resources in India. We are grateful to the Government of Telangana for their support in our endeavour."

> "Toshiba has identified India as a global manufacturing base and export hub. We are committed to support the government's initiatives of 'Make in India' and 'Skilled India.

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By Kruti Bharadva

LOOKING AT THE NUMBERS

The automotive industry is the heartbeat of the country's manufacturing sector. Here is a birds-eye view of where we stand and the road map ahead.

India became the fourth largest auto market in 2019, displacing Germany with about 3.99 million units sold in the passenger and commercial vehicles categories. India is expected to displace Japan as the third largest auto market by 2021.

The Indian automotive industry accounts for over 7 per cent of the country's GDP and 22 per cent of the manufacturing GDP. The industry supports over a 3.7 crore workforce and with GST collections of around Rs 1,50,000 crore, it accounts for nearly 15 per cent of total GST collection of the country in a year. The auto sector is also one of the biggest recipients of foreign direct investment an: Between April 2000 and March 2020, the sector has received FDI amounting to $ 24.2 billion.

PRODUCTION, SALES AND EXPORTS

Domestic automobiles production increased at 2.36 per cent CAGR between FY16-20 with 26.36 million vehicles being manufactured in the country in FY20. The total production of Passenger vehicles, three wheelers, two wheelers and quadricycles in the month of November 2020 was 22,96,701 units, as against 2,258,290 units in November 2019, marking a growth of 1.70 per cent.

Overall, automobile exports reached 4.77 million vehicles in FY20, growing at a CAGR of 6.94 per cent during FY16-FY20. Two wheelers made up 73.9 per cent of the vehicles exported, followed by passenger vehicles at 14.2 per cent, three wheelers at 10.5 per cent and commercial vehicles at 1.3 per cent

Overall, domestic automobiles sales increased at 1.29 per cent CAGR between FY16-FY20 with 21.55 million vehicles being sold in FY20. Two wheelers and passenger vehicles dominated the domestic Indian auto market. Passenger car sales are dominated by small and mid-sized cars. Two wheelers and passenger cars accounted for 80.8 per cent and 12.9 per cent market share, respectively, accounting for a combined sale of over 20.1 million vehicles in FY20.

EV sales, excluding E-rickshaws, in India witnessed a growth of 20 per cent and reached 1.56 lakh units in FY20 driven by two wheelers. Two wheelers and passenger vehicles dominate the domestic Indian auto market.

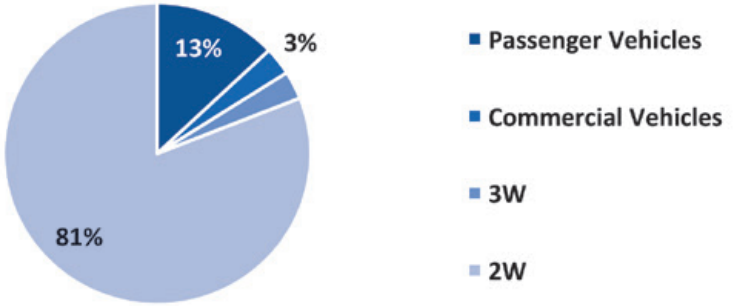
Passenger car sales are dominated by small and mid-sized cars. Two wheelers and passenger cars accounted for 80.8 per cent and 12.9 per cent market share, respectively, accounting for a combined sale of over 20.1 million vehicles in FY20.

Passenger vehicles sales was 1,455,558 units, three-wheeler sales was 108,475 two-wheeler sales was 9,637,871 units, commercial vehicles sales was 2,11,658 units in April-November 2020

THE COVID IMPACT AND RECOVERY

The automotive sector had already undergone considerable slowdown over the last 12-18 months due to structural changes beginning with the goods & services tax (GST), shift to shared mobility, axle-load reforms, the

Composition Of Auto sales in India - FY 2020 (Source: SIAM)



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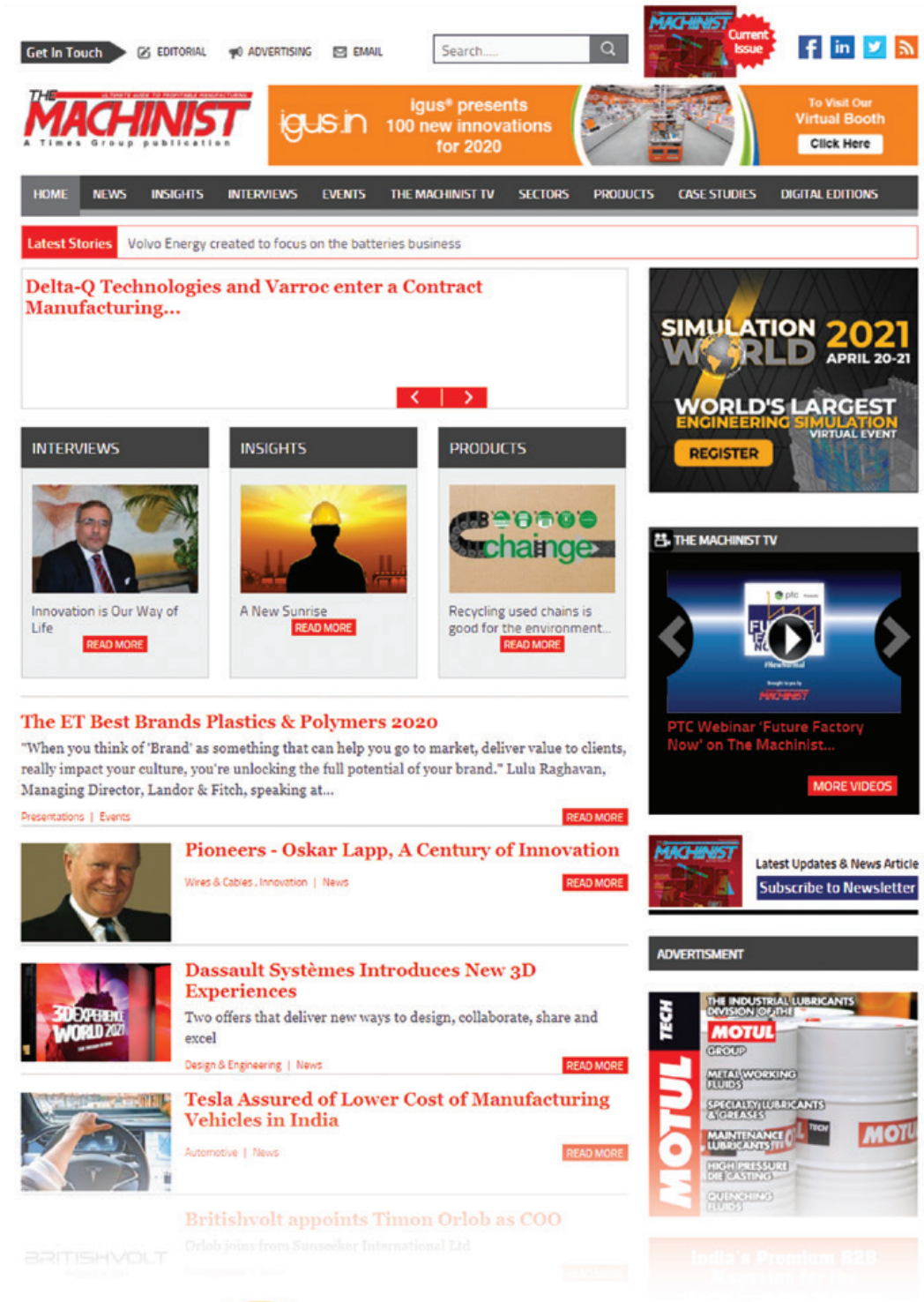

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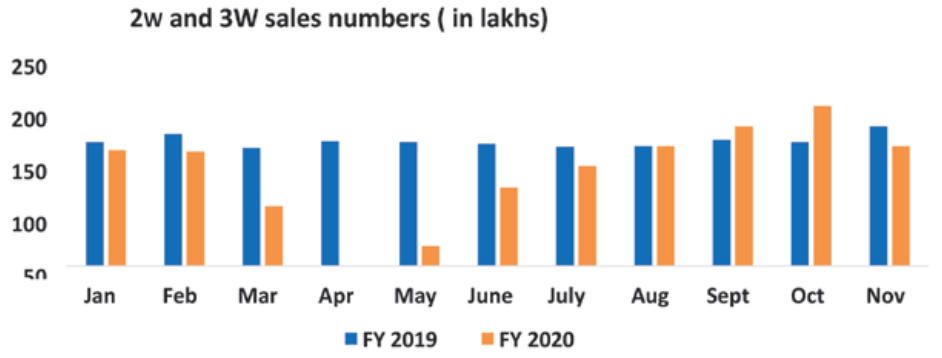


switch from BS 4 to BS 6 transition, liquidity crunch, etc. The COVID-19 lockdown had a multiplier effect – the industry has almost been at a complete standstill since March last year. A prolonged truncation of consumer demand due to the lockdown has significantly affected auto manufacturers' revenues and cash flows.

The sales volume, battling tough economic conditions and COVID-19-induced lockdowns, went down on a free fall. However, there has been a sequential recovery month over month in segments like passenger vehicles, two-wheelers and tractors.

While indicators of auto demand reflect some moderation in growth momentum in November 2020 as seen in sales of passenger vehicles and two and three wheelers. Demand for compact small cars mostly by first-time buyers is driving the car sales in India besides the pent up demand due to stringent lockdown

> "The Indian automotive industry accounts for over 7 per cent of the country's GDP and 22 per cent of the manufacturing GDP

restrictions in April and May. While urban areas have been more impacted by COVID-19 and the lockdown, industry players say that rural India is witnessing a faster recovery. Manufacturers are expecting the recovery trend to remain strong.

Despite the revival in demand, the auto sector, as whole, is expected to end this fiscal with 10-12per cent lower sales than last year.

CHANGES IN CONSUMER BEHAVIOURAL PATTERNS

The pandemic has brought about marked changes in consumer habits and behaviours. There is likely to be a shift away from shared mobility options as people prioritize social distancing and personal hygiene. This would effectively translate into a higher preference for affordable personal mobility, which could boost sales for auto manufacturers, especially in the entry-level vehicles category.

The increasing preference for contact-less online transactions has emerged as a major trend and is expected to reflect in automotive purchases as well. There was already a shift towards online models in after-sales with increases in online booking of appointments, doorstep pickup/delivery and online payments. Several original equipment manufacturers (OEMs), both premium and mass market, have already recognized this trend and launched a complete online buying experience, starting from initial enquiries and customization of features, to booking, financing and delivery in a completely contact-less transaction.

With the current outlook, the growth of the M&HCVs and bus segment will decline to -35 per cent to –40 per cent in FY21 and will grow by 40-45 per cent in FY22. LCVs will witness a slower decline of -17 per cent to –20 per cent and grow by 15-20 per cent during the period.

Growth in FY 2021 is contingent on recovery in macro and infra activity; the pandemic poses significant downside risks. The pandemic outbreak will significantly impact capacity utilisation levels of the CV industry, which is expected to fall to 36 per cent in FY2021 and rise to 45 per cent in FY22, from 48 per cent in FY20. Given the current market liquidity constraints and bleak demand, OEMs are withholding capex; from INR 67 billion in FY20 it is expected to fall to INR24 billion in FY21 and to 21per cent in FY22.

From the industry, it is understood that the credit profiles of OEMs are expected to remain healthy, supported by limited debt, healthy cash and liquid investments and limited investment plans. It is also estimated that the carmakers will cut CAPEX by 35 – 40 per cent during FY21-FY22 as there will be no capacity expansion in the short term. Instead, there will be incremental investments on new product development and platform improvisation.

On the positive, the industry's long-term drivers are intact but the domestic market is witnessing a

> The Indian auto-components industry is set to become the third largest in the world by 2025.

slower-paced recovery than that of the Chinese and other key global markets.The share of diesel vehicles is expected to decline below 40per cent in the next two years. Some manufacturers have exited the diesel portfolio completely

INDIAN AUTO COMPONENTS INDUSTRY

The Indian auto-components industry has experienced healthy growth over the last few years. The auto-components industry expanded by a CAGR of 6 per cent over FY16 to FY20 to reach US$ 49.3 billion in FY20.

The auto-components industry account for 2.3 per cent of India's Gross Domestic Product (GDP) and employs as many as 1.5 million people directly and indirectly. A stable government framework, increased purchasing power, large domestic market, and an ever-increasing development in infrastructure have made India a favourable destination for investment.

The industry can be broadly classified into organized and unorganized sectors. The organized sector caters to original equipment manufacturers (OEMs) and consist of high-value precision instruments while the unorganized sector comprises low-valued products and caters mostly to the aftermarket category.

Automobile component industry's revenue stood at US$ 49.3 billion in FY19, up from US$ 35 billion in FY14. Export of auto components grew at a CAGR of 7.6 per cent to reach Rs. 102,623 crores (US$ 14.5 billion) during the same time. India's automobile components export is expected to reach US$ 80 billion by 2026. The Indian auto components industry is expected to reach US$ 200 billion in revenue by 2026.

The Indian auto-components industry is set to become the third largest in the world by 2025.

IMPACT OF COVID-19 ON INDIAN AUTO COMPONENT INDUSTRY

The domestic auto industry is expected to take five to seven quarters to recover. Auto components are expected to follow a similar timeframe. India is a recognized hub for global sourcing of auto components. However, as a fallout of global production cuts, a slump in export sales is expected over the next few quarters. This demand decline will have an adverse effect on the industry over the next few quarters leading to weakened financial position amongst auto component manufacturers.

Most companies are likely to face liquidity pressures due to high fixed costs, low capacity utilization till production ramps up and high levels of inventory and receivables. Supply chain may suffer as several tier II and all tier III (auto component makers) face pressure. Stress in MSMEs will impact the last leg of the supply chain, adding to overall costs for the sector.

GOVERNMENT INITIATIVES

In the wake of the financial stress, the government, in June, approved a Rs. 20,000-crore aid package to the Micro, Small and Medium Enterprise (MSME) sector. Several Tier -III companies from the auto component sector also benefited from this initiative. Timely release of payments from the automakers helped tide over the crunch.

The government of India launched a PLI scheme to promote manufacturing in India and help the industries; bodies to recover from the COVID-19 Crisis. Production Linked Incentive (PLI) scheme has all the ingredients to make India self-reliant and integrate with global supply chain which we had terribly missed. PLI scheme is targeted and covers not only sectors which are import dependent but sectors where India has a comparable advantage globally as well. Rs 145000 Cr is the incentive proposed for the 10 additional champion sectors. Automobile and Auto Components is one of the 10 additional sectors where the PLI scheme is applicable with an applicable 57042 Cr PLI incentive.

As per the Union Budget 2019-20, the government moved GST council to lower the GST rate on EVs from 12 per cent to 5 per cent. Also, to make EVs affordable to consumers, the government will provide additional income tax deduction of Rs. 1.5 lakh (US$ 2,115) on the interest paid on loans taken to purchase EVs.

The government also came out with the Automotive Mission Plan (AMP) 2016-26 which will help the automotive industry to grow and will benefit Indian economy in the following ways: -

- Contribution of auto industry in the country's GDP will rise to over 12 per cent.
- Around 65 million incremental number of direct and indirect jobs will be created.
- End of life Policy will be implemented for old vehicles.

With new policies and frameworks in automobile sector and push from the government with initiatives like AatmaNirbhar India, Make in India, PLI incentive scheme, the Indian automobile industry is expected to achieve a turnover of US$ 300 billion by 2026 and will grow at a CAGR of 15 per cent from its current revenue of US$ 74 billion.

Sources: Market research from BDB India Pvt Ltd

RAISING THE DEFENCES

An insightful look at why the domestic defence sector is at the bedrock of India's manufacturing capabilities

By Kruti Bharadva

It was a bright day in September 2014 – especially bright for Indian manufacturing- when Narendra Modi, Prime Minister for India, announced his call to domestic manufacturers – "Make in India!" Half a decade later, India stands proudly as one of the fastest growing economies of the world.

But India has not yet achieved all that it set out to do in 2014. Addressing a webinar on effective implementation of the Union Budget's provisions in the defence sector, the Prime Minister rued the fact that the country is still amongst the biggest defence importers in the world.

"The country is working hard to change the situation and enhance its capacities and capabilities at a fast pace. Focusing on our defence industry with a sense of purpose is at the heart of the 'Make in India' and 'Atmanirbhar' programmes," the Prime Minister asserted.

THE CALL TO THE PRIVATE SECTOR

In August 2020, pursuant to the 'Atmanirbhar Bharat' initiative, the Department of Defence Production/ Ministry of Defence/Government of India developed a portal named 'SRIJAN'- the main objective of which is to partner the private sector in indigenization efforts of Defence Public Sector Undertakings (DPSUs), OFB and the Armed Forces. The portal is a non-transactional online marketplace platform

> "This self-reliance in defence manufacturing has been envisioned not only as a domestic requirement but also with an export perspective and can only be made possible with concerted efforts

DPSUs/OFB/SHQs display those items on this portal which they have imported or are going to import, each item having sizeable import value. They also display those items which have been planned/targeted in the coming years, for indigenization.

Indian manufacturers can show their interest in those items for which they can design, develop, and manufacture as per their capability or through joint ventures with OEMs. The concerned DPSUs/OFB/ SHQs, based on their requirement of the items and their respective guidelines and procedures, can interact with the interested Indian industry for indigenization. The interested Indian industry can also interact with concerned DPSUs/OFB/SHQs for their queries related to indigenization.

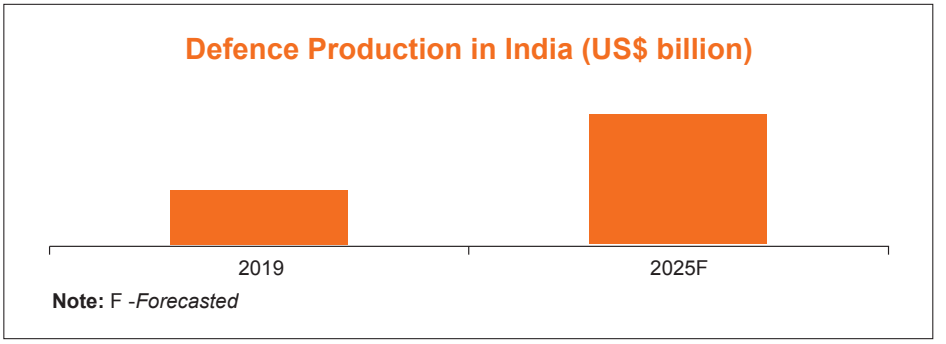
Rajnath Singh, Minister for Defence, India, said while launching the portal, "SRIJAN will help industry partners to play an active role in the goal of self-reliance in the defence sector. I call upon the Indian industry partners to show complete commitment and take proactive participation in the pursuit of indigenization and self-reliance in the sector. This self-reliance in defence manufacturing has been envisioned not only as a domestic requirement but also with an export perspective and can only be made possible with concerted efforts."

THE DEFENCE MANUFACTURING MARKET

India's defence manufacturing sector witnessed a CAGR of 3.9 per cent between 2016 and 2020, and specifically stood at US$ 11.00 billion in 2019. State owned enterprises and ordnance factories contributed the largest share, 79 per cent, to the total production value in 2019, while private sector contributed 21 per cent to the total production value.

Export business contributed US$1.00 billion to the total value in 2019. Foreign Direct Investment (FDI) equity inflow in the defence sector for April 2000 – June 2020 stood at US$ 9.52 million (Rs. 56.88 crore) as per data released by the Department for Promotion of Industry and Internal Trade (DPIIT).

India's defence value stood at US$ 463 million for FY20 and is expected to be at US$ 469.5 million in FY21



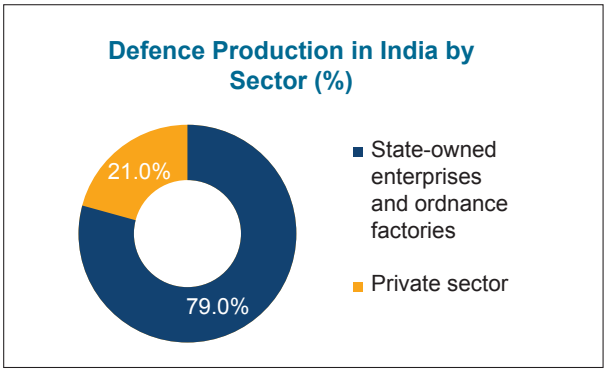
THE IMPORTS VS EXPORTS DEBATE

The masterplan does not stop at just reducing imports. The Indian government has set the defence production target at US$ 25.00 billion by 2025, which includes US$ 5 billion from exports by 2025. In other words, manufacture low cost-high quality products and become a leader in defence exports as well.

To achieve its USD 5 billion target in defence, a list of 152 indigenous defence platforms to be exported was released by the Ministry of Defence (MoD). The list was prepared based on the inputs received from the defence attaches in the Indian Missions and Posts in the Indian Ocean Region (IOR), as well as Africa. A list of friendly nations was drawn up and those items which could be exported, based on requirements of those countries, identified.

"Today, we are exporting defence equipment to more than 40 countries. We have to come out of the list of importing nations in the defence sector and become a major exporter in the sector," stated the Prime Minister.

Export business contributed US$ 1.00 billion to the total value in 2019. Defence exports in India were estimated to be at US$ 2.0 billion in 2019-20. India's defence import value stood at US$ 463 million for FY20 and is expected to be at US$ 469.5 million in FY21. Defence exports in the country witnessed strong growth in the last two years. India targets to export military hardware worth US$ 5 billion (Rs. 35,000 crore) in the next 5 years. As of 2019, India ranked 19th in the list of top defence exporters in the world by exporting defence products to 42 countries.

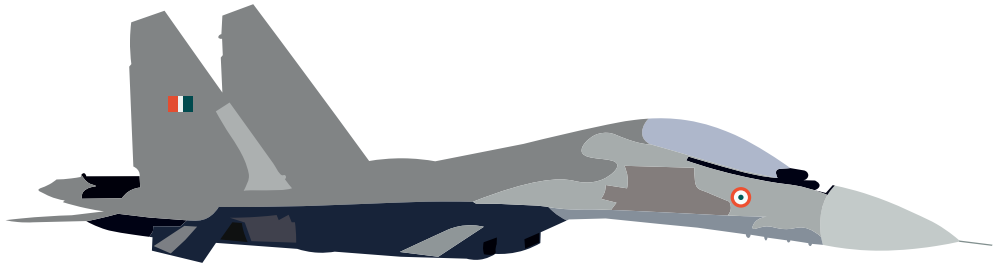


> The defence ministry estimates potential contracts worth US$ 57.2 billion (Rs. 4 lakh crores) for the domestic industry in the next 5–7 years (2025–2027)

ADOPTION OF SUPPORTIVE POLICIES

Medium, small and micro enterprises (MSMEs) can be described as the backbone of the entire manufacturing sector, and many of the reforms being adopted by the government are targeted at giving the MSME sector the encouragement to expand. Some of these reforms and strategies include:

- Setting a target of seventy per cent self-reliance in weaponry by 2027
- A push to start-ups in India to collaborate and develop innovative solutions like automation, robotics and drones to increase effectiveness of the armed forces
- Technological modernisations via public/private partnerships with domestic IT companies for intelligence analysis and enhancing military readiness
- A focus on leveraging long term strategic partnerships with global equipment manufacturers, to seek technology transfer. For example, an Intergovernmental Agreement with Russia to manufacture defence spare parts and equipment in India
- 'Defence Production and Export Promotion Policy 2020': To provide impetus to self-reliance in defence manufacturing under the 'Aatmanirbhar Bharat' scheme, the ministry aims to achieve a turnover of Rs. 1 lakh 75 thousand crore (US$ 25 billion), including an export of Rs. 35 thousand crores (US$ 5 billion) in the aerospace and defence goods and services by 2025.
- A new version of 'Defence Research and Development Organisation (DRDO) Procurement Manual 2020' on October 20, 2020
- There are plans to establish new infrastructure including a defence park in Kerala to manufacture defence equipment for the armed forces
- In November 2020, the Department of Defence, in partnership with the DGDE and Armed Forces, established a land management system (LMS) as part of efforts to enhance the overall defence land management
- To increase defence manufacturing in India and make the country a reliable weapon supplier to friendly countries, the Indian government allowed the following FDI limits in September 2020: For new licensees – FDI allowed up to 74 per cent through automatic route; FDI beyond 74 per cent would need to be permitted under the Govt. route. For existing Licensees – Infusion of new foreign investments up to 49 per cent can be added by making declarations of change/transfer within thirty days
- Defence ministry has put 101 defence items (artillery guns and assault rifles) under an import embargo to offer potential military hardware man-



ufacturing opportunities to the Indian defence industry

- A separate budget head has been created, outlaying US$ 7.4 billion (Rs. 52,000 crore) for domestic capital procurement.
- Establishment of a state-of the-art skills development centre with a focus on promoting applied research for development of materials used in aerospace, defence, nuclear, space and other strategic weapons. Examples include BEL, which launched a fully indigenised 'Maareech' integration facility for manufacturing, integrating and testing the Anti Torpedo Defence System, which has been designed by DRDO.

  BEML established an industrial design centre at Bengaluru as part of its new infrastructure creation.
- Key defence manufacturing players are focusing on supply chain management, for example, HAL implemented 'Public Procurement Policy' for micro and small enterprises (MSEs) and achieved >25 per cent procurement from MSE Entrepreneurs.

TECHNOLOGY TRANSFER

One of the key strategies the government is focusing on to boost domestic defence manufacturing is 'Technology Transfer' – which is simply strategic relationships and agreement with key global manufacturers, enabling India to manufacture locally, using global technology and vice versa. Lockheed Martin, as an example, has a joint venture with one of the leading local conglomerates, Tata Group, to manufacture major components for the C-130J Super Hercules transport aircraft.

In another prominent MOU, Israeli company Rafael Advanced Defense Systems will partner with Indian peer Bharat Dynamics to jointly provide an anti-torpedo defence system called SHADE for the Indian Navy.

Karnataka has also signed 33 memorandums of understanding with defence and aerospace companies during Aero India 2021. One MoU is for setting up of a mega cluster Abhyuday Bharat at a cost of Rs One Thousand crore to provide plug-and-play options for SMEs and design resources, testing facilities and vendor development under one roof.

Another is for designing and manufacturing 2-seater aircraft for civil naval application.

The State has entered into an understanding with GE to explore the option of developing a Centre of Excellence for aerospace robotics, intelligent sensor and engineering technology, which will be in line with Karnataka's new industrial policy that recognises aerospace and defence industry as a sector to focus on. Several MoUs are for setting up of facilities for manufacturing aerospace components, precision components, innovative engineering solutions, space application, microwave devices, radar and artificial intelligence products.

A couple of MoUs have been signed for setting up maintenance, repair and overhaul (MRO) facilities for aircraft.

Such partnerships are a result of India's efforts to create a capacity for the development of a domestic defence industry ecosystem. Reflecting the renewed interest in India as one of the world's top weapons markets, a total of 201 memorandums of understanding were inked for product launches and technology transfers during this year's Aero India, up from 50, two years ago. Joint ventures and Indian partners have already generated $600 million worth of exports and produced over $200 million in India industry revenues.

THE ROAD AHEAD – A FOCUS ON INNOVATION

In addition to the above policies and reforms, the government is focussing on innovative solutions to empower the country's defence and security via 'Innovations for Defence Excellence (iDEX)', which has provided a platform for start-ups to connect to the defence establishments and develop new technologies/products in the next five years (2021–2026).

Working through partner incubators, iDEX has been able to attract the start-up community to participate in the Defence India Start-up Challenge (DISC) programme.

The defence ministry estimates potential contracts worth US$ 57.2 billion (Rs. 4 lakh crores) for the domestic industry in the next 5–7 years (2025–2027). With these scenarios in hand, it wouldn't be too early to say that the curtain has been raised and the defence sector has taken centre stage in Indian manufacturing.

By Kruti Bharadva

SAVING TIME THROUGH OPTIMIZATION SOFTWARE

CGTech's Force optimization software reduces cycle time on every job it undertakes in a Minnesota-based aerospace and medical job shop, the Ultra Machining Company

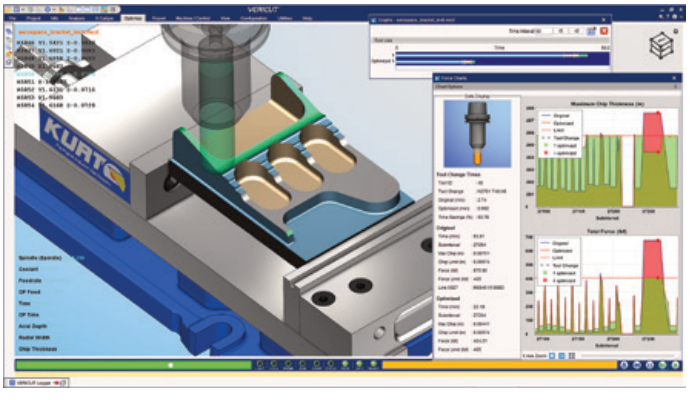
Don Lahr and Mike Triplett, programmers at the Ultra Machining Company, use VERICUT's OptiPath knowledge-based machining module and have recently installed a software update, one that included a customization they'd asked VERICUT developer CGTech to make on their behalf

The enhancement request, specifically, VERICUT SCR #16986: Add ability to output optimized feed rates with multiplier variable—made feed rate changes easier through operator-accessible macro variables. This modification serves to streamline setups and eliminate the need for the programming office's involvement on what could now be done with a simple variable adjustment.

FORCE ADOPTION

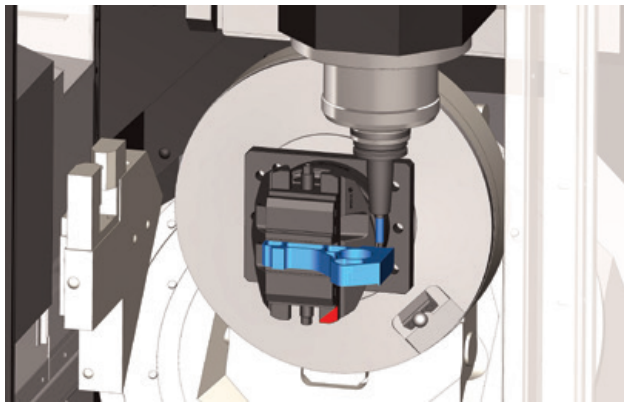
The discussion to incorporate CGTech's newly-released Force module, a physics-based tool path optimization tool said to reduce cycle times by 25 per cent or more, had only been at the 'maybe' stage three years ago, with implementation still in the distant future.

> "Programmers can even change strategies during a tool path to achieve the most effective optimization



But in February of 2020, UMC undertook its first Force test run on what Lahr describes as a fairly long-running job. The results were impressive enough that upper management agreed to invest in the software. "We cut around ten per cent off the cycle time on that one part number, which ended up saving the company almost $13,000," Lahr said. "It's not as large a savings as those that we've since achieved with Force, but it definitely opened some eyes to the value in moving forward."

The work piece in question was a medical component made out of 304L stainless steel and measuring approximately 2" x 3" x 1/2" thick. The largest tool used is a 3/4" 4-flute carbide end mill, the smallest just 1/32", taking axial depths of cut "only a thou' or two" per pass. Lahr noted that Force provided the most benefit during roughing and semi-finishing operations, but he added that even with very small tools such as those described here, it helped optimize tool paths to the point that cutter breakage fell to zero while cycle time often improved. "There's definitely a benefit for tool life as well," he added.



WHY THIS PATH TO OPTIMIZATION

Twenty different parts numbers have been optimized till date. Thus far, the cycle time improvements range from 28 per cent down to just over 3 per cent, although Lahr is quick to point out that UMC will recoup its investment three or four times over within the first year.

Those familiar with tool path optimization might be wondering: if UMC was already using OptiPath, why would they invest in Force? After all, both products promise shorter cycle times and improved tool life. Both solve problems with cutter deflection, chatter in corners, and similarly undesirable machining events. Does this mean UMC's investment in OptiPath was a waste of money? Not at all, explained Gene Granata, CGTech's product manager for VERICUT.

"Force and OptiPath are different products that use different approaches to optimization, but each one complements the other," he said. "OptiPath, for example, doesn't do any measurement of cutting forces. It instead uses either a volumetric method of optimization or one that measures chip thickness. Force also measures chip thickness but has additional checks and balances, including monitoring cutting forces or spindle power, and predicts tool deflection. In either case, material removal is kept constant by adjusting the feed rate, and subdividing tool path motions as needed to maintain consistent near-ideal machining conditions for each tool."

> "Material removal is kept constant by adjusting the feed rate, and subdividing tool path motions as needed, to maintain consistent near-ideal machining conditions for each tool.

LEARNING CURVES

Does that mean a company should use both? The answer, as one might expect, is "it depends." Granata suggested that Force excels in hard, difficult-to-machine materials, where slight, instantaneous spikes in tool loads can spell big problems with cutters and machine spindles. OptiPath, on the other hand, is more effective on soft metals like aluminium, mild steel, and gray cast iron where the primary goal is to clear material as fast as possible (rather than keep a constant chip load), or the tool's cutting conditions never approach unsafe cutting force or spindle power levels.

According to Granata, the approach many OptiPath customers use is to continue using their "tried and true" OptiPath strategies while they begin using Force optimization, especially in harder or difficult to machine materials, and for certain cutting tools where this optimization method works best. That said, there is no one size fits all approach to programming, as any CNC machinist knows.

"It depends on the strategies they prefer using," he said. "If you're an OptiPath power user, you would probably be more apt to add Force optimization to your OptiPath license and invoke both. You're then able to choose, on a tool by tool basis, which to use. Programmers can even change strategies during a tool path to achieve the most effective optimization. So again, the two are complementary toward offering the most possible optimization strategies."

The experiences of UMC's programming team appear to support this theory. Cory Mahn, Programmer, UMC, noted that Force has further decreased cycle time an average of 5 to 6 per cent on jobs that were previously run through OptiPath. And as a side benefit, the two have also found that Force reduces their overall programming time. Said Lahr, "With Force, we don't need to be quite as exact with tool path creation in our CAM software." He laughed.

"Perhaps the biggest adjustment for me has been to let Force do its thing. It will often suggest a feed rate that is at least double what I would have used, but if you just let it go, Force does it right."

By Kruti Bharadva

INDUSTRIAL AUTOMATION – A COMPONENT MANUFACTURER'S PERSPECTIVE

Automation is a key factor in the growth of any sector. **Anil Kumar,** Director, Inovance Technology India, takes us through an insightful look at automation in the manufacturing sector and its short and long term effects on the economy

Product montage of Inovance

Where do you see India in terms of automation in the manufacturing sector? Give us insight from your industry.

I believe there will be a strong future for the Indian manufacturing sector, and that this future will be highly automated. This is something I see both in a wider sense, and in my own professional life. In the wider sense it is clear that India, with its young, large, and growing population, and with the large number of skilled technology and engineering graduates we produce, has big strengths that will lead to manufacturing growth.

But in a professional sense I see the potential too, through the strong and ever-growing performance from our company's local industrial customers. Our company, Inovance, sells industrial automation kit such as AC Drives, HMIs, PLCs, Servos to factories and machine builders, and we've seen significant sales growth since the relaxation of COVID restrictions.

In the medium-term, global economic growth means the world is looking to India to become a global manufacturing hub. And we already see signs of success at this. Anil Kumar, Director, Inovance Technology India

It is also clear that, as Indian industrialists, our government is behind us. We've seen this recently in announcements surrounding the new national budget. One example is the new 'go vocal for local' campaign. What I see in this campaign, and the accompanying funding for Indian manufacturing that has been made available, is less an attempt to shut out foreign business, and more an attempt to support Indian companies to compete with global manufacturers, and also to increase their exports.

What role does automation play in India's small and medium sized OEM's?

Every day in my work I sell to and talk to Indian manufacturers of machine tools and industrial machinery. And every day I hear stories of strong growth in these sectors. I am confident that India's small and medium sized OEM machine builders are really well placed to

thrive in the coming years because of the strong engineering and technical skills in this country. Manufacturing machinery is one Indian sector that really should be well placed to grow its exports, since transportation costs are a small fraction of the cost of an industrial machine. And India since surely has the technical skills to build world-leading manufacturing machinery.

Chennai office of Inovance

In your opinion, is automation the key to our country taking on a major place in the world manufacturing stage?

From a factory automation perspective, while India has a reputation for unskilled labour, it is still true that Indian labour costs are growing and, as the population as a whole gets wealthier, this is a trend that will accelerate. Moreover, even the most manual factory still has a heavy element of basic automation within it, such as conveyors and cutting machines. And, at the end of the day, labour cost is not the only thing that drives automation. As Indian manufacturers ramp up their exports, they will need to improve product quality, reliability, and time to market; and automation can help with all of these issues by introducing precise and repeatable manufacturing processes that are just not possible for human workers on their own.

> "India's small and medium sized OEM machine builders are really well placed to thrive in the coming years because of the strong engineering and technical skills in this country

In the medium-term, global economic growth means the world is looking to India to become a global manufacturing hub. And we already see signs of success at this, such as the inspiring example of the involvement of the Indian pharmaceutical sector in supplying the COVID job to millions in the UK. Tesla planning to set up an electric car manufacturing plant in Karnataka is another example

In what other sectors do you foresee the effects of automation?

Another sector that I think is going to be of interest for the long term is warehouse automation. According to India's national investment agency, India's eCommerce retail market, which was $30bn in 2019, will grow at a CAGR of 30 per cent to be worth $200bn in 2026. This is just one factor causing growth in Indian warehousing. Clearly, in the short-term, low labour costs will prevent the fully automated solutions that are common in the warehouses of countries such as the USA. But the use of conveyors and other simple automation equipment is common in Indian warehouses even today. And smaller and more innovative online retailers may automate sooner as a way to gain a competitive edge. In the long run, if Indian eCommerce retailers want to offer reliable same-day-delivery slots, then efficient warehouse automation will be vital.

I also see strong potential for growth in the Indian mass manufacturing sector – in everything from clothing to automotive manufacturing. If there is one single problem that India's mass manufacturers face, it is substandard infrastructure. And here I believe the government could really help by improving our road and rail network – as I know they plan to do. Yet, even in spite of infrastructural issues, the immense and growing size of the Indian domestic consumption market makes growth in domestic mass manufacturing highly likely.

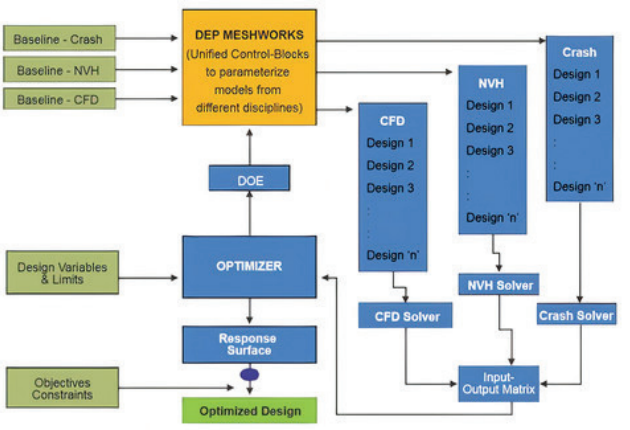
When it comes to the vendors of industrial automation kit such as industrial robots or industrial PCs, these are highly specialist products and they tend to be manufactured by a small number of global specialists. That will not change. But increasingly, as Indian manufacturing and machine building grows, these companies will tend to open local manufacturing sites in order to better serve local customers. This is a trend we see today, and I am certain that it is a trend that will also continue.

By Shirin Hameed

THE SECRET TO EFFICIENCY: MULTI-DISCIPLINARY OPTIMIZATION (MDO)

An in depth look at how Multi-Disciplinary Optimization (MDO) techniques enable automotive OEMs to achieve efficiency and mass savings

Increasing emphasis and high expectation on the fuel economy standards has pushed automotive OEMs globally to optimize their vehicle platforms. Fuel economy standards have to be achieved with holistically balancing safety, NVH and durability performance regulation and requirements. With competitive markets and compressed time to market needs, OEMs are looking for technologies that enable them to cut short their development time or make their current platforms more efficient. All this of course, has to be achieved with no degradation of performance. Another factor that is to be considered is that the above must be achieved with minimum packaging and tooling changes- if these can be kept constant while rolling out a new product line, it would be an excellent saving mechanism for any automotive manufacturer.



MDO design flow

Image Source: Detroit Engineered products

One place that can have a significant direct impact is to reduce weight from the BIW and chassis of a vehicle. Techniques like full vehicle parameterization and Multi- Disciplinary Optimization (MDO) can be utilized in shaving off the weight, keeping the other parameters constant.

MDO IN VEHICLE DEVELOPMENT

Vehicle body structures and sub-systems need to be designed to withstand multi-disciplinary load cases such as crash (non-linear transient), NVH (frequency domain), stiffness (linear static), durability (linear static) and aerodynamics (CFD). The structural requirements to meet loads in one discipline are very often detrimental to requirements for loads in other disciplines. Unless loads from all disciplines are considered simultaneously during the optimization process, the resulting design will not be well balanced for structural performance. With the focus on vehicle fuel economy, carrying out optimization to reduce weight while meeting the performance targets for all the above varied load cases is of paramount importance. Multi-Disciplinary Optimization (MDO) is essential to achieve this objective.

CHALLENGES IN THE CURRENT MDO PROCESS

The inability to adopt MDO as a step in the mainstream vehicle development process stems from the process limitations that have traditionally made the MDO process time intensive. Typical challenges encountered during full vehicle MDO exercises include:

Parameterization Time

The faster turnaround of an MDO project hinges on the ability to introduce different class of design variables in the full vehicle FE models with all their complexities. Usually these complexities of a full vehicle model counterweigh the faster execution of parametrization activity.

Multi-attribute Model Synching

Once the parameters are defined on any one FE model, for example the NVH FE model, there should not be any need to re-define them for other attribute FE models like safety FE models. Traditionally the need to recreate these parameters for other attribute models has created a bottle-neck in the MDO process timing. Parameters applied on one attribute model such as a crash model should be efficiently and automatically applied

to other attribute models such as NVH and durability models. If attribute models are 'synchronized' then this is achievable.

Design Generation Time

Job submission schemes may do a good job for one design at a time. However automated schemes are required to carry out the same analysis on multiple designs (for example the designs derived through a DOE). Using the parametrized CAE models, runnable analysis models for hundreds of designs need to be generated in an automated fashion.

Computation Time

One of the longest activities in the MDO process is the run-time taken by the solvers. Faster computing facilities with multiple CPUs and associated solver licenses are crucial for completing the analysis within the available time.

Automated Post-processing

There needs to be an automated process for extraction of results from different runs. Post-processing the results from hundreds of jobs without any scripts is a major hurdle in achieving a faster turnaround time for MDO.

AUTOMATED MDO

The automated MDO process consisted of a set of tools and processes that are used to facilitate faster project turnaround. The process starts with model synchronization- where full vehicle safety, trimmed body NVH and durability models are first unified and then synchronized. The models are then parameterized and one of the unified/synchronized FE models is selected and nominated as the 'donor' model. A comprehensive set of shape, section, gage, welding parameters are created on this donor model. These parameters are automatically transposed on all the other attribute 'driven' models. Design generation follows, where a Design of Experiments (DOE) matrix with the Optimal Latin Hypercube sampling technique is generated, discretizing the entire design space. Using software like DEP's Meshworks, crash, NVH and durability models are automatically generated for every design point of the DOE matrix. Optimization follows to find the best solution. The post-processed results are tabulated in the form of an input/output matrix where the input is the parameter values and the outputs are the responses. Using the input/output matrix, a Response Surface Model (RSM) is generated by fitting all the responses. Using the RSM, several optimization scenarios are carried out to pick a suite of optimal solutions. This entire process can be executed to complete the MDO in a few weeks.

> "With competitive markets and compressed time to market needs, OEMs are looking for technologies that enable them to cut short their development time or make their current platforms more efficient. All this of course, has to be achieved with no degradation of performance.

KEY BENEFITS OF THE AUTOMATED MDO PROCESS

High degree of automation

As demonstrated by the above vehicle program application, this process is capable of generating and submitting several hundred designs, analyzing and post-processing the results with a high degree of automation. This is a major enabler to execute the MDO in a short time as always desired to have an impact on the vehicle design.

Practical application to vehicle development

Earlier MDO processes that are not automated to this extent were typically executed only once during the life of a vehicle development phase due to the long execution time. Often Single Disciplinary Optimization (SDO) was carried out to identify the weight savings opportunities resulting in sub-optimal designs. In contrast, this process can be applied in a practical manner during every design cycle of the vehicle development.

Wide range of design parameters

The process outlined here allows for the selection of a wide range of parameters spanning various categories such as shape, section, gage, material, features, welding etc. thereby maximizing the design space exploration and hence the possibility of converging towards a true optimal solution. Further, this provides the opportunity to optimize the vehicle structure from the early stages of the vehicle development until the design is finalized for the verification prototype.

Automated synchronization across attribute models

Synchronization saves enormous time in not having to repeat the parametrization on each attribute model. It also minimizes errors during the parametrization step.

Rapid throughput

Generating and processing hundreds of design combinations within a very short time provides a wealth of data from which several useful design alternatives can be explored.

Weight saving while balancing performance

Since the process considers multiple load cases spanning multiple disciplines, a truly optimum solution with significant weight reduction can be achieved while simultaneously balancing performance for crash, NVH, stiffness and durability.

By Bijal Patel

HARNESSING THE POWER OF DATA MANAGEMENT

The Industrial Internet of Things (IIoT) is accelerating the pace of change around connecting machines. Yet, fewer than 30 per cent of manufacturers have extensively adopted Industry 4.0 technologies. Sandvik Coromant recommends that manufacturers start listening to what machines are saying – by connecting their machine shops.

The Industrial Internet of Things (IIoT) has perhaps impacted manufacturing more than any other industry. The IIoT market is set to grow from $68.8 billion in 2019 to $98.2 billion by 2024, yet, on the other hand, a recent report suggests that Industry 4.0 technology uptake is still low among manufacturers.

The transformation from linear plant setups into dynamic and interconnected systems is one of the greatest challenges of our times for machine shops. Some are unsure as to how Industry 4.0 fits into their established way of doing things. Many perceive the adding of Industry 4.0 to existing production setups as being expensive — when it needn't be. And other manufacturers see no reason to upgrade their existing tooling set-up and processes.

Sandvik Coromant's CoroPlus MachiningInsights platform is designed to give manufacturers greater visibility of CNC machine tools and machining processes.

Any given business will be at a different stage of their journey towards embracing digitalization with any specific view as to how this should be achieved.

But they need to make up their minds, as the COVID-19 continues to spell an unpredictable future for industry. Manufacturers must get on board now with these concepts to adapt existing processes, and to do so quickly and cost-effectively.

A TAILORED SOLUTION

Sandvik Coromant first launched its latest CoroPlus MachiningInsights platform, an expansion of the company's CoroPlus suite of connectivity software, in 2018. The platform is designed to give manufacturers greater visibility of CNC machine tools and machining processes, and to provide the tools needed to analyse, identify, and eliminate common sources of downtime and inefficiency.

Such a platform should prove useful as both Industry 4.0 and the Industrial Internet of Things (IIoT) accelerate the pace of change around machine connectivity. The answer lies in the volume of data to be managed. Any CNC with an Ethernet port can send information to MachiningInsights at higher volume than most CNC shops currently collect, for producing manufacturing data analytics to improve workshop efficiency and overall equipment effectiveness (OEE).

As for different manufacturers at different stages of their IIoT journey, machines that are less than 10 to 15-years-old will probably already be connectible to the network, and there are adapters for older machines to make them network capable. MTConnect, the manufacturing technical standard for retrieving process information from numerically controlled machine tools, is the established protocol used to communicate with Sandvik Coromant's CNC software. It can also connect to other types of manufacturing equipment using standard communication protocols.

> "By limiting the flow of data to uni-directional communication, we help close that door and make certain that a shop's million-dollar multitasking machine will not be held for ransom

"

We can also use that same interface to present operator instructions based on these events—for instance, if the spindle load exceeds a specific value during a roughing operation, we might pop up a set of work instructions for changing that tool.

Bijal Patel, Senior Digital Machining Specialist, Sandvik Coromant, elaborated, "There is an operator panel feature available, and you can use an external device such as a tablet PC, a laptop, or even a smartphone. Either way, an operator can either type in the desired information or tap a preconfigured button to indicate, for example, why the machine has stopped or that they just changed a drill. They can also do things like notify the tool crib that they're about to run out of inserts or enter a ticket with the engineering department that there's a problem. Any or all of these activities can be recorded in MachiningInsights for analysis, or further escalated if necessary. We can also use that same interface to present operator instructions based on these events—for instance, if the spindle load exceeds a specific value during a roughing operation, we might pop up a set of work instructions for changing that tool. "

THE QUESTION OF SAFETY

One aspect of MTConnect that may raise eyebrows is that it only allows one-way communication. Some plant managers may regard the use of uni-directional, instead of bi-directional, communication as a drawback. Sandvik Coromant recognizes the argument, but developers of MTConnect had some excellent reasons to make it uni-directional. Specifically, uni-directional communication puts control firmly in the user's hand, for a simpler and safer approach.

Another question of safety is that two-way communications make a machine tool more difficult to manage from a cybersecurity point of view.

"By limiting the flow of data to uni-directional communication, we help close that door and make certain that a shop's million-dollar multitasking machine will not be held for ransom," said Patel.

IMPROVING ACCESS TO REAL TIME INFORMATION

Since its launch, MachiningInsights has proven its value on the shop floor. Before implementing MachiningInsights, a shop supervisor would spend each morning entering performance indicators from the previous day's production into a spreadsheet, then distribute that information to management and on to people on the production floor.

If the operator adjusts a feed rate override, or tool breaks, or the machine remains idle for a given number of minutes, MachiningInsights provides users with the ability to configure e-mail or SMS alerts based on any one of several dozen conditions or events, which are just a few of the everyday situations that contribute to machine downtime.

The platform comes with a set of preconfigured reports and dashboards to get customers up and running quickly, who are free to modify them or to build their own from scratch. Users can log on to their MachiningInsights website and view whatever they have been allowed access to by the shop's administrator. Anyone who wants to see this data can open real-time dashboards or reports, and have visibility of what is currently happening, rather than what happened yesterday. The supervisor now has more time to act on information, instead of simply collecting it for historical purposes.

If manufacturers already have an Enterprise Resource Planning (ERP) system in place, and want to avoid installing another software package, Sandvik Coromant has a standard application programming interface (API) that tech-savvy shops can use to connect MachiningInsights to other software. It is secure and easy to set up.

As with all Software as a Service (SaaS) products, there is a subscription fee based on the platform level and the number of machines to monitor — a small price to pay for the enhanced visibility, ease-of-use, and significantly greater opportunities for continuous improvement. ROI is typically attained in weeks or months — not years.

NEW WAYS TO AUTOMATE

For workshops that are running unattended or lightly attended, MachiningInsights can monitor spindle and servo loads, macro variables and operational status, and if the machine is equipped with the right sensors, temperature, power, and more.

MachiningInsights is a subscription-based SaaS installed remotely by Sandvik Coromant. Once customers have identified the machines they wish to monitor, they can give Sandvik Coromant access to their server via remote desktop software to install the service.

The IIoT will continue its rapid growth and make countless productivity, profit and maintenance advantages available to machine shops that are willing to overcome their reluctance to embrace Industry 4.0. With the use of powerful-yet-simple software manufacturers can go digital on their own terms — and be within the 30 per cent of manufacturers that are prepared for an unpredictable future.

By Kruti Bharadva

CELEBRATING THE BEST BRANDS

A brief look at the Economic Times Best Brands in Metal Cutting and Metal Forming 2021 felicitation ceremony

The machine tool industry came together in Bengaluru on the 25th March 2021, to celebrate the best of the best- under the canopy of The Economic Times Best Brands in Metal Cutting and Forming 2020. The Economic Times Best Brands is an initiative to identify and recognise the best brands in the industry. This knowledge- based platform highlights key brands which have evolved and innovated over a period to serve the industry. The Best Brands list is based on market research conducted by Breakthrough Management Group India Private Limited-BMGI- who is the knowledge partner for this initiative.

WORDS OF WISDOM

After a year of virtual meetings and limited interactions, a sense of joy at meeting face to face (mask-to mask, maintaining all social distancing norms), was evident amongst all guests. The auspicious lamp lighting ceremony was performed by Naresh T Raisinghani, CEO and Executive Director, HBS, BMGI; Shri M V Rajasekhar, Chairman and Managing Director, BEML; Dr Sujatha Narayan, Regional Vice President, Wabtec Corporation; and Apoorv Kumar, Head Content - ET Edge.

"It is often said that it is the reaction to an adversity rather than adversity itself that determines what your future will be. I am happy to be here, meeting people,

and happier still at the confidence shown in us as we host a live event," commented Apoorv Kumar in his opening remarks.

Shri M V Rajashekhar, in his keynote address, touched upon how important it was for the manufacturing industry to come together like this and enhance the 'brand' of 'Indian Manufacturing.' He added, "The world is looking at India today, lets take the country to the top of global manufacturing- we certainly have the skills and ability to do so." He also expounded that despite a lull at the beginning of the year due to COVID, the industry had now entered a more robust period and that it was this robustness which would guarantee employment in manufacturing for the next decade.

Mr. Raisinghani briefly explained how businesses should take a step back and look at their goal and aspirations from a three to five-year perspective. "In the B2B segment, it is vital to create customer intimacy and connect through innovation and joint ventures," he added.

Dr Sujatha Narayan focused on why branding was so necessary to any company. "Branding and communication are relevant and add value to any company. Branding builds your credibility, visibility and respect in the market, and your employees feel proud when you have a recognisable brand."

THE FELICITATED BRANDS

The Best Brand felicitation took place in an alphabetical order and was done by Dr. Sujatha Narayan. These brands were:

- **Ace Micromatic Group**
- **Ace Designers Ltd**
- **Acemicromatic Manufacturing Intelligence Technologies (AMIT)**
- **Ace Manufacturing Systems Ltd. (AMSL)**
- **Micromatic Grinding Technologies Private Ltd.**
- **Bharat Fritz Werner**
- **Ceratizit India Pvt Ltd**
- **Chiron Group SE**
- **Cosmos Impex India Pvt Ltd**
- **ExxonMobil Lubricants Pvt Ltd**
- **Forbes & Company Limited (Totem)**
- **igus (India) Private Limited**
- **Jyoti CNC Automation Ltd**
- **Kennametal**
- **Lakshmi Machine Works Limited**
- **LVD Strippit India Pvt Ltd**
- **MMC Hardmetal India Pvt. Ltd. A Subsidiary of Mitsubishi Materials Corporation Japan**
- **MotulTech**
- **Murata Machinery Ltd**
- **Pro-Arc Welding & Cutting Systems Pvt Ltd.**
- **Rajamane Industries Pvt Ltd**
- **S&T Machinery Pvt Ltd**
- **SLTL Group (Sahajanand Laser Technology Limited)**
- **Sphoorti Machine Tools Pvt Ltd**
- **Trishul Machine Tools Pvt Ltd**
- **TruCut Precision Tools Pvt Ltd**
- **Tyrolit India Superabrasive Tools Pvt. Ltd.**
- **WIDIA**
- **WIDMA**

Look for a comprehensive list of the Best Brands in metal cutting and forming in the next issue of the Machinist!

By Kruti Bharadva

MAGNIFICENT WOMEN AND THEIR MACHINES

As a tribute to Women's day, we look at the trail blazers in Vedanta's Aluminum business

It has been a long held-held belief that few women would choose to take up roles in the manufacturing and heavy engineering segments and even less in the metals and mining industries. Vedanta's aluminum and power business segment is proving this hypothesis wrong. The company has a veritable treasure trove of skilled women, all successfully handling myriad core operations and technical roles, ranging from metal production, logistics, civil work and railway infrastructure to finance, security, and commodities procurement. In fact, its plant in Odisha also has an all-women fire-fighting team.

So how has the business succeeded in a creating a healthy mix of highly trained women employees in a sector that is unconventional for women, and that too in some of the remotest parts of the country?

Rahul Sharma, Deputy CEO, Aluminium Business, Vedanta Ltd says, "At Vedanta, we look at every role, no matter how traditional, as absolutely gender-agnostic. This means women can and do take up and lead any role in any function, from operations and maintenance, security, R&D, marketing, finance and HR, public relations, right up to operating cranes and smelter pot tending machines. As India's largest aluminum producer, we strive to foster a culture that nurtures merit, excellence, healthy competition and above all, an innovative spirit.

> "We strive to foster a culture that nurtures merit, excellence, healthy competition and above all, an innovative spirit.

Despite the production plants located in the hinterlands of Odisha and Chhattisgarh, the women who work here are talented, ambitious, and driven. They have leveled the playing field by undertaking critical roles in core operations and take pride in the contribution they are making to the growth of the business.

THE EMPOWERMENT CRUSADERS

Jyothi R Krishna, Manager, Civil Work Infrastructure and Railway Projects, Vedanta Aluminium, Jharsuguda, Odisha:

"In our business, we are driven by the fact that we produce one of the country's most crucial and strategic metals – aluminium – that is necessary for India's self-reliance in manufacturing. My colleagues and I are motivated by this desire to serve the country by ensuring our nation never sees a shortfall of this critical raw material. This mission fulfills me and spurs me on, both personally and professionally."

Incidentally, Vedanta's Jharsuguda plant is one of the world's largest aluminium smelters, producing more than a third of India's aluminium.

Aancy Kujur, Security Officer, Vedanta Aluminium, Jharsuguda:

Aancy is bold and does not back down from the multiple challenges she faces at work, despite often having the unpleasant task of dealing face-to-face with anti-social elements, material theft attempts, weapon bearing intruders and several other challenges. However, staying calm, she remains undaunted and as she counters each problem. She remains calm and undaunted in the face of it all.

Vasudha Singhal, Head – Coal Procurement and Contracts:
Vasudha recalls how after completing her engineering degree in Electronics Instrumentation and Control, several manufacturing companies refused to let her even appear for any of the campus placement exams and interviews, citing that most job opportunities were reserved for men. At Vedanta, she was encouraged to go through the placement process and hired as a maintenance engineer.

Not only did Vedanta encourage her to go through the placement process, realizing her potential, they recruited her as a maintenance engineer. With the zeal to learn different aspects of the manufacturing process, she then moved to the safety department.

> "In our business, we are driven by the fact that we produce one of the country's most crucial and strategic metals, necessary for India's self-reliance in manufacturing. My colleagues and I are motivated by this desire to serve the country

Women employees, apart from being professionally qualified and experienced for their roles, also bring in different perspectives, technical prowess, empathy, compassion, and attention to detail into the industry. Each of these women signifies the environment of inclusion and respect fostered by changing mindsets and behavior in an industry traditionally dominated by men.

UPDATE

BASF STRENGTHENS INNOVATION PIPELINE FOR SUSTAINABLE AGRICULTURE

BASF has strengthened its activities in research and development (R&D) for sustainable agricultural innovations, helping farmers to overcome environmental and economic challenges as well as meeting consumers' demand for more sustainably produced food. With solutions launching throughout the next decade, the pipeline supports the company's aim to annually increase its sales share of agricultural solutions with substantial contribution to sustainability by 7 per cent. By 2030, more than 30 major R&D projects will complement BASF's connected offer of seeds and seed treatment products, chemical and biological solutions, as well as digital services. This brings the pipeline to an estimated peak sales potential of more than €7.5 billion.

"BASF leads in solutions for sustainable agriculture. In addition to developing innovations, we also provide a connected offer, combining effective products as well as new technologies and services, tailored to customers' needs and their different crop systems around the world," said Vincent Gros, President, Agricultural Solutions division. BASF has committed to ambitious sustainability targets for its agriculture business by 2030: Besides increasing the annual sales share of sustainable agricultural solutions, farmers will be supported in reducing their CO2 emissions by 30 per cent per ton of crop produced. Further, the company strives to apply digital technologies on more than 400 million hectares of farmland cumulatively by 2030, while continuing to ensure the safe use of its products.

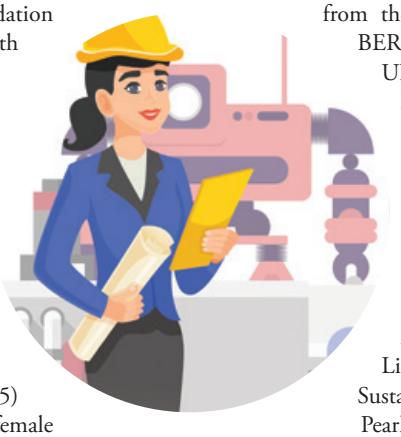
"Sustainability is engrained in our entire R&D process. It leads the way in how we develop our innovations, which support farmers produce more and better while preserving natural resources," Gros emphasized.

By Kruti Bharadva

GENDER EQUALITY IN THE MANUFACTURING SECTOR

Ambuja Cement Foundation collaborates with GRI South Asia to lead dialogue on gender equality in India's manufacturing sector

Ambuja Cement Foundation (ACF) in association with Global Reporting Initiative (GRI) South Asia organised a virtual roundtable on – 'Gender Equality in Manufacturing Sector' on 17th March 2021. This initiative was aimed at drawing attention to women's empowerment, and the opportunities in the manufacturing sector - to advance gender equality and inclusive development.



McKinsey Global Institute (2015) reported that if India increases its female labour force participation rate to 10 per cent by 2025, its GDP could rise exponentially by 16 per cent as compared to the current business situation. The majority of women are underrepresented in manufacturing and the argument to increase the industry's fair share of female talent is persuasive, however, one factor is certain: Manufacturing companies need a different approach towards recruiting, retaining, and advancing women in the workplace irrespective of their backgrounds.

SUSTAINABLE DEVELOPMENT GOALS (SDGs)

India adopted the Sustainable Development Goals (SDGs) in 2015 and the country's laws have provided opportunities to foster female interest in the industry and to exemplify the potential that exists for women in this sector. However, there's still a long road ahead. To successfully achieve the SDGs, partnerships between the government and private sector are required, thus this virtual event.

The event was witnessed by notable speakers from the industry including René VAN BERKEL, Representative UNIDO, UNIDO Regional Office India, Rubana Huq, President, Bangladesh Garment Manufacturers & Exporters Association, Dr. Aditi Haldar, Director, GRI South Asia, Suhas Joshi, Head of Sustainability and Business Stewardship, South Asia Bayer Group, Pratima Kirloskar, Promoter Group, Kirloskar Brothers Limited and Magali Anderson, Chief Sustainability Officer, Lafarge Holcim.

Pearl Tiwari, Director and CEO, Ambuja Cement Foundation shared certain important observations with regards to women in the manufacturing sector. She said, "The issue of gender equality in workforce has been discussed at a global level. The participation of women is lesser in the developing countries – problems such as wage gap, skill gap exists. Manufacturing industry is a vital sector for the development of any economy. This sector is mostly male dominated. Therefore, manufacturers need to rethink their hiring strategies. Diversity and inclusion are imperative for us in building a peaceful and prosperous society."

> "We need to come up with affirmative steps and a legal framework to create a safe working space for women. The mindsets, notions, and practices need to change which will help to create equitable workplaces

> "We as a society need to come up with affirmative steps and a legal framework to create a safe working space for women.

Dr. Aditi Haldar, Director, GRI South Asia also threw light on the gender gap. She said, "We as a society need to come up with affirmative steps and a legal framework to create a safe working space for women. The mindsets, notions, and practices need to change which will help to create equitable workplaces."

Together ACF and GRI SA along with the government and other organisations are creating opportunities for women where they are welcomed with dignity and respect.

By Kruti Bharadva

TROUBLESHOOTING HOLEMAKING IN STAINLESS STEEL

Machining stainless steel comes with its own set of challenges. Here is an indepth look at the entire process and the best methodologies

Unlike machining other materials, machining stainless steel requires review of a myriad of aspects prior to beginning work in the machine shop. Not only should cutting tool specialists and coolant specialists be consulted, but machine capabilities should be addressed as well. Furthermore, one must verify that the correct tooling components are being used: cutting tool geometries, substrates, and coatings, type of coolant and coolant pressure among others. Still though, machining stainless comes with many unique challenges because of its low machinability—a machinability rating that needs to be overcome to utilize the many benefits of stainless steel.

STAINLESS STEEL FAMILIES

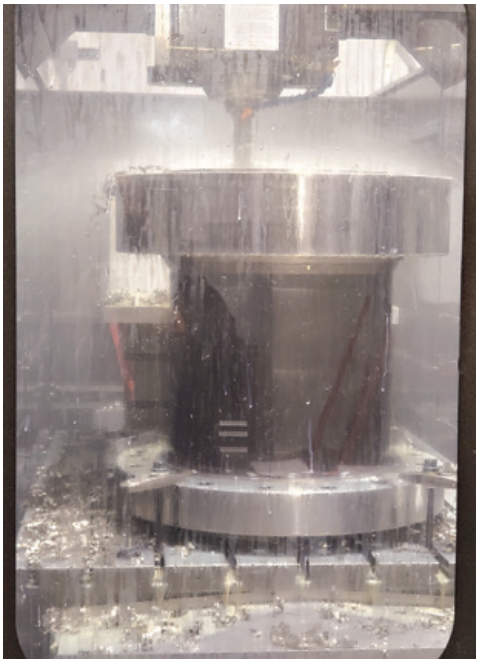
Stainless steel is offered in varying grades based on specific properties. These grades are also split into groupings based upon metallurgical qualities. Outlined below are the different families of stainless steel.

Austenitic – A rather common material, austenitic steel is identified as the Type 300 series; grades 304 and 316 are the most accessible. While austenitic stainless steel cannot be effectively heat treated, it can be hardened through cold working—the process of changing the shape without the use of heat. Corrosion resistance, low magnetism and good formability are also characteristics associated with this family of stainless.

Ferritic – As part of the Type 400 series, ferritic stainless steels are characterized by their corrosion resistance, strong ductility and magnetism and are typically iron-chromium alloys. This family can be altered through cold working rather than thermal hardening methods.

Martensitic – Similar to ferritic stainless, martensitic are also iron-chromium alloys within the Type 400 series; however, this grade is able to be hardened by heat treatment unlike the ferritic grade. Other characteristics include magnetism, good ductility and corrosion resistance.

Precipitation-hardened (PH) – Through the precipitation hardening process, precipitation-hardened stainless steel attains more strength in addition to greater corrosion resistance. Additionally, it is similar to martensitic stainless in terms of chemical makeup.



Duplex – With a composition made up of nickel, molybdenum and higher chromium levels, duplex stainless steels combine features of ferritic and austenitic stainless, yet this family demonstrates greater strength and high localized corrosion resistance.

Whether machining valve choke bodies for the offshore oil industry (410 stainless), pump covers for the food processing industry (316 stainless steel), bushings for the aerospace industry (17-4 stainless steel) or pumps for the water and wastewater industry (304 stainless steel), knowing and understanding the varying grades and properties of stainless steel will enable machinists to effectively utilize stainless steel and overcome its challenges when they arise.

THE CHIP CONTROL CHALLENGE

One of the greatest challenges of machining stainless steel is chip control. Alloying elements such as nickel cause stainless steel to be partially heat resistant,

which results in difficulty forming a chip and, thus, poor chip evacuation. In typical steel cutting applications, heat transfers into the formed metal chip. When machining stainless, the heat resistant nickel alloys prevent this heat transfer. This leads to higher cutting temperatures and increased rates of tool deterioration when compared to common steel machining. Simply stated, the nature of the material and its high amount of elasticity make it difficult to achieve chip formation and induce quite a bit of wear on the cutting tool.

> One cannot get away with just anything when machining stainless steel. stainless steel requires review of a myriad of aspects prior to beginning work in the machine shop

Combatting these challenges can be done a few ways—one of those being understanding machine conditions. While machine type does play a small factor, machine condition is more detrimental. Machinists must ask themselves, is the spindle rigid? Is the alignment reasonable or near zero runout on a lathe? Knowing these factors can greatly benefit or cause significant issues when trying to machine stainless steel. Additionally, running through the tool coolant provides significant tool life advantages over flood coolant. Ultimately, due to its alloying elements, more torque and horsepower are required to drill stainless than typical steel or aluminum materials.

These challenges in stainless applications can also be resolved by working with a more aggressive geometry to attempt to get the chip to form. In austenitic stainless like 316, it is best to use a geometry with a higher rake angle to produce a more manageable chip; however, when working with a harder material such as PH stainless, this method is not effective. In this instance, increasing the rake angle causes the cutting edge to weaken—in turn reducing tool life. With harder materials, this makes the negatives often outweigh the positives.

KEY BENEFITS

Nevertheless, the benefits of stainless are so numerous that it is beneficial to overcome these challenges when possible. Corrosion resistance is one of the key benefits of stainless steel. Because a number of grades of stainless are highly corrosion resistant, it is the material of choice in applications where weather or corrosive materials will be in direct contact. For example in the energy industry, electrical wiring that is run through the ocean for offshore wind farms is made out of stainless steel or a high temp alloy material because of its corrosion resistance, which does not allow salt water to negatively impact it as it does other materials. Similarly, offshore drilling utilizes stainless steel because of the corrosive and abrasive materials that are being pumped through these lines.

The food industry is another industry where stainless steel is often used. Stainless steel's chromium composition, which must be a minimum of ten percent, is highly reactive to oxygen environments. This forms a strong, unreactive barrier on the surface of stainless steel, making it the material of choice for the food industry. Finally, the naturally high strength of stainless steel as well as its resistance to corrosion and weather make it a vital material for the aerospace industry in terms of precision parts, fittings, and other components.

All in all, stainless steel is not a material that can be brought into a machine shop to machine straightaway; every aspect must be reviewed prior to machining stainless steel. Not only do machinists need to firmly understand the different grades of stainless and their properties, but they also need to examine machine capabilities. Yes, tool wear and excellent chip formation are challenges that one will face when drilling stainless. Fortunately, these can be managed through proper coolant usage and correct choice of insert geometries, coatings and substrates.

INTERNATIONAL UPDATE

INTEL LAUNCHES SKILLS COURSE FOR WOMEN

Intel, Fastrack to IT (FIT) and the Kildare and Wicklow Education and Training Board have launched a new manufacturing skills programme for women in Ireland

The Advanced Manufacturing Technician Maintenance Skills pilot initiative is aiming to help women pursue careers in Ireland's advanced manufacturing sector by giving them skills training and hands-on experience.

The organisations said that manufacturing is "one of the most dynamic and vibrant sectors" in Ireland and is expected to see increasing growth and complexity in the years ahead with the impact of industry 4.0 and the adoption of digital technology. Ireland is home to many manufacturing companies, producing everything from computer chips, plastics and pharmaceuticals to bulk chemicals, electrical components and control systems.

SAVING ENERGY AND WATER

New precision irrigation carriage reduces water and fertiliser consumption by 75 per cent

The igus roller e-chain for targeted irrigation has potential for considerable savings. The aim of the precision irrigation carriage is to use water resources sensibly whilst protecting the groundwater at the same time. With the new automatic irrigation system, the water reaches exactly where it should: directly to the plants. For the safe and compact guidance of hoses and cables, the developers rely on an igus energy chain system consisting of roller chain and guide trough.

A roller energy chain in a guidelite guide trough ensures safe guidance of the hoses and cables in the precision irrigation carriage.

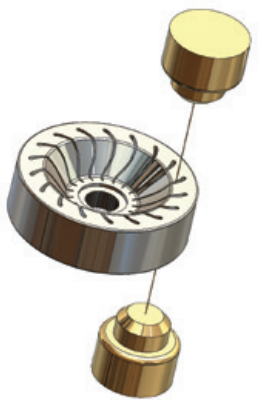
Water shortage is a major problem worldwide, which is why solutions are needed, especially in agriculture, which bring water in a targeted manner to the plant. Whereas conventional irrigation carriages with a continuous jet stream waste a lot of water, the precision watering carriage irrigates and fertilises in a stipulated way. The unique system is especially suitable for outdoor potted plant cultivation and ensures that water is delivered precisely into the middle of the plant's growing pot. By using this new technology, savings of 50 to 75 per cent are possible in irrigation water, plant protection and fertiliser, depending on the pot size. This also reduces the nitrogen input into the groundwater. The precision irrigation carriage has a span of 40m and a travel of 208m. The cables and hoses for the water supply were pulled behind the carriages until now. A loop was created, which required about 2m of space between the carriage guide and the plants. A safe and space-saving hose with cable guidance was required.

The main advantage of the system is that by guiding the hoses and cables, the usable area is increased by 343 square metres. It also increases the service life of the supply components in the system. A 3500R series roller chain with a width of only 35cm is used in a guidelite guide trough. The technical basis of the energy chain is the integration of rollers into the chain links to reduce the coefficient of friction on long travels. Thereby, up to 57 per cent of the required drive energy can be saved while moving the energy chain system. The guidelite guide trough is a cost-effective and quickly installable solution made of corrosion-resistant and durable high-performance polymer.

For more information contact:
Kaushik Ramanujachar
Product Manager E-ChainSystems®
igus (India) Private Limited
kramanujachar@igus.net
on www.igus.in

NEW WIRE EDM MODULE WITH SINGLE CLICK MODEL-TO-G-CODE FUNCTIONALITY

HCL Technologies (HCL) has announced a new wire EDM (Electrical Discharge Machining) module for the CAMWorks suite of CAD/CAM software. The wire EDM module includes new cutting-edge functionality that takes the design model to G-code in one click. Once the user clicks the "Solid to G-code" button, the system automatically searches the part for machine-able features, identifies them, generates all the operations with the users' preferences and settings (including tool offsets, cutting conditions and start holes), creates the toolpaths, and posts the G-code. Using the new wire EDM module, even complex 2-axis parts, 2-axis parts with tapers, and full 4-axis wire EDM parts can now be programmed in a single click.



The new wire EDM module also includes enhanced feature recognition for non-planar geometry. Instead of the user needing to project the geometry for the top and bottom of the part and create 2D sketches, and the software uses geometry directly from the solid model to construct and create the correct top and bottom profiles automatically.

Additional highlights include automatic angular wire threading, support for SOLIDWORKS patterns, and automation based on face colours. Automatic angular wire threading analyzes the part and automatically recognizes when angular threading would be required. It then creates the toolpaths necessary to allow for angular threading of the wire and to machine the part. Support for SOLIDWORKS patterns simplifies the NC code and streamlines the programming process by automatically identifying the patterns and utilizing them to simplify the CNC program. The technology based on face colours allows the user to easily identify and manage features that are to be programmed, as well as how they need to be machined. By assigning a colour to the face of a part or to the entire part, user-defined machining strategies are assigned automatically to streamline the programming process.

The technology included in the new module has been field tested on the most advanced EDM machines

PC-BASED CONTROL SIMPLIFIES INTEGRATION OF S7 CONTROLLERS

Beckhoff's TwinCAT 3 software now offers efficient connectivity options

The openness of PC-based control and the resulting array of connectivity options with other systems number among the fundamental advantages of TwinCAT automation software from Beckhoff. A new add-on now also enables easy and efficient communication with Siemens S7 controllers.

TwinCAT 3 offers numerous options for connecting TCP/IP-based thirdparty systems to the main control program: OPC UA, MQTT, HTTPS and Modbus are only a few prominent examples of an entire range of communication protocols. The TwinCAT S7 Communication (TF6620) function now expands this broad spectrum to include the S7 communication protocol.

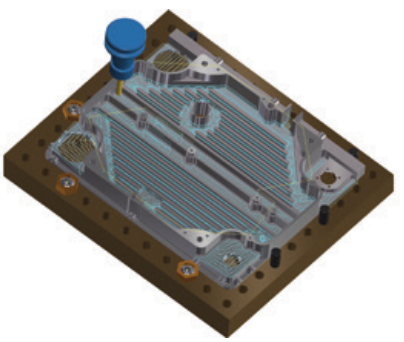
This product implementation enables reading and writing of variables from an S7 controller. The PLC application program carries this out directly – either via dynamically parameterizable PLC function blocks or via easily configurable I/O mapping. No additional hardware is required and the local TCP/IP network serves as the transport medium.

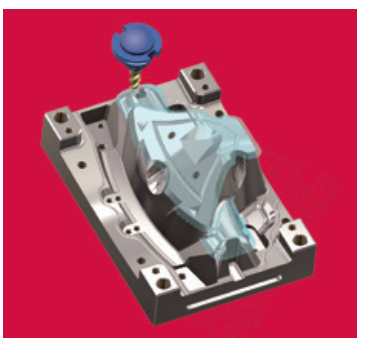
TwinCAT 3 software now offers efficient connectivity with S7 controllers

STREAMLINING THE MANUFACTURING PROCESS

The Mastercam Mill has been finessed to emphasise on speed and automation, with an aim to improving shop floor productivity.

The Mastercam Mill now offers expanded machining flexibility, with an increased emphasis on speed and automation. Multiaxis features, 3D enhancements, and 2D high speed toolpaths combine with dozens of additional new enhancements in a software package intended to improve shop floor productivity.





Multiaxis Improvements

Maintaining climb and conventional machining is crucial for surface finish and tool life. Controlling climb and conventional cutting for morph, parallel, unified, project curve, and flow toolpaths now provide constant control of climb or conventional cutting even while in complex areas that would require use of both sides of the tool.

The new 3+2 automatic roughing toolpath automatically makes multiplane 3-axis toolpaths for roughing. Mastercam analyzes the model and stock, and then creates a roughing toolpath. Mastercam calculates the remaining stock and computes a new toolpath. This continues until only a defined amount of stock remains, and results are all contained within one toolpath.

Multiaxis roughing has been enhanced and renamed to multiaxis pocketing and includes new options such as undercut roughing, wall finishing, and floor finishing. multiaxis pocketing provides greater control of the tool contract point and machining angle when using accelerated finishing tools and ensures that you get the best possible motion.

The new Unified Multiaxis toolpath allows you to select multiple pieces of input geometry to generate the toolpath pattern. Then, using those geometry choices, the toolpath picks the best algorithm to calculate the path.

2D and 3D Enhancements

Mastercam's 3D High Speed Blend toolpath includes many enhancements including the ability to keep created passes equidistant in 3D by adding cuts in steep areas, the capability to set the exact number of cutting passes, reverse cutting direction, confining curves to tool tip or tool contact point, as well as two new methods in the cut method options. By applying automatic and custom angles to raster toolpaths, mastercam now automatically sets different angles to maximize the length of the cut pattern and/or minimize the connecting moves.

Advanced Drill, a new toolpath, is a customizable multi-segment drill cycle that is useful for spot drilling, deep hole drilling, and back spot facing. Each segment of the drill cycle can be defined in a table, and for each segment, you can customize any or all conditions. The new Chamfer drill uses tools with a tip angle and chamfers holes after calculating the correct depth based on the desired width or depth. It also allows you to select holes of different diameters or sizes—or that lie in different planes—and machine them in a single operation with a single tool.

•MARK YOUR DIARY•

A list of key events happening between April 2021 to October 2021, both nationally and internationally.

APRIL 8–11, 2021

AMTEX
New Delhi

APRIL 8-11, 2021

Automation & Robotics
New Delhi

APRIL 12-16, 2021

Hannover Messe-Digital

APRIL 27–28, 2021

EuroBLECH Digital

MAY 7-9, 2021

EV Expo
New Delhi

JUNE 17-23, 2021

IMTEX
Bengaluru

JUNE 28-30, 2021

Auto Technika
Bengaluru

SEPTEMBER 3-5, 2021

IMEX
Mumbai

SEPTEMBER 3-5, 2021

Hand Tools Expo
Mumbai

SEPTEMBER 27-29, 2021

India Manufacturing Show
Bengaluru

SEPTEMBER 28-30, 2021

PU Tech India
Delhi

OCTOBER 4-9, 2021

EMO Milano
Milan, Italy

OUR INHOUSE UPCOMING EVENTS

THE MACHINIST SUPER SHOPFLOOR AWARDS 2021

Coming soon

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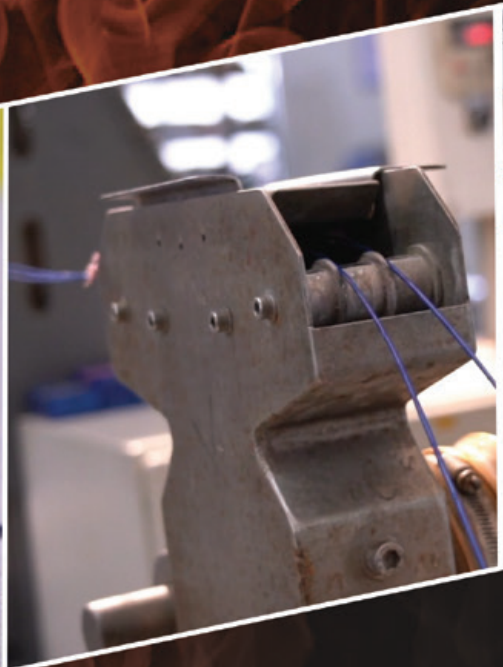

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1580V 1260V

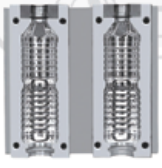
Tyre Mould

Cavity

Mouse Mould

Connecting Rod Mould

Teeth Mould



Bottle Mould

The Advantage

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- Available in three different control system options (Mitsubishi, Seimens, Fanuc)

Machine Highlights

- Roller guide ways on all axis
- High metal removal rate
- Handling intricate geometry
- Close surface profile and good accuracy
- High Rapid rates for Better cycle time
- Direct drive high speed spindle in 6000/8000/10000 rpm

The Economic Times Bb MC BEST METAL CUTTING BRANDS 2020

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*- The values mentioned are optional features.