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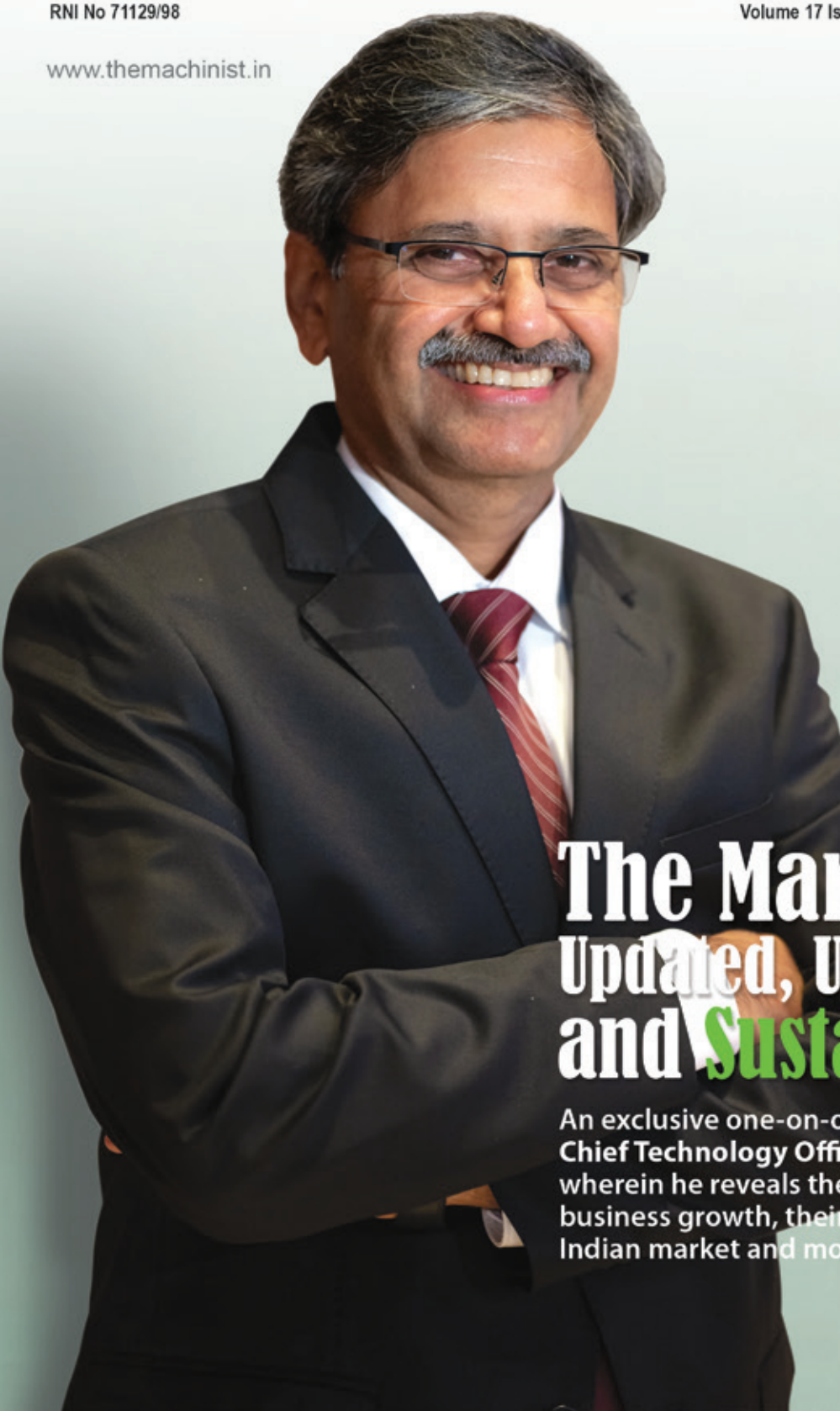

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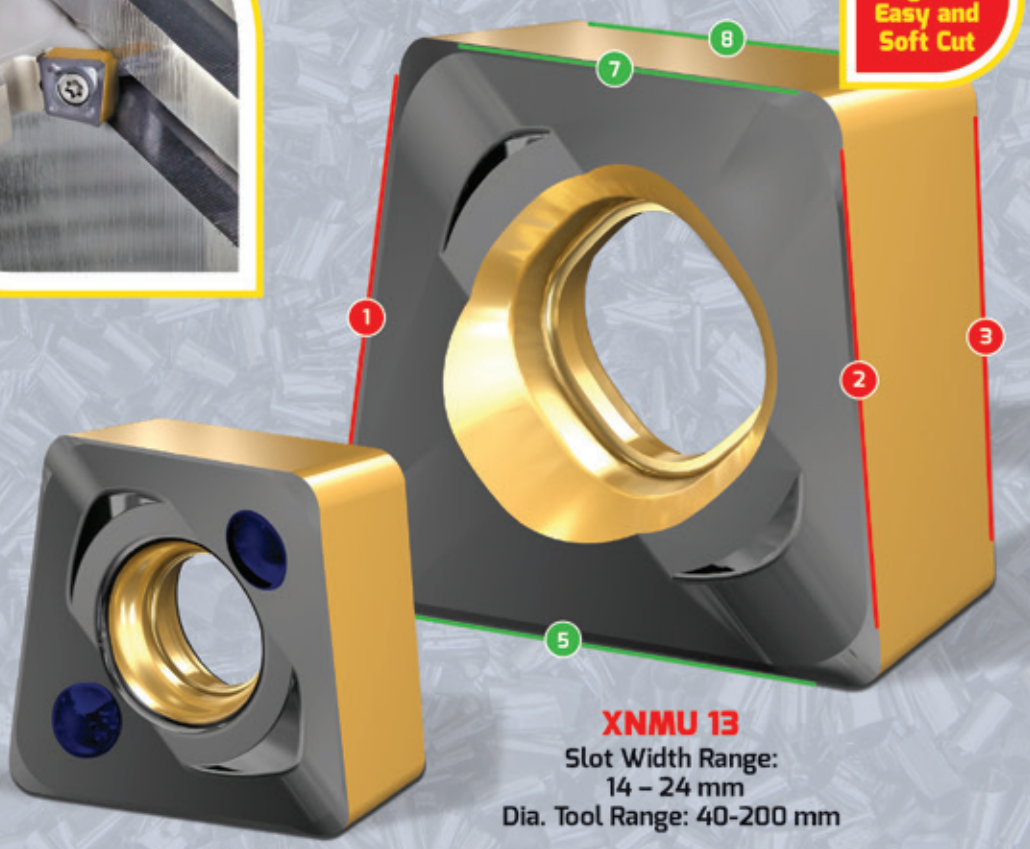

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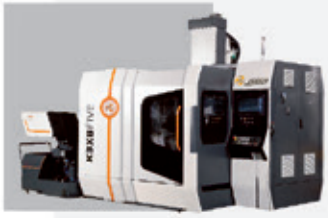

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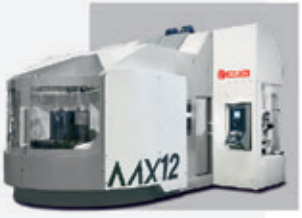

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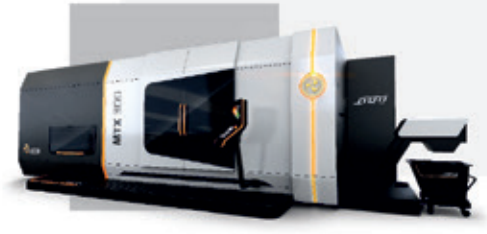

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CAPITAL GOODS: WHAT'S IN THE PIPELINE?

In the past 12-18 months, there has been an unprecedented increase in order inflows in the capital goods sector. Order inflows are being driven by the spur in government investments post the pandemic to strengthen the country's infrastructure and achieve self-reliance in manufacturing and increase technical competence. Moreover, the uptick in private Capex as a result of increasing capacity utilisation in the steel, cement, petrochemical, and refinery sectors due to the spike in commodity prices has fuelled the order book of most of the leading capital goods companies.

The order book of our coverage universe companies is at an all-time high with average revenue visibility of three years. Further, most of the companies expect strong inflows in the coming quarters as the order pipeline is quite robust as well as diversified with orders expected from infrastructure, hydrocarbon, power generation and distribution, defence as well as private sectors such as cement, petrochemicals and refineries. Further, emerging sectors such as data centres, renewable energy, and process automation are expected to aid the order inflow's growth going forward.

Order inflow of leading capital goods companies has grown at an average of 18 per cent y-o-y in FY2022. This has led to the companies achieving the highest-ever order backlog. Growth was largely driven by various government initiatives towards infrastructure and being self-reliant through the 'Make in India' initiative. For instance, the National Infrastructure Pipeline with an investment of Rs 111 lakh crore has provided a fillip to order inflows.

The government would be investing in the railways' sector to enhance track capacity, improve freight efficiency, augment the speed of trains, enhance safety, and ensure better connectivity. The government has planned to expand the National Highway network by 60,000 km by 2025 in major economic corridors, strategic areas, and elevated corridor and flyovers network in major cities such as Delhi, Chennai, Kolkata, Mumbai, and Bengaluru, with an investment outlay of Rs 20.33 lakh crore under NIP. The government also plans to spend Rs 750,000 crore on oil and gas infrastructure over five years.

The private sector witnessed recovery post the pandemic, resulting in strong volume growth, which led to a significant increase in capacity utilisation levels of private industries. Moreover, supply chain disruptions (due to the Russia-Ukraine war and Covid-led lockdowns in China) necessitated backward integration in many processes. Hence, the rise in Capex in sectors such as oil and gas, steel, and cement, as well as emerging avenues such as green hydrogen, digitalisation, data centres, and automation have also led to growth in order inflows of capital goods companies.

The government's efforts and initiatives such as Atmanirbhar Bharat, Power for All, Make in India, and PLI schemes have given an impetus to investments across various sectors of the economy and new opportunities are emerging. Further, global companies are adopting the China Plus One strategy to de-risk their supply chains and are considering India as one of the alternatives. This has turned out to be a good opportunity for India as its manufacturing cost is low and the availability of skilled labour is high. Hence, I believe the capital goods sector is in a sweet spot and can witness a strong Capex upcycle.

Editor

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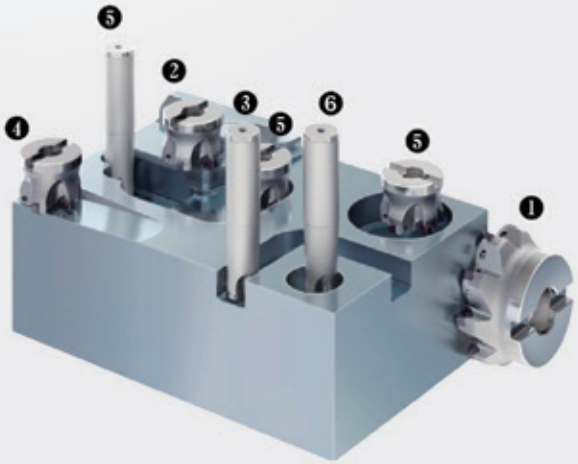

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Aequs & KLE Tech To Set Up Aequs Innovation Centre

DIVERSIFIED CONTRACT MANUFACTURERS, Aequs and KLE Technological University (KLE Tech.) have joined forces with a view to establishing the Aequs Innovation Centre (AIC). It is a knowledge centre true to its name that is known to develop innovative products for some of the biggest clientele in the Toys and Consumer Durable Goods markets.

"AIC will function as an innovation ecosystem and incubation platform for accelerated product development while leveraging the joint capabilities and infrastructure of Aequs and KLE. The objective is to speed up the idea-to-prototype journey for these emerging industries in India's manufacturing journey," said Aravind Melligeri, Chairman & CEO, Aequs, during the launch event at AIC today.

Further, adding material to the knowledge shared, he quoted, "The AIC seeks to ease a long-felt pain of enterprises, particularly in the hinterland, which faces challenges in developing products from scratch with limited expertise and resources".

"This new industry-academia initiative will harness the unconstrained minds of young engineers and academia. The Aequs Innovation Centre is in line with KLE Tech's belief that higher education institutions need to continually innovate to meet the demand of global economies by developing their capacity in research and development," said Ashok Shettar, Vice Chancellor, KLE Technological University.

Planned to be fitted at the Industry 4.0 Lab built by KLE Tech University, the AIC will leverage Aequs' knowledge and proficiency to train engineers and make use of their expertise in cutting-edge technologies and product design & development, and benchmarking processes in the industrial ecosystem. This will result in the manufacturing of top-notch Consumer Durable Goods to bring in maximum brand satisfaction.

With that being said, direct employment will be at large as the AIC anticipates employing around one hundred-plus engineer and students in the first five years.

Alstom Awarded €98 Million Contract To Manufacture 78 Chennai Metro Coaches

ALSTOM HAS BEEN AWARDED a contract worth €98 million (Rs 798 crores) to design, manufacture, supply, test, and commission 78 advanced metro coaches for the Chennai Metro Rail Limited (CMRL). The Phase II metro cars will operate on a 26 km corridor, which will connect Poonamallee Bypass – Light House through 28 (18 elevated & 10 underground) stations.

The million-dollar contract includes the manufacturing of 26 metro trains (three-car configuration) that can operate at a top speed of 80 kmph, as well as the training of personnel. With a 25 KV power supply for optimal energy efficiency, Alstom's Metropolis metros prove to be a safe and reliable passenger transport for over 11 million citizens of the city. The socio-economic development can be stimulated by connecting key zones with the contribution of the overall project.

Designed & engineered to run driverless, the metro trains are supported by Unattended Train Operations (UTO). While these trains can completely run-on signals the Operations Control Centre (OCC) will monitor all its functioning.

In accordance with the Government's 'Make in India' vision, these metro cars will fully be manufactured in India at one of Alstom's largest urban rolling stock manufacturing facilities in Sri City, Andhra Pradesh. This manufacturing facility possesses an annual capacity of producing 480 cars. The centre also has a strong portfolio that supports several domestic and international metro projects.

Alstom's previous projects include the successful manufacturing and delivery of 208 metro cars for the 54km of the first phase + extension of Corridor-I from the airport to Wimco Nagar and Corridor-II from Chennai Central to St. Thomas Mount. These trains are designed in a way ensuring Automatic Train Protection (ATP) and Automatic Train Operation (ATO), and regenerative braking system to significantly save energy. In addition to this, the company has successfully designed, tested, and commissioned the track works covering 45 km of corridors I & II for the Chennai Metro.

In line with the government's modernisation initiatives, Alstom has introduced several breakthrough technologies in India with world-class rolling stock, rail equipment & infrastructure, signalling and services. The company's successfully running metro trains can be seen in the cities of Delhi, Chennai, Lucknow, and Kochi. It is currently also manufacturing for Mumbai Metro Line 3, Agra-Kanpur metro, and Indore-Bhopal projects.

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Narinder Mittal Appointed Country Manager & MD of CNH's Agriculture Business In India & SAARC

CNH INDUSTRIAL INDIA announces that Narinder Mittal has been appointed as the Country Manager & Managing Director of CNH Industrial (India) Private Limited's Agriculture business for India and SAARC. The appointment will be effective from January 1, 2023.

Mittal succeeds Raunak Varma, who has been with CNH Industrial for over two decades.

Mittal, an alumnus of Columbia Business School, New York and an Engineering graduate from NIT Calicut, has vast experience in roles of increasing importance, most recently as the Vice President of Industrial Operations, APAC. Mittal joined the company in 2016 as Executive Director of India Manufacturing Operations, and was promoted to Vice President of AMEA (Asia, Middle East and Africa) with responsibility for manufacturing operations in China, India, Russia, Turkey, ANZ and Uzbekistan in 2020.

Prior to joining CNH Industrial, Mittal was the President and Corporate Head of Operations at Sonalika International Tractors Limited. He has an extensive industrial experience, having held managerial and operational leadership roles in companies including Claas, Federal-Mogul and many automotive companies throughout the country.

"India is a truly dynamic market with immense potential. It plays a vital role in the growth of the APAC region. CNH Industrial is focused on new trends and technologies to drive agricultural productivity and efficiency and Mittal, with his leadership and drive, is best placed to leverage new growth opportunities and strengthen our position in India," said Chun Woytera, President APAC, CNH Industrial. "I want to thank Raunak Varma for his five years' of service where he worked tirelessly to ensure success for our company in the market."

CNH Industrial India serves the country through its Case IH, New Holland Agriculture and CASE Construction Equipment brands, delivering on the promise to provide world class products of engineering excellence, with 'Made in India' manufacturing operations for over 25 years. In 2018, the company launched its own financing arm CNH Industrial Capital to support the business.

Continental Opens New State-of-the-art Campus In Bengaluru

INTERNATIONAL TECHNOLOGY COMPANY, CONTINENTAL inaugurated its Rs 1000-crore campus for its Technical Centre India in the presence of Dr C. N. Ashwath Narayan, Minister for Higher Education; IT & BT, Science & Technology, Skill Development, Entrepreneurship & Livelihood, Government of Karnataka.

The one million sq. ft. state-of-the-art campus is located at Electronic City Phase II, Bengaluru. The development of the new TCI campus is executed in a way that it houses hi-tech software, hardware, and vehicle test facilities for R&D and a plethora of training centres, all of which contribute to further the scope of innovation.

Continental's sustainability ambitions are fulfilled with a Platinum Certification from India Green Building Council (IGBC). This indicates that the campus is rich with green lung spaces, renewable energy sources, and rainwater harvesting. The centre is known to have a strong labour force and is Continental's largest and key R&D location globally. Established in 2009, the centre has developed itself over the years both in terms of people and proficiencies. TCI will extend its services to all five automotive business areas: autonomous mobility, architecture and networking, safety & motion, smart mobility, and user experience.

A wide list of TCI's contributions to saving lives include developing software for radar and cameras aiding several driver assistance features and functions such as the surround view system, adaptive cruise control, emergency brake assist, and lane change assist, among several others. As a result of development in the field of integrated active and passive safety technologies and products for enhanced vehicle dynamics, Continental is driving towards its goal of Vision Zero (zero fatalities, zero injuries, zero crashes).

Growing software content in vehicles is a result of high-performance computing which is necessary for defining the future of vehicle architecture. The Centre widens its competence when concerned with high-performance computing, and developing an in-car application server. Such services are what customers seek globally today. TCI also has wide capabilities for developing contemporary user experience technologies that enhance the interactive quotient within the vehicle, and present the occupants with visually appealing display systems.

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Hexagon's Elements Help Engineers Design System-level Modelling Products

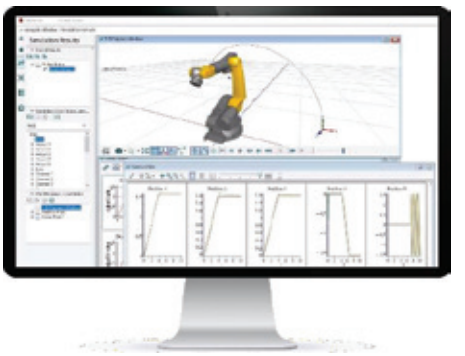
HAVING INTRODUCED ELEMENTS, new simulation software, Hexagon's Manufacturing Intelligence division aims at helping engineering teams understand the behaviour of systems that appear too complex in modern products. This software can evaluate the team performances and feasibility of new design concepts quickly to observe more efficient product development and reduce risk as well as cost.

Elements address the growing importance of integrated, multi-disciplinary system development and end-to-end workflows. The Elements software is easy for systems engineers to learn and use, using its drag-and-drop environment to model any physics type or logic and analyse systems by intuitively connecting blocks – regardless of whether they represent electrical, or hydraulic, or mechanical components – to solve system-level engineering problems. It is based on the Modelica language, an open and widely used standard for building fast, flexible, and customisable models.

Elements further ensure the quick and efficient computation of system-level models by optimising equations and code for fast calculation, thus boosting engineering development. As the design develops, and components and subsystems are detailed in specialist simulation software, the components can be routinely integrated into a larger system through full compliance with the FMI standard and Hexagon's proprietary SmartFMU technology. SmartFMU unlocks the Functional Mock-up Unit (FMU) for supported Hexagon products so that changes can be made directly in the Elements system-level model without going back to the specialist Computer Aided Engineering (CAE) software and its expert user. This will avoid resource blockage, time-consuming switching between applications, and versioning problems.

Both standard FMI support and the novel SmartFMU plug-and-play capabilities provide immediate value and solutions to challenges of system complexity, including those for transportation electrification; for example:

- Finding solutions to vehicle range optimisation issues by considering a vehicle's energy use under different driving conditions, taking into account eDrive design, regenerative braking, climate control, ADAS safety requirements, and battery choice.
- Improving the flexibility and accuracy of industrial robotics by designing control systems considering detailed mechanical system vibrations and interactions from multi-body dynamics simulation.
- Right-sizing heavy battery systems in new eVTOL aircraft designs by helping engineers understand the power draw during take-off and landing, safety margins, and thermal management system controls.
- Implementing safer, more sustainable long-life battery systems by using Elements to design control systems that balance the improved performance of lithium-ion batteries at elevated temperatures with the impact heating has on cell degradation.



Elements was developed in collaboration with Maplesoft.

Zen Mobility To Launch Purpose-built 'Light Electric Vehicles (LEV)'

ZEN MOBILITY has announced its first range of mobility solutions, which includes a multi-purpose four-wheeler LEV called the 'Zen Maxi Pod' and a purpose-built cargo three-wheeler LEV called the 'Zen Micro Pod'. The company most recently received the ARAI Certificate of Conformity for the Zen Micro Pod.

The Micro Pod, which will be made public in early 2023, aims to deal with the long-standing problems of riders and delivery partners in last-mile delivery. Zen Mobility also plans on launching a modern, multi-purpose 'Maxi Pod' in the coming years. Although it is designed in Germany and built indigenously, the Zen Micro Pod and Maxi Pod will be manufactured in India using locally sourced components, thus promoting the 'Make in India' initiative.

Powered by Zen's patented EV Drivetrain technology, it can be programmed to adapt to the varying nature of delivery operations. While the Micro Pod is specifically purpose-built, the Zen Maxi can be used for both passenger commute as well as goods delivery. The unique engineering feature of these vehicles lies in the lightweight construction of the composite chassis made from a combination of carbon fibre and glass fibre that enhance the specific performance-to-weight ratio. The Micro Pod has gone through several road tests across various parameters, including rough roads, steep slopes, and water wading tests, proving qualified by ARAI for its drivability, manoeuvrability, durability, and performance.

Namit Jain, Founder & CEO, Zen Mobility, mentioned, " People are likely to gravitate towards vehicles that offer better alternatives for problem-solving and are also aesthetically pleasing to look at. Hence, we have streamlined our efforts towards optimising the design process to not only enable easier handling, longer range, customisable storage options, lower cost of ownership, and a range of in-built technological features, but also style and design our vehicles to look aspirational that would naturally create customer pull."

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Hinduja Tech Acquires Drive System Design

HINDUJA TECH (HT), a world-class engineering services company, acquired Drive System Design (DSD), an engineering consultancy known for developing innovative solutions for electrified propulsion systems. DSD currently provides advanced engineering in several industries including automotive, commercial vehicle, off-highway, defence, and aviation across the United Kingdom, the United States, and Asia.

The acquisition helps HT in delivering end-to-end electrified propulsion systems design and development capabilities, strengthening its full-vehicle design and development position.

"The acquisition of Drive System Design is an important milestone in Hinduja Tech's growth journey in the eMobility industry. DSD has been focused on futuristic powertrain technology (ePT) since its inception over 15 years ago and has a state-of-the-art infrastructure in the UK and the US," said Kumar Prabhas, CEO, Hinduja Tech.

He added, "Both of these markets have high-end engineering talent and are leading the charge in the transition to electric mobility. As this demand increases, the combination of HT and DSD strengths will enable offering the best-in-class e-mobility solutions for global markets."

HT has 70+ clients globally, thus expanding its position in the outsourced engineering services industry and is aiming to speed up its growth to meet the rising demand for e-mobility. With DSD under its umbrella, HT will develop cutting-edge design and testing labs, along with advanced engineering capabilities, in the UK and the US.

"We believe that HT is the right partner at the right time and see this as a tremendous opportunity for the long-term future and expanded capabilities of DSD," said Mark Findlay, CEO, Drive System Design. "As part of the HT family, DSD will be able to increase its reach through HT's global business model and full vehicle development and integration expertise. It is an ideal complement to DSD's advanced engineering capabilities in transmission, driveline, motor design, power electronics and simulation."

igus Opens Nominations For Innovative Plastic-bearing Products

EFFECTIVE IMMEDIATELY, IGUS has started accepting submissions for the manus award 2023. The plastic specialist has been holding the ceremony every two years for the last 20 years, honouring the most creative, economical and sustainable uses of plain plastic bearings in industrial applications. The year 2021 witnessed a record number of participants with 582 submissions from 41 countries. The winners of the gold, silver, bronze and green manus awards will receive prize money of up to €5,000.

Plain bearings made of high-performance plastics are being extensively used by engineers irrespective of whether the product is a garbage truck, a packaging machine or an aircraft seat. As far as advantages are concerned, polymer bearings are lighter than metal bearings. It helps to improve energy efficiency, without requiring any additional lubricants, instead using solid lubricants that protect the environment. "We are always surprised at the applications in which our polymer bearings are now used across industries," says Tobias Vogel, CEO -Plain Bearings & Linear Technology, igus. "To promote this positive development and reward innovative engineers, we are honouring the most innovative uses of polymer plain bearings in industrial applications with the manus award 2023," he added.

igus will accept submissions until 10th February 2023. Everything is possible, from series applications to custom pieces. The only requirement: there must be at least one finished prototype. A jury of experts from science, industry and specialist media will then award the four prizes. The future winners will receive their awards at Hannover Messe 2023.

Increasing popularity

The next year will mark igus hosting the manus award for the 11th time. An estimated 3,000 applicants from all across the globe have participated in the competition in the recent years. The golden manus was awarded to Kässbohrer Geländefahrzeug AG.

In the four oscillating axles of the PowerBully track vehicle, the vehicle manufacturer declined the use of dirt-prone and maintenance-intensive metal plain bearings and instead opted for polymer iglidur TX1-type plain bearing bushings. For this application, igus manufactured and tested the polymer bushings in previously unheard-of dimensions. Finbin, a Finnish company, developed a dustbin that uses solar energy to compact waste, further earning the green manus. The company used dirt-resistant and lubrication-free plain bearings made from tribologically optimised plastic iglidur G in the hatch, pedal and transmission linkage of the bin.

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By Sangeet Kumar, Co-founder and CEO, Addverb

HOW AUTOMATION CAN RESOLVE LABOUR SHORTAGE & CONSUMER DEMAND

With the advent of Industry 4.0, warehousing became more prominent as the focus shifted towards the digitalisation of tasks.

There is an old saying - 'Necessity is the mother of invention' and perhaps the most applicable one in terms of advancing technologies. The rapid growth across industries, in terms of technological innovations, and newer mass production mechanisms, have reduced human effort and increased overall productivity.

During the second industrial revolution, also known as the technological revolution, many technological advancements took place. It was the time when the foundation of warehouse automation was also laid. In the mid-1950s the first warehouse automation machines were made, which were operated by small batteries laying the foundation for invention and development in the warehousing industry. Since then, the invention has been unstoppable.


Sangeet Kumar

With the advent of Industry 4.0, warehousing became more prominent as the focus shifted towards the digitalisation of tasks. The demand for more consumer goods increased and the tragic pandemic was fuel to the fire. The deadly pandemic had several drastic effects on the world but it has been a boon for technological advancement. The world has witnessed a row of technological inventions during this period. Just like any other industry, the supply chain had been adversely affected paving the way for technological progress.

Despite technological advancements, various industries were reluctant to adopt the latest technologies due to many reasons. But the tragic pandemic has left many industries around the globe in distraught conditions. As we know, the supply chain industry is labour-intensive, and the pandemic caused huge disruption to the supply chain industry leading to labour shortage. According to a report, Covid-19 has left a gap of 15 – 25 per cent in labour availability across industries.

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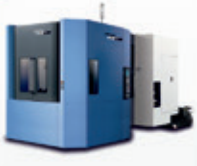

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CRUCIAL ROLE OF AUTOMATION

Automation came out to be very beneficial during such times of misery. Warehousing automation has reaped several benefits such as reduced labour costs, better inventory control and maximised storage space, etc. Warehouse automation resolved the labour crisis by automating tasks which are repetitive like pick and place, material movement, and enormous tasks like lifting heavy weights, palletising and depalletising so that humans can focus on more analytical tasks.

Warehouse automation not only resolved the issue of labour crisis around the globe, but has been fruitful in fulfilling increased consumer demand. With technological advancement around the world, consumers purchasing patterns also changed. Consumers have shifted from the traditional shopping style to online. Since then, the e-commerce industry is growing at a tremendous rate.

In India, 30 per cent of the retail market consists of e-commerce. According to a report by the Indian Brand Equity Foundation, the country's e-commerce market is expected to reach $111 billion by 2024 and $200 billion by 2026. There is no doubt that the e-commerce industry is witnessing tremendous growth, still, it does come with several pain points like quick picking and packaging needs, larger SKUs, changing warehousing landscape with the introduction of micro fulfilment and nano fulfilment centres, demand fluctuations, and promises to deliver on time.

The never-ending consumer demand is difficult to fulfil. To keep the digital e-commerce market floating, maintaining strong warehousing and distribution channels are crucial. Retail companies are more pressured to deliver products at a faster rate, to create credibility and a factor of reliability amongst the customers. Though the supply chain systems are improving, they are still facing labour shortages for deliveries and maintaining warehouses, which leads to delayed deliveries. Here comes the role that warehousing automation plays in solving many issues of supply chains.

THE SHIFT

The shift from labour-intensive warehouses to automated warehouses has been advantageous, especially for increased productivity, efficiency, and rapid deliveries. Businesses around the globe, and in India are opting for warehouse automation to extract more value from the business.

Warehousing automation has reaped several benefits for businesses. A case in point is, India's leading home-grown company Flipkart is expanding its warehousing operations across India to fulfil rapid customer demands. They are opting for more sophisticated warehousing technologies to resolve the challenges in the supply chain.

IMPROVING MANUAL WORK

Warehouse automation has improved the nature of manual work to a great extent. In warehouses, most of the work is repetitive which causes fatigue among the

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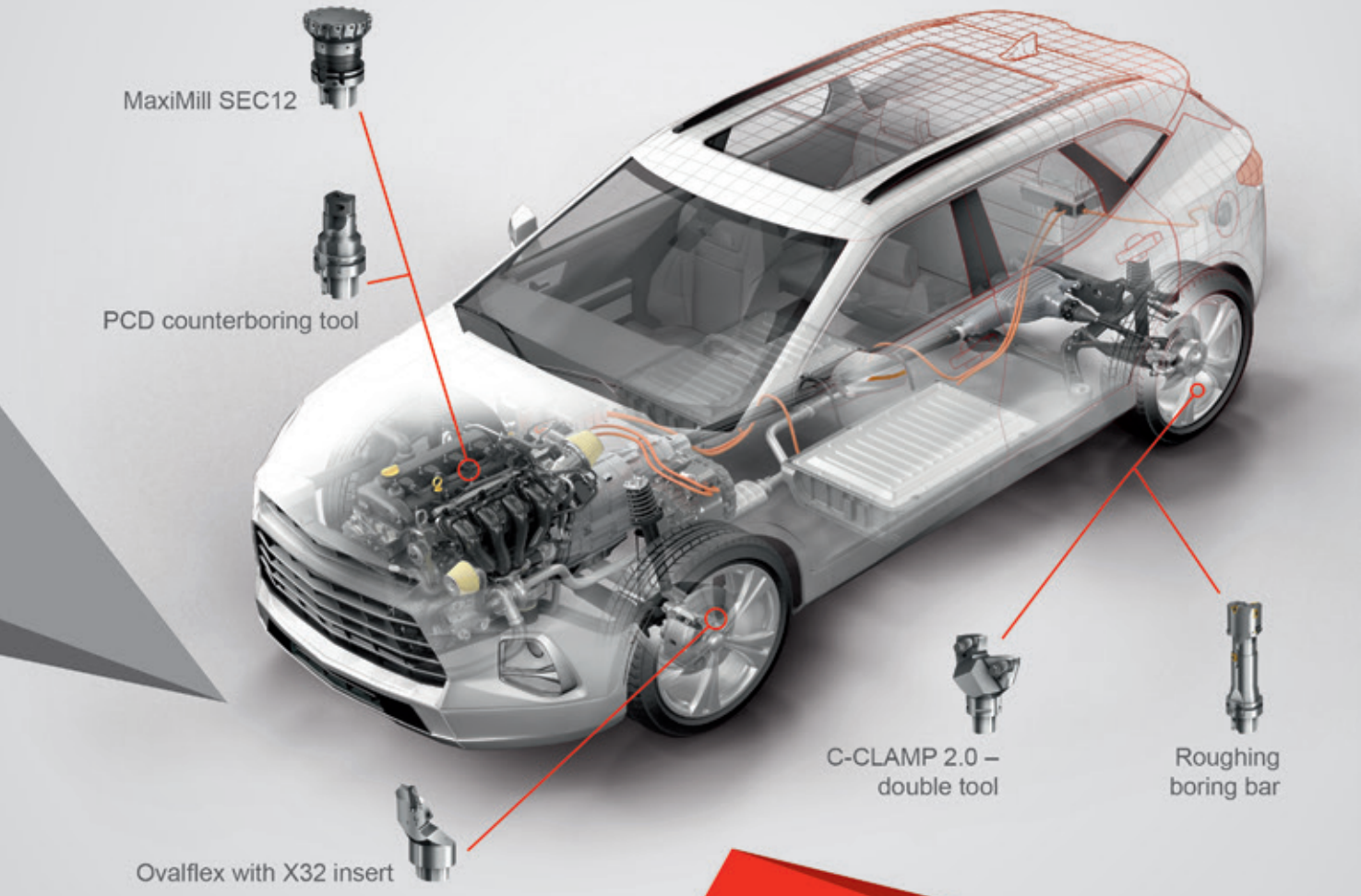

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workers leading to reduced work efficiency. Through automation, all tasks are taken up by robots relieving workers from performing repetitive tasks so that they can focus on more fruitful activities. Additionally, automation has made the workplace safer for workers as risks of injuries have been reduced to a great level.

INCREASED WORKFORCE EFFICIENCY

With the deployment of various robots such as AMRs and AGVs, shuttle systems, picking technologies, and sorting robots, various capital-intensive industries are successful in increasing the speed of warehouse operations in comparison to human workers with recommended safety standards. Businesses that are opting for warehousing automation solutions have an upper hand in terms of customer satisfaction due to timely order fulfilment.

ERROR-FREE INVENTORY MANAGEMENT

Humans tend to make errors, but through warehousing software such as WMS and WCS which are AI-enabled, chances of errors are minimised to negligible. This AI-enabled software help keep inventory in check in terms of numbers, ensuring faster pick rates, and assisting in maintaining an accurate flow of goods in the warehouse. Moreover, it (software) helps in maintaining a balance between timely deliveries and customer satisfaction. The businesses, as well as the customers, are safe from the hassles of untimely placement and cancellation of orders due to 'Out of Stock' conditions.

COST OPTIMISATION AND MAINTENANCE

A one-time investment in automation results in lower operational costs and high returns on investment. The benefits include increased efficiency, reduced labour costs, better control and productivity, optimised handling and storage costs, eliminated risks, etc. Moreover, the maintenance cost is low when regularly monitored and maintained. This prevents downtime in machinery and makes the running of the warehouse smooth.

SUSTAINABILITY GOALS

Nearly every industry, including retail and e-commerce, has sustainability on its agenda. Executives can get closer to their environmental goals with the use of automation technologies and warehouse management systems. Managers may better manage the use of warehouse resources, maximise space utilisation, and integrate fundamental green practices like recycling into operations with the aid of predictive analytics, condition monitoring, and smart warehouse management systems.

As we know, the consumer of the current generation is quite aware and environmentally conscious. They prefer brands which are environment friendly. Sustainability in a way attracts more customers towards a particular business.

Automation solutions offered these days range from simple material handling tools like forklifts to semi-automated warehouses and fully automated warehouses. The future and growth of the warehousing industry are fathomable and businesses can pick and choose the nature of automation solutions they require based on their scale, availability of labour, nature of their business, and several other factors.

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By Sujatha B.Y, AVP Digital Assurance Services, Conneqt Business Solutions

DIGITAL ASSURANCE: A GROWING PRIORITY FOR INDIA MARKET

Organisations are using several technologies today in an integrated fashion to offer end-to-end smooth customer service. The article elaborates on how Digital Immune System (DIS) can help companies offer an enhanced customer experience.

Technological innovations have changed and simplified our lives in many ways. Each innovation that comes to the fore is aimed at addressing a specific challenge in IT, electronics and communication technology, offering specific improvements and benefits to customers and individuals. Today, organisations are trying to leverage varied technology offerings in an integrated fashion to provide seamless customer services, in a digital first world, at an unprecedented pace.

Sujatha B.Y

BUILDING DIGITAL IMMUNITY

However, this need for faster deployment has introduced 'technical debt' in software development, with inadequate assurance/testing practices being one of the key contributors. In fact, hyper digitisation is pushing CIOs to take on increased responsibilities for revenue generation. Nevertheless, antiquated development and testing approaches are no longer sufficient to deliver robust and resilient business-critical solutions that provide a superior user experience. By 2025, Gartner predicts that organisations that invest in building digital immunity will increase end-user satisfaction through applications that achieve greater uptime and deliver a better user experience.

A Digital Immune System (DIS) combines several software engineering strategies, such as observability, automation, and extreme testing, to enhance the customer experience by protecting against operational and security risks. However, testing the technology framework alone will not suffice in today's hyper-competitive market. Companies need to evaluate testing practices that go beyond testing and aids business outcomes in a seamless manner. This is where digital assurance comes in.

Digital assurance applies several extreme testing practices in assuring DIS and Superapps by leveraging

cloud, low code/no code test automation tools and platform-driven testing approach.

STRIKING BALANCE BETWEEN QUALITY SOFTWARE VS SPEED-TO-MARKET

Organisations need strategies to address technical debt challenges to build DIS. Like monetary debt, where 'interest' gets accrued, with technical debt, the interest accrued becomes increasingly difficult as it is required to fix the defects or make code changes while the project sails through multiple phases. Gartner defines technical debt as a deviation of an application against Non-Functional Requirements (NFR), which could be attributes such as compatibility, security, reliability, usability, efficiency, maintainability and portability.

Digital assurance has a significant role in ensuring that a software application meets the key NFRs through extreme testing. Compatibility, usability and portability attributes are directly addressed through well-defined test automation strategies, while performance assurance and security assurance address reliability and efficiency aspects.

Within digital assurance parlance, test automation has become a necessity rather than the latest fancy trend followed primarily for post-production-release regression tests. Today's agile & DevOps strategies demand automated tests to be written before the applications are developed. Significant development has continued in this space, with new test automation tools/platforms being released now and then, posing a challenge in choosing the right tool/platform.

GROWING ADOPTION OF CLOUD TEST AUTOMATION PLATFORMS

The need for accelerating test automation has led to the evolution of cloud test automation. As cloud technology offers extraordinary infrastructures, tools, and high-performance servers, it is a smart move for testing to adopt cloud platforms for addressing specific challenges concerning shorter and frequent high-quality release cycles. It is necessary to have a continuous test execution and orchestration platform to support scalable testing across the web and various mobile device channels.

The key benefit of moving to a cloud test automation platform is to effortlessly assure compatibility testing and test coverage on multiple platforms, browsers, and devices with parallel execution support to increase the speed of test execution within optimised costs. By 2025, Gartner predicts that organisations that invest in building digital immunity will increase end-user satisfaction through applications that achieve greater uptime and deliver a better user experience.

LOW CODE/NO CODE REPLACE CODE-DRIVEN TEST AUTOMATION

Scriptless test automation has been around for the past decade, pioneered by Tricentis through the TOSCA tool to simplify test automations which traditionally required good programming skills. The main advantage of this platform is that apart from testers, the business team – product owners, BA and UAT can easily create and run automated tests. This tool can also handle usability tests following a model-based testing approach. It also reduces significant efforts and associated costs by up to 40 per cent.

TOSCA, defined by Gartner as a model-based approach, supports test automation at the UI and API layers, service virtualisation and exploratory testing. The success of this tool in the QA space led to many such low code/no code test automation tools in the market.

Scriptless testing tools, as the name suggests, reduce or eliminate the amount of scripting involved in the creation of tests using model, object, data or keyword-driven approaches with the purpose of enabling user testing and reducing costs.

Even though plenty of codeless automation tools have emerged, it is necessary to pick the right tool suitable for the application under test, as one single tool may only work universally for some applications.

Cloud test automation combined with low code/no code tools will significantly benefit companies focused on customer satisfaction by building reliable, responsive IT systems.

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UPGRADING THE LEGACY

In a tete-a-tete with **CV Raman, Chief Technology Officer, Maruti Suzuki India,** he reveals the secret to Maruti's business growth, their plan for the Indian EV market, how they are working on attracting the Gen Z customer base and more. Excerpts…

By Anvita Pillai

Maruti's Y-o-Y net profit for Q2 was up by 62 per cent compared to last quarter. What do you attribute this success to? Can you elaborate on the strategies implemented for the same?

For Maruti Suzuki, we can mainly attribute the growth from last year to this year to the increase in volume. Further, it was also driven by the fact that we launched several new models. While these are the two things that have changed, the other thing is that the industry is slowly coming out of the pandemic right now, and our growth levels have recovered to 2018-19 levels. So, while we are just recovering, I believe, a comparison to last year's business would not be an ideal comparison.

Maruti has yet not stepped into the EV game full-fleged, yet. Do you feel Maruti could miss out on the EV race considering players like Tata and MG Motor have already made a mark?

Maruti has a plan in place, and since the market is still maturing, the need for electric vehicles and infrastructure will only grow. We have already announced a Rs 10,000 crore investment to go electric. Recently, Prime Minister Narendra Modi laid out the foundation for our new EV plant and our battery plant. We plan on launching our first EV by 2025. We are likely to participate more in the EV space going forward, and we would enter prominently once there is a growth in the volumes.

> "We are looking at the electrification of the powertrain in a strong way. We are working on strategies to create a functioning where ICE vehicles can co-exist with electrification"

Sustainability is a big topic across the automotive sector. However, EVs are not as sustainable as portrayed. So, how can the industry work on bringing out sustainable electric vehicles? How is Maruti working towards ensuring sustainability is a key area of focus throughout its vehicle line?

We are looking at various technologies when we look at NetZero and carbon neutrality. While the target for NetZero is 2070, we are planning to approach carbon neutrality sooner. As Maruti Suzuki, we believe, for India, there are various alternatives which are available. Improvement of the current powertrain is one aspect that we are working on. We recently upgraded all our powertrains to the next generation to give better fuel efficiency. Secondly, as the Government of India moves towards building a gas-based economy, we are working on CNG penetration in a big way. CNG emits close to

Looking at the various requirements of India, the regulatory changes that are made need to be keeping the Indian condition in mind. All of this is something which the industry is working on with the government. Together, creating such a path will make sure that there is growth and also the least disruption.

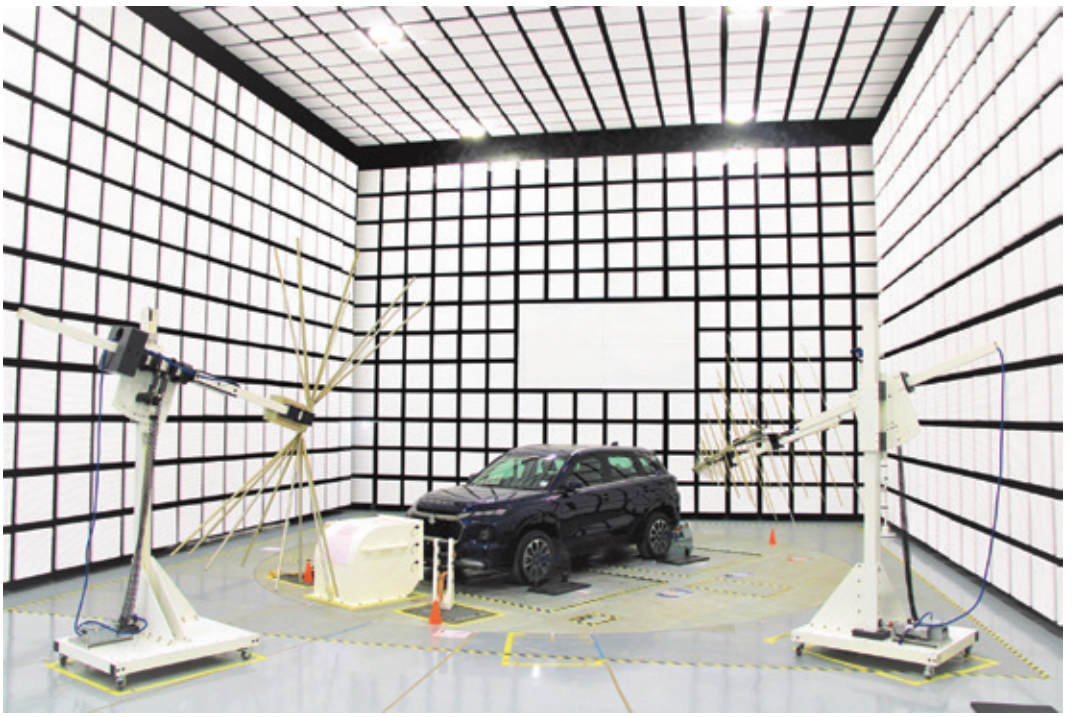
20-25 per cent less carbon dioxide than the average ICE vehicle, so we are working on it hands-on.

Further, we are also looking at the electrification of the powertrain. We are working on strategies to create a functioning where ICE vehicles can co-exist with electrification. For this, we have mild hybrid technology which has already been introduced, and we recently introduced strong hybrid technology. The strong hybrid gives almost 35 per cent better fuel efficiency and doesn't require any charging infrastructure. At any point in time in a city drive, it can function 30-50 per cent on EV mode. It has a self-charging system which helps in reducing the carbon footprint and offers nearly 35 per cent of fuel efficiency.

Lastly, we are also looking at ethanol in a big way. We are working on making all our vehicles E20 compliant and are simultaneously also working on flex fuel and flex engines, which will again reduce the carbon footprint. As mentioned earlier, we will enter the EV market by 2025. So, we are looking at a whole gamut of technologies, which will be relevant to different segments, ensuring we cater to the varying customer requirement.

If you had to claim certain pain points for automotive manufacturers in India currently, what would they be? How can they be addressed?

As far as the government policy perspective is concerned, the government recently introduced the PLI scheme for the adoption of technology, which we believe is going to be very helpful for the industry. Looking at the various requirements of India, the regulatory changes that are made need to be keeping the Indian condition in mind. All of this is something which the industry is working on with the government. Together, creating such a path will make sure that there



is growth and also least disruption.

One doesn't know how the energy basket is going to move because things change not just in the country but geopolitically. So, flexibility and agility will be very important. And then, of course, cost corrections based on whatever other requirements come one's way will also be important.

Going further, Gen Z is the primary customer for vehicle sales in India. What kind of business and technology innovation is Maruti looking at to cater to them?

As far as the Gen Z is concerned, I think, what they are looking at majorly is being connected. Since digitalisation is happening in a big way, what they predominantly need is internet and connectivity on the go.

Today, vehicles are getting connected, telematic solutions are happening – you are able to stream music on the go, there is driver aid, geo fence, and a lot of assistance by way of these telematic solutions. Apart from these features in a vehicle, such as a surround camera, H & B safety assist systems, etc., are something young customers are looking forward to.

With regards to customisation, Gen Z believes a lot in customisation. Maruti launched a customisation packet, in which, with every vehicle, we were able to offer an accessory customisation package. This was big among Gen Z as it helped them stand out and distinguish themselves within the community. So, going further, if automakers are able to provide that extra level of customisation in real-time to the growing audience, they will be able to attract customers easily.

With Industry 4.0 being incorporated into the vehicle, it possesses the risk of making the vehicle vulnerable to hacking and digital intrusion. How is your organisation working on making a vehicle safer from not only a driving experience but also from the user experience perspective?

Cybersecurity is one important topic of discussion among automakers today. With the vehicle becoming connected, manufacturers will want to give OTA updates and software-related changes to the vehicle. It will be important for manufacturers to build firewall protection and ensure that the vehicle cannot be hacked into or taken control of. With data privacy becoming a big thing, we as responsible OEMs need to keep customer information confidential. We need to ensure that we can communicate with whatever systems we are providing and have firewall protections in place to offer end-to-end security.

5G was recently introduced in India, and it will soon be launched in even the smallest cities of India. What impact does 5G posit to have on the automotive industry?

5G is basically about data latency and the ability to process more data efficiently. Vehicles today throw in a lot of data and analysing them is very important. 5G in India is at a very nascent stage, so I don't see a major impact coming in from it in the immediate short term. But in the medium term, as more services come into play, and with electrification and connectivity becoming a requirement, 5G is going to play an important role in the development of the automotive sector.

What is the way ahead for your Maruti in India?

We are here, and we recently celebrated 40 years of Maruti in India. We are now hopeful we will be able to celebrate 100 years in India, too. We will continue to provide the best-in-class products with good design, comfort, convenience, performance and sustainability.

By Venu Shanbhag, Managing Director, Saint-Gobain Sekurit India

SHAPING THE FUTURE FOR EV GLAZING SOLUTIONS IN INDIA

Lightweighting has been a trend that automotive manufacturers have been implementing greatly across vehicles. The article elaborates on why automotive glazing is a key application for OEMs growth in the field of lightweighting materials.

Automotive original equipment manufacturers (OEMs) are looking at every chance to lighten the weight of vehicles in order to save on fuel and cut carbon dioxide (CO2) emissions. Because of this, automotive glazing has become one of the key automotive applications with the great potential for growth in the field of lightweight materials. Automotive glazing greatly contributes to not just the external appearance but also has an impact on performance of vehicles, as the new EV concepts, a large portion of the front, top and rear part of the vehicle is covered with a windshield, roof and tailgate glass. In today's time, the extended emphasis on the aesthetics and styling, glazing has become an important part of body design that needs to be integrated into EV cars. This is completely different from conventional glazing with the rise in demand for advanced manufacturing process. Saint-Gobain Sekurit a leader in many of these advanced technology products making it the partner of choice with globally popular and iconic EV car manufacturers. With several products in the market for roofs and encapsulation glass for side fix glasses which enhance design and styling of vehicle.

ENSURING ACOUSTIC, THERMAL, AND VISUAL COMFORT

In ICE/CI engine vehicles where external noise is veiled in the loud engine noise, electric vehicles have a contrast effect. In addition, the increased usage of voice-controlled features makes it a necessity to solve for in-cabin acoustics. Glazing plays a very important

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role in reducing DB levels and this is achieved using special PVB layered acoustic windshield on the front. A recent global trend in front door glasses indicates a shift towards laminated sidelights and we have the capability in India to make laminated sidelights as low as 4 mm thickness without compromising on safety.

Innovative thermal comfort glazing solution that is apt for Indian conditions, help reduce the amount of heat entering the cabin and improve passenger comfort. A detailed study through simulations (qualitatively & quantitatively) on thermal comfort comparisons for vehicles in Indian conditions has demonstrated a significant improvement in cabin comfort for vehicles equipped with thermal comfort glasses when compared with standard glasses. In addition to thermal comfort to the customer, the load on the HVAC system and in turn, on the battery, is also reduced by selecting the appropriate thermal comfort glazing set for the vehicle.

Beyond the aesthetic performance, interactive glazing solution with Heads Up Display (HUD) is widely applied in windshields for reducing driving effort. With the help of R&D centre in India, there are several prototypes that incorporate static & dynamic displays in the glazing which are best suited for EV cars. Any ADAS feature can be displayed on the windshield based on the criticality to enhance safety. Apart from glazing, R&D centres has also developed competency in integrating displays and sensors in plastics that find application in interior and exterior of the vehicle, for instance, integration of vehicle lock/unlock, charging level, lane warning, etc. on the A or B pillars.

> "Innovative thermal comfort glazing solution that is apt for Indian conditions, help reduce the amount of heat entering the cabin and improve passenger comfort.

ENERGY EFFICIENCY

Battery range is a prominent aspect in the purchase process for electric vehicle buyers. In addition, a lightweight vehicle is the ideal wish for every engineering and design team. Vehicle weight is considered as critical criterion by manufacturers to improve battery range. With lightweight glazing solutions of lower glass thickness which reduces the weight of glazing significantly and contributes to improving the range. Besides weight reduction, asymmetric thickness of glass also improves the vehicle's safety by reducing the risk of breakage. It has become increasingly important to switch to the newest glazing solutions on the market to effectively tackle various challenges in automotive industry as leading OEM and industry leaders are working towards reducing carbon emissions and ensure there is a more sustainable alternative.

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By Karan Gupta, Senior Vice-president – SME Online, Moglix

VIRTUAL MARKETPLACES: THE NEXT BARRIER FOR MSMES TO CONQUER

MSMEs have been the backbone of the developing Indian economy. With digitalisation in full swing, the article elaborates on the impact that digitalisation can have on the MSMEs in India.

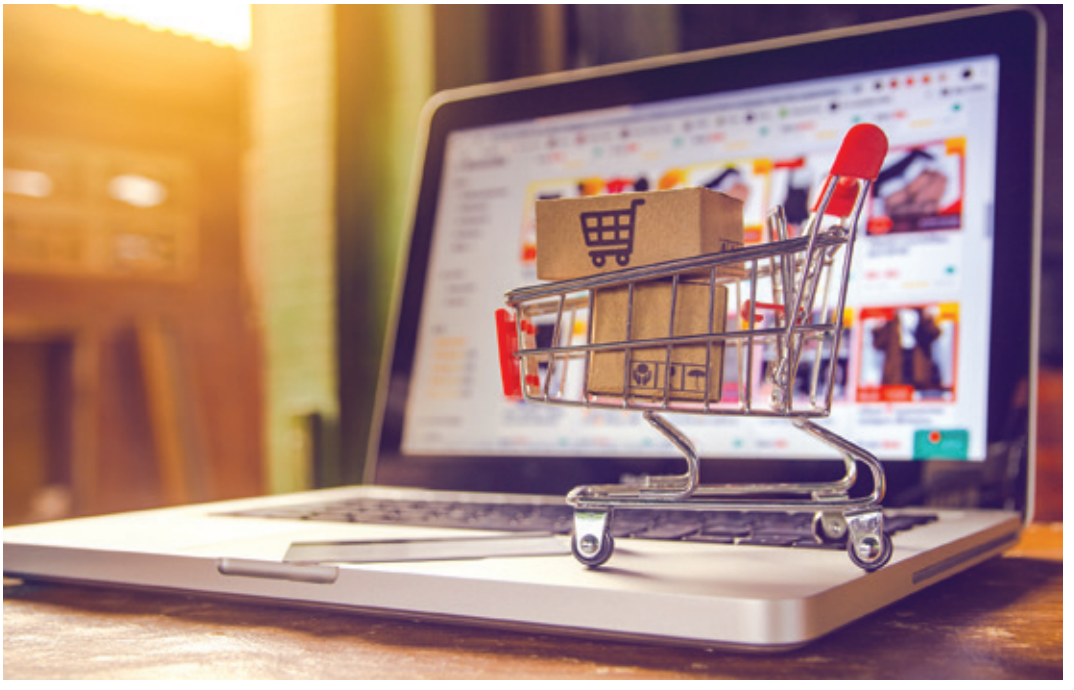
SMEs fundamentally power the Indian economy. Of course, at the top of the tower, one finds blue-chip public & private companies, tech giants, and a handful of companies that evoke envy and admiration across the globe. However, the economy, at the rural and town level and in large pockets in the cities rely on the resiliency and resourcefulness of SMEs.

Karan Gupta

THE DIGITAL GULF

As can be expected, these MSMEs have traditionally been family-run units that are often, if not always, skeptical of the digital revolution underpinning the new business dynamism of the modern age. It results in a situation where the market share of these small units is being progressively cannibalised, not just by larger, better-operated units but by larger multinational chains with deeply embedded franchisee networks, not to mention new-age startups.

The first real shock to the SME firmament in India became apparent during the pandemic. Supply chains across the world, including India, were hamstrung. Goods and commodities of daily and discretionary consumption were stranded on highways and ports for days. It became a moment of true crisis for the mom-and-pop store in one's neighborhood, where MSMEs had no option but to facilitate credit



This unprecedented e-commerce boom in India has been one of the major catalysts in the growth of SMEs over the past decade. The declining digital divide, growing internet penetration, and encouraging support from the major players in the ecosystem, have translated into newer business models for SMEs and virtual marketplaces alike.

to customers or equip themselves with modern digital payment infrastructure.

Millions of SMEs, naturally, joined the digital bandwagon. As a result, the Indian payment landscape fundamentally transformed. Hole-in-the-wall shops, grocers, kiosks, etc., all invariably now have a QR code or a digital medium for payment acceptance. However, this digital transformation is, at best, partial. True digitisation in supply chain management, logistics, inventory, or cost management is still a dream. Manual administration is still the norm in an age where AI and machine learning-powered apps and robotics are helping European and American small businesses jump ahead by leaps and bounds. Additionally, embracing technological breakthroughs helps small businesses compete meaningfully with larger enterprises to improve their operational and profit margins.

THE CURIOUS CASE OF E-COMMERCE BOOM & SMES

The Indian e-commerce sector is projected to reach a whopping $300 billion by 2030. This unprecedented e-commerce boom in India has been one of the major catalysts in the growth of SMEs over the past decade. The declining digital divide, growing internet penetration, and encouraging support from the major players in the ecosystem, have translated into newer business models for SMEs and virtual marketplaces alike. These online marketplaces enable SMEs to access newer markets, improve customer retention and boost margins by 49 per cent, drastically reducing customer acquisition costs. SMEs that leverage virtual marketplaces witness up to 80 per cent deduction in their marketing and distribution expenses. The government's push to digitise India and empower the bottom of the pyramid has also reduced the entry barrier. Today, entering the e-commerce space and setting up a virtual store is easier and more affordable than ever. With growing regulatory support and relentless innovation in the e-commerce industry, trade is expected to be more inclusive, and SMEs can revel in the tangible benefits of having an online presence that is more personalised, resilient, and not bound by geographical limitations. And the virtual marketplaces of today will play a crucial role in ensuring that the SMEs of tomorrow are digital-ready.

VIRTUAL MARKETPLACES LEVELING THE PLAYING FIELD

On a prima facie basis, it is easy to point out the obvious benefits of digital transformation and an online presence. However, virtual marketplaces have the potential to reimagine and reinforce the entire SME ecosystem. Take procurement, for instance. Virtual marketplaces enable SMEs to deal directly with suppliers, reducing procurement costs, increasing visibility, and eliminating possible bottlenecks. This also allows small businesses to relish the benefits of 'economies of scale' previously exclusive to larger players.

Similarly, virtual marketplaces also facilitate shorter TATs leading to better customer experience, conversions, and engagement. With a growing emphasis on vernacular interfaces, e-commerce in India is all set to unlock new opportunities in rural India. Coupled with accessible financing options and noble initiatives by e-commerce giants to help post-pandemic recovery, virtual marketplaces will help the SME sector in India to take on giant conglomerates and soar to new heights.

THE E-COMMERCE LIGHT AT THE END OF THE TUNNEL

India is projected to clock 350 Mn e-commerce users by 2025 and is expected to grow at a CAGR of 23 per cent. This is a staggering figure and a testament to the fact that e-commerce is a new reality for small businesses that cannot be ignored. There is a lot of hope to be drawn from the explosive advent and penetration of virtual marketplaces in the country. Quite radically, it has changed how the game is played. SMEs that have kept pace with the digital transformation in the business domain can reap massive dividends from their digital metamorphoses. Several new logistics and inventory management startups that also deal in trade financing are helping SMEs script a new future for themselves, and all of this is being made possible by the e-commerce boom. Invoice financing provided by these cutting-edge startups can help SMEs and exporters take on larger orders, bolster their working capital and se-

> There is a lot of hope to be drawn from the explosive advent and penetration of virtual marketplaces in the country. Quite radically, it has changed how the game is played. SMEs that have kept pace with the digital transformation in the business domain can reap massive dividends from their digital metamorphoses.

cure better material movement, all without the hassles of wading through reams and reams of paperwork.

Virtual marketplaces also stimulate small retailers to digitise their operations and throw their hats in the ring in competition with the big players. New supply chain trends like analytics and automation have fancied the imagination of MSMEs. They are tapping into the power of predictive analytics to preempt the orders customers are likely to place and prepare for the elevated demand. Businesses are also waking up to the importance of having an online presence in a virtual marketplace as it ensures crisis resistance. Smarter MSMEs are starting to understand that we operate in a day and age where new and increasingly complex problems keep cropping up by the day. Only with the help of avant-garde tools like big data and algorithms can these overwhelming problems be tamed and overcome.

HOW WILL ONDC BE GAME-CHANGER?

The Indian government is acutely tuned into the problems that small retailers encounter while dealing with e-commerce websites. To devise a comprehensive and efficacious solution to these problems, the government has launched its ONDC or Open Network for Digital Commerce project, which will target the creation of open networks to exchange goods and services over a digital network. Put simply, it will entail creating a gateway platform that will restrict a cabal of small sellers and operators from imposing predatory pricing and capturing market share in violation of competition laws in the country. The platform will truly empower SMEs in an unprecedented manner so that a small retailer can go toe-to-toe with a large corporation. In the end, it will be the customer who will emerge as the winner.

THE NEW PROMISED LAND BY FY25

Naturally, change requires time to take root. The ONDC initiative and the digitisation within the MSME domain will not yield mammoth gains immediately. However, incremental growth over a long-enough timeline can lay a strong foundation for tomorrow and create the kind of exponential growth that can change the very grammar of economic development in the Indian economy. These initiatives, laudable as they are, will primarily start fructifying by 2025 as more and more small retailers and manufacturers will find the wherewithal and financial clout to step into the playing field sans fear of the big names in their segments. These MSMEs have been the key driver of the Indian economy over the decades, and undoubtedly, they will help India achieve the $5 trillion economy goal.

By Hari Mishra, Co-Founder, NONA Lifestyle

TECHNOLOGY DISRUPTING MERCHANDISE MANUFACTURING

With the growing pace of technology, it has now become the heart of manufacturing functioning. The article throws light on how technology is disrupting the merchandise sector and helping it soar globally.

Advancements in technology have had key roles to play in almost all areas of businesses across the world, and the merchandising sector is no different. Throughout industries, technological breakthroughs have been instrumental in reshaping operating models to keep in sync with the demands of the customers as well as their changing behaviours and preferences.

Hari Mishra

In the past, manufacturing in the merchandising sector, in particular, has performed admirably through brand strategies and business models based on traditional expertise in different branches of the market. However, in order to sustain and evolve with the changing times, it is key that the sector paves the way for advanced technologies like 3D Printing, robotics, cloud computing, data analytics, and virtual and augmented reality to help take things to the next level.

Not only will the modern technological methods offer commerce newer ways to operate businesses more effectively, but they will help attract new buyers and drive costs down in order to achieve higher profits. Well, here are some key methods of how technology is disrupting manufacturing across the merchandising sector:

1. 3D Manufacturing / 3D Printing

If there's one futuristic method that has been a game-changer in the manufacturing sector, it is additive manufacturing, also popularly known as 3D Printing.

The ever-changing market for products means that

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A few key advantages offered by 3D manufacturing are rapid manufacturing, less turnover time for products, mass production and customisation, and rapid innovation wherein newer and unique products can be created and revised without much hassle.

consumer goods of all types have their own specificities, and the need to meet these demands is what may separate success from failure.

This is where 3D printing steps in. From printing action figures, art products, electronic components, and fully sustainable shoes to washing machine parts, 3D printing helps create adapted objects by the process of depositing, joining, and solidifying the material under computer control.

The process has taken great strides in moving up across different sectors of the textile industry by speeding up production, reducing costs, and minimising inventory wastage while creating custom-made and highly personalised product designs that meet the needs of the consumers.

Moreover, a wide range of materials like plastic, metal, resin as well as multicolor materials means that 3D printing can help build high-quality, complicated, and intricately designed products in no time.

A few key advantages offered by 3D manufacturing are rapid manufacturing, less turnover time for products, mass production and customisation, and rapid innovation wherein newer and unique products can be created and revised without much hassle.

2. Cloud-Based Applications:

When it comes to the highly competitive business world of today, the merchandising sector can have its hands full catering to the requirements of managing, storing, and analysing gigantic volumes of data.

However, technological advancement method like cloud-based applications or cloud computing aids businesses in making tasks a lot more convenient and simplistic.

In simple terms, cloud computing is the delivery of different services through the internet. Under this bracket of technology, tools and applications like data storage, databases, servers, networking, and software help the manufacturing in the merchandising sector in managing and processing massive volumes of sales data and real-time inventory.

In the current scenario, where-in manufacturing market have been urged to focus on extending their reach to customers and enhancing their experiences, cloud computing services like Software-as-a-Service (SaaS), Infrastructure-as-a-Service (IaaS), and Platform-as-a-Service (PaaS), have helped transform manufacturing for the textile industry.

With the emergence of cloud computing, manufacturers find effective ways to manage supply chains. It does so by cutting down infrastructure, storage, and computing costs.

Not just that, cloud services also assist manufacturing in the merchandising sector by providing efficient inventory management, data security, higher profitability, enhanced user experience, and disaster management.

3. Demand Vs Production Using Data Analytics

The ever-present market factors along with intense competition between businesses on providing the perfect product that meets the expectations of customers mean that there is an increasing focus on demand Vs production.

As a result, the use of data analytics across all stages of the business process has been the need of the hour.

What Data Analytics (DA) does is that it helps examine data to study and find trends using specialised systems and software before drawing conclusions on the basis of processed information.

To attain success in the cut-throat industry, it is essential for businesses to channel and manage data with the aim of providing benefits to customers while also generating profits.

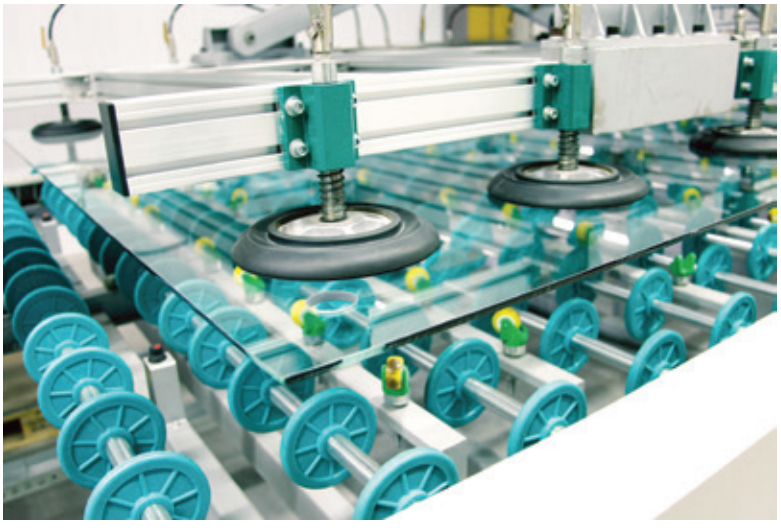
The process of DA helps does just that by tracking popular products that are emerging in the market and carrying out forecasts of sales and future demand through predictive simulation and the optimisation of placements of products.

Moreover, data analytics provides heat-mapping of the customer which manufacturers can leverage by increasing the supply of the specific product on the basis of the brand's purchase history.

Post that, it helps in handling these customers through targeted marketing strategies, before targeting what could be the next sale. As a result, it helps optimise business processes while effectively meeting customer expectations.

4. Using Virtual Reality For Sampling

With modern consumers inclining towards being more tech-savvy than ever before, traditional marketing techniques are proving to become less and less effective every day.



This is why technological advancements like Augmented Reality (AR) and Virtual Reality (VR) are becoming highly popular as they enable businesses to provide customers with a unique and enjoyable shopping experience.

At the sampling stage, AR and VR help customers in finding out whether the desired product is the right fit for them. Be it clothes, shoes, glasses, jewelry, or even furniture for their homes, customers can use virtual reality to project the products before choosing to buy the product.

Therefore, manufacturers are using AR & VR which can be utilised for sampling to have an edge over their competitors as they can deliver good customer experience, product accessibility, while also enhancing customer loyalty and the possibility of recommending the products to others.

5. Designing Web Applications / Marketplace

With almost all businesses now using internet services to attain information about the market, customers, and purchasing items, it becomes crucial for a firm to stand out in order to attain success.

Therefore, having a good internet presence becomes a vital cog in helping clients recognise your brand, research your services, and build trust, while also engaging with your products.

This is where designing web applications has a key role to play. It aids the firm in having an excellent brand presence by meeting the needs of customers while keeping in mind the company's requirements, services, and overall functionality.

What textile businesses gain from designing web applications is that they are able to improve the overall traffic, sales, and performance of the business.

Web applications help customers embrace your unique brand values and market position in newer and more engaging ways. Not just that, using advanced web technologies assist the firm in ensuring that customers receive the right support when they need it. Moreover, creating an interactive & simplistic user interface helps the firm to outperform its competitors and ensure that customers choose brands over shops.

This goes a long way in enhancing overall client loyalty as web applications help firms engage with their valuable customers in a more personalised manner.

6. Smart Factory

An integral part of the new industrial revolution, the concept of a smart factory completely changes the ways products are manufactured, thereby enabling technology to have a huge say in manufacturing in the merchandising sector.

The smart factory brings together an interconnected network of machines, communication mechanisms, and computing power to use advanced tech like artificial intelligence (AI) and machine learning to study data and drive automated processes.

With traditional supply chains and manufacturing ecosystems failing during the coronavirus pandemic, there was an urgent need for businesses to switch to a more adaptable and digitally enabled solution for their manufacturing requirements.

Moreover, the increasing expectations of modern customers also paved the way for the development of innovation and smart factory technologies that bring on digital transformation and intelligent automation in the merchandising sector.

Technology Exploring Potentials

From what we've seen above, it can be clearly established that technology is now at the very heart of businesses, especially when it comes to manufacturing in the merchandising sector.

While traditional and much-proven practices have served businesses well in the past, it is the advancements in technology that will eventually help push beyond the boundaries to meet customer expectations and provide ground-breaking, enjoyable, and more personalised experiences.

Moreover, at a time when challenges arising out of increasing competition in the market continue to create difficulties for textile industries, investment in the right customer-focused technologies will be central to surviving in the future and exploring the full potential of merchandising.

By Vikas Gupta, Managing Director -- Operations, PG Electroplast Limited (PGEL)

WAY FORWARD FOR INDIAN WHITE GOODS MANUFACTURERS

The article elaborates on the changing landscape of the electronics manufacturing industry, and how to work towards the sector's holistic growth.

Vikas Gupta

The outbreak of the COVID-19 pandemic permanently changed the way people work and live. However, despite the severe second COVID wave in May-June 2021, the Indian economy grew 8.7 per cent in FY2022 after contracting 6.6 per cent in FY2021. Barring contact-intensive sectors like trade, hotels, and transport, despite the second and third COVID-19 waves, all sectors of the economy clocked higher growth compared to FY2020, and FY2022 GDP was 1.5 per cent higher than FY2020 GDP.

The pandemic also changed the way they consume technology. People across the globe, including Indians, turned to improving their culinary skills and fitness levels in the extra time that they had at their disposal. Given the amount of time consumers were staying indoors, people looked at automating their home appliances to balance household chores with professional duties. Home appliances and white goods made their way to shopping carts.

Spending on consumer durable goods, be it cooking appliances like microwaves with auto cook menus, induction cooktops, hand blenders, dishwashers, or products like vacuum cleaners and water purifiers, rose sharply. This also applied to energy-efficient air conditioners with air purification capabilities, multifunctional refrigerators with water and ice dispensers, quick-wash

> Although uncertainty continues to prevail, we believe that as both the consumption and investment sectors are firing simultaneously, the nation's fiscal position is becoming stronger.

washing machines, and the athleisure category. Expenditure on home theatres and music systems also surged as people looked to create a theatre-like experience at home for indoor entertainment.

CHANGING ECONOMY & EFFECTS

For FY2023, the Indian economy faces a mix of tailwinds and headwinds as global growth is likely to slow down due to the withdrawal of easy monetary policy and high inflation, thus impacting the sectors dependent on exports. In addition, tighter monetary policy domestically can also impede growth further. However, the accelerating corporate capex combined with private consumption due to the complete removal of covid curbs is providing the growth impetus for the domestic economy.

After having their resilience tested rigorously, high-frequency indicators finally suggest an upswing for businesses and consumers. Rail and freight traffic, passenger traffic, power consumption, e-way bills, and GST receipts are all on the rise. Also, the southwest monsoon rainfall is 6 per cent above the long-term average at the end of August. Kharif sowing has picked up. Urban demand is strengthening, while the rural market is gradually catching up. Inflation has started to ease, though it persists above the upper tolerance band of the RBI.

Therefore, although uncertainty continues to prevail, we believe that as both the consumption and investment sectors are firing simultaneously, the nation's fiscal position is becoming stronger. Tax collections have jumped significantly and have been almost continuous for six consecutive months. GST collection has been over Rs 1.4 trillion, the corporate sector's profitability remains strong, and India is probably the best large economy for FY2023.

In the white appliances industry, value-added, health and hygiene-focused products that eliminate viruses or have disinfectant properties have gained traction. Rapid installation of air conditioners and cooling devices in both commercial and residential places due to increasing temperatures has further raised the demand for white goods and is expected to accelerate the growth of the Indian white goods market. Aside from these factors, there is a high demand for electronic items that can control home attributes like lighting, climate, entertainment systems, and appliances. Similarly, customers are opting for technologically advanced smart products that are connected, energy efficient, easy to use, and enable them to multitask. A trend toward upgrading to larger TVs, refrigerators, and washing machines is also driving sales in the sector.

Lifestyle changes, an increase in disposable income, rapidly increasing spending on home improvement, rising living standards, easy access to finance, and rising technological advancements in home appliances have all contributed to the sector's growth. Moreover, the growing use of 'plastic money', that is, credit and debit cards providing incentives such as cash-back offers or discounts on selected sales, coupled with the emergence of e-commerce platforms, is also escalating the country's white goods sales.

CUSTOMISING FOR GROWTH

According to Invest India estimates, the country's white goods industry reached $13.66 billion in the financial year 2021 alone, primarily because white goods are an integral part of every household. Incidentally, the durables industry recovered faster than other consumer discretionary sectors, such as apparel and jewellery retail.

The industry has responded proactively by understanding user needs and curating offerings aligned with ever-changing consumer demands and behaviours. At the same time, manufacturers are busy adopting the new age of omnichannel models to debottleneck this market with the support of large format modern retail, e-commerce, and private labels. The strategy will not only help the industry to bridge the gap between traditional e-commerce and offline channels but also help them to build loyalty, create lifelong client relationships, strengthen their brand image, and capture a larger slice of after-sales services.

Interestingly, while demand for home appliances and electronic devices has increased significantly in metropolitan cities, a similar trend has been observed in tier-II and tier-III cities, owing primarily to the increasing affordability of products and transmission network augmentation that has been able to cover several unserved regions. Consumer behaviour is expected to shift in the coming years, with a growing need for energy-efficient solutions and a growing preference for smart IoT products dominating consumer choice.

Notwithstanding the semiconductor shortage and the pandemic, India's appliances and consumer

electronics industry, worth Rs 75,000 crore, is expecting double-digit growth this decade. Projected price corrections will further fuel the YoY double-digit growth following the softening of raw material inputs and favourable economic conditions. Consumers are no longer sensitive only to the price but are looking for premium products that offer great value and safety features, resulting in increased demand for home automation devices.

Since the consumer durables industry contributes to the growth of the country's manufacturing sector by adding value and generating employment, the Indian government has been proactively building a conducive ecosystem for the sector. Reforms in the form of the GST, approval of 51 per cent foreign direct investment in multi-brand and 100 per cent in single-brand retail, introduction of the modified special incentive package scheme, launch of the National Policy on Electronics, and the 'Make in India' initiative have improved the manufacturing ecosystem. Significantly, manufacturers importing from countries with which India has signed free trade agreements have realised that local manufacturing may be cheaper due to lower labour costs and not having to pay for high freight costs from overseas.

India imports white goods, namely refrigerators, ACs, LEDs, and washing machines, from China, Thailand, and Vietnam. Its import bill stood at $1.74 billion in FY21, according to Invest India data. The industry's ability to achieve growth, however, is getting impacted because of the supply chain struggles due to the ongoing geopolitical situation, an overreliance on imports of essential parts and semiconductors, cheap imports of consumer durable products from countries like China, Singapore, etc., and the rising cost of raw materials like copper, steel, aluminum, and plastic. Rising energy consumption and electricity prices, as well as a lack of proper electrification, are some of the other factors that are obstructing market growth and challenging the growth of the white goods market.

To address that, the Government of India recently launched the production-linked incentive scheme for white goods, which gives durable goods manufacturers an opportunity to reduce import dependency and launch new premium products at lower price points. This policy will elevate the industry to the next orbit and usher in a period of exponential growth. The PLI scheme for white goods has seen a committed investment of Rs 6,632 crore. The scheme will also help the nation do incremental new production worth over Rs 1,22,671 crores and create 46,000+ new direct jobs over five years.

CONTRIBUTING TO THE TRILLION DOLLAR GOAL

Despite rising inflation and depreciating rupee value, future demand will accelerate on the back of government support, rising purchasing power, easy access to credit, and the wide usability of online sales. Furthermore, the increasing contribution of rural towns to sales of branded, high-quality home appliances indicates that they are set to grab the front seat in steering the country's demand surge across all products.

All this augurs well for the consumer durables industry and will undoubtedly change its landscape faster than expected and in a positive direction. As the nation marches towards becoming a $5 trillion economy by 2025, this sector will play a key role in India's development as the nation becomes more urban, industrialised and connected.

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AT THE PARTING OF THE WAYS

Back in the seventies, Iscar introduced Self-Grip, the brand name of the original blockbuster parting tool design concept. According to the design concept of the Self-Grip tool, a pressed carbide insert was clamped into a tool blade using the blade's elastic forces without the need for mechanical securing elements. At that time, other manufacturers also attempted to clamp inserts into a parting tool using the same principle. However, it was Iscar that invented a reliable, truly workable concept that set the benchmark for parting applications.

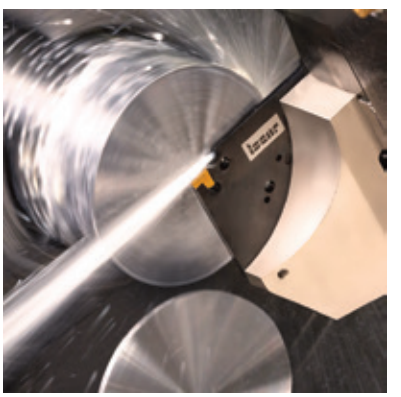
The Self-Grip tool proved to be a game changer in parting. Shortly after its inauguration, similar designs by other producers appeared in the metal-cutting market. Iscar had already established its name as an authority in parting applications and quickly became the unrivaled leader in the industry. Today, there is no question why Iscar's ongoing inventions of new parting tools attract great interest and deserve such close attention.

Iscar's Self-Grip tool concept was a breakthrough, which aspires its prolific R&D engineers to continue improving the concept today. The "classical" Self-Grip tool line has been upgraded and considerably expanded with new geometries and remarkable approaches to parting metal productively. The evolution of Iscar's parting tools exemplifies a logical progression of development by use of highly engineered solutions throughout several generations of R&D engineers.

Its pin-pointed high-pressure coolant (HPC) provides competitive advantages for better parting performance by decreasing temperatures at the cutting zone and by assuring excellent chip breaking, which substantially improves surface finish and prolongs tool life. In machining difficult-to-cut heat-resistant superalloys and austenitic stainless steel, HPC reduces or even eliminates the built-up edge phenomenon. High pressure coolant is highly advantageous in parting operations.

The production of effective inner coolant channels in thin tool blades is a difficult engineering task. Iscar has provided robust solutions to contend with this problem. One of these solutions is offered through Do-Grip parting tools, developed several years after the successful launch of the Self-Grip tool line. A Do-Grip tool carries an insert with two cutting edges situated at opposite ends. The edges are twisted relative to each other; thus, the non-working edge does not limit the cutting depth of the tool.

The Pentacut family of tools that mount star-shaped carbide inserts were originally designed for parting small-in-diameter workpieces, tubes, and thin-wall parts. These cost-efficient inserts provide five indexable cutting edges and a highly economical utilisation of tungsten carbide. The inserts are clamped in the insert pocket by a screw that passes through the insert's central hole. The evolutionary stages of the 5 cornered insert proved to be difficult when utilising Pentacut inserts for large diameter workpieces. To successfully contend with this task, the insert needed to grow in size which made the task technically problematic and economically impractical.



The solution was found in the Penta-IQ-Grip – a family of parting tools that also mounts indexable inserts with five cutting edges. The family enables parting workpieces in diameters of up to 40 mm (1.5"). Due to an innovative dovetail securing principle, the tools utilize relatively small-sized inserts and provide highly rigid clamping which significantly increases tool life, improves part straightness and surface finish in parting applications. In addition, there are Penta-IQ-Grip tools with an HPC option.

The Self-Grip clamping concept utilised the elastic behaviour of a parting blade. This attribute paved the road for a new and improved parting system which took clamping stiffness to a new level. Tang-Grip functions on the principle of supreme support for the insert to counteract cutting forces applied on the tool during the operation. The orientation of the slot that functions as an insert pocket was changed compared to the Self-Grip tool design, and therefore support is achieved by the long and rigid rear wall of the pocket. Tang-Grip has a solid stopper, unlike the friction retaining force that characterises most parting systems that feature a self-clamping insert. With a robust insert design and a reinforced cutting edge, the Tang-Grip enables parting at exceptionally high feed rates, consequently increasing productivity to new extremes.

Notwithstanding, there appears to be another side of the 'parting' coin. Increasing the feed rate causes an increase of cutting force components. The situation worsens when the diameter of a bar and depth of penetration become larger. This

results in blade deflection, which can become a significant factor in affecting the application. The method of utilising Y-axis parting is a way to overcome the problem. The blade is loaded in a manner which is preferable. Y-axis parting is common on multitasking machines with a Y-axis drive assuring appropriate feed motion, yet these machine types are not popular.

Compared to traditional parting along the X-axis, Y-axis parting substantially improves the blade's dynamic behavior by use of a tangential cutting force. When parting in the direction of radial forces, blade rigidity is reduced. Once again, Iscar's prolific R&D engineers invented a formidable winning solution by introducing Logiq-F-Grip, a new tool family characterised by a square adapter with four inserts mounted on each of its cutting tips. The adapter combines both blade orientations (in X- and Y-directions) which provides a balanced-rigid design. The adapter has four insert pockets, and substantially prolongs tool life. The system is suitable for all types of lathes, regardless of whether they have a Y-axis drive.

When searching for the right parting tool, all manufacturers stand at the parting of the ways. Iscar's milestones in creating revolutionary parting systems prove once again its commitment to advanced solutions to meet customer demands.

EVM LAUNCHES NEW USB 3.2 FLASH DRIVE 'ENSTICK'

The newest product of EVM, 'EnStick' comes in a durable ABS casing with shock and drop resistance power, giving its customers a 10-year warranty.

Hundia Info Solutions Pvt Ltd is one of the leading vendors of computing and mobility products and the brand owner of EVM. Recently, it introduced its newest offering in the range of flash drives. The homegrown accessory maker has launched a new USB 3.2 Type-A Flash drive, 'EnStick'.

Ideal for the use of students and professionals in India, the flash drive comes in a durable ABS casing with shock and drop resistance, offering great portability, big storage, and efficient transfer speeds. With blazing fast USB 3.2 Gen 1 performance of up to 100MB/s read and writing up to 30mB/s, access to content can be granted anytime and anywhere in a split second. EnStick provides a unique 10-year warranty, giving consumers the finest in after-sales assistance. Another feature includes a pick-up and drop-off service as part of its after-sales service.

HYBRID LEVER FOR RECTANGULAR ENCLOSURES: SOFT CLOSING & STRONG HOLD

Lightweight construction is one of the most important factors in recent manufacturing trends. In addition to replacing metal with lightweight materials, lightweight structures use a combination of different materials to maximise advantages and minimise disadvantages.

Mencom introduces the innovative IL-BRID lever available for all standard-size rectangular enclosures. The IL-BRID lever is designed to improve the traditional closing mechanism while achieving durability and low-wear performance by combining the thermoplastic materials' smoothness with the stainless-steel spring's sturdiness.

The new soft closing design is especially suitable for applications with frequent opening and closing, thanks to the self-extinguishing UL-approved thermoplastic locking lever component that significantly reduces friction and wear when it slides on the pegs. The stainless-steel core then intervenes to ensure higher resistance against various mechanical stresses and vibrations from harsh industrial environments.

In addition to the proprietary lightweight ergonomic handle design for an easy and safe grip, its compact size and curved form allow, it to occupy minimal space on the edges. The lever is easily detachable and reversible in the bulkhead housings and can be mounted on the counterpart hood. The IL-1BRID lever provides IP65 or IP66/IP69 degrees of protection (EN 60529) with superior locking strength to sustain even large cables.

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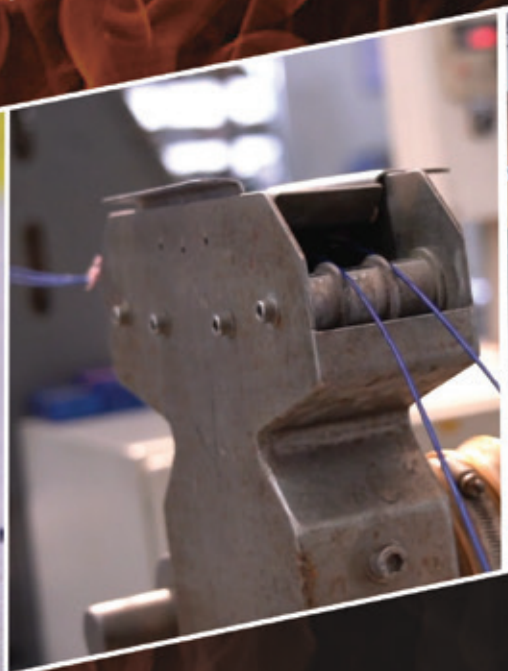

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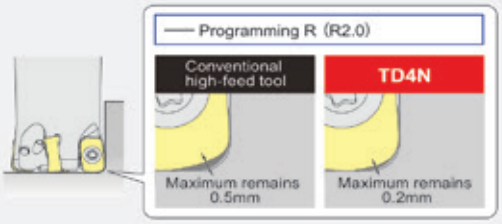
TD4N

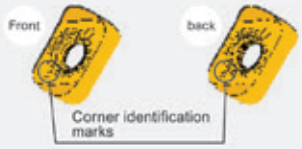
Radius mill TD4N

Reduces uncut remnants on work pieces

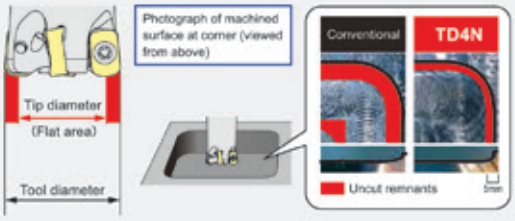
The cutting edge shape was reviewed for TD4N so that uncut remnants are reduced. This enables the load on the next process to be reduced by up to 40 compared to conventional products.



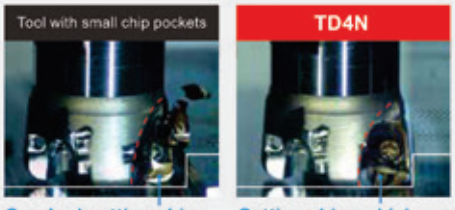
Economical 4-corner inserts with chip breakers for various applications



Large tip diameter for excellent handling



Excellent chip discharge characteristics

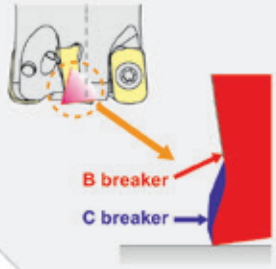


Crushed cutting chips

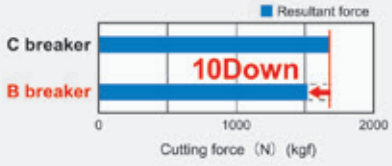
Cutting chips which were discharged well

Magnified view of cutting edge cross section

Positive rake angle



Comparison of cutting force



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- **Tailstock with Live Center**
- **Linear Motion Guideways** 24 m/min Rapid Rates
- **Heavy Duty Bi-directional Turret**

	LT-2 LM 800	LT-2 LM 1200	LT-2 LM 1500
Z-Axis Stroke (mm)	820	1220	1540
Spindle Power (kW)	7.5 (Cont.)/11 (15 min)	7.5 (Cont.)/11 (15 min)	11 (Cont.)/15 (15 min)
Max Turning Diameter (mm)	350	350	350

Optional Features

- Servo Steady Rest
- Single/Double/Twin Steady Rests
- Servo Tailstock
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