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LAPP....

Pinnacle of Innovation

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- ▶ Oil And Gas.....Pg 22
- ▶ Autonomous Vehicles.....Pg 30

- ▶ Biotechnology In Healthcare Industry Pg 26
- ▶ Technological Shifts..... Pg 49



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*“Reshaping industries
and embracing
innovation”*

Sanjay Jadhav

Joint Editor, sanjay.jadhav@pi-india.in

The surge of Artificial Intelligence and advance automation in Indian businesses

According to sources, about 63% of Indian businesses are actively directing their investments into Artificial Intelligence (AI) and Machine Learning (ML) to have automated operations in 2024. This marks an 85 percent increase in AI investments compared to the previous year.

The Indian automation sector is on the brink of substantial expansion, propelled by initiatives such as rising domestic demand and infrastructural developments. This surge in automation adoption spans various industries, including automotive, pharmaceuticals and food processing. India offers a competitive edge in terms of labour and operational costs, attracting global players to set up manufacturing units.

Overall, the Indian automation industry presents a promising picture, but addressing the challenges and actively engaging the workforce are crucial for sustainable growth and reaping the full benefits of this technological revolution.

The Cover Story for this issue is an exclusive tribute to the LAPP Group, which speaks volumes about their unwavering pursuit of innovation and dedication. LAPP India, a trailblazer in cable and connection technology, has marked a significant leap towards self-reliance with the inauguration of its inaugural compounding plant—the first of its kind within the entire LAPP Group.

The Industry Focus topic revolves around Oil & Gas while the Technology Focus topics throw light on Biotechnology in the Healthcare Industry and Autonomous Vehicles. Meanwhile, the Special Feature for this edition is Technological Shifts.

A&D will continue capturing and circulating the right information, facilitating manufacturing enterprises, identifying and applying new technology adoption strategies to move their business towards a brighter future. □



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CONTENTS

MARKET

08 NEWS

10 “Fostering self-reliance in Gas Turbine technology”

Interview with Rohit Chouhan, CEO, Nabhdrishti Aerospace

11 “Meeting evolving industry demands”

Interview with Chetan TA, Managing Director, Murrelektronik India and South Asia

MANAGEMENT

12 “Industrial automation unlocking opportunities for growth and development”

Interview with Dr Uday Bhattachandra, Managing Director, Balluff Automation India

COVER STORY

14 LAPP.... Pinnacle of Innovation

LAPP India's innovative compounding plant marks a new era in cable tech, reflecting growth and innovation. This Cover Story lauds LAPP Group's relentless commitment to innovation and excellence

FOCUS

OIL & GAS

22 Oil and Gas firms overhaul work models to navigate market challenges

This article throws light on the role of digital transformation in helping the Oil and Gas industry

TECHNOLOGY

BIOTECHNOLOGY IN HEALTHCARE INDUSTRY

26 Biotechnology's renaissance in Healthcare: A technological odyssey

Role of biotechnology in shaping the future of healthcare

AUTONOMOUS VEHICLES

30 AI in EVs: From Autonomous Driving to Energy Optimisation

AI is playing a pivotal role, not only in enabling autonomous driving but also in optimising energy efficiency

SMART PACKAGING

32 Embracing technology: Automation trends in the packaging industry

Automation trends governing packaging developments



32

SMART PACKAGING

Embracing technology: Automation trends in the packaging industry



49

TECHNOLOGICAL SHIFTS

The Indian technological space: Innovation, resilience and transformation



14

COVER STORY

LAPP....

Pinnacle of Innovation



All image courtesy: shutterstock

41

QUALITY MANAGEMENT

Future of quality management in transmission projects

- ADVANCED AUTOMATION**
- 36 How can you enhance material management?**
Ways to optimise internal transport of materials and their handling

- AUTOMOTIVE LIGHTWEIGHTING**
- 38 Engineering a lightweight mobility solution**
The article covers recent advancements and top methods in optimising automotive lightweighting

- QUALITY MANAGEMENT**
- 41 Future of quality management in transmission projects**
Sterlite Power's quality transformation process in TBCB projects for transmission lines and substations

- SAFETY AND INTEGRATION**
- 44 Evolutionary leaps in elevator manufacturing industry**
Automation, AI, sustainability revolutionise elevator safety

- ROBOTICS IN HEALTHCARE**
- 46 Surgical robots: The future of healthcare**
Recent rapid tech advances, notably in robotics, simplify life, transform medical procedures

SPECIAL FEATURE

- TECHNOLOGICAL SHIFTS**
- 49 The Indian technological space: Innovation, resilience and transformation**
In a evolving global tech landscape, India leads the digital revolution, transforming its development and progress

NEW PRODUCTS

- 52** Optoelectronic sensor for harsh environments; Tailored automated solutions for wireless devices; High-speed connectors for UHD transfer; The powerful condition-monitoring tool
- 53** Decentralised modular automation system; High-Performance RFID Solutions Unveiled; A new rotating consistency measurement; Next-Gen Cobot: Superior Motion Control

Columns

- 03** Editorial
- 04** Content
- 06** Industry Edge
- 54** Highlights: Next Issue
- 54** Company Index

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Sanjay Jadhav

Joint Editor, A&D India

Talk

In Indian manufacturing, automotive sector thrives with cutting-edge automation adoption.

Powerhouse of future: The Indian automation sphere

India has taken a leading role in embracing automation, experiencing a notable evolution in its industrial scenery where automation has played a crucial part in fostering growth. In recent times, the manufacturing sector in India has undergone a substantial transition towards increased automation.

Automated systems outperform manual labour in terms of speed, accuracy, and consistency, elevating productivity and positioning India as a strong contender in the global market. Moreover, automation aids in cost reduction by substituting manual tasks with automated processes, leading to sustained savings in labour costs.

This enhances the competitiveness of Indian industries on both domestic and international fronts. Embracing automation enables businesses to efficiently allocate resources, streamline operations, and concentrate on innovation, providing them with a distinct edge in the global market.

Current year projection

As per the latest reports, the Indian Industrial Automation Market size is estimated at \$ 15.12 billion in 2024, and is expected to reach \$ 29.43 billion by 2029, growing at a CAGR of 14.26 percent during the forecast period (2024-2029).

Revolutionising Automotive Manufacturing

In the expansive realm of Indian manufacturing, a domain that has witnessed significant strides in leveraging automation for enhanced efficiency is the automotive manufacturing sector. Renowned as a pivotal hub for automobile production, India has seen a remarkable surge in the adoption of cutting-edge automation technologies by automakers. These substantial investments in advanced automation solutions underscore the industry's commitment to streamlining and optimising their assembly lines.

Vast potential

As technological advancements progress, there exists a vast potential for increased integration and innovation. The amalgamation of automation with cutting-edge trends like 3D Printing, Blockchain, and Augmented Reality holds the key to unlocking unprecedented possibilities and transforming the manufacturing sector. This convergence not only signifies a shift in traditional paradigms but also heralds a revolution in the way products are conceptualised, produced, and experienced. The dynamic interplay between these evolving technologies promises to reshape the manufacturing landscape, ushering in a new era of efficiency, flexibility, and creative potential. □

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Cientra and Invas join hands to build groundbreaking 5G IoT solutions for the agriculture and mining industries

Cientra and Invas recently announced a strategic alliance to develop innovative wireless sensors and actuators for sectors including mining and agriculture. The collaboration aims to seamlessly integrate and optimise the functionalities of Cientra's 5G platform with Invas's cutting-edge Internet of Things (IoT) devices. The principal aim of this initiative is to instigate a paradigm shift in the agricultural and mining industries of the country through the guarantee of optimal IoT device quality while upholding the security and integrity of the 5G network. Anil Kempanna, CEO, Cientra, said, "Our 5G business initiatives are being expedited

to provide a robust portfolio of repeatable solutions that can be customised to satisfy the needs of our customers for such solutions. We wholeheartedly concur with our PM, Narendra Modi, that India possesses the capacity to actively participate in the advancement and integration of technologies rather than merely consuming them. At this moment, the digital revolution in India is at a critical turning point".

Panasonic expands its lighting business with the launch of its new facility in Daman

Panasonic Life Solutions India (PEWIN) has recently opened a new manufacturing unit in Daman, Gujarat. The new dedicated facility will enhance the current manufacturing capabilities as well as PEWIN's lighting manufacturing capacity in India. The company has invested a total of ₹15 million, which will facilitate in-house manufacturing of lighting products, keeping in line with the company's growth plans. With this investment and a strategic growth plan, PEWIN aims to lead the lighting segment by 2030. Speaking on this new launch, Kuniyasu Shimaoka, Managing Director, Global Lighting Business, Panasonic Corporation, said, "We see enormous potential in India, especially with regards to the manufacturing industry. The investment of ₹15 million is set with the objective of expanding our business in India. Keeping in mind the 10th anniversary of Make in India, Panasonic (PEWIN) aims to start manufacturing in Daman to speed up inland manufacturing while continuing business with Indian suppliers".



Continental and Synopsys provide Vehicle Digital Twin Capabilities to accelerate software development

Continental recently announced a collaboration with Synopsys to accelerate the development and validation of software features and applications for the Software-Defined Vehicle (SDV). This new collaboration integrates Synopsys' industry-leading virtual prototyping solutions for virtual Electronic Control Units (vECU) within Continental's Automotive Edge (CAEdge) cloud-based development framework. The results are digital twin capabilities for software development that help automakers accelerate software development and speed up their time-to-market. Gilles Mabire, CTO, Continental Automotive, said, "The Software-Defined Vehicle requires working on hardware, software, applications, and validation in parallel, all while maintaining the highest level of quality and safety. Synopsys' virtual ECUs and vehicle digital twin capabilities enable us to develop and test advanced software solutions earlier, so they can be deployed to vehicles faster".

Bonfiglioli's new 100 crore State-of-the-Art facility comes up in Pune

Bonfiglioli Transmissions, the Indian subsidiary of Bonfiglioli Riduttori S.p.A., recently inaugurated its 42,500 sq. meters high-tech, smart assembly facility in Pune. The new and bigger facility commences operations from 29th November 2023, and features high-tech and real-time smart assembly operations in an eco-friendly and people-friendly environment. Almost 80 percent of its plants are solar-powered. With the new facility being fully functional, the company aims to better serve its markets in the western region, catering to over 20 verticals in the discrete manufacturing and process sector. Speaking about the assembly facility, Kennady V. Kaippally, Country Manager, Bonfiglioli India, said, "We are committed to supporting industrial development in India by supplying smart and efficient systems required for Industry 4.0 operations. The western region represents a high-growth market, and we are expanding our assembly facility in Pune to meet the needs of the evolving market. The new facility has the highest standards of quality and safety, consistent with other Bonfiglioli locations worldwide".



Schmersal inaugurates Solar Power Plant at their Indian production site

Schmersal India inaugurated the first-ever Solar Power Plant at Schmersal India's production site on 8th January, 2024. Sven S. Jacobi, Head of Quality Management, Schmersal Group inaugurated the plant. This is a green project ideated by Dnyaneshwar Pangarkar, Head-Operations and Shreeram Kelkar, Manager, Purchase & Maintenance along with other team members.

The solar power plant covers an area of 2500 m². It is a ground-mounted system with a capacity of 300 KW. The plant will support the factory's power consumption by generating up to 50 percent of our current power consumption per day. It will generate around 1100 units per day. Solar power plants do not produce greenhouse gas emissions during operation, making them an integral part of efforts to combat climate change. By reducing emissions, solar energy contributes to a healthier planet and a sustainable future. Schmersal India is the seventh Schmersal subsidiary in which they produce 'green electricity' from their photovoltaic systems. Along with this plant launch, a Quality Department inaugurated an in-house testing facility. Quality head Bhushan Salunke, along with his team, developed an in-house testing facility to perform endurance and life cycle tests on existing as well as newly developed products and mechanical properties (tension, compression, etc.).



Below are the benefits of in-house testing facilities:

- For newly developed products, the life cycle or endurance test can be performed in-house.
- It is faster and easier to validate the product life cycle or endurance test of an existing product if any raw material component changes.
- Cost and time-saving: These tests are more time-consuming and costly with third-party testing labs.
- Perform mechanical testing (tensile, compression, etc.) on raw materials in-house.

We are hopeful for the year 2024, we are looking to double our production by 2025 in India with 100 percent localisation by 2026. We are also planning to start an electronic product assembly plant at our plant in India. We also aim for in-house accredited QC labs by 2026. We are working towards a goal to achieve ₹250 crore in domestic sales in the year 2024.

Rockwell Automation, Michelin Strengthen collaboration in the digitalisation of manufacturing

Rockwell Automation, recently announced it has strengthened its collaboration with Michelin, focusing on digital innovation across Michelin's manufacturing processes.

Key initiatives of this collaboration include: Modernising traditional manufacturing equipment through digitalisation; Integrating advanced analytics and data science tools at the operational and plant levels, utilising a wider partner ecosystem, including Kalypso, a Rockwell Automation business; boosting operational reliability and efficiency through digital solutions; Frank Kulaszewicz, Senior Vice President, Rockwell Automation, said, "This new step marks a new chapter in our journey, deepening our commitment to Michelin's digital transformation in machine automation, and solidifying the mutual trust between our companies". This collaboration between Michelin and Rockwell Automation is comprehensive, covering multiple aspects of digital transformation. Joint efforts in prototyping and testing will validate the feasibility and effectiveness of new ideas and enhance the efficiency of R&D initiatives, laying the groundwork for ongoing co-innovation and co-development.



ABB Boosts CCS with Subsurface Modeling in Digital Twin

ABB has signed a partnership with Canadian-based Computer Modelling Group (CMG), to incorporate subsurface modelling into their existing digital twin technology for commercial Carbon Capture and Storage (CCS) operations. With this collaboration, ABB will use its Ability™ OPTIMAX® energy management system to integrate above-ground digital twin technology with CMG's subsurface modelling, providing a full end-to-end solution. Brandon Spencer, President, ABB Energy Industries, said, "Capturing and storing carbon dioxide underground is a highly technical and challenging process. Being



able to deliver proof of concept across the entire CCS process is crucial to accelerating adoption. Without subsurface modelling, the industry simply cannot calculate the cost or manage the risks, which is crucial if we are to scale the CCS market to the extent required to support decarbonisation of industry and emissions reductions in line with the Paris Accord". Pramod Jain, CEO, CMG, said, "This partnership brings together two powerful technologies to develop a product to support the intelligent, real-time operational decision-making required to make carbon storage a success at scale".



“Fostering self-reliance in Gas Turbine technology”

...says **Rohit Chouhan**, CEO, Nabhdrishti Aerospace. In an interview with **Sanjay Jadhav**, he discusses the growth plans of his company, stating their contribution to the Indian aerospace industry.

What current trends in the aerospace industry are influencing the development and adoption of small gas turbine technology?

In a compelling shift towards sustainable aviation, the demand for microgas turbines is experiencing a notable surge. This growth is intricately linked to the expanding regional connectivity facilitated by small aircraft, marking a significant milestone in the global aviation landscape. The spotlight on achieving a net-zero goal in aviation amplifies the urgency for innovative solutions. While electric flight powered by batteries remains a work in progress, the industry acknowledges the need for substantial advancements in battery technology.

Can you share the short-term and long-term growth plans for Nabhdrishti Aerospace in the dynamic aerospace market?

Our immediate focus is on deploying a 350 SHP gas turbine, driving innovation in UAVs, cruise missiles, small planes, and helicopters. With rising demand for local connectivity and Urban Air Mobility, we anticipate significant growth over the next decade. Looking forward, our long-term goals include expanding our micro gas turbine portfolio from 300 to 1000 SHP and showcasing our commitment to diverse applications in aviation and power generation.

What key factors or market drivers have contributed to the success and demand for Nabhdrishti Aerospace's small gas turbines?

We're pioneering India's first fuel-flex Micro gas turbine, seamlessly transitioning from conventional to eco-friendly fuels like green hydrogen. Our novel recuperator device elevates fuel energy extraction, achieving a remarkable 50 percent efficiency boost compared to conventional designs. Leveraging a local supply chain and 3D-printed parts ensures optimal efficiency and an eco-friendly approach, all at one-fifth of the cost of imported alternatives. Notably, the absence of a local player in one of the world's largest Gas Turbine markets positions us strategically for success.

In what ways do you contribute to the growth of the Indian aerospace industry and the overall economy?

Firstly, our core strategy focuses on fostering self-reliance in Gas Turbine technology. Secondly, we are sourcing more than 95 percent of components locally, which helps to create a vibrant environment for flourishing precision manufacturing in India, which will create high-quality manufacturing jobs and foster economic growth. Lastly, we are dedicated to advancing sustainability.



“Meeting evolving industry demands”

...says **Chetan TA**, Managing Director, Murrelektronik India and South Asia. In an interview with **Neha Basudkar Ghate**, he explains that by focusing on R&D, high-quality products and deep customer engagement leads to proximity to industry players and enhances partner profitability. Excerpts...

What market trends do you foresee shaping the industry in the automation technology, and how is Murrelektronik positioned to capitalise on these trends?

As the automation landscape evolves, decentralisation emerges as a pivotal theme, minimising cabling and emphasising on-field products. Future shop floors are poised for significant technological strides, with robotics playing a central role. The rise of AI-based Cobots is particularly noteworthy, gaining traction in Chinese, Japanese, and European manufacturing landscapes, a trend expected to intensify in the coming decade. Murrelektronik has consistently led the way in pioneering decentralised installation concepts, aligning our future endeavours to seamlessly meet the evolving demands of the industry.

In the context of Industry 4.0 and the IIoT, how is it important to adapt to meet the changing demands of customers and industries?

In the realm of Industry 4.0 and the Industrial Internet of Things (IIoT), Murrelektronik has been actively evolving since 2010. Our commitment is evident through the integration of IO link capabilities into a number of our products. Recognising the increasing significance of data in future power electronic hardware, our research and development efforts are strategically focused on optimising data collection while minimising the space required for installation.

How does the specialisation in decentralisation gives the company a competitive edge in the market, and what benefits does it bring to your customers?

Murrelektronik's forte lies in IP67-based decentralised automation and installation concepts, providing a distinct competitive edge in the market. We have consistently delivered innovative products tailored for Automotive, Machine Tool, Packaging, and Intralogistics verticals. Our focus on decentralised installation concepts not only facilitates the avoidance of excessive cabling but also brings substantial benefits to our customers, including cost savings, space efficiency, and minimised downtime.

Given your core competencies in IIoT, PLC, and engineering, how does Murrelektronik approach innovation in product development?

Murrelektronik's proactive innovation, dedicating 4 percent of profits to R&D, ensures top-notch products. In the realm of customer engagement, our solutions align with expectations, particularly evident in the Intralogistics vertical. Challenges of quick downtime and operational enormity in peak seasons are addressed through the pivotal role of our reliable products. Recognising diverse industry needs, our proximity to stakeholders enables tailored solutions, reducing installation and commissioning times, directly contributing to partners' profitability across various industrial applications □

“Industrial automation unlocking opportunities for growth and development”

says **Dr Uday Bhalchandra**, **Managing Director, Balluff Automation India**. In an interview with **Sanjay Jadhav** he describes that industrial automation is reshaping the Indian economy and by leveraging latest technologies, India can enhance its competitiveness on the global stage. Excerpts...



Q How has the demand for sensor technology and automation solutions evolved over the past few years, and what indicators suggest its trajectory in the near future?

» Industrial Automation from 2023 to 28 is expected to grow with about 14 + CAGR. In my opinion, the actual figures may be better in 26 to 28 because of a very good beginning and much improved visibility of 2024. The beginning is already done and you will see very prominent improvements in the Industrial Internet of Things (IIoT) and Industry 4.0 which is at the centre of the latest technological approaches for the evolution,

production and management of the complete manufacturing, production logistics chain, also known as smart factory automation, and are dominating the trends in the industrial sector in India with machinery and devices being connected via the internet.

Q How do you approach workforce sustainability, skill upgrades, and empowerment to align with technological advancements and changing market needs?

» Balluff Automation globally, in APAC and now in India aggressively focuses on sustainability of workforce

by adopting many HR and training programmes. The engineers keep receiving training on new technologies to align with technical upgradation. There are routine interactions of Balluff India team members with other overseas offices for a better understanding of the offerings, since many of our customers have manufacturing bases in more than one country. At Balluff India, our approach to workforce sustainability, skill upgrades, and empowerment revolves around our commitment to staying at the forefront of technological advancements and meeting the evolving needs of the market.

As a partner for innovative solutions in industrial automation, we recognise the pivotal role our workforce plays in maintaining and enhancing our competitive position. We prioritise creating a work environment that fosters long-term employee well-being, growth, and satisfaction. We invest in ongoing training programs to equip employees with the latest industry knowledge and technical expertise. This not only enhances their individual capabilities but also ensures that our collective skill set aligns seamlessly with the cutting-edge technologies we offer. As a world leader in sensor technology with many decades of strong experience, Balluff is uniquely positioned to lead the charge in aligning our workforce with technological advancements. Our teams actively engage with emerging technologies, staying ahead of the curve to ensure that our solutions remain not only current but also anticipate future industry trends.

Q How do you perceive the correlation between technological advancements in automation and the broader economic growth in various sectors?

» Industrial automation has become a driving force behind economic transformation, reshaping industries and economies worldwide. India is no different, in fact very prominently placed in the world with very fast movement expected here, due to projected and sustainable growth in the economy.

The best part of this change is that not only large Indian or MNC's are going for increased automation but even the medium and small size companies are understanding the importance of automation to produce more at reduced cost and maintaining quality, even if sometimes the initial investments are more. By adapting and being open to technological advancements, Indian companies are becoming more competitive in the market domestically and even at the global stage. By embracing and cultivating automation, businesses can optimise resource allocation, streamline operations

and focus on innovation, standardise operations and most importantly reduce rejections. All these benefits keep giving them distinct advantages in the global market.

Q How do you foresee the role of emerging technologies (like AI, IoT, etc.) impacting the development of sensor technology and automation solutions in the coming years?

» Interconnected smart devices and machines are becoming more significant worldwide and are enabling automation across industries. Adding to this ever-increasing awareness of Industry 4.0, the use of AI will make the design of automation processes more complicated but more effective and better performing. Frankly, we cannot ignore IOT, AI, and Industry 4.0, however small or big the organisation is. Adapting to these trends is the only intelligent solution and we at Balluff have started taking into consideration these technological advancements well in time.

Balluff offers technological solutions for every critical application and process, hence we need to be one step ahead in adopting these technological advancements as our routine initiative. Industrial automation is reshaping the Indian economy, unlocking opportunities for growth and development. By leveraging automation technologies, India can boost productivity, reduce costs, create employment opportunities and enhance its competitiveness on the global stage. In today's ever-changing and extremely competitive business environment, nostalgia is of course a place to learn from but certainly not a place to live in. Not just products or technologies, but also the ways of making businesses and reaching customers are changing.

Q Reflecting on Balluff India's journey, what pivotal milestones have contributed to the company's success and leadership position in sensor technology and automation solutions?

» Balluff globally is more than 100 years old and is known for its high-technology products and technologies for critical applications in automation. The products and technologies offered are building a strong foothold in the Indian automation market slowly but effectively. We will soon complete five years in the Indian markets as a subsidiary. We had a tough time for two years because of Covid. With the strong support from Balluff APAC and Balluff HQ (Germany), we have aggressive growth plans in India for the next three and then for the next five years and onward. □



LAPP....

Pinnacle of Innovation

LAPP India's pioneering compounding plant, a symbol of innovation and growth, unfolds a new chapter in cable technology. A dedication to 'Make in India' fuels regional growth and industry excellence. This Cover Story is an exclusive tribute to the LAPP Group, which speaks volumes about their unwavering pursuit of innovation and dedication.

Radiating in the brilliance of remarkable success, LAPP India triumphs with the revelation of a cutting-edge compounding plant, a testament to our steadfast commitment to innovation and dedication.

In the heart of Bhopal, Madhya Pradesh, LAPP India, a trailblazer in cable and connection technology, has marked a significant leap towards self-reliance with the inauguration of its inaugural compounding plant—the first of its kind within the entire LAPP Group. As the plant's doors swung

open, a new chapter in LAPP India's journey unfolded, embodying the spirit of innovation and commitment to the 'Make in India' initiative.

Kicking off with a flourish of achievement, Matthias Lapp, Chief Executive Officer, LAPP Group, inaugurated the sprawling 36,000-square-foot facility equipped with cutting-edge technologies. The Compounding Plant Braintrust, a collaborative team comprising experts from LAPP Korea, LAPP Switzerland, LAPP Germany, and

LAPP USA, has played a pivotal role in the development of proprietary formulations tailored for diverse cable applications.

Founded in 1959 and fully family-owned, LAPP is a global provider of integrated solutions and branded products in cable and connectivity technology. With a portfolio spanning cables, industrial connectors, conduits, glands and more, LAPP serves industries such as machinery and plant construction, food, logistics, textile, energy, and mobility. In the 2021/22 financial year, LAPP generated consolidated sales of €1.9 billion and employs around 5,055 people worldwide.

In his inaugural speech, Matthias Lapp expressed immense pride in the accomplishments of the LAPP India team, stating, "The opening of this state-of-the-art compounding plant is a testament to the dedication and commitment to innovation at LAPP". With an 'Automatic Dosage System' and predictive intelligence, the facility not only signifies a commitment to 'Make in India' but also boosts local production, driving regional growth.

Amidst the celebration, LAPP India also marked its 25th year, coinciding with the launch of the compounding plant dedicated to backward integration and developing proprietary compounds. This milestone facility houses a revolutionary E-beam charger, directly addressing the surging demand for high-performance cables in critical sectors such as railways, metros, renewable energy, and

e-mobility charging infrastructure.

LAPP India, a 100% subsidiary of LAPP, a cable and connection technology leader headquartered in Germany, began its operations in 1996. With manufacturing facilities in Bengaluru and Bhopal, LAPP India provides a range of products including power and control cables, data communication cables, optical transmission systems, industrial connectors, and more. LAPP's commitment to quality is reflected in its eight brands - ÖLFLEX®, power and control cable; UNITRONIC®, data communication systems; ETHERLINE®, data transmission systems for Etherline technology; HITRONIC®, optical data communication systems; SKINTOP®, cable glands; EPIC®, industrial connectors; SYLVIN®, cable protection and guiding systems; and FLEXIMARK®, marking systems.

Since its inception in 2012, the Bhopal plant has witnessed remarkable progress, starting with single-core production and expanding to multi-core and solar cables. Now, with the addition of the compounding plant, LAPP India showcases its dedication to continuous improvement and meeting the evolving needs of the Indian market.

Looking ahead, LAPP India aims to be a €300-million company by 2027, solidifying its position as a leading force in the Indian cable industry. Matthias Lapp expressed his enthusiasm for establishing similar setups in the near future, reinforcing their commitment to driving industry excellence in India. □



“The compounding process is critical in our industry, and our ability to do it in-house increases our flexibility, resilience, and strengthens our positioning in the market.”



Matthias Lapp,
CEO, LAPP Group

In an exclusive interview with **Neha Basudkar Ghate**, **Matthias Lapp**, explained how LAPP Group and LAPP India have pioneered success in the cable and connection industry, adapting technology to meet market demands while maintaining a core focus on sustainability.



As the CEO of LAPP, how do you see the global positioning of LAPP Group and its subsidiaries, and what role does Lapp India play in the overall strategy of the Group?

» In 2020, we crafted a global strategy aimed at enhancing customer focus and ensuring continuous growth. LAPP has consistently pursued growth, considering it a non-negotiable aspect of our trajectory. Our unequivocal plan outlines specific directions, including a strategic effort to reduce dependency on the central headquarters, originally established in Germany, and to fortify our presence in Europe. As part of this strategy, we have earmarked a substantial growth initiative in Asia-Pacific and North America, intending to diversify and broaden our global sales footprint.

The rationale behind this strategic approach, particularly in Asia-Pacific, centres on acknowledging the significant populations of countries such as China and India. We believe that our sales distribution should mirror the demographic weight of these regions compared to Europe and America. Consequently, our focus in Asia-Pacific, with a keen emphasis on China and India, involves targeted investments to foster not only the general growth of these markets but to achieve an equivalent expansion in India. India in particular is a key focus due to its vast size, comparable to that of Europe, and the diverse opportunities it presents. Hence, our strategy encompasses direct investments tailored to support and accelerate growth, not just in the Indian market, but with the overarching aim of achieving phenomenal growth in the region.



What is the breakdown of our total sales volume across different regions, and how does our ideal distribution align with the demographic focus, especially considering the significance of India and China?

» Our total sales volume is currently divided into

two-thirds in Europe and one-third collectively in Asia Pacific and the Americas. Ideally, a balanced distribution of one-third each across Europe, Asia Pacific, and the Americas would be optimal. However, when considering the demographic perspective, with a focus on people, we aim to massively increase the share of sales in Asia Pacific. Within this, the primary markets of interest are India and China, constituting the largest share. India, being our number one market, carries significant weight in this distribution. Although there's no undue pressure on the India team, it aligns with our expectations to have a substantial presence there. To reinforce this strategy, we are making substantial investments in the region.

LAPP has emerged as the most successful multinational in the cable connectivity market in India, attributing its success to several factors. Firstly, the early initiation of operations and strategic investments made at the opportune time have played a pivotal role. The company's patient approach towards the Indian market, acknowledging the gradual pace of business development and embracing it, has also been a contributing factor.

A crucial element of LAPP's success lies in its adept application of the 'think globally, act locally' philosophy. More than 50 percent of the products sold in India are specifically developed for the Indian market, meeting local standards. This localisation strategy has enabled LAPP to effectively compete with local manufacturers by combining international concepts and practices with products tailored to local preferences. Noteworthy is the deep-rooted passion for India within the LAPP ownership structure, which began with Ursula Ida Lapp, the founder of the German U. I. Lapp GmbH, continued with Siegbert and Andreas Lapp and is now being continued by Matthias Lapp, CEO of today's Lapp Group. This passion is complemented by a profound understanding of Indian culture, traditions, and business practices. Unlike many other multinationals, the Lapp family's genuine interest and investment in understanding and aligning with India's nuances have been key contributors to Lapp India's success over the past 40 years.

Q Can you shed light on the origin and philosophy behind LAPP's commitment to manufacturing in India 'Make in India' initiative, and how has this commitment evolved over the years?

» Our family's belief in the 'Make in India for India' philosophy dates back to 1998, well before it became an official policy. This philosophy, inherited by the family, led to the establishment of the plant in Bangalore in the same year. Since then, a significant 50 percent of products designed for the Indian market adhere to Indian standards, reflecting the core tenet of LAPP's philosophy. While the company does export to various regions, including Bangladesh, Nepal, Sri Lanka, the Middle East, and East Africa, the primary focus remains on India. The overarching goal is to manufacture products in India that meet local standards while maintaining the capability to export globally, aligning with the enduring commitment to the 'Make in India for India' ethos.

We prioritise maintaining our first-mover status in emerging Indian markets such as semiconductor manufacturing, energy storage systems, and e-mobility. Our investments in cutting-edge technology aim to keep us at the forefront of these high-growth segments. For instance, the introduction of E-Beam technology has opened new markets. In sectors like semiconductors and Electric Vehicles (EVs), where India is witnessing rapid growth, we've established engineering research centres in Bangalore.

Our global strength in these segments allows us to introduce products into India while ensuring adaptation to local requirements. Beyond sales, our emphasis is on the development, adaptation, and engineering of

products for the local market. A recent example is the design and development of a cable for the E-Mobility market, meeting Indian standards.

Q The Compounding Plant is a notable addition to Lapp India's facilities. How does this facility enhance LAPP Group's capabilities in terms of backward integration, and what role does it play in fostering innovation through the development of proprietary compound formulations?

» The compounding process is crucial for our industry, and our capability to do it in-house not only keeps the industry alive but also positions us as leaders. With our compounding plant in India, we can delve deeper into research and development, tailoring solutions to specific customer needs and market demands. Unlike relying on external compounders, having our own compounding facility empowers us with formulation capabilities.

For a decade, our compound engineers in Switzerland focused on basic research, resulting in innovative formulas ready for the market in the next decade. Now, with our in-house compounding plant, we have the expertise within our global team, benefiting from the knowledge shared by engineers in Korea. This integrated approach, encompassing E-Beaming, wire drawing, compounding, and standard cable production, is unique to Lapp India and positions us at the forefront of the industry worldwide.

Q The introduction of the E-Beam Charger facility is interesting. How does this align with LAPP Group's strategy to tap into emerging markets such as Railways, Metro, Renewable Energy, and E-mobility charging? How do you foresee this contributing to LAPP Group's growth in these sectors?

» The E-Beam ensures superior process stability in cable production compared to alternative methods like chemical crosslinking. While chemical crosslinking relies on varying heat levels during the process, leading to potential inconsistencies, the E-Beam radiation method provides precise and uniform crosslinking throughout the cable. This precision is crucial for maintaining the quality standards that define LAPP's products. Although we may not be the cheapest option, our commitment is to provide value for money by offering the right cable for specific applications without compromising on quality or integrity. The E-Beam technology allows us to deliver consistently reliable products, ensuring that every metre meets the promised performance standards.

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In our product portfolio, we offer both Indian-standard products for domestic use and European-standard products for export markets, each carrying multiple certifications to cater to diverse customer needs.

Q Lapp India has been a participant in the 'Make-in-India' initiative. Can you shed light on how the Bhopal unit's localisation efforts align with LAPP Group's commitment to producing locally, creating employment, and contributing to the nation's growth?

» For us in India, adherence to local standards, particularly those set by the Bureau of Indian Standards, is crucial to ensuring consistent product quality that exceeds minimum requirements. The introduction of E-beam technology has fuelled demand for products capable of operating in harsh environments, such as those in EV, semiconductor and marine applications, necessitating qualities like chemical and oil resistance and higher temperature performance.

As part of our localisation efforts, the Lapp India team focuses on bringing new technologies to Lapp India and adapting them to meet the growing needs of emerging segments. The Central Government's emphasis on infrastructure development aligns with our product offerings in areas like road, rail, airports, harbours, and smart agriculture. We prioritise designing products for the local market that surpass standards while incorporating concepts like sustainability and corporate social responsibility.

In India, the commitment to corporate social responsibility is strong. It extends to contributing to education, health, and rural upliftment, aligning with government philosophies. By doubling the revenues in India in the next three years, Lapp India aims to generate employment and actively engage in educational projects, sustainability initiatives, and the dissemination of knowledge regarding evolving supply chain practices in India. This holistic approach reflects our dedication to driving positive change and best practices in the country.

Q How does the leadership at LAPP envision passing on a business that is not only prosperous but also environmentally responsible to the fourth generation of family members, and how are they motivating everyone in the company to embrace this sustainability-focused mindset?

» We, as a German company under the leadership of the third generation, are deeply committed to sustainability. Our primary objective, particularly as the head of the company, is to pass on a healthy, successful, and environmentally responsible business to the fourth generation of Lapp family members. Recognising the singular nature of our planet, our responsibility extends beyond mere business success. It involves a paradigm shift in thinking, starting

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Research and development hold significant importance for us, shifting our focus from traditional approaches to embracing new technologies and trends. We recognise the value of integrating the global perspective seamlessly, tapping into the strong research, development, and innovation focus of the entire Lapp Group.

with us. The key challenge lies in convincing everyone that this shift is not only necessary for our present but also imperative for the next generation. The motivation for change must come from within, and awareness of the need for sustainability is paramount.

Q What specific social responsibility initiatives does Lapp Group, as well as its individual units, plan to undertake to contribute to the regions where they operate, with a particular focus on Lapp India?

» Lapp India has initiated several CSR projects directly benefiting communities. Starting two years ago in Bangalore, the Lapp India team expanded to Bhopal and recently to Pune, with plans for Delhi in the coming year. Across all operational areas, CSR projects focus on education, health, social welfare, and rural upliftment. Lapp India supports schools, offers math and science education, and engages in initiatives for old-age homes and orphanages. In Jigani, Bengaluru, Lapp India adopted a village, running long-term projects supporting schools, clinics, environmental cleanup, and providing drinking water facilities. These initiatives hold significant importance for us.

Globally, each LAPP country is expected to prioritise CSR, which is not merely compliance with emerging political mandates, but a longstanding practice embedded in our family company's ethos. We have been dedicated to CSR for years, including initiatives like the Oskar Lapp Foundation, founded in 1992, focusing on heart disease

research and supporting young students in medicine. Our commitment extends to addressing women at work, with a strong emphasis on childcare. The LAPP Group's key focus revolves around providing childcare facilities in industrial areas and ensuring accessibility and support for working parents. The childcare association, initiated by my father, has grown to support more than 4,000 children who now progress through the daycare system. This initiative aligns with changing mandates, such as mandatory daycare for every child in Germany, and reflects our ongoing commitment to societal responsibility.



How does LAPP adapt to evolving market trends, especially in the context of Industry 4.0, and how is the company positioning itself to leverage emerging technologies?

» Industry 4.0, initially championed by the German industry, has become a pivotal focus for us, with LAPP being among the pioneers associated with the Industry 4.0 association. The resurgence of this concept is now more relevant than ever, driven by the increasing demands of AI in machine operations. Our comprehensive portfolio aligns seamlessly with Industry 4.0 requirements, capitalising on the proliferation of sensors and machines generating vast amounts of data. The use of cables and wires in this connectivity surge has significantly expanded our industry's potential. In the Industry 4.0 landscape, the role of cables extends beyond controlling servo drives to include connecting various sensors, ensuring fast and secure data transmission. This is a crucial aspect, especially in scenarios like emergency stops, where cable connections are imperative for immediate and secure halting. Although we may not explicitly mention it, our involvement in robotics and adaptation to evolving needs positions us to play an even more significant role in the Industry 4.0 landscape in the future, a prospect that holds great importance for us.

Internally, our highly qualified engineering team is dedicated to understanding and exceeding customer requirements. Over the past decade, we have actively tailored our product portfolio to align with Indian standards and rules, demonstrating a daily commitment to meeting market expectations. In terms of research and development, we have established three centres of excellence in collaboration with leading academic institutions, namely PSG College of Technology in Coimbatore, R.V. College of Engineering in Bangalore, and the Maulana Azad National Institute of Technology in Bhopal.

Our engagement with academia allows us to stay abreast of cutting-edge research, emerging trends, and new technologies. This collaboration is instrumental in

integrating innovative concepts into our product portfolio. Simultaneously, we leverage the potential of students—whether actively studying or fresh graduates—by offering internships, graduate training programmes, and project-based opportunities. By fostering this collaboration, we encourage students to bring fresh concepts that can be further developed into new products for the market.

Research and development hold significant importance for us, shifting our focus from traditional approaches to embracing new technologies and trends. We recognise the value of integrating the global perspective seamlessly, tapping into the strong research, development, and innovation focus of the entire Lapp Group. This collaborative approach ensures a continuous infusion of new ideas and technologies into our product offerings for the market.



Can you provide insights into Lapp India's approach to research and development? How does the company encourage innovation and ensure that products meet or exceed customer expectations?

» Ensuring a seamless global process from idea to market is crucial, addressing the challenge of aligning customer needs with product specifications. We follow a comprehensive five-year integrated roadmap, engaging in a stage-gate process that involves customer and sales team collaboration. This approach helps us avoid over-engineering and ensures market-driven product development.

To enhance our global potential, we have instituted a global technology advisory board consisting of experts specialising in electricity, compounding, and connectivity. These professors, leaders in basic research, examine long-term industry trends, anticipating challenges like changes in copper availability or oil-based PVC. This foresight guides our research and development team for the next five to ten years, fostering innovation and preparedness for future industry shifts.

Additionally, we prioritise collaboration with academia globally, establishing centres of excellence and promoting dialogue between our teams and professors, students, and deans. This interaction not only provides HR resources but also offers valuable insights and perspectives, overcoming blind spots that the industry might have compared to market needs.

The synergy between academia and industry is invaluable, bringing new perspectives, ideas, and solutions. By engaging in conversations with customers and seeking diverse viewpoints, we strive to eliminate blind spots and ensure that our products are aligned with market demands. □

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Oil and Gas firms overhaul work models to navigate market challenges



Martins highlights the vital role of digital transformation in helping the Oil and Gas industry navigate volatility. The article underscores how digital technologies not only tackle industry challenges but also drive proactive adherence to environmental regulations and emerging ESG targets amidst evolving business dynamics.



Fernanda Martins,

Industry Director,
Energy and Emerging Markets,
AVEVA

The Oil and Gas (O&G) sector faces mounting challenges amid a changing world. Market uncertainty and pricing volatility are plaguing the industry, making it difficult for companies to plan and execute accordingly. Ongoing geopolitical events have fractured already fragile supply chains, while the hangover of the global pandemic has reshaped worker dynamics and reduced the available workforce.

What's more, amid an ever-stricter climate for environmental regulations, companies must stay ahead of mandates and public and industry pressures to meet new ESG targets.

Given the rocky economic climate of the last few years, many O&G firms have been reluctant to invest in capital upgrades or digital infrastructure to increase efficiencies. But today's wafer-thin margins and high stakes are now acting as a propellant for energy companies to seek out technological solutions for complex challenges.

Across the world, O&G firms are finding success through the digitalization of work. Fresh ways of working with technology, based on common data platforms, advanced analytics, and global visibility, are helping companies become more profitable.

According to LNS Research's recent 'Industrial Transformation in 2021: Getting Real' report, half of industrial enterprises report they have embarked on a digital transformation journey, and these programmes are yielding very real benefits. LNS found that leaders in digital transformation are 72 percent more likely to have increased revenues by more than 10 percent and 57 percent more likely to have reduced the Cost of Goods Sold (COGS) by more than 10 percent.

Through the adoption of digital tools, companies can leverage their own industrial data and turn that information into innovative insights. This value-added data then enables companies to:

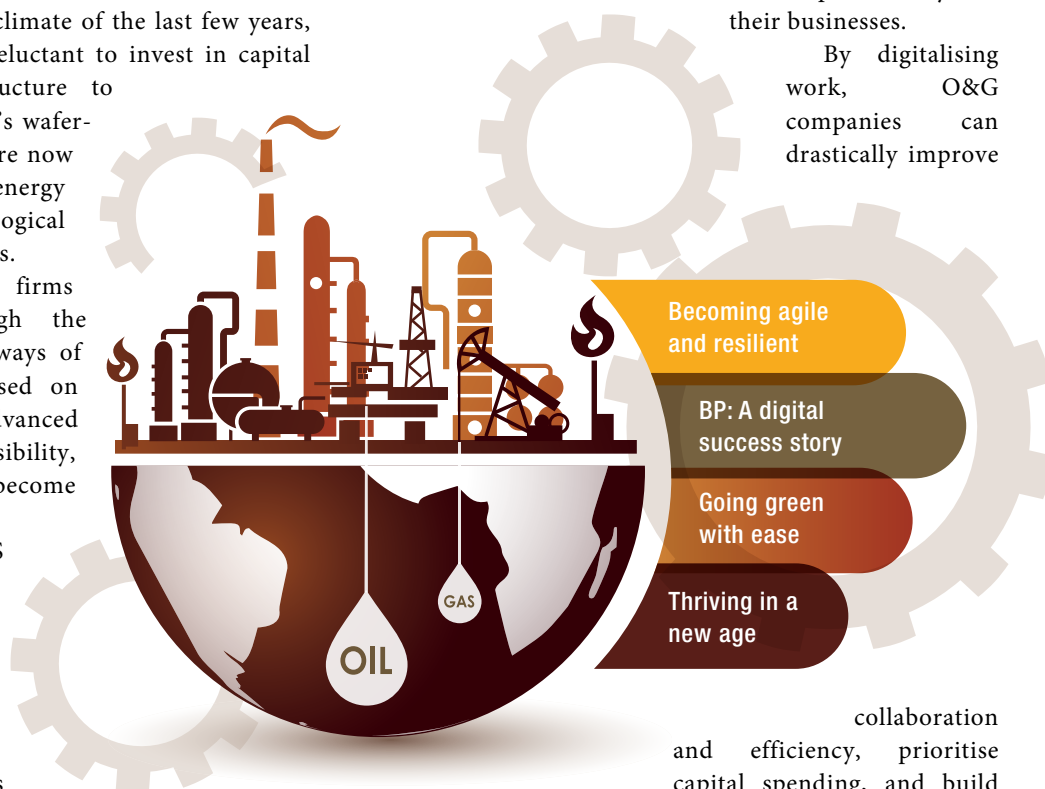
- Speed time from concept to full-capacity production
- Empower the workforce
- Optimise the value chain to create more agile operations
- Enable reliable, efficient, and safe operations

- Meet sustainability and decarbonisation objectives

Optimised operations through digitisation

To accelerate their transformation, forward-looking O&G companies are leveraging digital initiatives powered by the latest advances in cloud, Artificial Intelligence (AI), big data, digital twin, and the industrial Internet of Things (IIoT). Built on open, agnostic industrial software design principles, O&G companies are using these technologies to overcome key challenges while improving sustainability and the profitability of their businesses.

By digitalising work, O&G companies can drastically improve



collaboration and efficiency, prioritise capital spending, and build more agile operations that can

withstand market shifts. Because digital work allows workers to complete tasks from anywhere across different sites and locations, operators can accomplish more than just solving problems. Through digital workflows, they can improve overall efficiency, use the remaining time to innovate, and help companies build resilience against workforce disruptions and attract a new generation of workers.

Not only do digital tools enhance enterprise-wide collaboration, but they can also seamlessly unify operations and supply chains, breaking down silos while opening new pathways for information flow. By centralising operational insights and visualisations, operators can collaborate on the same information at the same time to identify weak spots in the business and work together to improve efficiency and profitability.

Shared data aligned with advanced analytics improves the transfer of institutional knowledge and empowers the workforce. Even when workers are away or retire, new workers can make informed decisions by accessing information in a central digital repository with contextualised operational data and AI-based guidance.

Digitalisation likewise improves sustainability initiatives and regulatory compliance. Software applications can optimise operations, streamline environmental reporting, and maximise energy usage.



Becoming agile and resilient

With reliable operational data and accurate models, companies can optimise every part of the value chain. From process optimisation to inventory management and supply and demand balance, they can uncover new opportunities that lead to greater profitability.

Agile operations start with good-quality data and integrations, and that requires a convergence of engineering, operations, and information technology. By creating one single source of truth for real-time operational data and contextualising that information alongside engineering, performance, and financial data, teams can use AI-powered tools to run real-time comparisons and simulations to find new efficiencies.

BP: A digital success story

Global energy giant BP's downstream business processes 1.7 million barrels per day in eight refineries around the

world. Unfortunately, the company's outdated technology wasn't intuitive and made it difficult to share best practices across locations. Teams were also unable to quickly make decisions to reflect market changes, leading to lost opportunities and benefits. As part of its Digital Innovation Program, BP opted to review its global downstream supply chain management process to enable more agile operations.

BP deployed a series of digital cloud technologies to maximise margin capture, efficiency, and sustainability. One of the solutions was used to optimise the production planning of its downstream business, which allows teams to quickly run complex analyses and analytics using accurate, real-time data. By simplifying and standardising its supply chain management, BP has fostered better collaboration and planning, which has increased overall agility, significantly cutting crude purchase time and improving the modelling of CO₂ emissions.

Overall, BP has significantly improved margins, made better, faster decisions, increased planning and analysis accuracy, and decreased the time it takes to analyse information from hours to minutes.

Going green with ease

Sustainability and decarbonisation are key drivers for the O&G industry. As companies look to reach net-zero targets by 2050, they must increase compliance with energy transition mandates and open up new value chains for carbon and hydrogen.

Reaching these goals and complying with new market demands requires companies to reshape business models, increase investment in ESG programmes, and bolster decarbonisation initiatives. To succeed, O&G companies need to modernise facilities and increase visibility across the value chain.

Access to reliable data, optimisation models in the cloud and enhanced KPI visualisation gives companies the operational intelligence they need to boost the value chain, reduce emissions, and innovate to reach energy targets.

Thriving in a new age

Through digital initiatives powered by the latest technology enablers, O&G companies can build industrial information infrastructure and upgrade engineering and operations applications to accelerate value creation.

They can then visualise and share industrial data within their teams and value chain partners. By undertaking these initiatives, O&G firms of the future can streamline engineering cycles, achieve operational excellence, and empower their workforces to drive the circular economy and ensure profitable, sustainable operations. □



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Biotechnology's renaissance in Healthcare: A technological odyssey

The healthcare industry is evolving rapidly due to biotechnological advancements, revolutionising diagnostics, treatments, and patient care. As we navigate the complexities of the 21st century, the spotlight is firmly on the role of biotechnology in shaping the future of healthcare.



Thomas Gebauer,
Associate Director-Marketing,
Progenesis



In the world of modern healthcare, the partnership between biotechnology and medical innovation shines as a beacon of transformative potential. With each groundbreaking step, biotechnology becomes ever more entangled with healthcare, rewriting the story of patient care, diagnosis, and treatment. This convergence isn't a mere passing fad, but a renaissance, where the fusion of biological understanding and technological prowess propels us into exciting and uncharted territories of medical advancement.

From decoding the human genome to tailor-made treatments, biotechnology's impact is reshaping the healthcare landscape. Fancy new diagnostics and cutting-edge imaging peek deeper than ever before, while biopharmaceuticals and gene therapies pave the way for targeted treatments. This blending of biotechnology with medical devices empowers individuals to become active participants in their own well-being.

Yet, amidst these triumphs, ethical considerations loom large, demanding a careful balancing act between innovation and responsibility. Looking ahead, exciting trends like CRISPR-based gene editing whisper promises of further breakthroughs. As we navigate this transformative journey, embracing the potential of biotechnology while addressing ethical complexities is of paramount importance.

The future of healthcare is being shaped by the harmonious tune of biotechnological progress, promising a future of personalised, compassionate, and unparalleled possibilities in patient care. This renaissance heralds an era of unprecedented innovation and human-centred healthcare solutions, an era where the well-being of every individual takes centre stage.

The convergence of biotechnology and healthcare has ushered in a transformative era, pushing the boundaries of what was once deemed impossible. As the pillars of science and technology intertwine, a symphony of innovations is orchestrating a renaissance in patient care, diagnostics, and therapeutic interventions.

Foundations of biotechnology in healthcare

Biotechnology's journey in healthcare began with the manipulation of DNA, laying the groundwork for groundbreaking advancements. Since the inception of recombinant DNA technology, the landscape has evolved into a multidimensional realm where genomics, proteomics, and sophisticated technologies harmonise to redefine medical possibilities.

Genomic medicine and precision therapies:

The sequencing of the human genome ignited a paradigm shift in healthcare. Biotechnology's influence on genomic

medicine is unmistakable, propelling us into an era where treatment is tailored to an individual's genetic makeup. Precision therapies, a testament to biotech prowess, target specific molecular mechanisms with unprecedented accuracy, revolutionising patient outcomes.

Advanced diagnostics and imaging

Biotechnology has become the vanguard of diagnostic precision. Molecular diagnostics, powered by biotech techniques like PCR, unveil genetic markers that were once elusive. In parallel, cutting-edge imaging technologies, a testament to biotech's impact, provide clinicians with nuanced views into the human body, enhancing diagnostic acumen and fostering early detection.



Biopharmaceuticals and drug development

The nexus of biotechnology and drug development has given rise to a new era of therapeutic possibilities. Biopharmaceuticals, including monoclonal antibodies and gene therapies, showcase the potential of biotech in crafting targeted and effective treatments. The acceleration of drug discovery, propelled by biotechnological advancements, promises a future where diseases are tackled at their genetic roots.

Medical devices and wearable technology

The fusion of biotechnology with medical devices has birthed a patient-centric revolution. Biosensors and wearable technologies, empowered by biotech innovations, provide real-time health data, empowering individuals to

actively manage their well-being. Continuous monitoring, facilitated by biotech-driven devices, not only enhances patient outcomes but also lays the foundation for a proactive approach to healthcare.

Challenges and ethical considerations

Yet, with the triumphs come challenges. The ethical considerations surrounding biotechnology in healthcare are paramount. The potential misuse of genetic information, privacy concerns, and the ethical implications of gene editing necessitate careful navigation. As biotech forges ahead, it is imperative to establish a framework that ensures responsible and ethical implementation.

Future trends and innovations

Peering into the future, the trajectory of biotechnology in healthcare appears boundless. Emerging trends, such as CRISPR-based gene editing, microbiome therapeutics, and the integration of Artificial Intelligence, foretell a landscape continually shaped by innovation. The synergy between biotech and these burgeoning technologies promises novel solutions to medical challenges that have lingered for decades.

Navigating the future of healthcare

In the crucible of biotechnology, healthcare is undergoing a renaissance. The symphony of scientific innovation and technological prowess is crafting a narrative where patient-centric care, precision therapies, and proactive diagnostics take centre stage. As we navigate this transformative odyssey, it is imperative to embrace the boundless potential of biotechnology while diligently addressing ethical considerations.

The future of healthcare is being written in the language of biotech, promising a landscape where diseases are unravelled at their molecular seams and the well-being

of individuals takes precedence in a personalised and compassionate healthcare ecosystem. The renaissance is here, and the crescendo of biotechnological progress resonates through the corridors of healthcare, ushering in an era of unparalleled possibilities.

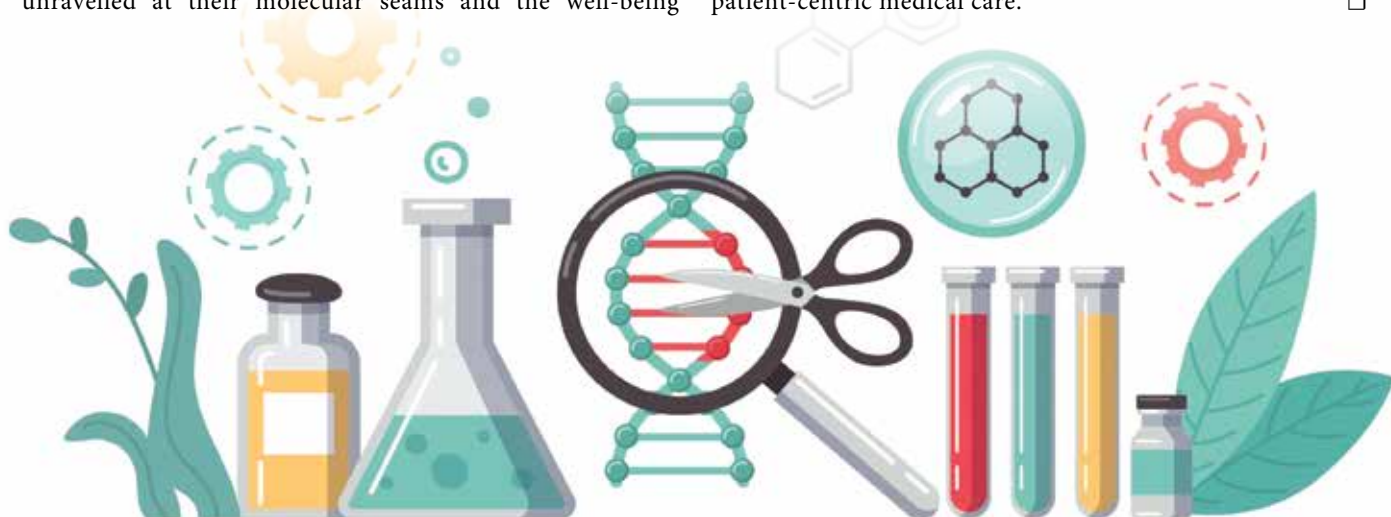
Future vision

Following technological advancements, the fusion of biotechnology and healthcare emerges as a ray of hope, offering a vision of a future marked by individualised, empathetic, and inventive medical solutions. The evolution of biotechnology in healthcare, starting from its modest origins in DNA manipulation to the current era of genomic medicine, precise therapies, sophisticated diagnostics, and biopharmaceuticals, illustrates the profound impact of scientific advancement. This convergence not only transforms patient treatment but also empowers individuals to actively engage in their own health through wearable technologies and proactive diagnostics.

Yet, amid these successes, ethical concerns loom, underscoring the need for responsible innovation. As we navigate the complexities of CRISPR-based gene editing and other emerging technologies, establishing a robust ethical framework becomes imperative to guide their application.

Looking forward

Looking forward, the trajectory of biotechnology in healthcare appears limitless, with emerging trends such as microbiome therapeutics and the integration of artificial intelligence offering further avenues for innovation. As we embark on this transformative journey, it is crucial to address ethical considerations while harnessing the full potential of biotechnology to shape a future prioritising the well-being of every individual. The symphony of biotechnological progress echoes throughout the healthcare landscape, signalling an era of unprecedented opportunities and patient-centric medical care. □





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AI in EVs:

From Autonomous Driving to Energy Optimisation



Kaustubh Dhonde,

Founder & CEO,
AutoNxt Automation

The automotive industry is undergoing a revolutionary transformation, with Electric Vehicles (EVs) at the forefront of this change. Beyond the environmentally conscious shift from traditional internal combustion engines to electric power, a significant technological revolution is taking place within EVs. Artificial Intelligence (AI) is playing a pivotal role, not only in enabling autonomous driving but also in optimising energy efficiency.

Autonomous Driving

The journey of AI in EVs begins with autonomous driving capabilities. Cutting-edge AI algorithms are being integrated into EVs to enhance safety and provide a seamless driving experience. These systems leverage machine learning to continuously analyse data from various sensors—cameras,

and lidar to make split-second decisions. The goal is not just to replace human drivers but to enhance road safety and efficiency.

One of the key technical aspects of autonomous driving is the development of advanced perception systems. AI algorithms can process complex visual and spatial information in real time, allowing EVs to navigate diverse and dynamic environments. This technology is continually evolving, with ongoing research and development aimed at refining the accuracy and responsiveness of autonomous systems.

Energy Optimisation

Beyond autonomous driving, AI is playing a crucial role in optimising energy consumption and enhancing the overall efficiency of electric vehicles. The success of EVs depends not only on their ability to navigate roads autonomously but also on their capacity to maximise range and minimise energy usage.

- **Predictive Energy Management:** AI algorithms are employed to predict and manage energy usage based on various factors, such as driving conditions, terrain, and even weather patterns. These systems continuously analyse data to optimise the deployment of energy, ensuring that the vehicle operates at peak efficiency.
- **Adaptive Cruise Control:** AI-driven adaptive cruise control systems are designed to optimise speed and acceleration patterns based on real-time traffic conditions. By evaluating the surrounding environment and traffic flow, the AI system adjusts the vehicle's speed to maximise energy efficiency, extending the range of the EV.
- **Regenerative Braking Systems:** AI plays a crucial role in enhancing regenerative braking, a technology that converts kinetic energy into electric energy during deceleration. By precisely modulating braking force based on real-time conditions, AI ensures efficient energy recapture, contributing to extended battery life and increased overall efficiency.
- **Smart Charging Infrastructure:** AI is not confined to the vehicle itself; it extends to the charging infrastructure. Smart charging stations equipped with AI algorithms can analyse usage patterns, predict peak charging times, and distribute energy intelligently. This not only optimises charging processes but also reduces strain on the grid.

Challenges and Future Developments

Despite the advancements in AI for EVs, challenges

persist. The intricate balance between safety and efficiency is a continuous area of focus. Ensuring that AI systems make split-second decisions that prioritise both the safety of passengers and pedestrians while optimizing energy consumption remains a complex task.

Additionally, the integration of AI technologies requires substantial computing power, which can be a limiting factor in smaller EVs with constrained onboard resources. Striking the right balance between powerful AI capabilities and energy-efficient hardware is a challenge that engineers and researchers are actively addressing.



The future developments in AI for EVs are promising. Continued research aims to refine algorithms, improve sensor technologies, and explore innovative ways to integrate AI into the broader transportation ecosystem. Collaborations between automakers, technology companies, and researchers are driving advancements that will shape the future of mobility.

Conclusion

As Electric Vehicles become increasingly prevalent on our roads, the role of AI goes beyond just facilitating autonomous driving. AI is the driving force behind energy optimization, ensuring that EVs not only reduce our carbon footprint but also operate at peak efficiency. The marriage of AI and electric mobility represents a significant leap forward in the evolution of transportation, with the promise of safer, more efficient, and sustainable journeys. As we embrace this technological shift, the continued collaboration between the automotive and tech industries will be instrumental in realizing the full potential of AI in electric vehicles. □

Embracing technology:

Automation trends in the packaging industry

India's packaging industry has demonstrated remarkable resilience in recent years by achieving a continued upward growth trajectory. Here is a deep dive into the automation trends governing packaging developments in all verticals.



Mahesh Sudhakar Bhale,

General Manager,
Engineering & Projects,
Cosmo Films



The packaging industry is experiencing an increase in demand for specialised packaging materials from different sectors like FMCG, healthcare and medicine, consumer technology, building and construction and others. In this digital era, manufactures are automating their processes to cater to the rising demand by achieving higher efficiency, reducing human intervention, eliminating risks and reducing their environmental impacts. Confirming the industry's robust growth, a report predicts that the packaging industry in India is expected to reach \$ 200 billion by 2025, growing at a CAGR of 18 percent to 20 percent, which is encouraging. The rapid adoption of advanced digital solutions is leading to the shaping up of new trends in the packaging industry, notably:

Enhancing processes with technology

The manufacturers in the packaging industry are constantly adopting cutting-edge technological solutions for automating processes, achieving enhanced control and monitoring and analysing industrial systems. Talking about the BOPP, BOPET and CPP manufacturing processes, the machines are now equipped with highly advanced PLC automation systems to achieve precise control over essential parameters such as temperature, pressure, speed and others. These efficient systems are capable of providing manufacturers significant advantages over the traditional relay-based control systems.

In addition to the advanced PLC automation systems, high-end SCADA systems are further enabling manufacturers to control, monitor and analyse industrial devices and processes. They constantly monitor systems and automatically process and record data, store historical trends, recipes and process parameters for machine health monitoring. There are latest and superior machine handling systems which are being adopted to make the manufacturing processes safer and convenient.

Quality assurance for customers customers

It is extremely crucial for the manufacturers that their customers always receive the right products while making no compromise on quality. Additionally, the manufacturers are required to regularly monitor the manufacturing process, ensure regular maintenance of systems, detect anomalies and address potential issues.

To achieve this, they are automating the quality control process to make sure the customers do not get substandard products by discarding poor quality items from the process line. For example, manufacturing of BOPP, BOPET and CPP, which are specialised packaging products, thickness measurement plays a very important role.

AI and Data for decision-making

The packaging industry is actively embracing advanced technologies like Artificial Intelligence (AI), data analytics and others to adopt a data-driven approach for predictive maintenance, informed decision making and offering tailored products for specific needs of various industries. With the help of AI technology, they are now capable of reading large volumes of data, identify historical patterns and trends to detect anomalies and ensure predictive maintenance. Data analytics further empowers them by converting data into actionable insights to make informed decisions related to manufacturing process and achieve the desired outcomes. In the competitive landscape, personalisation backed by data-driven approach is giving manufacturers a competitive edge. Getting access to data related to customer preferences, needs and behaviours, manufacturers can now offer tailored or customised products, suited for specific requirements of diverse industries for business success.



Sustainable manufacturing practices

Packaging manufacturers are constantly adopting technological solutions to meet the growing needs of various industries. However, at this critical juncture, they also face environmental challenges such as climate change, carbon emissions, depleting natural resources and many. This makes it crucial for them to adopt sustainable manufacturing processes to build a cleaner and greener future for all. Making efforts in this direction, the manufacturers are using digital solutions to get real-time data on their energy demand and consumption. By regularly tracking their electricity spends and wastage, they are able to conserve energy and achieve their energy-saving targets easily. Moreover, by scheduling



their operations during off-peak hours when electricity demand and prices are low, they are contributing in lowering grid strain as well. Nowadays, they are utilising demand controllers to meet different load conditions. With the help of these, the manufacturers can automatically adjust loads of power systems and control and flatten the load curve during peak power usage.

Similarly, in their bid to ensure a healthy ecosystem, packaging manufacturers have initiated effluent treatment in their plants by adopting the concept of Zero Liquid Discharge (ZLD). ZLD is a new-age technology introduced at plants to decrease water pollution at polyester chips' plants by utilising various kinds of wastewater treatment processes. This is also an assurance to disallow any discharge of wastewater from the plant, meaning, there will be zero wastage. Being a water-intensive sector, adopting green technologies like these can save the local habitat and improve water health for the flora and fauna.

Importantly, manufacturers in the packaging industry are shifting their reliance on renewable energy sources like solar energy by installing rooftop solar panels. This is supporting them in reducing their carbon emissions and dependency on fossil fuels. Furthermore, integrating smart solar monitoring, energy management and online power monitoring systems enables them to monitor all of the electricity parameters at one place. With real-time monitoring, they can proactively measure spikes in consumption, reduce base loads, evaluate peak hours, identify irregularities, optimise operational scheduling

and track energy-saving targets and goals more accurately. This approach is helping them to maximise their benefits by tracking their energy spending with real-time alerts and calculating their carbon footprint savings for both financial and environmental gains.

Smart packaging for perishables

Customers nowadays are spending more on packaged food products, which is increasing the demand for packaging solutions for perishable products. The packaging industry is adopting technological solutions to come up with innovative solutions for the evolving market needs. For example, smart packaging has emerged as a viable solution to deliver packaged food items of their best quality to customers. These intelligent solutions can monitor and track parameters like temperature and humidity along with shipment details for safer deliveries. Moreover, smart packaging solutions come with QR codes to help customers get all the essential information of the products to help them make informed decisions and improve overall satisfaction.

Automation, backed by technological advancements in the packaging industry, is not just enabling manufacturers to meet the rising demand but also allowing them to cater to its needs quickly, efficiently and sustainably. As technologies continue to advance, the manufacturing process of packaging products will become agile and efficient, contributing to the industry's overall growth and success in the coming period. □

Simple Vision sensors

IVS 108 and IVS 1048i / DCR 1048i



As easy to use as an optical sensor with high performance comparable to a camera system – the unique Simple Vision concept from Leuze. The Simple Vision product range offers quick and easy entry into image processing used in industrial automation. Whether presence or absence detection, part detection or inspection, measuring or counting – we will always have the right solution for your specific applications. Image capture, processing and communication functions are all integrated in just one image processing sensor. This results in a multifunctional, modular, extremely reliable and easy-to-implement image processing solution. Powerful, embedded software tools work either independently or together in a job pipeline without the need for an external control. Simple Vision makes things easy.

Our product range: With exactly the right performance for your tasks



IVS 108

For detecting the presence and absence of objects such as caps, labels or prints on all types of bottles and flacons processed in filling systems. Furthermore: check of the alignment of objects irrespective of their shape, material, color and dimensions.



Presence detection



DCR 1048i

The high-performance code reading algorithm ensures extremely high reading rates. As an option, this model has an improved algorithm specially conceived for DPM codes.



1D- / 2D-code reading
DPM code reading



IVS 1048i

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Presence detection
Measuring + counting
1D- / 2D-code reading
DPM code reading



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How can you enhance **material management?**

It is apparent that the importance of material handling to the economy of a country is as equal that as of the industries itself. The following are a few ways to optimise the internal transport of materials and their handling.



Ramesh Bhorania,
Vice President, Robotics and
Factory Automation,
Prama Hikvision India

A company's material is a paramount substance for manufacturing plants, retail stores and even end-consumers. Raw material, finished goods, inventory at each stage and material movement are an important part of the entire business process and take significant consideration, such as operational manpower, equipment and the process itself. When out of sync, their impact on overall efficiency and production yields will be negatively huge.

Impediments

Traditional material handling systems resist immediate replacement by modern counterparts due to challenges like high capital investment, ROI concerns and technological resistance. Despite hurdles, the logistics industry is gradually overcoming them, anticipating a surge in adopting advanced automation technology for Material Handling Equipment (MHE). The forefront of this evolution integrates machine vision, AI and mobile robotics. Machine vision offers visual material sensing, collaborating with robots such as Automatic Guided Vehicles (AGVs) and mobile robots. Vision-based AI enables natural navigation, reducing errors, enhancing accuracy and diminishing human dependency in distribution. This system seamlessly cooperates with existing software and control systems like PLC. Notably, Pick-to-Light systems have eliminated human errors in both forward and reverse logistics, making inbound and outbound distribution processes more efficient and accurate, with a reduced cycle time and heightened volume management.

Significant changes

Conveyors are pivotal in the evolving landscape of material handling, adapting to various needs from automated warehousing to smaller automated stations. Unique design requirements cater to specific industries. Automotive manufacturing facilities often necessitate conveyors with high load ratings. Streamlined transfers between conveyors utilise direction-changing modules and pallets with mating features. All-in-one modules that incorporate pallet positioning devices reduce the need for separate devices along the conveyor length, optimising floor space.

Safety features

MHE must be checked, verified for its safety features with expert help. The COBOTS for palletisers are equipped with safety sensors to work cohesively. Due to ultrasound, laser technology, mobile robots can work safely with operators, find dynamic obstructions and plan re-routing in accordance with robot control systems or fleet management systems.

Emerging technologies

As mentioned, newer technology is equipped with safety mechanism based on AI, IIoT and latest sensing technology. Mobile robots for MHE and COBOTS can work in cohesion with humans. Due to digitalisation and IIoT, real-time updates of all SKUs are available and can be availed for quick delivery of SKUs through mobile robots.

Optimal internal material transportation

- **Docking seamlessly with elevators:** With Autonomous Mobile Robots (AMRs), materials can be transferred automatically across floors with high efficiency. With the Robot Control Systems (RCS), maps on different floors can be managed together to ensure seamless docking using elevators and across-floor navigation.
- **Transporting materials to production lines:** AMRs can eliminate this with great ease. These robots can be cluster-controlled by robot control systems to realise optimal task allocation, multi-robot path planning and traffic management, covering diverse application scenarios.
- **Docking seamlessly with mechanical arms:** With the booming need to achieve higher productivity with lower costs, manufacturers nowadays are looking to upgrade automation to increase work efficiency.
- **Logistics vision solutions in picking, outbound delivery:** Warehouse management systems further optimise order analysis. For outbound delivery efficiency in e-commerce and 3PL with omni-channel sales, logistics vision solutions are crucial. Implementing a CCTV system for real-time video tracking during outbound delivery enhances traceability.

Latest trends going forward

E-commerce involves crucial processes like inbound, sorting, distribution and outbound. Post-COVID-19, the surge in e-buying has intensified the challenges of timely delivery due to high volume and variants. However, advancements such as AGV and mobile robot-based sorting have significantly reduced issues related to sorting, dispatch and reverse logistics. Manual sorting is being replaced in many areas, achieving 100 percent accuracy at a rate of 20,000 parcels/hour. The integration of dimensioning, weighing and barcode scanning with mobile robot-based sorting systems is proving to be a transformative solution for the e-commerce and logistics sectors. □



Engineering a **lightweight mobility solution**

Automotive lightweighting strategies using simulation-driven design play a significant role in new vehicle development as they address all these challenges holistically. It helps find innovative solutions and deliver a design that strikes the right balance between cost, weight, and performance. The article discusses some of the latest developments and best practices in the use of optimisation techniques for automotive lightweighting.



Sushil Mane,

Senior Director,
Technology & Customer Support,
Simulation & Design Support, Altair

Recent trends in the automotive industry, like electrification, connectivity, and autonomous vehicles, have driven the need for a holistic vehicle development strategy, keeping in mind the emphasis on sustainability. These trends require balancing weight distribution and the integration of electronic systems, apart from vehicle performance attributes like safety, drivability, etc.

Achieving high-level performance

A common practice for new vehicle product development is to use a top-down approach, as it gives more design freedom to meet high-level vehicle performance targets. A disruptive process is gaining momentum at both new EV start-ups and established OEMs; it is the use of an integrated optimisation process. It extensively introduces optimisation technology across every stage of a simulation-driven product development process, leveraging an automated software toolbox, including vehicle modelling and integration workflows and simulation solvers.

The process starts with engineers developing new vehicle concepts with the use of topology optimisation techniques targeting key performance attributes. Topology optimisation is the process that helps optimise the distribution of material within a given vehicle design space, delivering an early lightweight vehicle concept. The topological concept is then

transformed into a mixed-fidelity beam-and-shell model using automation tools.

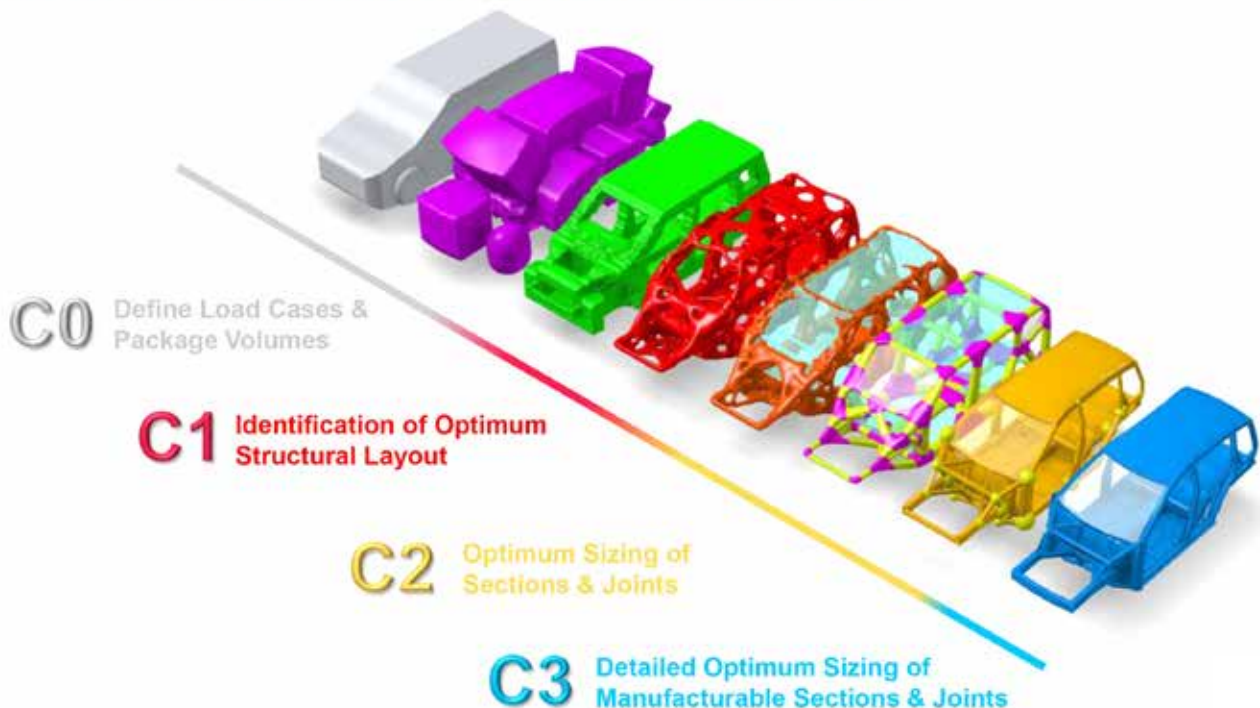
The process further allows engineers to use multi-disciplinary and multi-model optimisation techniques to rapidly explore the design space by changing idealised beam cross sections or joint definitions. While vehicle performance attributes for durability and vibration are targeted in this stage, the process also provides flexibility to perform check runs to evaluate various local crash scenarios.

Design makes a difference

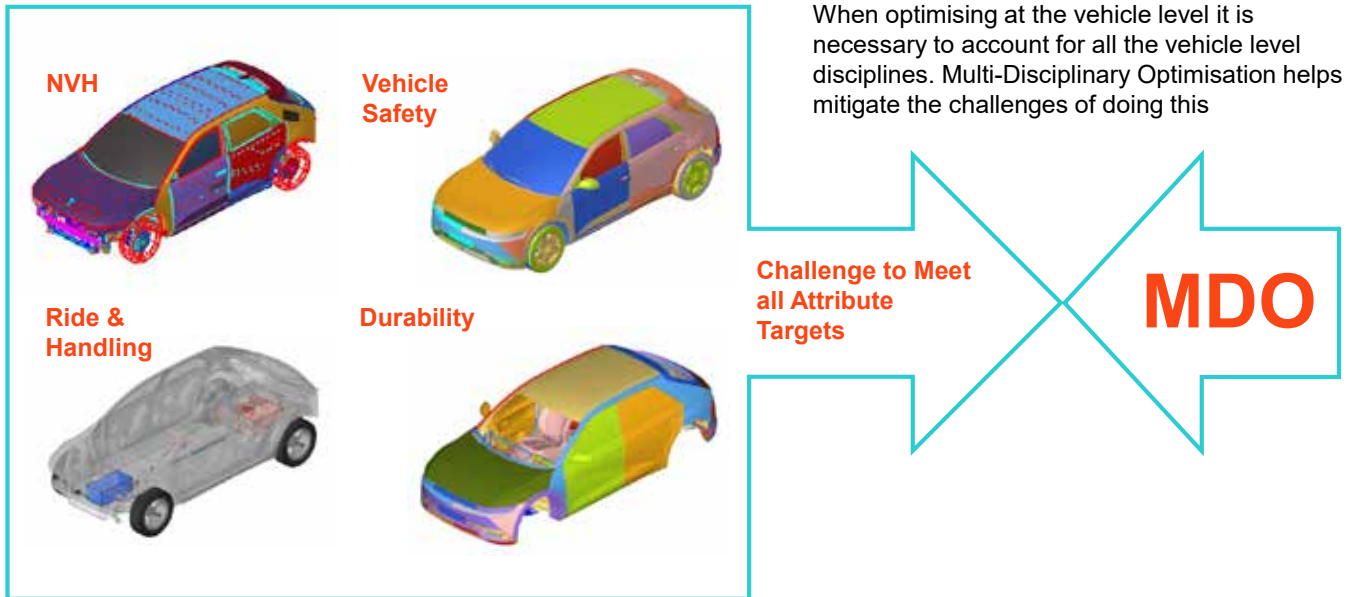
As the design matures, a high-fidelity model is generated that helps to perform detailed sizing of manufacturable sections and joints of the BIW structure using a Multi-Disciplinary Optimisation (MDO) approach for all vehicle load cases. All along this process, a designer handshake is maintained to help generate and evaluate the component designs.

As the design evolves from the full vehicle towards the detailed component-level engineering validation stages, integrated optimisation and manufacturing simulation tools help designers further lightweight the designs. Topological or shape changes of the component are rapidly generated, and quick manufacturing feasibility checks like casting, metal forming, injection moulding, etc. are conducted in this integrated design and simulation environment.

C¹²³ Vehicle Concept Development Process



MDO – Key to Meeting the Challenge of Vehicle Level Optimisation



These tools, with integrated and powerful meshless solvers, run simulations within seconds to minutes, helping designers deliver component designs. These component designs are integrated back into full vehicle models to check vehicle-level performance.

Capturing manufacturing effects

Special materials like composites, reinforced plastics, and 3D-printed parts play a critical role in lightweight component designs. These special materials have their challenges when it comes to material modelling and capturing manufacturing effects. Engineers use interesting simulation workflows to arrive at laminated composites to find optimal ply patches and thickness, as well as the stacking sequence of the plies in the stack, providing both strength and lightweight. Reinforced short-fibre plastics, for instance, also provide the required strength to the polymer material and lightweighting benefits.

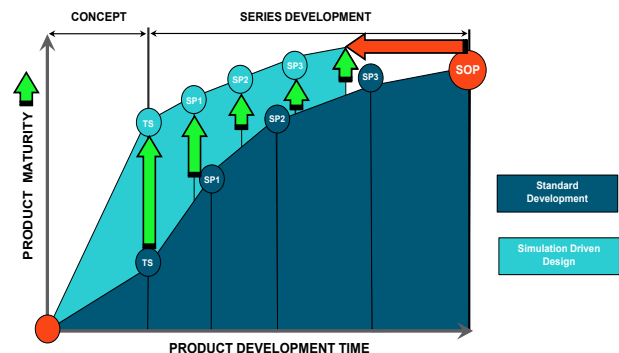
As manufacturers further contend with increasing competition, there is also huge pressure to reduce development time. New developments in Artificial Intelligence, with their machine learning algorithms, provide unique integrated engineering workflows to further reduce the development time.

Formulating new designs

Engineers increasingly rely on AI-based machine

Schematic BIW Design Process

Delivers Key Business Benefit – Significant Development Time Reduction with Increased Maturity



learning algorithms to quickly predict and optimise design performance. Complex structural behaviours can then be predicted using various techniques like classification, clustering, ensemble, and deep learning algorithms to build predictive models from simulation result files.

These predictive models are plugged back into generative optimisation workflows to rapidly derive lightweight concepts. This convergence of simulation and AI will play a huge part in the future of vehicle development and lightweighting strategies.

Such integrated process workflows inject a renewed sense of design innovation, facilitating quality decisions based on engineering data and rapid package space exploration and leading to new design concepts in lightweighting. □



Future of quality management in transmission projects

Sterlite Power has benchmarked the processes to deliver First-Time Right (FTR) quality assets, hence reducing the Cost Of Poor Quality (COPQ). This article presents a comprehensive analysis of the quality transformation process implemented by Sterlite Power in transmission lines and substations across Tariff Based Competitive Bidding (TBCB) projects.



Arun Sharma

CEO,
Infrastructure Business,
Sterlite Power

The ultimate goal for any organisation is to deliver reliable asset quality throughout the project life. Quality management is a crucial aspect of the transmission sector as it ensures the electricity transmitted to consumers is reliable, safe and efficient. At Sterlite, we have implemented a robust quality management system to ensure assets built can deliver services for more than 35 years without fail. This commitment to quality has helped Sterlite Power become a leading player in the power transmission sector, with a high-quality management team, excellent execution capabilities and a marquee project portfolio. Despite competition and cost optimisation, we have been able to execute and deliver reliable assets across India.

Our focus on quality is also demonstrated through sustainable practices adopted throughout the project life cycle, such as optimising transmission routes to reduce environmental impact. Additionally, the company has overcome transmission challenges with technology by implementing its 360 degree solutions, innovation, project execution and design capabilities. This is a testament to the company's commitment to quality management and its ability to overcome challenges with innovative solutions.



On-boarding and assessment of partners

On-boarding and assessment of partners is conducted as EPCs, service providers and suppliers based on document and on-ground assessment using defined templates and questionnaires. These assessments cover categories such as Quality Management System, Product Qualification, Product Technology, Manufacturing, Relevant Experience, Health and Safety, Design and Engineering, Financials and Legal, Project Management and Execution.

Manufacturing quality plan and inspections

After on-boarding EPCs, a kick-off meeting is held to explain quality management processes, including supplier management, field quality and QA QC norms for ensuring zero defects. Suppliers submit a Manufacturing Quality Plan (MQP) that outlines raw material procurement, in-process quality checks and factory acceptance tests according to relevant IS/IEC standards and technical specifications. Inspections are carried out by competent authorities to ensure zero-defect products are delivered to project sites.

The tower materials, including high tensile steel and mild steel, undergo various tests to ensure their quality. These tests include mechanical tests such as ultimate tensile strength, yield stress, elongation and bend test, as well as chemical tests that measure the chemical composition of the materials, including C, Mn, Ph, S etc. Galvanisation tests are also conducted to check the uniformity, mass, thickness and adhesion of the zinc coating.

To ensure the quality of substation equipment, inspections and tests as per relevant standards and technical specifications are conducted. Stage and final inspections are carried out at supplier premises to ensure zero-defect quality product supply at the site. Critical electrical tests are carried out on equipment such as transformers, reactors, Gas-Insulated Switchgears (GIS), CVT and wave trap, including high voltage tests, short circuits, gas leakage and insulation resistance.

Field quality manual and critical-to-quality parameters

A Field Quality Manual is prepared in line with Indian standards and technical specifications, ensuring pre-inspection, in-process and post-inspection checks for delivering first-time-right products. Sixteen CTQ parameters are defined, with stage-wise checklists prepared for monitoring and recording construction quality with documentary evidence, including photographs of construction quality. CTQs related to foundation quality (6 nos.) include excavation, silt content, slump cone test,

cube sampling, concreting and cube testing. CTQs related to erection (4 nos.) include tower erection tools, pre-erection readiness, torque tightening and tack welding. CTQs related to stringing (6 nos.) include insulator handling and storage, conductor handling, conductor sag, conductor installation, OPGW tools and OPGW installation, which are monitored on an activity basis in the field to ensure first-time right quality.

Ensuring the quality of tower materials is crucial for safe and efficient transmission of electricity. Our commitment to quality management is evident throughout its project life cycle, from on-boarding and assessment to sustainable practices and innovative solutions. The company's focus on quality has helped it become a leading player in the power transmission sector, delivering reliable assets across India. We ensure the quality of its concrete foundations through concrete cube testing. The cubes are tested after 28 days of casting to determine the strength of the casted foundation. Special care is taken in the preparation and handling of the cubes i.e. baby care of cubes (preparation cubes by trained workmen, Interim curing, handling of cubes from site to stores, placing cubes in curing tank, maintaining temperature) to achieve a zero-cube failure rate.

Training and quality tool box talks

Trainings and quality TBTs are conducted at the site before the start of work for each activity to ensure all activities are performed as per critical to quality requirements. The company prepares special videos covering Dos & Don'ts to deliver correct education/information to gang members for ease of understanding before the operation is performed to get first-time right results. The training hours imparted per person are monitored on a daily basis as a record, and interactions with gang members are done on a regular basis to know about their feedback and to check training effectiveness.

Digitalisation and monitoring

Digitalisation of processes is a critical component of quality management in Sterlite Power. We make use of technology for capturing site data (Critical to Quality) on a real-time basis to ensure the identification of potential system issues before they become major quality concerns. The Eagleye tool has been implemented across the site to capture foundation CTQs for effective data storage and quick retrieval, leading to improvement in Flip readiness, SPV Governance.

Weekly project reviews on quality issues, improvements and the way forward are conducted with all internal stakeholders. This initiative has given the right guidance, direction and motivation to the quality team to deliver best outcomes, which in turn has resulted in good quality assets. The quality performance is further validated by external agencies (Vedanta & TUV SUD) via audits conducted on quality processes without having any major/minor concerns in the last four years. This approach helps Sterlite Power to identify potential quality issues and take corrective actions before they become major concerns.

Conclusion

Quality transformation is essential for Sterlite Power to meet the increasing power demands and provide reliable assets for power transmission. The company has made significant investments in the following areas to improve the reliability and quality of electricity transmitted to consumers, contributing to a more sustainable future:

- Competent manpower
- Calibrated tools and machines
- Standardised methods and operating procedures
- High-quality materials with robust design

The country's strengthening stride towards net zero, growing power demand, emphasis on power quality and reliability, push for manufacturing and growth in per capita consumption of electricity make it crucial to take urgent action. The company's focus on grid, reliability and flexibility is critical to ensure 24/7 quality and reliable power to all. □



Evolutionary leaps in elevator manufacturing industry

The elevator manufacturing industry, rooted in tradition, is undergoing a revolutionary transformation driven by automation, AI and a commitment to sustainability. This article explores the dynamic shifts shaping the future of vertical transportation, ushering in an era of efficiency, safety and ecological consciousness.



Manish Mehan,
CEO & MD,
TK Elevator India

The concept of elevators has existed for ages, and while their fundamental purpose remains unchanged, the underlying technologies driving elevators have undergone numerous evolutionary leaps over the years. Automated operations of elevators have resulted in significant improvements in the efficiency, safety and overall user experience. With urbanisation leading to a growing demand for housing, there is an increasing imperative for intelligent, efficient and advanced elevator technologies to facilitate the expansion.

The journey towards coordinated operations

Over the years, elevators have undergone significant transformations, transitioning from manual operation to a steadily advancing phase of enhanced safety and efficiency through the integration of various automated features. As buildings became taller as urban development advanced, the demand for enhanced elevator performance, security and dependability became increasingly evident. In response to this need, the evolution of smarter elevators emerged as a natural solution.

Automated or smart elevators make use of Big Data and Artificial Intelligence (AI) to enable more efficient vertical transportation of commodities and passengers. Smart or connected elevators are increasingly being used in buildings such as hotels, residences, arenas, hospitals, sports facilities, offices and airports among others. These are designed to minimise overall energy consumption and manage passenger traffic efficiently within a building. Smart elevators make use of advanced algorithms and data to minimise waiting time by effective traffic management in commercial, residential and various other buildings. Technologies incorporated in these units include biometrics, destination access and dispatching control systems, digital security control systems and touch screen control among others, to optimise the travel experience for passengers.

The integration of destination control for passenger elevators has not only enhanced the overall user experience. Still, it has also firmly established elevators as integral components of contemporary building design and urban development. A significant benefit of this automation trend was improved utilisation of resources and enhanced customer safety. Elevators are now not only much more convenient but also significantly safer because of technological improvements that brought about sophisticated sensors, emergency protocols and real-time monitoring. This change resulted in a secure and efficient vertical transportation experience. As a result, elevators have increasingly become an essential transportation means that easily fit into our daily routines and the changing urban environment.

Innovation in green elevators with a focus on sustainability

Elevator companies have started to give more emphasis on the sustainable performance of their products as customers and the public have become more and more environmentally conscious. Manufacturers are incorporating energy-efficient components like regenerative drives to align with 'green building' principles and intelligent controls. These projects support the global push for sustainability by decreasing carbon emissions through reducing the consumption of energy.

Moreover, post-pandemic measures have also been introduced to improve air quality inside the lift cabin and are fostering a better experience for customers.

Emergence of MAX in India


India's elevator industry and urban infrastructure are currently at a turning point with the introduction of revolutionary technology. The way elevator systems are managed and operated across the subcontinent is set to be changed by revolutionary technologies. The development could not have come at a better time, given the constantly changing urban infrastructure in India and the rising demand for dependable, affordable vertical movement. The technology brings in an era of extraordinary elevator management by predicting possible problems before they arise. Additionally, the technology guarantees that the buildings maintain a technical advantage by smoothly connecting with India's transition towards digitisation. The introduction of the technology has the potential to completely transform lift performance, service and efficiency. The convergence of innovation and connection will help to create smarter, more sustainable cities that can meet the vertical transportation needs of a dynamic, quickly expanding population as urbanisation picks up speed.

Conclusion

The transition to more automated lifts is an excellent representation of a journey marked by creativity, determination and intelligence. We are currently poised to experience greater improvements in automation and AI because of the elevator industry's on-going innovation. With concepts of emission-free cities being introduced, elevators may one day become one of the predominant means of traffic for future cities, boosting connectivity and accessibility in ways that were previously unimaginable through developments like MAX. Elevators are expected to have a significant role in influencing urban environments as cities develop, promising a time when vertical mobility will support urban expansion. □

Surgical robots:

The future of healthcare

A close-up image of a robotic hand, likely from a surgical robot, holding a blue surgical instrument. The hand is metallic and has a white sleeve at the wrist. The instrument has a circular head and a long, thin handle.

In the past few years, technology has advanced quickly, particularly in the field of robotics. These new developments are undoubtedly appealing, and robots have significantly simplified our lives.

Here is how robotics has led to a complete metamorphosis for medical procedures and what comes next.



Dr Sudhir P Srivastava,

Founder, Chairman and
CEO, SS Innovations



Advancements in robotic surgery

The development of robotic technology has been particularly beneficial and significant in the field of medicine, where efficiency is essential to save patients' lives. Indeed, surgical robots are considered an important advancement in the healthcare industry and have the potential to impact how medical procedures are carried out in the future. To assist healthcare workers in treating patients and optimising hospital operations, medical robots have recently made a significant impact. These robots are made up of hardware, software, sensors and tools that interact with one another to create a linked ecosystem that may provide information and guide a surgeon's decisions.

Robotic surgeries and benefits

Robotic surgery provides surpassing precision and accuracy. They can carry out intricate procedures with a minimum amount of invasiveness, resulting in smaller incisions, less tissue damage and quick patient recoveries. These robots can be controlled by surgeons with extreme

accuracy, enabling delicate and refined procedures that could be difficult for human hands alone. The most common technique for which robots are utilised is keyhole surgery, which is done through very small incisions. The robot's instruments are miniature so they can fit through the opening. In an effort to get beyond the drawbacks of existing minimally invasive surgical techniques and to improve the skills of doctors performing open surgery, robotic-aided surgery was created. Cardiology, gynaecology and urology are just a few of the many surgical procedures for which surgical robots have been developed.

The most prevalent kinds of surgical robots have a camera arm, one or more mechanical arms and surgical instruments that are miniature linked to those arms. A 3D image of the inside of the body is captured by the camera, which is a high-definition magnified camera. The surgeon is seated next to the operating table at a computer console. The surgeon can regulate all of the robot's arms at once through the console, and the screen shows a stereoscopic image of the patient's inside body. The robot precisely duplicates the motions made by the surgeon as they are made with the controls. The robot alerts the doctors if there is resistance or if the tissue is being

overstressed. That helps a lot and makes the procedure even safer and easier for the patient. Additionally, it is easier on the surgeons. They have access to the entire operating room while performing the procedure while seated at an open console in front of a height-adjustable workstation, which is 'an important safety feature.' The robotic equipment can be sterilised and used again, which is both environmentally friendly and economical.



A set of remotely controlled manipulators known as a telemanipulator enables the surgeon to perform stereoscopic real-time operations from a control station that is not attached to the operating table. Robotic arms with end-effectors implanted through specially crafted trocars perform endoscopy-like manoeuvres while docked next to the patient. Memory devices are crucial in ensuring that the robot-assisted surgery goes smoothly. Based on the patient's physical record, the memory storage solutions can carry out a variety of tasks. Additionally, they can provide precise data to measure calibration offsets showing storage drive system misalignment, data life and other things.

Compared to conventional techniques, surgeons who use robotic systems report that it improves precision, flexibility and control throughout the operation and gives them a better view of the spot. Surgeons can carry out delicate and intricate treatments using surgical robots that might be challenging or impossible with other techniques. Surgical robots are incapable of independent movement. Surgeons are in control at all times. Safety controls are in place to make sure the

robot doesn't move without the surgeon's permission.

Data and analysis about a patient's status and improvement can be provided using Robotic Process Automation (RPA). It can track the patient's progress from the moment they first displayed symptoms to their current state. It also provides a clever diagnosis and therapy possibilities. This technology streamlines a chunk of their labour while analysing data from various healthcare providers, considerably improving the care cycle. The quality of healthcare coordination, population wellness, remote monitoring and utilisation management can all be improved with RPA. When healthcare personnel are freed up from these aspects of their everyday chores, they can freely concentrate on more important tasks like communicating with patients one-on-one.

Robotic surgery is a brand-new, cutting-edge technology that is revolutionising the surgical field. The capacity of the surgeon to control the instruments and subsequently the tissues is substantially improved by instruments with higher degrees of freedom. Through the use of the proper hardware and software filters, these systems are made to correct the tremor of the surgeons in the end-effector motion. Additionally, these devices have the ability to scale movements, converting massive movements of the control grips into tiny movements inside the patient.

Envisioning a robotic future

The ability of surgical robots to lower the risk of complications and enhance patient outcomes is one of its important advantages. It can reduce the possibility of human error, ensuring that operations are performed safely and accurately. Robotic surgery is especially useful in difficult operations like cardiac and neurological surgeries, where accuracy and precision are crucial. To operate surgical robots, specialised training is required for surgeons.

Surgical robots push the boundaries of healthcare technology innovation in the direction of better clinical results. This technology's novel effects have the potential to produce fundamental clinical advancements. The development of surgical robots occurred at a time when there was an increasing demand for higher surgical precision and safer operations, as well as when surgeons were progressively adopting minimally invasive surgical technology to improve their outcomes.

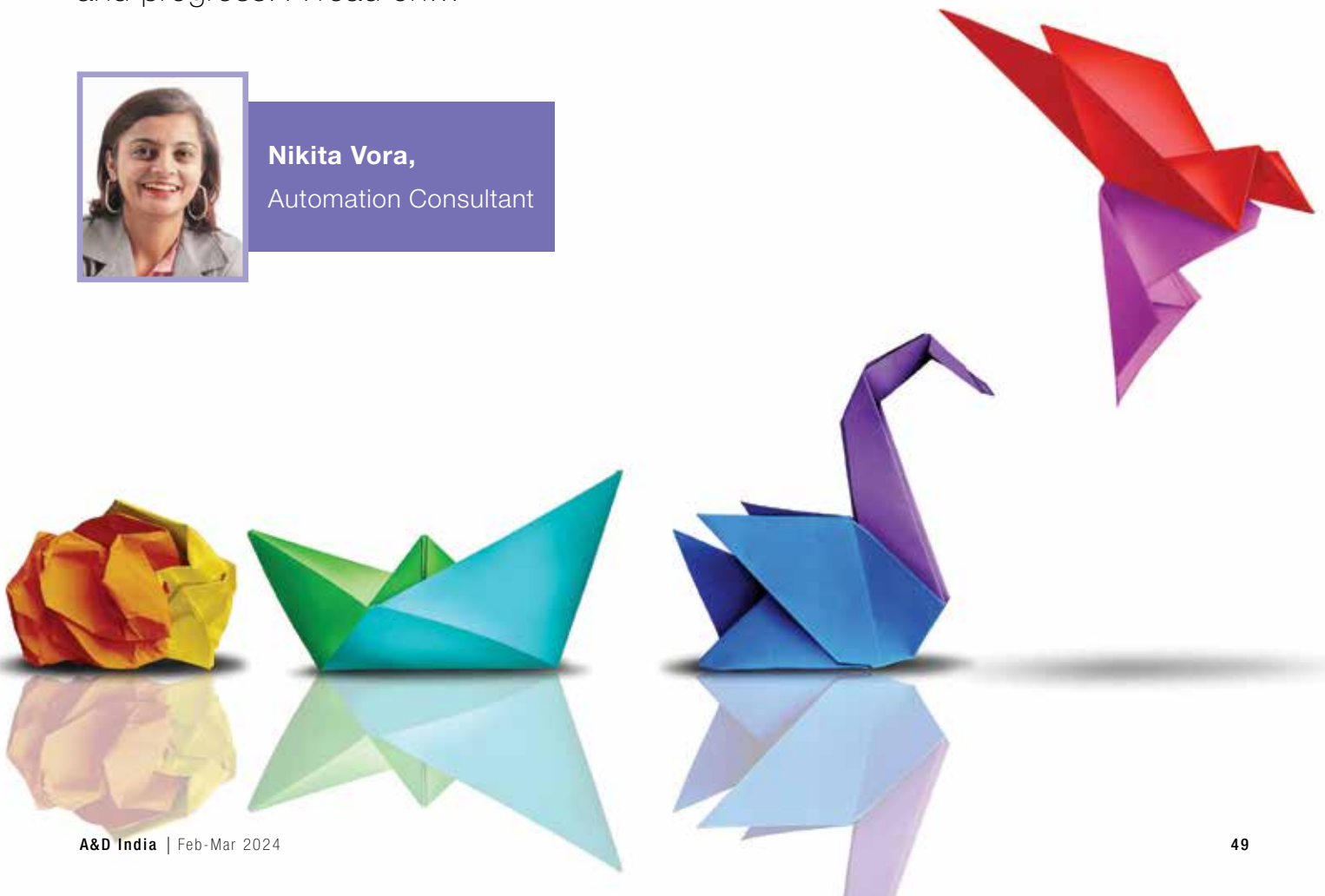
Robots in medical professions can improve clinical workflows and patient care and provide a secure working environment for both patients and healthcare professionals. In the future surgical robots will become an essential component of surgery. Surgical robots were made possible by developments in surgical technology, and their widespread use has helped surgeons and care teams operate more quickly and effectively while improving patient outcomes. □

The Indian technological space: **Innovation, resilience and transformation**

In the heart of a rapidly evolving global technological landscape, India is emerging as a front-runner in the digital revolution. This journey is not merely about adopting new technologies but about a profound transformation that is rewriting the narrative of a nation's development and progress. A read on...



Nikita Vora,
Automation Consultant



From digital inclusivity to green technology, the evolving technological landscape in India is shaping a future that promises growth, opportunity, and a new identity in the digital world. Following are some of the simulators for this new technological shift:

Digital Inclusivity: The Jio Effect

At the forefront of India's digital transformation is the remarkable rise of Reliance Jio. Launched in 2016, Jio disrupted the telecom sector by offering affordable 4G services, catalysing a digital renaissance in the country. This democratisation of data connectivity led to a surge in digital adoption, connecting millions to the internet for the first time. Jio's impact transcends traditional boundaries, making digital access a reality and fostering a new digital culture.



Industrial Revolution 4.0: The Automation Wave

In the industrial sector, India is witnessing the integration of automation and smart technologies, ushering in the era of Industry 4.0. Companies like Tata Motors and Mahindra are at the forefront of this revolution, leveraging automation to enhance production efficiency and drive industrial innovation. The manufacturing landscape is evolving rapidly, embracing robotics and artificial intelligence to stay competitive in the global market.

Fintech Frontiers: UPI's Success Story

India's financial landscape has undergone a paradigm shift, thanks to the success of the Unified Payments Interface (UPI). This fintech innovation has simplified transactions, making digital payments accessible to all segments of society. With billions of transactions processed monthly,

UPI exemplifies how technology can transform traditional banking, promoting a cashless economy and inspiring similar innovations in the financial sector.

Healthcare and Technology: The AI Impact

In the healthcare sector, India is witnessing a transformative impact with the integration of digital technologies. Startups like Practo and advancements in Artificial Intelligence (AI) powered diagnostics by companies like Qure.ai are revolutionising patient care.

Telemedicine and digital health records are bridging the urban-rural healthcare divide, making quality healthcare more accessible across the nation.

The use of AI and machine learning in diagnostic procedures is enhancing accuracy and availability.

Educational Transformation: The Rise of EdTech

The education sector's transformation is perhaps the most visible in Indian society. EdTech platforms like Byju's and Unacademy are not merely supplementing traditional education but redefining it. These platforms have made education more accessible, interactive, and personalised, reshaping the learning experience for millions of students across the country. The digitisation of education is a key driver in preparing the workforce for the demands of the digital age.

Green Tech: Renewable Energy Initiatives

India's commitment to sustainable development is exemplified in its focus on green technology. The growth of renewable energy sectors, spearheaded by companies like Adani Green Energy and ReNew Power, is a testament to this commitment. These initiatives are crucial to addressing environmental challenges and promoting sustainable economic growth. As India embraces solar and wind energy, it sets an example for the world in transitioning towards cleaner and greener technologies.

E-Commerce Growth

The rise of e-commerce platforms has been transformative for India's retail landscape. Companies like Flipkart, Amazon India, and Snapdeal have not just changed how Indians shop; they have redefined consumer culture, logistics, and even payment systems, contributing significantly to the economy's digitisation. E-commerce is not just a commercial success story but a reflection of changing consumer behaviour in the digital era.

The Startup Ecosystem: Fostering Innovation

The Indian startup ecosystem is a vibrant and dynamic landscape, supported by government initiatives like 'Startup India'. Young entrepreneurs are driving innovation across sectors, and cities like Bengaluru, Hyderabad, and Pune are emerging as global startup hubs, attracting investment and talent. This thriving startup culture is crucial to pushing the boundaries of innovation and establishing India as a global technology powerhouse.

Smart Cities: Reinventing Urban Living

India's Smart Cities Mission is about more than just urban modernization; it's about reimagining urban living. Utilising IoT, AI, and big data, cities are becoming more efficient, sustainable, and citizen-friendly. This initiative is crucial in addressing the challenges posed by rapid urbanisation and creating a blueprint for the cities of the future.

Cybersecurity: A Crucial Pillar

In the digital age, cybersecurity is paramount. India is strengthening its digital infrastructure to protect against cyber threats. Initiatives like the National Cyber Security Policy are crucial to safeguarding India's burgeoning digital economy and ensuring a secure online environment. As India's digital footprint expands, cybersecurity measures become instrumental in protecting sensitive data and securing the nation's digital assets.

Transforming Public Services

Digital governance in India is revolutionising public service delivery. E-governance initiatives are making government services more efficient, transparent, and accessible, enhancing the interface between the government and its citizens. The digitisation of public services streamlines bureaucratic processes and contributes to a more responsive and accountable governance structure.

Space Technology: India's Galactic Aspirations

India's foray into space technology, marked by successful missions like Mangalyaan (Mars Orbiter Mission) and Chandrayaan (Moon Mission), demonstrates its capabilities in this elite field. These missions have not only bolstered national pride but have also positioned India as a significant player in the global space arena. Space technology is not just about exploration but also about showcasing India's scientific and technological prowess on the world stage.

Rural Digital Connectivity

Efforts to extend digital connectivity to rural areas are crucial to ensuring inclusive technological growth. Initiatives like BharatNet aim to bring high-speed internet to India's rural heartlands, bridging the digital divide and opening up new opportunities for rural populations. The digital empowerment of rural communities is instrumental in creating a more equitable and inclusive digital landscape.



Adapting to Technological Changes

The evolving technological landscape is reshaping India's workforce. There is a growing need for reskilling and upskilling to keep pace with technological advancements. This shift is not just about job preservation but about embracing new opportunities in a digitally driven economy. The future of work in India is intertwined with technology, requiring a proactive approach to skill development and continuous learning.

A future of promising growth

India's journey through this era of technological renaissance is a narrative of innovation, resilience, and transformation. The country is not just adapting to technological changes; it is actively shaping them.

From the digital democratisation initiated by Jio to the transformative impact of UPI in finance, from the advancements in healthcare and education to the commitment to sustainable development, India is carving out a path that could redefine its role on the global stage.

This journey is about more than just technological adoption; it's about redefining India's future, a future that promises growth, opportunity, and a new identity. □

Optoelectronic sensor for harsh environments

Balluff Automation India recently introduced a new BOS R254K optoelectronic sensor under the SAMS (Smart Automation and Monitoring System), which one can use to reliably detect bottles, containers, and pallets in the food industry and packaging sector, for example. Designed for demanding



BOS R254K

applications, it is ideal wherever cleaning is regularly carried out with aggressive agents and high pressure. Resistant to cleaning agents

(Ecolab), it meets the high cleaning cycle standard set by Balluff. The IP67 and IP69K protection classes allow it to be used in critical applications with harsh ambient conditions, especially in the factory automation sector. Another plus is that its numerous additional functions enable condition monitoring. For example, the sensor provides helpful diagnostic data through its self-monitoring function. In addition, you gain valuable information about the place of use, including the application itself. The bottom line is that the sensor can be used to increase plant availability. This technology enables both virtually object-independent object detection and reliable small-part detection.

Balluff Automation India | Pune

High-speed connectors for UHD transfer

Fischer Connectors has released new high-speed connectors and cable assemblies for Ultra High Definition (UHD) audio/video data transfer at 18 Gbit/s in demanding environments, matching the performance speed of



Above: Fischer Core Series in size 104, 20 pins. **Below:** Fischer MiniMax™ in size 08, 19 pins. (Photo © Conextivity Group 2023)

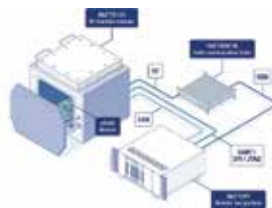
HDMI 2.0. Stéphane Antonetti, Product Data Expert, Fischer Connectors, said, "The speed of our audio/video connectivity solutions, 18 Gbit/s, is equivalent to the HDMI 2.0 standard widely used in 4K cinema projectors and Ultra High Definition home TVs. Because Fischer Connectors' circular connectors are rugged by design, they combine the best of both worlds, providing design engineers with a versatile portfolio of high-speed, high-performance connectivity solutions for a wide range of harsh-environment applications". Fischer MiniMax™ UHD connectors available in 'size 08' (12.9 mm diameter plug) have a miniature,

lightweight, compact, high-density layout with 19 contacts, ensuring high-quality data transmission for digital signals in demanding applications such as aerial imaging, especially in military operations for drones equipped with high-resolution cameras.

Fischer Connectors | Haryana

Tailored automated solutions for wireless devices

Analog Devices, Inc., and Rohde & Schwarz are helping the automotive industry adopt wireless Battery Management System (wBMS) technology, which brings technical, environmental, and cost advantages compared with wired Battery Management Systems (BMS). A new automated test solution is tailored for verification and mass production tests of wireless devices. This development builds on existing efforts for wBMS RF robustness testing.



wireless battery management system (wBMS)

The Battery Management System (BMS) is one of the most vital components of an Electric Vehicle (EV), ensuring safe and efficient management of the battery pack and thereby influencing the safety, range, and performance of EVs. Traditional BMSs are wired

systems that limit the design flexibility and EV production scalability, as well as increase the weight of the vehicle. A more advanced approach is to perform the communication between the Cell Monitoring Controller (CMC) for each battery module and the Battery Management Controller (BMC) wirelessly. This simplifies the assembly, maintenance, and exchange of cells, resulting in cost and effort advantages. In addition, it saves space and provides weight reduction in the vehicle.

Analog Devices | Bangalore, Rohde & Schwarz | Bangalore

The powerful condition-monitoring tool

ifm electronic India, recently introduced, the state-of-the-art condition monitoring system moneo RTM, which enables the set-up of user-specific dashboards. This allows the user to have the plant status at a glance and to acquire important process information. In the event of damage, an alarm message will be sent directly to the user. This makes it possible



moneo RTM

to react quickly and avoid a possible total failure. It is also possible to forward this damage report by e-mail to inform corresponding maintenance personnel in good time. Comprehensive data analysis, less

downtime, more efficient maintenance planning, and cost-optimised production processes. To make more data available to assess damage, this add-on reacts as soon as an alarm is triggered in moneo RTM. This is the case if the predefined parameters are not reached or exceeded, and damage to the machine or plant becomes likely. The raw vibration data will then be automatically recorded. This can then be visualised in terms of time and frequency range.

ifm electronic India | Pune

Decentralised modular automation system

Murrelektronik, recently introduced Vario-X, a modular automation system that brings sensors and actuators into the immediate machine environment on a decentralised basis and offers a flexible, scalable solution for all applications. By developing the Vario-X Controller, Murrelektronik has now created a high-performance and versatile industrial PC that, as a



Vario-X

decentralised controller, can either be used at the heart of a machine or incorporated into a higher-level control network. Besides a large number of physical interfaces, it also offers a wide range of communication protocols. Thanks to an IP67 protection class, it can be installed directly on the machine, which paves the way for cutting-edge decentralised installation

concepts without a control cabinet. The Vario-X Controller impresses with its powerful quad-core CPU, which enables it to achieve short cycle times and handle large volumes of data. CODESYS V3 PLC functionality means it can autonomously control machinery and systems, while EtherCAT master functionality facilitates the high-performance connection of field devices such as drives and I/O modules.

Murrelektronik | Bangalore

High-Performance RFID Solutions Unveiled

Pepperl+Fuchs recently introduced the IQH3-FP-V1 and IQT3-FP-IO-V1 RFID read/write devices. These two new high-performance products solve identification tasks by combining the advantages of high-frequency RFID with a unique sensing range that is space-saving in a modern,



IQH3-FP-V1 and IQT3-FP-IO-V1 RFID read/write devices

compact enclosure. Based on the proven and globally standardized high-frequency RFID technology (13.56 MHz) in accordance with ISO 15693, the RFID read/write devices offer fully reliable and interference-free read/write results for all near-field applications. The devices have a one-of-a-kind detection

range of up to 30 cm (adjustable) for this class on the market and the ability to detect up to 20 RFID tags with a single-read operation. In addition to the high degree of versatility in their application, the new RFID read/write devices also demonstrate excellent process reliability. By automatically checking their resonance frequency, the devices can automatically adapt to interference caused by the installation location, surrounding materials or interference radiation to maintain full detection power.

Pepperl+Fuchs | Bangalore

A new rotating consistency measurement

Valmet introduces a redesigned Valmet Rotating Consistency Measurement (Valmet Rotary) for pulp and paper producers. With the latest technology, a new user interface, and easier maintenance, the transmitter continues to offer highly accurate fibre consistency measurement for critical applications.



Valmet Rotating Consistency Measurement

The redesigned Valmet Rotating Consistency Measurement has a new mechanical design and an electronic solution to improve reliability. Thanks to its high sensitivity, the third generation is as accurate as the previous one.

The simplified design makes on-site maintenance easier and faster, resulting in low overall lifetime costs. Based on shear force measurement technology, the product has excellent performance even in challenging environments with high temperatures or pressures and abrasive chemicals. A modular design secures a universal use covering a consistency range of 1.5 to 16 percent. Sami Laaksonen, Product Manager, Automation Systems Business Line, Valmet, said, "Built on well-known technology and long experience, the new measurement is robust and built to last. The patented technology ensures rapid measurement response and fast reaction to consistency variations".

Valmet | Finland

Next-Gen Cobot: Superior Motion Control

Universal Robots recently launched the UR30, a new series of innovative, next-generation cobots that is built on the same architecture as the award-winning UR20. Despite its compact size, the UR30 offers extraordinary lift, and its superior motion control ensures the perfect placement of large payloads, allowing it to work at higher speeds and lift heavier loads. This



UR30 next generation Cobot

makes the UR30 ideal for several applications, including machine tending, material handling, and high-torque screw driving. For machine tending, the high payload brings new possibilities as it allows the cobot to use multiple grippers at the same time.

This means it can remove finished parts and load more material in one single pass, shortening changeover times and maximising productivity. UR30 will also effectively support high-torque screw driving as it can handle larger and higher-output torque tools, and thanks to a steady mode feature, UR30 delivers straight and consistent screw driving. This will be beneficial in, for example, the automotive industry.

Universal Robots | Bangalore

Highlights: April - May 2024



» CHEMICAL & PROCESS

Chemical and process automation refers to the application of advanced technologies, such as artificial intelligence, robotics, Internet of Things (IoT), and data analytics, to optimise and control manufacturing processes in the chemical and related industries. The article will delve into the fascinating domain of Chemical & Process Industries, where intricate reactions, precise methodologies, and cutting-edge technologies converge to redefine possibilities.



» SENSORS & PROCESSORS

Sensors are the eyes and ears of industrial systems, capturing real-world phenomena with precision. Complementing this data acquisition prowess are processors, the computational powerhouses that transform raw sensor inputs into actionable insights. This section will dig deeper into the transformative potential of this dynamic duo.

» FLEXIBLE AUTOMATION

As industries navigate through dynamic market conditions, the concept of 'flexible automation' emerges as a cornerstone for innovation and competitiveness. Unlike traditional rigid systems, flexible automation offers a paradigm shift, empowering businesses to swiftly respond to changing demands, optimise operations, and drive sustainable growth. This feature will talk about the intricacies of flexible automation and its transformative impact across diverse sectors.



» PLC & SCADA SYSTEMS

PLS and SCADA systems offer a seamless integration of hardware and software, orchestrating complex industrial processes with unparalleled efficiency. PLS serves as the nerve center, executing logic-based control functions with precision and speed, while SCADA provides a comprehensive interface for real-time monitoring, data acquisition, and remote control across diverse industrial environments. The Special Feature throws light on the intricacies of PLS and SCADA systems, exploring their functionalities, applications, and the transformative impact they have on industrial operations.



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COMPANY INDEX

Name	Page
ABB	09
Altair	38
Analog Devices, Inc	52
AutoNxt Automation	30
AVEVA	22
Balluff Automation India	12, 52
Beckhoff Automation	01
Bonfiglioli India	08
Bonfiglioli Riduttori S.p.A.	08
Bonfiglioli Transmissions	08
Cientra	08
Computer Modelling Group	09
Continental	08
Cosmo Films	32
Emerson Automation Solution	25

Name	Page
Fischer Connectors	52
ifm electronic India	02, 52
Invas	08
LAPP India	14, Back Cover
LAPP Group	14
Leuze Electronic	35
Michelin	09
Mitsubishi Electric India	07
Murrelektronik	11, 53
Nabhdrishti Aerospace	10
Panasonic Life Solutions India	08
Pepperl+Fuchs	53
Phoenix Contact	Front Inside Cover
Prama Hikvision India	36
Progenesis	26

Name	Page
Rockwell Automation	09
Rohde & Schwarz	52
Schmersal Group	09
Schmersal India	09
Schneider Electric India	Back Inside Cover
SEW Eurodrives	21
SS Innovations	46
Sterlite Power	41
Synopsys	08
TK Elevator India	44
Universal Robot	53
Valmet	53
VEGA India Level & Pressure Measurement	29

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