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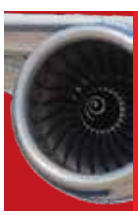

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"Embracing the Green Wave"

Neha Basudkar Ghate
Joint Editor, neha.basudkar@pi-india.in

Sustainable transportation with cutting-edge technologies

In the wake of surging technological advancements and the ever-growing demand for electrical power, nations worldwide are compelled to explore alternative energy sources for power generation. In recent years, the exponential increase in power demand is anticipated to deplete fossil fuels for power production. Simultaneously, the escalating environmental concerns stemming from fossil fuel-based transportation mechanisms have urged the automotive industry to seek alternative fuel options.

Here comes hydrogen-based transportation, our Cover Story for this issue, where we delve into the significance of opting for hydrogen fuel, emphasising its clean energy attributes with zero emissions and high energy transfer capabilities. Hydrogen-powered fuel cells not only promise a pollution-free future but also boast two to three times the efficiency of traditional combustion technologies.

Industry leaders provide insights into the ongoing transformation and its global benefits, shedding light on how this shift is reshaping the automotive landscape. In this issue's industry focus, we take a deep dive into Auto Components Manufacturing, providing insights into breakthroughs in battery technology for electric vehicle components. Our post-IMTEX Forming coverage captures the essence of the 2024 event, offering an engaging and insightful experience.

Turning your attention to Technology, our focus includes Design Software & Digital Twin and Upcoming EV Technologies. Additionally, our Special Feature highlights the role of Data Analytics in Manufacturing. As we navigate through these transformative times, it is evident that the intersection of sustainable transportation and cutting-edge technologies is reshaping our future. Therefore, the choices we make today will undoubtedly shape the trajectory of our automotive and energy landscapes. □

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All image courtesy: *shutterstock*

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NEW PRODUCTS

Columns

Neha Basudkar Ghate

Joint Editor

Unlocking manufacturing success!

The Indian manufacturing sector has been the nuts and bolts of the country's economy. This is highly impacted by technology, which has gradually stimulated innovation, with digital transformation emerging as the linchpin for securing a competitive advantage in this ever-evolving market. This segment delves into a comprehensive and meticulously researched study reflecting the profound impact of manufacturing on India's economy, both domestically and globally.

Unveiling the Economic Impact

Manufacturing emerges as a cornerstone of India's economic growth story, with pivotal contributions from key sectors such as automotive, engineering, chemicals, pharmaceuticals, and consumer durables. Prior to the pandemic, the Indian manufacturing industry accounted for 16–17 percent of the nation's GDP, projecting itself as one of the fastest-growing sectors. This section aims to dissect how manufacturing has become an integral pillar in the economic landscape, fueling India's progress.

Projections and Growth Trajectory

Statista's projections for the manufacturing market estimate a value addition of US $266.40 billion by 2024. Simultaneously, the Federation of Indian Export Organisations envisions India's exports soaring to US $900 billion in the fiscal year 2023-2024. Remarkably, the manufacturing sector is poised for a robust growth rate of 6.5 percent in 2023-2024, a notable fivefold increase compared to the 1.3 percent growth rate in FY23, as reported by Moneycontrol.

Catalysing Innovation and Expansion

The manufacturing drive, as highlighted by The Economic Times, has become a magnet for startups and small businesses, beckoning them to explore promising opportunities within the sector. This influx has not only spurred innovation but also propelled expansion, underscoring the sector's allure for dynamic enterprises seeking growth and diversification.

Towards a momentum of success

In conclusion, India's manufacturing sector is not merely a cog in the economic wheel but a driving force propelling the nation towards sustained growth. The budget emphasises key initiatives aiming to propel India to developed nation status by 2047. The journey ahead is marked by opportunities, incentives, and a commitment to fostering an environment where the manufacturing sector ensuring a robust and resilient economic future for the nation. □

neha.basudkar@pi-india.in

Talk

Budget 2024: Charting a Course for Growth

In the Union Budget 2024, India, with three consecutive years of 7 percent GDP growth, stands as the fastest-growing G20 economy. The budget key initiatives aims to propel India to developed nation status by 2047. Notably, the 'Make in India' campaign receives strong support, with a significant allocation of ₹ 6,903 crore for FY25 (360 percent higher than last year) to establish India as a semiconductor and electronics manufacturing hub. The PLI Scheme for Automobiles and Auto Components sees a substantial budget increase of 623 percent, reaching ₹ 3,500 crore from ₹ 484 crore in FY24 revised estimates. Similarly, the Pharma sector's PLI Scheme allocation rises by 26 percent to ₹ 2,143 crore, and the Food Processing Industry experiences a 26 percent boost, reaching ₹ 1,444 crore from ₹ 1,150 crore in FY24.

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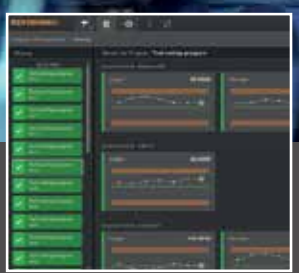

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Tata Steel and ABB India to collaborate on lowering steel production carbon footprint

Tata Steel and ABB India have signed a Memorandum of Understanding (MoU), on working together to co-create innovative models and technologies to help reduce the carbon footprint of steel production. ABB will bring global experience in automation, electrification, and digitalisation to the mining and metals industries. ABB and Tata Steel will explore energy optimisation via hydrogen as an alternative fuel for upstream processes and energy reduction, as well as substitution through fully integrated electrification and digital systems such as ABB Ability™ eMine and e-Mobility solutions and energy-efficient motors. Vipul Gautam, Group Vice President, Global Account Executive, Tata Group, ABB, said, “World Economic Forum figures anticipate the energy transition will require as much as three billion metric tonnes of metals over the medium term—six times more mineral inputs by 2040 to reach net-zero emissions globally by 2050. ABB is confident in working with our customers and partners to evolve how steelmaking is powered to help reach production and environmental targets”.

EKA Mobility and GreenCell Mobility sign MoU to roll out 1000 electric buses

EKA Mobility and GreenCell Mobility announced the signing of a Memorandum of Understanding (MoU). Under this collaboration, EKA Mobility will supply GreenCell Mobility with 1000 intercity electric buses in 12-metre and 13.5-metre categories in the next few years. Sudhir Mehta, Founder and Chairman, EKA Mobility, emphasised the strategic synergy, stating, "Our collaboration with GreenCell Mobility is strategically positioned to usher in a cleaner, more sustainable future through electric mass transportation". Devndra Chawla, MD & CEO, GreenCell Mobility, commented, “Our combined efforts are poised to transform public transportation, offering a cleaner, more efficient, and environmentally friendly solution. We are committed to leading the charge in the evolution of electric mobility”. Supplying 1000 electric buses yields ₹ 70 crore in annual fuel savings, avoids 120 lakh gallons of diesel, and benefits six lakh daily commuters, cutting 32400 metric tonnes of CO_2. Furthermore, an estimated six lakh individuals will benefit every day from improved and sustainable public transit infrastructure.

Continental and Aurora aim at high-volume manufacturing of autonomous trucking systems

Continental and Aurora Innovation announced they have achieved a key development milestone to commercialise autonomous trucks at scale. The companies have finalised the design and architecture of the future fallback system and hardware of the Aurora Driver, an SAE (Society of Automotive Engineers) Level 4 autonomous driving system that Continental plans to start production of in 2027. The finalised hardware design comes less than a year after the companies entered an industry-first partnership aimed at high-volume manufacturing of autonomous trucking systems. Philipp von Hirschheydt, Executive Board member, Automotive Group Sector, Continental, said, “Technologies for autonomous mobility present the biggest opportunity to transform driving behaviour since the creation of the automobile. Achieving this milestone puts us on a credible path to deploy easy-to-service autonomous trucking systems that customers demand”. Chris Urmson, Co-Founder and CEO, Aurora, said, “From day one, we knew we’d need to build a strong ecosystem of partners to bring this technology to market safely and on a commercial scale”.

HHV Group installs 2.5m Telescopic Mirror Coater in Mount Abu for the Department of Space

Hind High Vacuum Advanced Technologies (HHVAT) recently completed the installation of 2.5m Telescopic Mirror Coater (TMC) at Gurushikhar Peak of Mount Abu, Rajasthan, India, at an altitude of about 5,600 feet above mean sea level. This is for the Physical Research Laboratory (PRL), a unit of the Department of Space, Government of India, to coat the mirrors of the telescopes with high-reflective aluminium. The TMC installed by HHVAT is equipped with a unique downward physical vapour deposition process, which demands a diligent hardware design to ensure a smooth and debris-free aluminium coating onto both a hyperbolic concave primary mirror (M1) and a hyperbolic convex secondary mirror (M2). Prasanth Sakhamuri, Managing Director, HHVAT, said, “Astronomical telescopic mirror coaters require a technologically advanced high vacuum equipment design, engineering, and manufacturing. HHVAT has been globally recognised as a trusted supplier of vacuum coaters for telescopic mirrors and has demonstrated at various locations, including demanding high altitudes going up to about 14,800 feet”.

TRUMPF expands in India

TRUMPF has announced its expansion in India as it opens a new production facility which will be situated in Pune. The factory will start with TruBend Series 1000 Basic Edition bending machines and will follow with TruLaser Cutting Series 1000 Basic Edition by 2025. TRUMPF will invest more than € 4 million in the new production facility. The production will start this year.

Till Kueppers, Chief Operating Officer, TRUMPF Machine Tools Germany, said, "India is developing strongly and still has growth potential. The proximity to this emerging market allows us to produce more efficiently and respond more quickly to the needs of our customers. Furthermore, the local presence gives us the opportunity to develop tailored solutions for the Indian market while leveraging global synergies. In the long term, we want to supply other markets from India and expand our supply chain". Pradeep Patil, Managing Director, TRUMPF India, said, "This investment is the first step in our long-term growth strategy. Our customers will benefit not only from high-quality products but also from increased customer proximity and adaptability".

Mohammed Hidayath, Director Sales, TRUMPF India, said, "We will leverage the talent available in India and utilise the ecosystem that has high experience in machine building to deliver TRUMPF quality in India. This will increase the confidence of the customers to invest in TRUMPF machines and encourage new entrepreneurs to start with TRUMPF machines. This unique value proposition would be a great contribution to the sheet metal industry in India and our valued customers". TRUMPF is also expanding its support infrastructure by adding a showroom in Bengaluru, and it is planned to be operational within this year. This will strengthen and improve the value-added services for the customers. With a software research and development facility based in Chennai, TRUMPF is further able to offer comprehensive solutions to customers.

Altair inaugurates the Innovation Experience Centre in Pune

Altair recently introduced its newly established Innovation Experience Centre in Pune. On this ocassion Vishwanath Rao, Managing Director, India and GCC, Altair, said, "The centre will provide prospects and customers with a hands-on experience of Altair's technology solutions, from simulation and design to high-performance computing, data analytics, and AI. It will also allow visitors to have direct interaction with in-house experts, so they can gain a comprehensive understanding of Altair's solutions and how the convergence of such technologies impacts product development". **The Innovation Experience Centre has physical models displayed using a digital twin aspect. Those are as follows:**

- **Digital Twin:** The Digital Twin technology can seamlessly integrate physics- and data-driven twins throughout every stage of the product's life cycle, from design, manufacturing, and operations to on-field and in-service use.
- **Light Weighting:** This shift towards composite materials in automotive design represents a state-of-the-art approach to achieving lighter, more fuel-efficient, and potentially more long-lasting vehicles.
- **Safety and Efficiency in Flight:** The key factors for achieving efficient and safe drone flight are optimising weight while maintaining strength. This requires the implementation of optimisation technology to achieve an exceptional balance. And then, by incorporating system simulation, a multi-physics approach to product development becomes evident.
- **Bridging the Visualisation Gap:** Experience a new way to see simulation results with seamless integration and an immersive and unparalleled perspective that will revolutionise one's journey as an engineer or designer.
- **Reduced Order Modeling AI (RoMAI):** The RoMAI methodology empowers users to quickly replace the complex leaf spring suspension system with an equal numerical model, which helps speed up the design process by multi-folds.
- **Vehicle and Control Modeling:** A 3D vehicle and control model at the start of the design phase will provide us with the necessary motor specifications, which essentially helps to verify the design and product requirements using the same system simulation environment.

Altair featured its comprehensive digital twin offering at the Symposium on International Automotive Technology (SIAT), which was held from January 23 to 25 at the Pune International Exhibition and Convention Center, Moshi, Pune Symposium on International Automotive Technology (SIAT), Center, Moshi, Pune.

"Sustainable commitment: ethical sourcing, recycling, efficient design"

…says **Dinesh Arjun,** CEO & Co-Founder, Raptee Energy. In an interview with **Sanjay Jadhav,** he charts the course of the electric motorcycle industry by building a safe, smart and sustainable electric motorbike for the Indian market. Excerpts…

What inspired you and your co-founders to delve into the electric motorcycle industry, and how does this passion drive Raptee's mission?

Growing up amid India's global ascent, particularly witnessing the impact of Indians and Indian start-ups globally, I developed a keen interest in the country's automotive sector during my college years. Focused on electric two-wheelers, we identified a significant gap in the Indian market, marked by outdated technology and a reliance on imported components. Recognising the cultural significance of motorcycles in Indian society, Raptee emerged with the vision of creating a safe, smart, and sustainable electric motorbike crafted by Indian tech enthusiasts for the local market.

How does Raptee's motorcycles maintain a technological competitive edge?

Raptee can zoom past the competition by embracing tech's fast lane. Electric bikes and AI-powered engines will rev up performance and efficiency. Safety takes centre stage with collision-dodging smarts and AR displays keeping riders informed. Riders personalise their dream bikes with 3D Printing, while on-demand manufacturing puts the pedal on customisation.

How does Raptee plan to balance sustainability, innovation, and affordability while expanding its product line and catering to a broader consumer base?

Raptee's success lies in the intricate balance of sustainability, innovation, and affordability within their expanding product line. Ethical material sourcing, closed-loop recycling, and efficient design form the pillars of their commitment to sustainability. Embracing modular platforms and open innovation ensures affordable innovation by sharing R&D costs and optimising production. Catering to a diverse consumer base involves segment-specific offerings and strategic partnerships. By skillfully executing these strategies, Raptee aims to not only lead in future mobility but also create a harmonious blend of profitability, environmental consciousness, and widespread accessibility. Balancing these elements is crucial to sustained success.

What role do you believe investments and strategic partnerships play in driving Raptee's growth and development within the electric motorcycle industry?

In charting its course through the electric motorcycle industry, Raptee relies on the dynamic interplay of investments and strategic partnerships. Financial backing from investors and venture capital fuels their innovation engine, enabling the development of cutting-edge technology that resonates with tech-savvy consumers. This investment not only powers innovation but also facilitates the scaling of production, expanding manufacturing capabilities to meet growing demand and capture a significant market share.

"Advanced drive and motion systems support sustainable performance in vehicle sector"

…says **Sandeep Khullar**, Executive Director and GM, Dana India, OH and CV. In an interview with **Neha Basudkar Ghate**, he describes that India is chosen as a base for global engineering, supply chain, and manufacturing by OEMs, Tier-1 suppliers. Excerpts…

From your perspective, what are the current trends shaping the off-highway and commercial vehicle industries in India?

There is an increasing trend of using India as an engineering, sourcing, and manufacturing base to support global engineering, supply chain, and manufacturing by major OEMs and Tier-1 suppliers in India. This is helping grow Indian capabilities across the wide spectrum. There is an increase in electrification projects, especially for commercial, material handling, and specific agricultural and construction equipment. OEMs are looking for more and more participation from systems and aggregate suppliers rather than component suppliers who can add value during the designing and conceptualisation phase of a new product.

Dana has a rich history of innovation. How is Dana India leveraging cutting-edge technologies to meet the evolving needs of its customers in the Indian market?

We are charting the course for the future of transportation by transitioning away from conventional powertrains to embrace hybrid and electric solutions, thereby reducing emissions and elevating operational efficiency. Our commitment to innovation extends to the adoption of cutting-edge technologies such as electrification, connectivity, and automation. Additionally, through strategic partnerships with industry leaders, we are collectively shaping the trajectory of transportation, fostering a safer, more sustainable, and more accessible future.

What sustainability initiatives has Dana India undertaken, in the context of off-highway and commercial vehicles?

Through the provision of cutting-edge drive and motion systems, we provide advanced drive and motion systems to support sustainable performance in various vehicle sectors, actively shaping the landscape for cleaner, more intelligent, and more efficient mobility solutions tailored for off-highway and commercial vehicles. By doing so, we contribute to the transformation of these industries, ushering in an era of environmentally conscious and high-performance transportation solutions.

Are there any plans for diversification or new product launches to capture emerging opportunities in the market?

Intending to identify new products and growth opportunities, Dana collaborates with customers and various stakeholders and therefore continues to upgrade and launch new axles, gearboxes, and motors based on customer needs. The company also set up an electrification plant in India in 2020, which supports products across light vehicles, commercial vehicles, and off-highway applications for Indian as well as global customers.

"Rapid adoption of advanced technologies is a defining trend in the Indian tooling landscape"

…says **Shanmugasundram**, VP, TAGMA and MD, S&T Group. In an interview with **Neha Basudkar Ghate**, he articulates that the Indian tooling industry is positively evolving with increased digital adoption and skill development, driven by robust economic growth, rising purchasing power, growing Foreign Direct Investments, and a steady uptick in manufacturing output.

Q Can you provide an overview of the current state of the Indian die mould industry, highlighting key trends and developments that have shaped the market in recent years?

» In the dynamic landscape of the Indian tooling industry, several notable trends are shaping its trajectory. One significant trend is the evident move towards diversification. Traditionally reliant on the automotive sector, tooling companies in India are increasingly exploring opportunities in emerging sectors. This strategic shift allows them to mitigate risks associated with sector-specific dependencies and fosters a more resilient and expansive business model.

Another transformative trend is the accelerated adoption of digital solutions. The aftermath of the pandemic highlighted the invaluable benefits of digital technologies in maintaining operational continuity. Tooling companies are progressively integrating digital solutions into their business operations, streamlining processes, enhancing efficiency, and ensuring adaptability in the face of evolving challenges.

Skill development emerges as a critical trend, driven by the rising expectations of customers. The tooling industry is witnessing an evolution in customer demands, necessitating continuous skill enhancement among professionals.

Moreover, the rapid adoption of advanced technologies is a defining trend in the Indian tooling landscape. With many Indian companies now catering to global customers, there is a growing demand for

high precision and swift turnaround times. To meet these global standards, tooling companies are proactively embracing the latest technologies, ensuring that their capabilities align with the evolving needs of the industry.

Q The recently released report on the Indian Tool Room Industry (August 2023) is of great interest. Could you share some key findings and insights from the report, especially regarding market size, growth projections, and emerging opportunities?

» The Indian tooling industry is in a high growth phase, and I expect this to continue in the coming days as well. The global tooling industry and the Indian tooling industry have been growing steadily post-pandemic. While the global tool room industry stood at $80 billion in 2021 post-COVID-19, the total market size of the tool room industry in India is estimated to be ~₹23,600 crore. Interestingly, ~34% of the tooling demand is met through imports, with ~80% of the imports from China, South Korea, Japan, and Taiwan. ~15% of tooling production in India is exported; - USA, Spain, Mexico, and Germany are major export destinations. The share of Commercial Tool Rooms (CTRs) in total demand grew at ~8.1%, and Captive Tool Rooms grew at ~1.5%, while imports have been almost stagnant with minor changes.

Q The industry is evolving rapidly with technological advancements. How is the Indian die mould industry adapting to new technologies?

» With adoption to new technologies, the Indian die mould industry has become imperative for sustained growth and competitiveness. The influx of global manufacturing giants establishing production units in India has created a significant demand for Indian toolmakers. To meet the requirements of these global players, Indian companies are compelled to uplift their offerings by incorporating cutting-edge technologies into their manufacturing processes. Furthermore, the increasing trend of Indian companies exporting their products necessitates a focus on meeting the stringent quality expectations of their global counterparts. This drive for quality and precision has become a catalyst for the die-mould industry in India to embrace technological upgrades.

The evolving landscape also includes the emergence of industries such as medical and aerospace in India, which demand exceptionally high accuracy and precision in manufacturing. To cater to these burgeoning sectors, die mould manufacturers in India are actively upgrading their technologies to ensure they can meet the specialised requirements of these industries.

In essence, the adoption of new technologies is not merely an option for Indian mould makers; it has become a compulsion dictated by the evolving demands of the industry. The industry's proactive approach towards technology integration reflects a commitment to staying abreast of advancements and ensuring that the Indian die mould sector remains at the forefront of innovation and quality on a global scale.

Q Looking ahead, what is your outlook for the future of the Indian die mould industry, and what growth strategies do you believe will be critical for companies to stay competitive in this evolving market?

» The future of the Indian die mould industry appears promising, driven by positive indicators such as the robust growth of the Indian economy, increasing purchasing power, rising Foreign Direct Investments (FDIs), and a steady increase in manufacturing output. The consistent month-on-month growth in GST collection further signals a favourable business environment. To ensure competitiveness in this evolving market, Indian toolmakers need to implement strategic measures:

- **Invest in technology:** Embracing advanced technologies and automation will enhance efficiency, precision, and overall competitiveness. Adopting Industry 4.0 practices can optimise manufacturing processes.
- **Adopt new-age manufacturing practices:** Keeping pace with modern manufacturing methodologies, such as additive manufacturing and digital twin technologies, will position companies at the forefront of innovation.
- **Invest in Skill Development:** Continuous training and upskilling of the workforce are crucial. The industry's ability to adapt to evolving technologies relies heavily on a skilled workforce. Investing in training programmes ensures that employees stay abreast of the latest advancements.
- **Enhance Capacity:** With the expected growth in demand, expanding production capacity will be essential. Scaling up operations ensures that companies can meet increasing market requirements and maintain a competitive edge.

In essence, a proactive approach towards technology adoption, skill enhancement, and capacity expansion will be imperative for Indian die-mould companies to thrive in the dynamic and competitive landscape of the future. ☐

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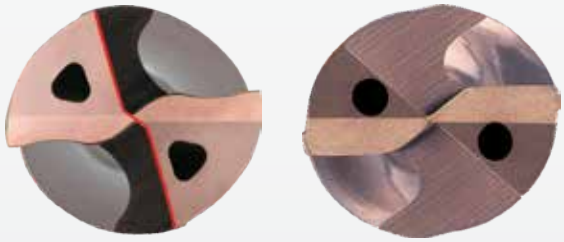

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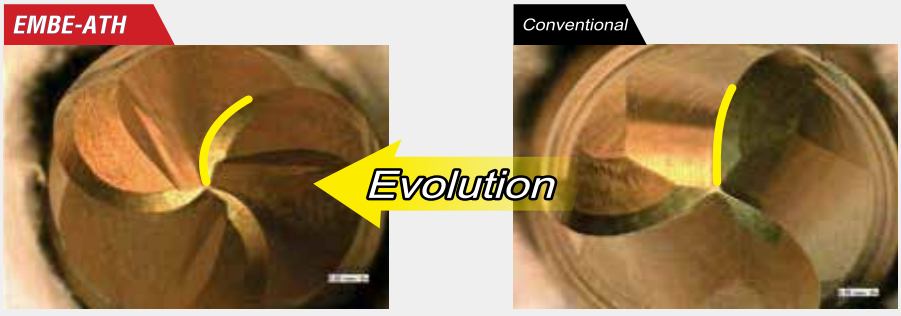

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The Hydrogen Advantage: Future of Mobility

Arun Bhardwaj
Editorial Director,
EM and A&D India

The future of mobility looks dynamic, multifaceted, and hydrogen systems here presents a compelling avenue for achieving sustainable transportation. The technological advancements here continue, and infrastructure evolves, thus making hydrogen play a crucial role in shaping the transportation landscape for years to come.

When you stop learning and refrain from asking new questions, you don't know where you are headed in life. For instance, so far, we only know the power of batteries, but do you know that hydrogen technology plays a crucial role in energy supply for transportation. It has alternative potential in the fields of logistics and the development of e-fuels. However, hydrogen here provides a basis for an advanced energy transition.

Research institutions like Bremerhaven University of Applied Sciences aim to explore the potential and limitations of this technology. According to this research, the hydrogen economy plays a significant role in achieving a greener energy supply.

The technical feasibility of hydrogen as a molecular energy is ideal for decentralised production, storage, and usage. Nevertheless, its marketability and competitiveness need further testing, just like establishing an infrastructure for this energy source.

Hydrogen in logistics and mobility

Logistics plays a key role in a sustainable economy. The 'Hydrogen in Logistics and Mobility' sub-study researches the latest trends in the mobility sector. The instance of trucks states that despite being equipped with a battery, their performance degrades, which increases with charging times and therefore decreases the overall productivity. Alternatively, hydrogen can be refuelled without generating CO_2 emissions.

The acceptance here is crucial, as employee feedback is immensely positive. The hydrogen-powered truck shows outstanding work and is comparable to the battery-operated truck. Moreover, the operating time was sufficient for the driver's daily working hours.

Why is Hydrogen the best option for the future of transportation?

- **Faster Refueling Time:** Hydrogen fuel vehicles can be refuelled in a matter of minutes as compared to conventional internal combustion vehicles. This is in contrast to EVs which typically require longer charging times.
- **Extended Range:** The hydrogen vehicles have a longer range per tank as compared EVs per charge. This makes them suitable for long-distance travel without the need for refuelling.
- **Lighter Weight:** Hydrogen has a higher energy density than batteries, thus contributing to lighter overall vehicle weight. This enhances the efficiency and performance of hydrogen-powered vehicles.
- **Versatility in Vehicle Types:** Hydrogen can be applied to many vehicles, including cars, buses, trucks, and trains. This makes hydrogen a best option for many transportation needs.

- **Zero Emissions:** Hydrogen cells produce zero emissions at the point of use. The byproduct is water vapour, making hydrogen an environmentally friendly option for reducing air pollution.

- **Scalability:** Hydrogen can be scaled up to meet the demands of the growing fleet of fuel cell vehicles. This is crucial for accommodating an increasing number of hydrogen-powered vehicles.

- **Long-Term Sustainability:** Hydrogen is produced using renewable energy sources like wind or solar power, contributing to more sustainable and eco-friendly transportation.

Research status for Hydrogen as an alternative fuel

- **Fuel Cell Tech:** Research is focused on advancing fuel cell technology that is crucial for hydrogen as a clean energy source for vehicles. The fuel cells convert hydrogen into electricity thus emitting only water vapor and heat as byproducts.

- **Hydrogen Production Methods:** Other methods of hydrogen production are under investigation, which involve electrolysis, natural gas reforming, and biomass gasification. The researchers aim to develope more efficient, cost-effective, and environmentally friendly ways to make hydrogen.

- **Storage and Distribution:** The efficient storage and distribution of hydrogen are crucial challenges. The research is focused on developing advanced storage technologies and creating a reliable hydrogen infrastructure, including pipelines, stations, along transportation methods.

- **Material Science:** Overall improving the materials used in fuel cells and storage systems is a key area of research. This includes developing materials that enhance the efficiency of fuel cells, as well as materials that allow for safe and effective hydrogen storage.

- **Integration with Renewable Energy:** The researchers are looking for the integration of hydrogen production with renewable energy like wind and solar power. This aims to produce 'green hydrogen', with renewable energy to power the electrolysis process.

Challenges and potential negatives associated with Hydrogen as a fuel

- **Production Challenges:** The majority of the hydrogen is produced using natural gas, a process that emits CO_2. This shift towards green hydrogen production methods is crucial, but it requires advancements in renewable energy technologies.

- **Infrastructure Development:** Establishing a huge hydrogen infrastructure, requires refuelling stations, pipelines, and storage facilities which is a substantial undertaking. This needs significant investments and cooperation among stakeholders.

- **Energy Intensity:** The process of making hydrogen, especially through electrolysis is energy-intensive. For that ensuring the overall energy balance is positive and environmentally friendly is a challenge.

Image source: www.addcomposites.com

- **Storage and Transportation:** Hydrogen has a low energy density in terms of volume that requires big storage tanks or advanced materials for effective transportation. The liquid hydrogen, for instance, needs low temperatures for storage.

- **Cost:** The hydrogen fuel vehicles and the infrastructure are expensive, research is on to reduce the costs associated with production as well as utilisation.

- **Safety Concerns:** The hydrogen is highly flammable as it has a specific safety issue related to production, transportation, and storage. The research aims to acknowledge these safety challenges to see the widespread adoption of hydrogen technologies.

Future of mobility

While hydrogen has these advantages, it is important to admit that challenges like infrastructure development, production costs, and energy efficiency need to be addressed as a widespread adoption. This future will require a combination of many technologies, including hydrogen and batteries, each playing their role based on strengths and applications.

While technological innovation is vital, government support is equally important. Governments should come together for clear policies, incentives and investments to accelerate the development of battery and hydrogen technologies. Additionally, international cooperation is crucial to creating a robust hydrogen infrastructure that spans nations. ☐

Team EM engaged in an exclusive conversation with industry leaders to gain profound insights into hydrogen as a fuel and its applications in logistics and mobility.

Sameer Jindal,

Director, MG Motor, Technical Director, VAVE and MG Nurture Program, MG Motor India (Morris Garages)

"Hydrogen holds immense promise as a future transportation fuel, but overcoming challenges is vital for its widespread adoption. Infrastructure development, including hydrogen refueling stations and pipelines, is a key hurdle that governments can address through strategic investments. Collaborations between public and private sectors can expedite this process. Technological innovation is crucial for enhancing infrastructure efficiency, spanning storage to transportation systems. Production costs present another challenge, with governments incentivising cost reduction through support for research into renewable energy sources and efficient production methods. International cooperation is essential for establishing common standards, reducing costs, and enhancing efficiency. Energy efficiency remains a critical concern, with governments encouraging advancements in fuel cell technology through incentives and research funding. Despite significant investments, a clear government roadmap is lacking in India, hindering progress. Defined roadmaps, government initiatives, technological innovation, and international collaboration are pivotal for unlocking hydrogen's potential as a competitive and widely adopted green fuel in the future of transportation.

Disclaimer: The opinions expressed are solely my own and do not reflect any initiatives undertaken by MG Motor in this context.

Avinash Punekar,

CEO, iCreate

"Hydrogen is pivotal for the future of eco-friendly transportation, but challenges must be overcome to unlock its full potential. Creating a scalable and efficient infrastructure is essential for hydrogen to become the primary choice in our daily lives. Additionally, reducing large-scale production costs is critical for economic viability, requiring investment in innovative technologies. Government initiatives, policies, and collaboration between public and private sectors support this goal. International cooperation is indispensable, with shared efforts in research and development accelerating progress and establishing global standards. The commitment of iCreate to spearhead innovation showcases dedication to catalysing change on a national and global scale. Focusing on start-ups and technological innovation can propel hydrogen to the forefront of transportation, aligning with our vision for a sustainable, low-emission future.

Dr Sreyas Vidyasagar

VP & Global Head, Industrial Heavy Machinery Practice,
Tata Technologies

"Hydrogen fuel: A complex but exciting challenge for a cleaner world. Switching to hydrogen fuel isn't easy. It's a multi-faceted puzzle involving engines, controls, production, storage, and even delivery. From the physics of fast-burning flames to the need for revamped radiators and turbochargers, every piece needs rethinking. But remember, humanity took over a century to embrace diesel after steam. We are due for another leap, and the challenges are similar. Mankind must adapt, redesign, and overcome, just like before. The journey to a cleaner future starts now, and it's one we should all be thrilled to be part of. Exciting times are ahead, fueled by hydrogen's promise of a better tomorrow.

Shailendra Goswami,

Chairman and Managing Director, Pushkaraj Group

"Hydrogen emerges as a promising solution for the future of transportation, particularly in sectors like heavy-duty vehicles, aviation, and shipping. Despite its potential, several challenges must be addressed for hydrogen to become a mainstream and sustainable option. Governments, technological innovation, and international cooperation play pivotal roles in overcoming these challenges. Issues such as the high costs associated with production, distribution, and infrastructure development can be mitigated through financial incentives and comprehensive investments by governments. Green hydrogen production, storage and transportation challenges, safety concerns, and the need for scaling up production all necessitate a combination of technological advancements and government contributions. International collaboration becomes crucial for setting standards and harmonising regulations. Additionally, public awareness and acceptance pose challenges that governments can alleviate through awareness campaigns and incentives for consumers. In summary, a coordinated effort involving governments, technology, and international collaboration is imperative to make hydrogen a viable and sustainable option for the future of transportation.

Yogesh Umbarkar,

Vice President, Eatron Technologies and Executive President - Asia
Executive Board Advisor, Astron Aerospace

"Embracing hydrogen as the future of transportation requires a collective effort to overcome multifaceted challenges. Despite its potential as a clean energy carrier, robust infrastructure is a foremost concern, necessitating strategic government investments and policies to incentivise private sector participation in hydrogen production and distribution. Infrastructure development not only ensures accessibility but also instills public confidence in hydrogen-powered vehicles. Production costs pose a significant obstacle, demanding technological innovation supported by government encouragement through financial incentives and collaborative platforms. Achieving economies of scale can make hydrogen economically competitive. International cooperation is crucial for standardised energy efficiency protocols. Collaborative research and the establishment of global benchmarks ensure uniform efficiency across borders. In summary, governments, technological innovators, and international collaborators must jointly address infrastructure, production costs, and energy efficiency to pave the way for hydrogen as the preeminent choice in a sustainable era of transportation.

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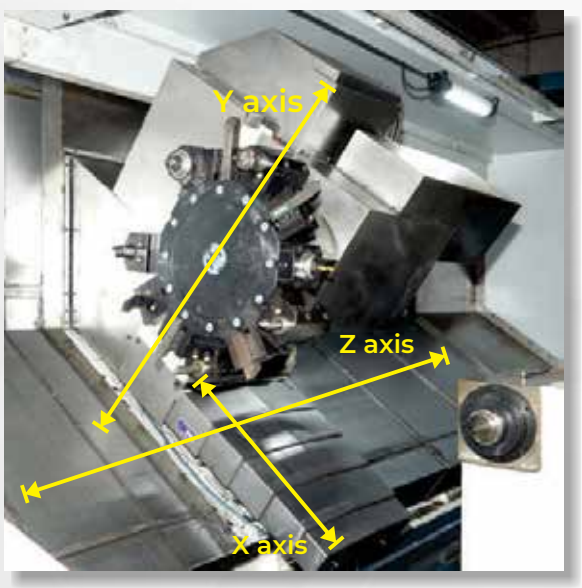

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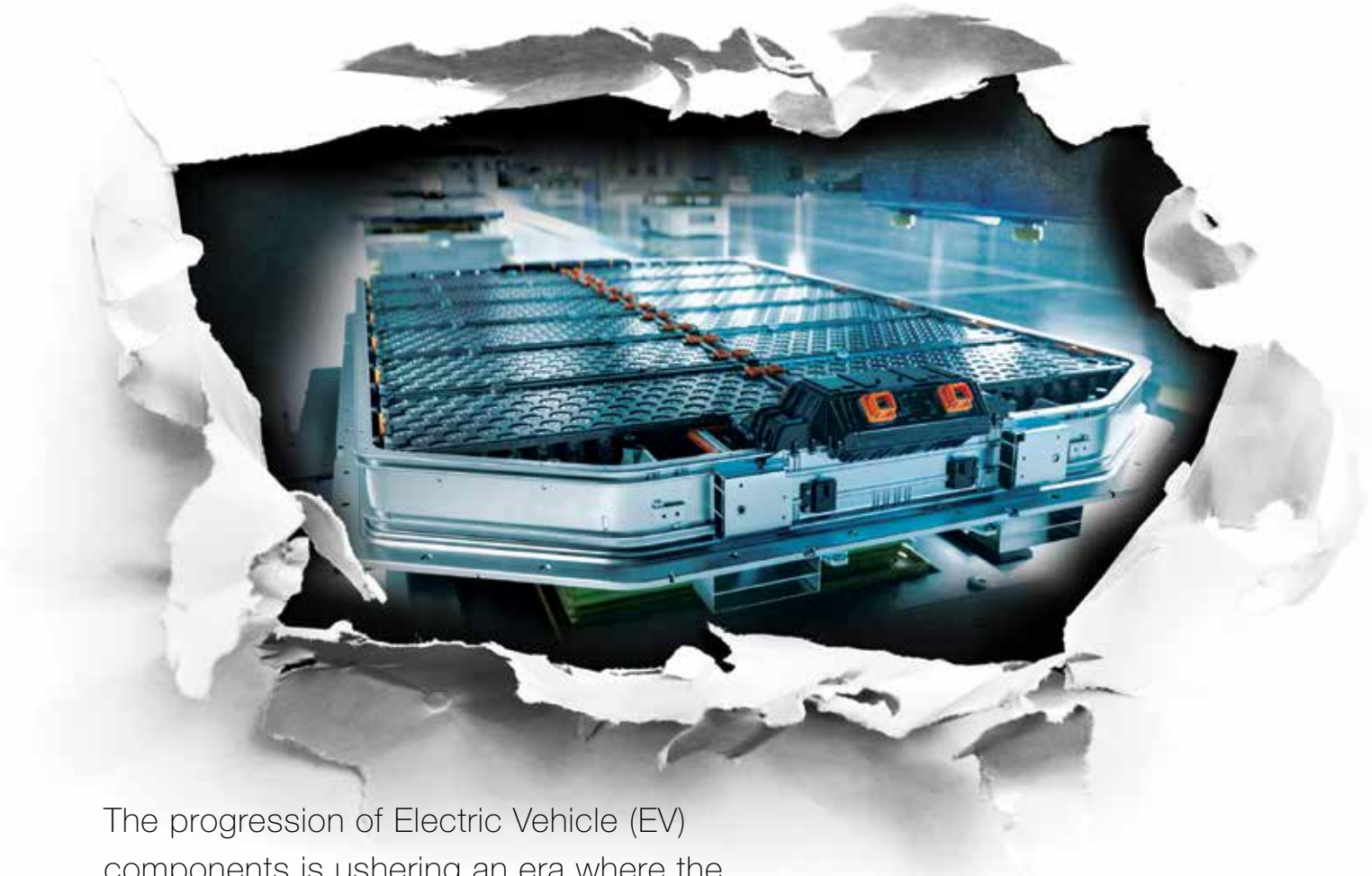
Breakthroughs in battery technology

for Electric Vehicle components



The progression of Electric Vehicle (EV) components is ushering an era where the intersection of sustainability and convenience is evident. This signifies a shift towards making eco-friendly transportation as accessible and efficient as conventional options. This article explores the developments in battery technology within EV components.

Bharath Rao
Co-Founder / CEO, Emobi

In an era swiftly moving towards sustainable alternatives, the electric vehicle sector takes the lead in innovation, driven by notable progress in battery technology. Picture this: a not-so-distant future where cars are not only a means of transportation but also a seamless part of the electric grid and a source of energy storage for consumers and the grid.

This transformation is not merely a dream but a reality unfolding. With breakthroughs in battery science, the once cumbersome limitations of EVs, such as range anxiety and prolonged charging times, are becoming relics of the past. Imagine a world where you can charge your car as swiftly as you charge your smartphone, unlocking the full potential of electric mobility.

The electric vehicle market has experienced remarkable growth in the last five years, primarily fuelled by consumer preference for eco-friendly alternatives, notably electric scooters. Despite the challenges posed by the COVID-19 pandemic to global vehicle production, the overall sales of EVs have remained positive. As per the market report, the electric vehicle market is projected to surge from approximately $388.1 billion in 2023 to a staggering $951.9 billion by 2030, reflecting a Compound Annual Growth Rate (CAGR) of 13.7 percent.

Challenges faced by current battery technologies.

Current battery technologies, particularly the prevalent use of lithium-ion batteries in electric vehicles, encounter several formidable challenges hindering widespread adoption. Consumers express concerns over a limited driving range, high maintenance costs, battery-related issues, and a scarcity of charging infrastructure, especially evident in numerous Asian markets. The restricted driving range contributes to 'range anxiety', dissuading potential EV buyers due to fears of running out of charge during longer journeys. Moreover, the high maintenance costs associated with battery replacement can deter cost-conscious consumers, presenting a significant hurdle for EV market expansion.

Beyond consumer-related challenges, on the technical front, the industry grapples with the limitations of the lithium-ion battery supply chain. Currently, lithium-ion batteries, the backbone of most EVs, have very few suppliers and manufacturers with proven cell cycle life and energy density at commercially competitive pricing, significantly affecting the ability of new cell manufacturers to secure their supply chains at reasonable pricing. The extended charging time, averaging 17 hours for a full charge, proves to be a

substantial deterrent for consumers, emphasising the need for faster charging solutions. As a result, hybrid vehicles that combine battery and gasoline propulsion remain more popular than pure EVs. Additionally, the comparatively high entry cost for EVs poses a barrier, as potential buyers find the initial investment challenging to justify, further impeding the broader acceptance and integration of electric vehicles into mainstream automotive markets.

Exploring the components of an electric vehicle battery: Cells, Modules, and Packs

Operating an electric vehicle requires a lot of power, much more than a smartphone needs. That's why electric vehicles use many battery cells, ranging from dozens to thousands. The structure of an EV battery varies slightly depending on the type of electric vehicle, but generally, it consists of cells, modules, and a pack.

To effectively manage the many battery cells in an EV, these cells are arranged in modules and packs. Simply put, cells, modules, and packs are units of grouped batteries. A module is a collection of cells, and a pack is a collection of modules. In the end, the electric vehicle has one main type of battery: a pack.

Let's take an example from an industry perspective, like a generic electric vehicle. In such a vehicle, there could be a total of, let's say, 96 battery cells. These cells are grouped, with 12 cells forming a module and eight modules combined to create a pack, which is then installed in the vehicle.

Now, let's break down each term. A cell, the basic unit of a battery, must have a high capacity per unit volume to perform well in the limited space inside a vehicle. It also needs a longer lifespan compared to batteries in typical mobile devices. Additionally, cells must be able to endure shocks while driving and maintain high reliability and stability in varying temperatures.

When multiple cells are placed in a frame for better protection against external shocks like heat or vibration, it's called a module. When several modules, along with a Battery Management System (BMS) and a cooling device that controls the battery's temperature and voltage, come together, it forms a pack. This is how numerous cells are arranged in an electric vehicle, in the form of a pack, to ensure safe and efficient operation.

Advancements in battery technology in EV components

- Solid-state batteries represent a groundbreaking advancement in EV technology. Traditional lithium-ion batteries use liquid electrolytes, which can pose safety risks and limit energy density. Solid-state batteries, on the other hand, replace the liquid electrolyte with a solid electrolyte, offering improved safety, higher energy density, and faster charging times. This innovation not only extends the range of electric vehicles but also addresses concerns related to battery safety.
- Graphene, a single layer of carbon atoms arranged in a hexagonal lattice, has shown great promise in improving battery performance. Graphene-based batteries are known for their high conductivity, lightweight structure, and ability to store more energy. As research progresses, integrating graphene into EV components could lead to longer-range vehicles and faster charging.
- Recent breakthroughs in fast-charging technologies have significantly reduced the time required to charge EV batteries. Advanced charging systems, such as ultra-fast chargers and Vehicle-to-Grid (V2G) technology, enable quicker charging times without compromising the long-term health of the battery while also providing emergency backup power and support to the grid.

The future of the EV battery market

The electric vehicle market is changing a lot to make cars that people want and to follow rules about not making pollution. Many companies are making new types of cars for homes and businesses. Smart people from schools, governments, and car companies are studying and trying new ways to make batteries for these cars. Even though there are still some problems to solve, the future of electric cars seems to be getting better. ☐

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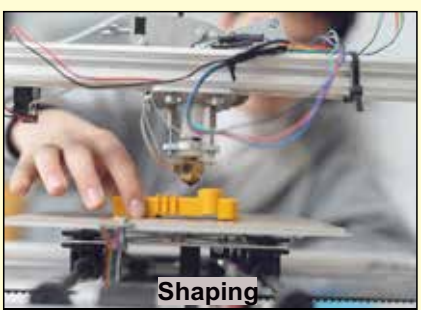

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IMTEX FORMING 2024

concludes at BIEC on January 23

IMTEX Forming 2024, Asia's largest exhibition on metal forming and manufacturing technologies witnessed participation of 600 exhibitors and nearly 40,000 attendees. **Team EM,** was present on ground and brings to you insights from the five day event.

The eighth edition of IMTEX Forming 2024, Asia's largest exhibition on metal forming and manufacturing technologies was held at the Bangalore International Exhibition Centre (BIEC) from January 19 - 23, 2024.

C.K. Venkataraman, Managing Director, Titan Company, and Geetanjali Kirloskar, Chairperson & Managing Director, Kirloskar Systems jointly inaugurated the exhibition. The inauguration ceremony featured the presence of Jamshyd N. Godrej, Chairman-Exhibitions, IMTMA; Rajendra S. Rajamane, President, IMTMA; Mohini Kelkar, Vice President, IMTMA, and Jibak Dasgupta, Director General & CEO, IMTMA and BIEC, who all shared the stage during the event.

The five day exhibition featured the participation of over 600 exhibitors from 20 countries, with an attendance of approximately 40,000 visitors. The event showcased cutting-edge technologies and trends in metal forming, including presses, bending, welding, joining, high-speed laser machines, robotics, and automation in sheet metal working. Additionally, the exhibition highlighted advancements in forming machinery, near-net manufacturing, additive manufacturing, digital manufacturing, shopfloor automation, and Industry 4.0.

Addressing the inauguration ceremony, C.K. Venkataraman emphasised that as India aims to achieve a $5 trillion economy by FY26, the manufacturing sector must play a pivotal role by contributing $1 trillion. This necessitates a substantial contribution from the machine tool industry. IMTEX Forming 2024 also featured simultaneous events which included Tooltech, Digital Manufacturing and Weldexpo.

Tooltech 2024, concentrated on machine tool accessories, forming tools, die and mould, metrology, CAD/CAM while Digital Manufacturing showcased the latest innovations in additive manufacturing and Industry 4.0, and Weldexpo, an exhibition for welding, cutting, and joining in association with the Indian Institute of Welding, were held concurrently. Meanwhile, Moldex India and Fastenex India focused on moulding, fasteners, and fixing technologies respectively. ☐

TRUMPF

"IMTEX provides a great opportunity for us where we get to meet and greet our customers. We were thinking about opening a second facility in Asia which would be different from our Chinese factory, and we immediately thought of India, because of the available market opportunities. The Indian market has the potential for prosperous market growth, which is why we decided to have our new facility opened in India. And India is a big country, and being present in just one city is not enough if we want to be close to our customers if we want to show them our machines in real and this is why we decided to open another big showroom in Bangalore.

– Mareike Sautter,
Head of Country Management, Asia, TRUMPF

Fronius India

"We always look forward to IMTEX, and this edition is special because it is IMTEX Forming, which allows us to showcase live welding processes. And this is where people get to experience the welding technology. Our expectation, like any other business participating here, is to gain more customers. This year we are also promoting sustainable processes, which is a core value for every decision we make. For us sustainability means that the product must last for its entire life.

– Vishwanath Kamath,
Managing Director, Fronius India

Phillips Machine Tools

"Since this year was IMTEX Forming, we took the opportunity to participate in IMTEX MouldX which is a concurrent show. It allowed us to showcase a lot of exciting products on display. What we are trying to show here is that we can provide them with a toolroom. Even though India is a relatively low-cost country, we are seeing automation growing in a big way and most of our machines are built to be automated at any given point of time. Our automation department has continuously been working with robots and co-bots, and that is great.

– Terrence Miranda,
Manging Director, Phillips Machine Tools

ATQ Metro

"IMTEX Forming is a good platform for an industry like us, who are in the field of metal cutting, metal forming, or metrology. We have been participating in IMTEX for more than five years, and the people and overall crowd that we are meeting has been quite good.

– Suryakant Jadhav,
Applications Sales Manager, ATQ Metro

Beckhoff Automation, India

"This year IMTEX Forming is witnessing a lot many visitors and a good footfall rate, and people are showing more interest in the technology that we have to offer. IMTEX is definitely getting bigger, and this edition is quite big. In terms of market growth, we can say that that there is a maturity, and machine builders are thinking ahead of building better technology.

– Ajey Phatak,
Head of Marketing and Business Development, Beckhoff Automation, India

Hexagon Manufacturing Intelligence India

"Every year IMTEX gets better and it shows that the manufacturing industry is booming in a big way. About two to three years ago, the Indian manufacturing industry only contributed 12-13 percent of GDP, and last year it contributed about 16 percent GDP, which is a significant growth. And our target is to grow about 20-30 percent by the end of his decade, and that is the direction we are going. And IMTEX being the largest manufacturing event in the country, it is obvious that Hexagon must participate.

– Shridhar Dharmarajan,
Executive Vice President & Managing Director, Hexagon Manufacturing Intelligence India

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TAGMA sets the stage for the grandest Die Mould India Expo Yet!

Die Mould India 2024, organised by the Tool and Gauge Manufacturers Association of India (TAGMA), is set to be the most extensive gathering in its category. This remarkable showcase will present a diverse array of cutting-edge technologies, products, and solutions across various sectors of the die and mould industry.

Die Mould India, the premier event showcasing the latest advancements in the die and mould industry, is gearing up for its most monumental edition yet. Organised by the Tool and Gauge Manufacturers Association of India (TAGMA), the 2024 edition promises to be a groundbreaking event, setting new benchmarks in the industry.

Scheduled to take place from February 14th to 17th, Die Mould India 2024 is poised to be the largest gathering of its kind, with over 300 exhibitors converging on a sprawling area exceeding 25,000 square meters. This impressive showcase will feature a diverse range of cutting-edge technologies, products, and solutions spanning various sectors of the die and mould industry.

Drawing interest from across the globe, Die Mould India anticipates welcoming representatives from more than 15 different industries, with a robust delegation of over 50 OEMs and public sector units expected to attend. This unprecedented turnout underscores the event's significance as a global platform for networking, collaboration, and innovation.

According to Devaraya Manjunath Sheregar, President, TAGMA, “Die Mould India 2024 represents a pivotal moment for the industry, providing a unique opportunity for stakeholders to explore the latest trends, exchange insights, and forge meaningful partnerships. As we witness unprecedented advancements in technology and manufacturing processes, Die Mould India continues to play a crucial role in driving innovation and progress”.

The exhibit range at Die Mould India 2024 will encompass a wide spectrum of products and services, including dies and moulds, press tools, jigs, fixtures, gauges, additive manufacturing, 3D Printing, CAD/CAM software, machine tools, EDM, Coating, heat treatment, hot runner systems, measuring machines, die casting machines, mould bases, and much more. From traditional manufacturing techniques to cutting-edge technologies, attendees can expect to discover the full breadth of offerings that are shaping the future of the industry.

As the leading association representing the tooling and gauge industry in India, TAGMA is committed to fostering growth, excellence, and collaboration within the sector. Die Mould India stands as a testament to TAGMA’s dedication to promoting innovation, knowledge-sharing, and industry advancement. ❐

HAIMER's Cutting-Edge Innovations:

Transforming Metal Cutting with Digitisation and Automation

HAIMER, a system provider specialising around machine tools, will present a conclusive overall concept about digitisation and automation of tool room management at the TAGMA 2024 edition.

From now on, all HAIMER shrink fit, balancing, and presetting machines will receive a new software version that includes a bi-directional interface that can be connected to the new HAIMER Tool Room Manager (TRM). An optional OPC-UA interface, client, or MQTT Connect interface standardises access to machines, devices, and other systems and enables manufacturer-independent data exchange.

In 2024, HAIMER will offer its customers an optimal tool data Management - Wintools and tool dispensing system – Tool Base. As a software solution for tool and data management, WinTool enables the management of tools, resources, machine programs, processes, and master data, in addition to connectivity with MES, ERP, and different types of CAM softwares and storage systems. Toolbase is a smart tool dispensing system that includes individually configurable tool cabinets and software. It enables efficient access management via barcode, RFID, or manual interaction. In the future, all HAIMER Microset presetting devices can be equipped with WinTool as a standard. Visitors to the HAIMER booth will get a first impression.

Another innovation is that all HAIMER tool holders will be lasered with a unique data matrix code in the future, which can also be used for tool management solutions. This means that a wide variety of information can be stored in a database for each tool holder and retrieved as needed—without the need for an RFID chip or a glued-on QR code. In addition, the digital data is already stored in the HAIMER WinTool system.

Amolak Preet Singh, Managing Director, India, South East Asia, ANZ

"Haimer India will be showcasing Unique QR Codes generation and i4.0 Systems at TAGMA. This will help our customers embrace the new i4.0 systems. Also, we will be displaying our innovations, which can reduce the cut time by up to 50%. This will be available at booth No. E 10(A), Hall 1, from February 14th to February 17th, 2024".

Cracking the complexities of Autonomous Vehicle Development

The autonomous industry has revolutionised the personal driving experience, enhancing comfort, convenience, safety, and sustainability. Deploying autonomous vehicles poses numerous complexities and challenges in development. By harnessing the power of digitalisation, we can pave the way for a safer, more efficient, and more widespread adoption of autonomous vehicles.

Mathew Thomas,

Country Manager and Managing Director, Siemens Digital Industries Software India

Back in 1995, Navlab5 was launched by Carnegie Mellon University on a trip from Pittsburgh to San Diego. The first self-driving car navigated itself without human intervention. So, the autonomous industry has transitioned from 'potentially possible' to 'definitely possible' to 'inevitable' to 'commercially available' now, reinventing the personal driving experience by making it more comfortable, convenient, safe, and sustainable. Undoubtedly, the industry has captured consumers' imaginations and fueled millions of investments; however, the development and deployment of autonomous vehicles come with numerous complexities and challenges. These complexities must be addressed, and the right way is through the power of digitalisation - paving the way for safer, more efficient, and widespread adoption of autonomous vehicles.

Understanding AV complexity

While the concept of self-driving cars may seem futuristic and exciting, the implementation and development of AV systems have introduced a significant amount of complexity. To achieve true self-driving capabilities, AVs require a combination of advanced technologies and engineering domains. This complexity stems from various factors, including mechanical, electrical, and electronic systems, AI, ML, and communications networks. In an AV, these domains intersect to a greater degree than they have previously, ensuring that no system operates independently.

For example, a lane-keeping assist system requires sensors, processors, and software to detect road lines and calculate vehicle trajectory. Yet, even the most advanced ADAS systems available today only attain level 3 self-driving capabilities. However, even the most advanced ADAS systems available today only achieve level 3 self-driving capabilities. The leap to level 4 represents a significant shift in the progression towards AVs, as control over the vehicle shifts entirely from the human to the machine.

Further autonomy relies on the maturation of several key technologies. Vision sensors, such as cameras and LiDAR arrays, must accurately identify vehicles, pedestrians, and various objects in diverse weather and lighting conditions, ensuring reliable operation despite adverse conditions, which is a critical step towards level 4 vehicles. Additionally, onboard computing power must significantly increase to process the vast amount of incoming sensor data at near real-time speeds. Alongside enhancing raw computing power, the continuous development of AI and ML can aid vehicles in processing data more efficiently and rapidly.

As technology matures and the industry advances towards level 4 and 5 AVs, the vehicle's complexity grows across domains. Level 5 AVs replace human driving functions with software, electronics, and mechanical components. Sensors such as cameras, LiDAR, and RADAR serve as the vehicle's senses, while computer chips and advanced software act as the brain for processing information and making decisions. High-speed network connections act as nerves transmitting data, and mechanical systems act as muscles for physical motion. This integration results in a vehicle resembling a computer on wheels with advanced components, sensors, networks, and embedded software.

Building trust in the market

Besides growing product complexity, consumers' unfamiliarity with the technology is also one of the challenges faced by AV manufacturers. Gaining public trust is crucial for adoption to progress. While pilot programmes and test drives can help alleviate concerns, they are not practical on a large scale. Instead, manufacturers can contribute to the establishment of testing standards and regulations for AVs, demonstrating the capabilities of their systems. These standards allow for cooperation between companies and governmental organisations to define safety ratings, reliability requirements, and testing programs. Additionally, extensive testing, including high-fidelity simulations, is needed to meet benchmarks and address non-routine scenarios efficiently, improving the safety of AV systems.

Harnessing the potential of digitalisation in systems engineering

Automakers must adapt to the increasing complexity of integrating software-driven features into vehicles. Embracing digitalisation and taking a holistic view of the vehicle as a system of systems is crucial for innovation and competitiveness. Digitalisation not only helps

address immediate challenges but also lays the foundation for future growth.

The core of digital transformation is the concept of a comprehensive digital twin of the vehicle, covering all aspects of the vehicle's lifecycle. Building highly accurate models enables predicting product behaviour and supports model-based design, integrated manufacturing operations management, and data analytics. The digital twin serves as the backbone of product development and delivers insights, reduces cycle time, improves efficiency, and enhances market agility.

The digital twin fosters a collaborative approach, integrating mechanical, electrical, electronic, and software domains to design a complete system. It facilitates verification and validation of self-driving systems through high-fidelity simulations, efficiently identifying safety-critical scenarios in a virtual environment. Furthermore, modern simulation solutions enable comprehensive verification and validation, including individual components, sensors, control units, and software, in virtual environments. Companies can test systems and vehicles before costly prototyping and physical certification, making it ideal for early verification, especially for newly identified 'corner cases'. Insights from virtual simulations can be seamlessly integrated into digital design and engineering environments, enhancing system designs. The digital twin, combined with advanced simulations, empowers automakers to address challenges, improve development processes, and drive innovation in the dynamic automotive industry.

The smarter future of the automotive industry

Digitalisation is set to empower automotive companies in their pursuit of achieving advanced vehicle autonomy, driven by the complex infrastructure of powerful computer chips, sensors, software, and electromechanical subsystems, and electrical wiring. Moreover, digitalisation will also encourage collaboration across domains, ensuring data coherence and facilitating the capture and analysis of information from both testing and real-world scenarios.

Finally, it’s important to recognise the value of strong technology partnerships for the success of digital transformation initiatives. Not only will it help develope digitalisation plans, but it will also build powerful digital twins of products, production processes, and more. With the right support, automotive companies can overcome the challenges of AV complexity and the digital future of their industry. ☐

Safety First: Advanced Safety Features in Electric Two-Wheelers

With electric bikes and scooters gaining popularity as transportation choices, manufacturers should prioritise safety features, elevating the overall rider experience. Discover advanced safety technologies that are gaining traction in the realm of emerging EV trends and are now essential for modern electric bikes and scooters.

Sushant Kumar,
Founder and Managing Director,
AMO Mobility

According to the latest EV Markets Report, the rate of EV adoption in India has witnessed a surge of 55 percent since the year 2018. Interestingly, the report also stated that the rate of adoption has been high in the electric two-wheeler and three-wheeler segments. The rising popularity of two-wheelers can be attributed to their cost-effective operation and environmental perks. However, two-wheelers are also prone to getting into accidents. In 2022, two-wheeler fatalities in India rose by nearly 8 percent, accounting for around 44 percent of road fatalities. As more individuals opt for electric bikes and scooters as their mode of transport, manufacturers should focus more on the safety aspect of the vehicles and enhance the features to ensure a complete experience for the riders. Such efforts will also align with the government's attempt to increase road safety and help manufacturers comply with new regulations. On the other hand, individuals should look for electric two-wheelers with advanced features that enhance their protection and ensure a smooth riding experience.

Let's explore some advanced safety features in the upcoming EV technologies, which are increasingly popular among riders, making them a must in modern electric bikes and scooters.

Stability Control System

Efforts made in the past to enhance the stabilisation of electric two-wheelers typically involved expensive and energy-intensive methods, including gyroscopes. However, their viability remained limited for widespread adoption. With rapid advancements in this technology, one can now access more effective and affordable solutions to address the balancing challenges of electric two-wheelers. Previously, the stability aspect came at the expense of compromising the agility of two-wheelers. Thanks to cutting-edge and effective Narrow Tilting Twin-wheel (NTT) technology, a blend of stability and agility has become possible.

Traction Control System

This has to be one of the most crucial safety features for riders, as it regulates wheel spin when riding on hilly terrain, in muddy areas, or off-road. It helps optimise the traction of the electric bike during acceleration to ensure a safe riding experience. The system lowers the risk of skidding or losing control by effectively modulating the power delivery to the two-wheeler's wheels. As a result, this feature has become an essential safety feature for riders who are into adventure riding or sports riding activities.

Anti-lock Braking Systems

This advanced technology is responsible for preventing the wheelers of e-scooters or bikes from locking up during sudden braking. It helps maintain the rider's steering control and effectively lowers the risk of skidding. Needless to say, the feature proves immensely useful in the case of emergency braking by improving the stopping distances, which helps prevent severe accidents or the impact of collisions. The latest advanced, clever braking technologies also display regenerative techniques and help improve the mileage of the EV significantly.

Smart Connectivity

The feature enhances the vehicles' safety on the road by facilitating real-time monitoring of their performance and enabling remote diagnostics. In addition, these systems are trained to send emergency alerts in case of an accident, potentially saving the rider's life.

Advanced Battery Systems

The battery of electric vehicles plays a crucial role in ensuring safety. Previously, older batteries used to be more prone to overcharging and overheating. With newer developments in modern battery chemistry, EV batteries are relatively lighter and more durable. In addition, EV battery manufacturers are consciously investing more effort in engineering advanced battery systems that help implement safety norms in the long run. For instance, AI-enabled battery management systems have helped tackle issues related to overheating by extending features like overcharge protection and short-circuit prevention. The latest systems come with

in-built thermal management features that help reduce potential risks. More efforts are in place to lower recurring battery-related incidents by optimising the performance of the battery system and running the components through rigorous testing and quality control measures.

Telematics and Sensors

This particular advanced safety feature serves as the rider's co-pilot during their journey. Typically, telematics and sensors help collect and analyse crucial riding data. The advanced system also helps identify previous patterns to offer valuable insights, which could potentially prevent accidents. For instance, the system weighs several factors, such as the rider's driving habits, accident data, and road conditions, to detect risky behaviour and prevent accidents.

Optimising space and comfort

Modern two-wheelers are known for their compactness and the effective use of limited urban space. Since they can easily navigate through congested and narrow lanes, they have become a go-to mode of transportation for the public and last-mile delivery partners. Similarly, their compactness also helps lower the risk of getting into collisions.

Besides these, electric two-wheelers are known for their unparalleled comfort quotient thanks to their key features, such as adjustable suspensions, noise reduction features, and ergonomic seating. In addition, the lack of bulky combustion engines and transmissions offers ample space to provide higher comfort and enhance utility.

Smart Gears and Accessories

The advancement of safety feature technologies is no longer limited to electric two-wheelers. Today, protective gear and accessories come equipped with smart technologies that aim to enhance the safety of riders. For instance, individuals can find smart helmets with an in-built communication feature, which facilitates rider safety by providing them with timely collision warnings. In addition, they allow hands-free communication and offer real-time navigation assistance. Premium smart helmets also come with heads-up displays and rearview cameras, collectively offering riders key information about their surroundings and road conditions. Besides helmets, motorcycle gear and jackets are also getting upgrades. Individuals might find premium racing suits and jackets with airbag systems that promptly inflate during a collision, providing the rider with added protection and potentially saving them from serious injuries.

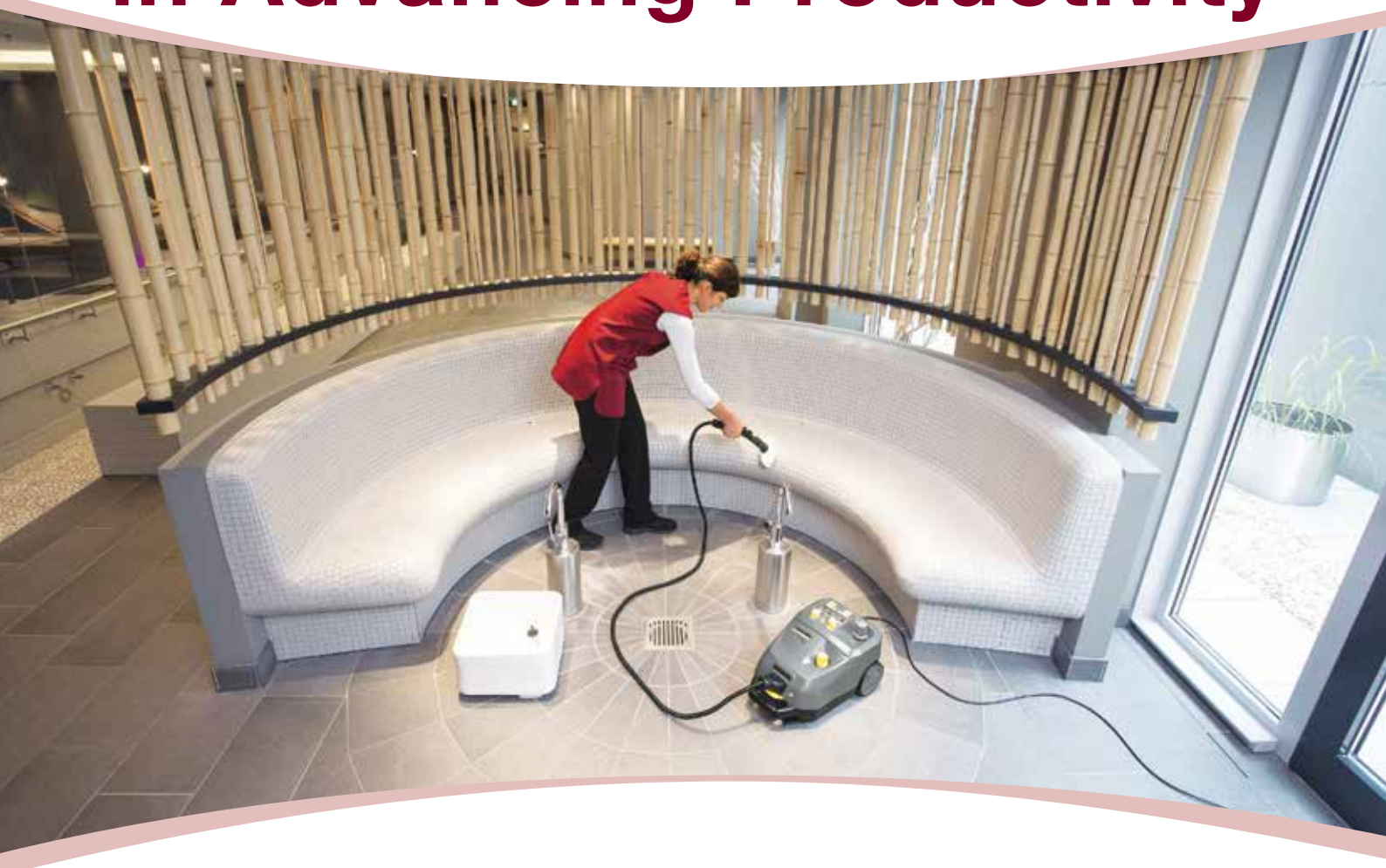
Why do we need advanced safety feature technologies for EVs in India?

The country is a thriving automotive hub and the world's largest two-wheeler market. This is because two-wheelers are among the primary modes of commute for most Indians, especially in Tier-II and Tier-III cities. With the push to promote clean and sustainable mobility, electric scooters have witnessed a sharp rise in demand. While the demand is high, the segment needs more breakthroughs to enhance its

components' capabilities and safety features. This surge necessitates the need for safety by driving more efforts towards the research and development of advanced technologies and features. Such an effort will help reduce the rate of fatal accidents in the country and boost the adoption rate of EVs. However, parallel efforts should be made to make safety technologies affordable so that more manufacturers can incorporate them into their products and more riders can purchase safer electric vehicle models equipped with advanced technologies.

These advancements to improve safety features in electric two-wheelers highlight a commitment to prioritise road safety on a broader scale. Previously, affordability was a major roadblock to relegating these advanced technologies across the EV ecosystem. However, with safety taking precedence over all else in EVs, more initiatives to make road safety a priority for all can be expected. With more government efforts towards making EV components cheaper and increased investments in R&D to improve efficiency, more advanced safety features can take over the EV landscape in the future. ❐

The Role of Industrial Cleaning in Advancing Productivity



To ensure smooth running of your business, it is vital to have a clean factory, office space, storehouses and warehouses. A healthy and clean industrial environment leads to enhanced company performance, customer satisfaction, lesser environmental impact and improved overall brand image.

Jatinder Kaul
Managing Director
Kärcher India

Keeping things clean at work has always mattered - it is a simple just a fundamental aspect. But events of the past few years have reinstated the importance of staying on top of cleaning and disinfecting. Dirty factories, storehouses or warehouses can reduce employee and machine efficiency, health and safety issues, poor product quality, decreased productivity and missed deadlines.

Although the task may seem mammoth, innovative technologies, such as antimicrobial coatings and autonomous floor scrubbers, have made the task easier and led to enhanced workplace safety, productivity, and sustainability. Given below are the most recent industrial cleansing technologies that will shape the future of the workplace :

Automated Cleaning Equipment

One of the biggest technological shifts in industrial cleaning is the advent of automated equipment like robotic vacuum cleaners, floor scrubbers, and sensory monitoring systems. For example, floor scrubber robots can autonomously clean hard floors by navigating around people and obstacles using LIDAR and other sensors. Automated scrubbers like these optimise cleaning routines, lower labour costs, and ensure consistency without requiring worker oversight.

Some other examples of automated cleaning tech include:

- Autonomous UV-disinfection robots that eliminate pathogens on high-touch surfaces.
- Intelligent restroom monitoring systems like IoT sensors detect hand soap or toilet paper levels and notify cleaning staff when refills are needed.
- Surface disinfecting robots that use UV-C light or antimicrobial fluids to sanitise high-traffic areas.
- Self-driving sweepers are suitable for warehouses, parking lots and other large commercial spaces.

Smart Waste Management

Efficient waste management, facilitated by smart technologies, enhances industrial hygiene. Optical sensors automate waste collection, ensuring high-volume pickup with minimal contamination. Smart bins with indicators and compactors optimise collection routes, reducing overflow and pest problems. Route optimisation software analyses bin-level data for the most efficient collection paths.

Antimicrobial Surface Solutions

Advanced antimicrobial precautions, including nanotechnology-based surface treatments, are crucial to halt the spread of harmful microbes. Coatings with silver nanoparticles or other active ingredients can be applied to high-touch surfaces, offering persistent disinfection without harmful chemicals. Copper alloys, known for their inherent antimicrobial properties, are gaining popularity in crafting hygienic industrial surfaces. Additionally, innovative surface materials with microscopic texture patterns, like Sharklet, create inhospitable conditions for microbes, providing a self-disinfecting shield between routine cleanings.

Advancing Workplace Hygiene Through Innovation

The latest industrial cleaning innovations are advancing workplace hygiene and safety to new levels. Automated scrubbers, antimicrobial coatings, and waterless steam technology enable more effective, frequent, and sustainable sanitisation. Smart waste disposal optimises material flows for cleaner facilities. These technologies enhance productivity and compliance while reducing human labour needs. Overall, the industrial cleaning sector is embracing automation, green solutions, and proactive hygiene enhancement to transform workplace cleanliness. With advanced technologies, maintaining stringent cleanliness standards is becoming more efficient across manufacturing, food production, retail, hospitality, education, and transportation sectors.

Food Production

Maintaining stringent hygiene and cleanliness standards is critical in food production facilities. Regular sanitisation of surfaces, equipment and staff areas is crucial to prevent contamination and meet safety regulations. Technologies provide specialised cleaning solutions for various food sectors like dairy, meat, produce, beverages, etc. Their machines optimise efficiency while ensuring food-grade hygiene.

Warehousing and Logistics

In warehouses and logistics hubs, dust and debris accumulation can create hazardous conditions and lead to equipment issues. Regular cleaning improves air quality, safety, and productivity. Industrial vacuums efficiently remove dust build-up from inventory racks, vents, and machinery. Their scrubbers also maintain clean, non-slippery floors across large spaces.

KEY POINTS ABOUT INDUSTRIAL CLEANING SOLUTIONS:

Vacuum Cleaners for Food Industry Hygiene	• An efficient vacuum cleaner effectively removes food particles and contaminants to maintain hygiene in production areas. • It features high suction power and a large debris tank to efficiently clean food processing environments.
Ride-On Sweepers for Large Facilities	• A ride-on sweeper is suitable for cleaning large warehouses, production floors, parking lots, etc., up to 7,800 sqm/hour. • The powerful sweeping system can collect small and large debris for low-maintenance cleaning.
Scrubber Driers for Safe Sanitised Floors	• Scrubber drier cleans and dries floors effectively to ensure a safe, hygienic environment in food facilities. • A battery-powered ride-on scrubber drier provides up-to 90cm cleaning path for large areas. It combines high brush pressure/suction for superior floor cleaning.
Steam Cleaners for Chemical-Free Sanitisation	• A steam cleaner provides high-temperature pressurised steam to sanitise surfaces and kill germs without chemicals. • It is an eco-friendly, non-toxic way to sanitise food processing equipment and environments.
Compact Scrubber Drier for Small Businesses	• Scrubber drier provides a cordless cleaning solution for hard floors up to 200 sqm. • It outperforms mopping with its higher roller speed, contact pressure and bi-directional vacuuming. • The compact size makes it ideal for small facilities.

Retail Environments

Retail stores require cleaning that enhances visual appeal while protecting goods. Grease, grime and spills must be promptly removed from floors, display cases, restrooms and more. Cleaning improves store hygiene and ambience cost-effectively, from compact vacuum cleaners to ride-on sweepers suited for large retail spaces.

Safer and more sustainable workplaces

Innovative industrial cleaning technologies are driving workplace hygiene into the future. Intelligent robotic equipment automates repetitive sanitisation tasks for consistent results. Antimicrobial surface enhancements provide persistent, chemical-free resistance against bacteria. Sensors enable real-time monitoring and optimisation of waste disposal. Waterless steam and vapour systems allow chemical-free disinfection.

These cutting-edge solutions promote cleaner, safer environments while increasing efficiency, lowering the cost, and reducing environmental impact. By embracing automation, smart waste management, and sustainability, industrial cleaning is transforming into a high-tech sector that advances both workplace hygiene and productivity.

Waterless Cleaning Technology

Sustainable cleaning approaches are also emerging as an industrial trend. New waterless technologies are enabling effective cleaning without wastewater generation. This protects the environment while lowering utility bills for businesses. For example, steam cleaning systems like those from Advanced Vapour Technologies use superheated dry steam for chemical-free surface cleaning and sanitising. The steam degrades grime and kills over 99 percent of germs without any liquid discharge.

Some novel waterless approaches also utilise microfiber fabrics, ultrasonic, UV irradiation or detergent-impregnated pads. These allow the cleaning of industrial machinery, floors and walls with minimal or zero wastewater output.

Gel or foam-based cleaners are ideal for water-sensitive areas like electrical panels or machinery. They stick to surfaces for increased dirt removal before safely evaporating without residue. The environmental and economic benefits of waterless cleaning methods make this an important industrial cleaning trend.

Maintaining cleanliness and compliancy

Cutting-edge technologies are making industrial cleaning smarter, greener and more automated than ever before. From robotics to antimicrobial nanotechnology, innovations like this transform workplace hygiene while boosting productivity and efficiency. Some industrial sites are also implementing AI-enabled systems to automate waste sorting for recycling. For example, AMP Robotics uses computer vision technology to identify and separate recyclable materials, reducing waste processing costs.

Overall, intelligent waste management is crucial for industrial settings to maintain clean and compliant facilities. While automation handles repetitive cleaning tasks, smart waste management streamlines material flows to maintain clean facilities. Antimicrobial surface enhancements provide proactive microbial resistance between cleanings. Sustainable waterless methods also minimise environmental impact. ☐

Empowering manufacturing with Advanced Analytics

Data analytics is a crucial element in the digital transformation of various industries, with manufacturing being no exception. This article outlines how tools for manufacturing analytics can effectively identify upcoming trends, enabling manufacturers to proactively strategise production, equipment maintenance, quality control, and raw material procurement.

Ali Hyder,
Group CEO,
Focus Softnet

Manufacturing analytics refers to using data generated from machines, operations, and systems to manage and optimise production, including maintenance, quality, and planning.

Manufacturers have always used data to improve the efficiency of their production process. But today, this has changed significantly in how data is collected.

While many companies still rely on fragmented, traditional methods to manually check and record factors and write down machine operation and maintenance histories, unfortunately, these methods are not only highly prone to human errors but are also time-consuming and often biassed, making them inefficient in generating quality insight for accurate decision-making.

However, as the manufacturing industry undergoes a digital transformation, devices are connected to reduce the labour associated with manual documentation. Automated machine data collection mechanisms are propelling the next generation of manufacturing analytics to unlock the most accurate forecast based on a plethora of advanced use cases ranging from straightforward monitoring and diagnostics to predictive maintenance and the aftermath of automation.

In new-gen manufacturing analytics, data that records events can be utilised to enhance equipment performance, drive process improvement, save costs on production, and minimise human errors. The tool provides reliable information that reveals accurate equipment conditions and trends in production.

Types of Marketing Analytics

Manufacturing analytics is a collection of different processes that provide insights businesses can leverage to implement data-driven decisions. Here are the four types of marketing analytics that marketing businesses can apply to their company's pipeline:

- **Descriptive Analytics:** It is the simplest type of data analytics that focuses on the most fundamental aspects of your business. This is available in the ERP dashboards and reports and informs users about what has happened or is currently happening. Descriptive analytics reports can answer common business performance-related questions concerning the expectations of achieving sales and other business goals. Descriptive analytics lays the foundation for all manufacturing insights.
- **Diagnostic Analytics:** Diagnostic analytics help identify the underlying causes of organisational problems. It is about breaking down available business data to determine the grounds for an issue, event, or behaviour. This is done following popular techniques, including drill-down, data discovery, data mining, and correlations. Like descriptive analytics, diagnostic analytics relies on historical data but seeks to identify and explain anomalies and outliers.
- **Predictive Analytics:** The predictive approach of manufacturing analytics leverages descriptive and diagnostic analytics data to help manufacturers forecast what might happen next in their business. It mines historical data sets to evaluate potential risks and identify the most likely future trends to help companies develope the right strategies.
- **Prescriptive Analytics:** Prescriptive analytics includes observing historical data and predicting outcomes, and based on that, suggesting a course of action, as it encompasses the most advanced techniques, such as simulation, optimisation, and machine learning.

It is considered the highest level of an optimal manufacturing analytics solution, assisting organisations in overcoming future challenges. Manufacturers can see which processes need improvements and could immediately impact their bottom lines.

How does manufacturing analytics strengthen the industry?

Contextual awareness is critical for modern manufacturing businesses. Manufacturing analytics makes companies more competitive in terms of cost, quality, and customer experience. With the help of real-time manufacturing analytics and intuitive visualisation tools, companies could leverage data to improve their productivity and profitability.

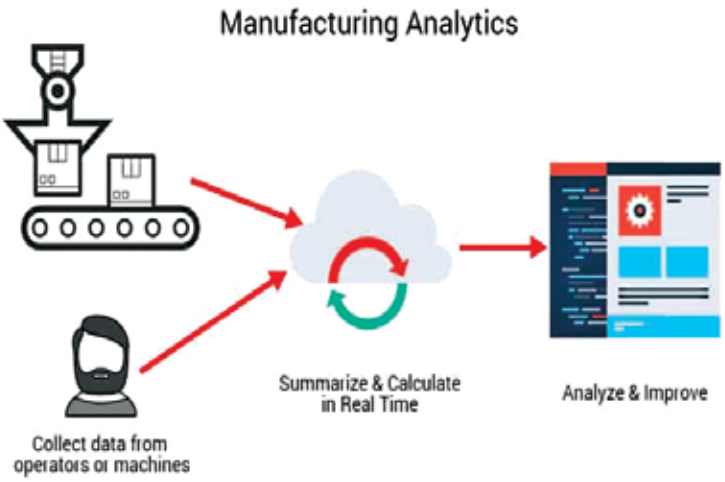
- **Lower operating costs:** Manufacturing analytics lets manufacturers generate records to instantly gain insights for handling ad hoc queries. This is a visualisation model with easy-to-read data that could help manufacturers optimise their operating costs and eliminate unnecessary spending.
- **Increase asset performance and productivity:** Data analytics can help manufacturing businesses capture and interpret machine data to reveal accurate insights that can help improve their asset performance and drive predictive maintenance. This prevents untimely asset breakdowns and unexpected downtime, which improves asset performance and increases production.
- **Making product customisation possible:** Data analytics is evolving this behaviour by making it possible to predict demand for customised products accurately. ERP software with innovative data analytics tools can identify changes in customer behaviour, making it possible for manufacturers to efficiently produce customised products as they manufacture goods on a larger scale.
- **Optimising supply chains and production processes:** With the help of the right analytics, manufacturers can closely monitor supply chains in exact detail and aim to modify every section of the production process. This capability lets manufacturers identify production bottlenecks and reveal underperforming components in the entire process. Manufacturers can spot their dependencies and generate an alternative plan to strengthen production processes and eliminate potential pitfalls.

Steps to success in Manufacturing Data Analytics

Manufacturing data is notoriously complex. Gathering, analysing, and utilising the data must be carefully executed by a team of well-trained professionals.

Here are the five things required to make marketing analytics have an impact:

- **Make sure to capture data from the right source:** The first step in marketing analytics is to ensure that data is captured from the right source. Begin by determining the requirements and building a catalogue of your data resources for success in manufacturing analytics.
- **Make sure to capture useful data:** When the data quality is different from what is needed to execute the project successfully, it typically leads to problems of insufficient data granularity to draw accurate conclusions. To make matters worse, many manufacturers lack standard operating procedures, and they are unable to generate data that is consistent enough to be valid, making analysis difficult or impossible. Unfortunately, this issue becomes apparent only after the project is well underway. So, it is critical to include project milestones for teams to discuss the suitability of the data collected for analysing a problem before the project initiates.



- **Stay away from manual data preparation:** According to the data scientists, they spend 80 percent of their time cleaning and blending data, and only 20 percent is used on performing analyses and developing insights. This is unacceptable at a time when manufacturers need to incorporate data-driven decisions to ensure their operational processes continue to accelerate, making it critical for modern manufacturers to invest in tools that can automate data cleaning and blending activities
- **Focus on building out a data platform first :** Manufacturers must ensure that the data models are generalisable and adaptable to address multiple use cases and extend capabilities throughout the enterprise.
- **Ensure the results are actionable:** Results need to be actionable, which means insights must be presented in a way that allows manufacturers to leverage the data to drive informed business decisions.

To ensure this happens, it is critical to accurately incorporate proper context in a location where users can easily view it. In the absence of this, efforts will fail as no one can understand the report and, therefore, is unable to drive the opportunities for operational success. ☐

Helping **MSMEs grow**

Over the years, there has been a significant focus on helping manufacturing companies' growth, which came with its share of challenges. Here are a few key points to ensure the growth of MSMEs despite challenges...

Shraddha Subramanian,
Founder & CEO,
Sparkling Soul

Stages of growth

Since its formation, the MSME segment has proven to be a highly dynamic Indian economy sector. There are three stages of growth for any business. They are:

- **Survival:** Survival is the most important part. Surviving various challenges makes it hard for the business to grow. A manufacturing company must try to grow even when survival is at stake.
- **Sustenance:** Sustenance helps in building the trust that production is adequate and taking care of day-to-day operations. Reaching this stage also indicates that the business is out of its survival stage.
- **Thriving:** In the future, the profit margins start to increase, boosting the organisation to buy new machinery and implement new requirements. This is the stage where every business aspires to be. This has a huge horizon as it is a true sign of expansion.

Any business aiming to grow goes through these stages with their fair share of challenges, such as:

Challenges for MSMEs

- **Lack of vision:** Many MSMEs have very limited vision. Because of the lack of capital, the investment in machinery and infrastructure is just to make sure the manufacturing lines work. Their ability to invest in modern equipment and technology is also less because of limited financial resources, which may not qualify for thinking about expansion, next steps, long-term planning and a solid vision.
- **Lack of resources:** MSMEs feel a lack of resources all the time. This leads to complete burnout for every new product or manufacturing line they plan to start, as they feel a lack of resources which actually may not be the case.
- **Everchanging market condition:** The variation in

prices for raw materials, economic ups and downs and fluctuations in currency exchange rates have a significant impact on manufacturing MSMEs. These increase manufacturing costs, reduce profit margins and disrupt production planning.

- **Difficulties in expansion:** Inadequate infrastructure, lack of usage of new technology and modern machinery and abiding by the updating rules of compliance are some prominent difficulties manufacturing companies face in their expansion. Moreover, global companies occupying the market with the help of liberalisation may also affect the revenue streams for MSMEs here.

Operational challenges

A haphazard way of running the business makes it more cumbersome and can overwhelm the business owner. Here are a few common mistakes that MSMEs must avoid.

- **Cash flow:** Undefined payment collection and absent client interaction policies lead to easily defaulted agreements, causing cash flow challenges for business owners. The manufacturing sector's substantial infrastructural investments exacerbate these issues, quickly draining company resources.
- **Customer retention:** As the business progresses, continuing with the existing customers with a low price point becomes a space of overwhelm and burden. This also takes away the energy and time to pitch for new customers at better rates.
- **People dependency:** Most MSMEs are people-dependent. People are fewer and the roles and responsibilities are not clearly defined. Everyone does everything and that makes every employee at the same level in everything rather than deploying people according to their skills and helping them grow in their specific skillset.
- **Lack of processes and documentation:** MSMEs have the least documentation, with a lack of standard operating procedures. This makes things disorganised and the output varies with a lot of manual intervention, leading to low standardisation levels.
- **Lack of employee engagement and upskilling:** As the cash flow is a challenge, there are not many efforts made for employee engagement and upskilling them. This leaves the organisation's status as is and, over some time, the organisation starts falling back because of this.
- **Hiring:** Hiring poses another challenge because skilled resources demand higher salaries, which some MSMEs may not be able to afford fully. This imbalance in having skilled resources while getting the business to the next level enables the organisation to hire more skilled resources, and the cycle continues.
- **Follow-up overwhelms:** Business owners are burnt out because of constant follow-ups with prospective clients to hire and manage every area of business.
- **Decision fatigue:** Another space of burnout is taking too many decisions on every front of the business. This overwhelms the business owner as there is no creativity left in decisionmaking, and it is just an on-the-fly process to finish to see the next steps.
- **Customer acquisition:** The prospects for customer acquisition are chased for doing business, which causes burnout for most business owners. Chasing a customer for business development may feel easy rather than attracting it.

Ensuring growth

The challenges address and any additional ones can be overcome by a few unconventional solutions that are:

- **Clear vision:** Having a clear vision about the expansion in manufacturing helps in keeping a check on decision-making. Checking the business decision alignment with long term helps companies thrive and walk with a conviction for decisionmaking.
- **Resourcefulness rather than resources:** Being resourceful is your creativity in generating resources. A structured approach towards a business defines resourcefulness and the ability to create resources all the time.
- **Intuition in business decisions:** Intuition is a universal superpower; neglecting it can lead to mediocre decisions. Leveraging intuition can propel business growth to remarkable heights swiftly, as it taps into the business owner's innate ability to discern what works in the present moment, unbound by past experiences. It's a magic wand every business owner possesses, activated by channeling energy and creativity.
- **Attract premium clients:** Manufacturing companies can attract premium clients with ease by projecting themselves as a premium brand with value-added services and a commitment to serving their potential clients.
- **Charge your worth:** Charge your worth for services/products, avoiding a low-price market entry. Be a unique player, securing your value. This approach ensures financial freedom, allowing reinvestment in new manufacturing lines. While challenges exist for manufacturing MSMEs, opportunities abound. Growth is facilitated by energetic and unique positioning, relying on intuition, creativity, and innovation for massive success. ❐

Compact premium laser cutter

ByCut Star 3015

Bystronic recently launched the ByCut Star 3015, which is equal in every way to the ByCut Star 4020. With the same features, it cuts sheet metal with measurements of 3 x 1.5 metres with precision, speed, and intelligence. The ByCut Star 3015 is, also available with a power of up-to 30 kilowatts. The technological leap from the previously available 3-to-20-kilowatt levels to the new 30-kilowatt level is considerable, and it opens up new possibilities for you to optimise your production and, as a result, to remain at the forefront of ever-tougher competition. Cutting thicknesses up to 50 millimetres has become a reality. The cutting speeds of the ByCut Star therefore increase significantly compared to 15 kW and MixGas for sheet thicknesses between 6 mm and 15 mm. The piercing times are also shorter for sheet thicknesses of 15 mm. Intelligent functions of the ByCut Star help sheet metal processors achieve maximum quality, thus making the difference clear.

Bystronic Laser India | Pune

A new powder recycling process for a sustainable circular economy

ALD Vacuum Technologies recently announced the state-of-the-art additive manufacturing solution, the EBuild® 850. This innovative system can process powder with a wide distribution, enabling it to be used not only in industrial-scale part production but also in powder recycling efforts.

EBuild® 850

Using selective electron beam melting to create powder-filled ingots, ALD achieves an unprecedented build rate of over 1000 cm³ per hour. This approach not only reduces waste but also offers versatile options for downstream processes. The powder-filled, solid-cased ingots are much safer to handle and process than loose powder. This flexibility increases the overall efficiency of the recycling process and enables integration into established processing routes. It is the first system on the market suitable for additive manufacturing of both large-scale parts and high-volume production. High productivity, robustness, and superior material quality enable the step to industrial additive manufacturing.

ALD Vacuum Technologies India | Navi Mumbai

New function simplifies cobot programming

CLOOS, will be offering seam tracking with arc sensor technology for the QINEO ArcBoT cobot solution. The QINEO ArcBoT from CLOOS offers an easy entry to automated welding technology. It relieves employees, ensures consistent, reproducible welding quality, and combines the high-tech QINEO welding power source with a high-precision cobot from Doosan Robotics. The unique advantage of the new function is the monitoring of the welding process by the proven CLOOS arc sensor. During welding, the sensor precisely checks the torch's position concerning the programmed path. This enables automated adjustment in the event of any deviations to ensure consistent, high-quality welding. Loss of time is minimised because measuring and welding take place simultaneously with the arc sensor. At the same time, workpiece distortion, e.g., due to thermal expansion, is directly compensated for. The CLOOS arc sensor thus combines productivity with optimised quality.

QINEO ArcBoT

Cloos India | Pune

Stick packing machines to improve production efficiency

Jintian Packaging Machinery Co. recently announced the release of its new Multi-lane Packing Machine. Specifically designed for the efficient packaging of sugar, salt, seasonings, instant coffee, and instant beverages, this high-performance, vertical packaging machine is set to make a significant impact. The machine is designed for the packaging of a variety of materials, including sugar, salt, seasonings, instant coffee, and instant beverages. With its outstanding flexibility and multi-channel design, it demonstrates versatile packaging capabilities. From sachet to stick packaging, the multi-lane packing machine quickly adapts, providing businesses with an efficient and rapid packaging solution. The machine is a high-performance vertical packaging machine that, through advanced multi-channel design, can be customised with two to 15 channels based on packaging capacity and bag size requirements. This design not only improves packaging efficiency but also reduces production costs.

Multi-lane Packing Machine

Jintian Packaging Machinery Co| Guangdong Province

Effective tool for cleaning stainless steel surfaces

Suhner recently launched the BRUSHmax 3.0, a safe and effective tool for cleaning stainless steel surfaces, especially after welding. It quickly and easily removes the blue and brown iron oxide stains without changing the surface texture of the metal. The liquids with which BRUSHmax works only become reactive at high temperatures. Under normal conditions, they are therefore comparatively harmless to the user and the environment.

BRUSHmax 3.0

It offers four functions:

Cleaning from small to large surfaces without attacking the surface structure. Removes annealing colours, rust, and white spots, edges, or streaks. Polishing of various components of subsequently created welding seams on electropolished material from residues left behind, burns, or small scratches. Marking of your own labels, such as logos, serial numbers, graphics, and lettering such as product names, part numbers, or QR codes, on your products. Passivation for immediate 100% protection against corrosion (rust). Ensures higher quality and customer satisfaction.

Suhner | Pune

CO_2 calculator for automotive customers

SKF India has introduced an auto CO_2 calculator tool to help customers in the automotive industry better understand and address carbon emissions and gain a distinctive competitive edge. This tool is designed to revolutionise the bearing selection process, aligning seamlessly with SKF's commitment to carbon neutrality and its clean and intelligent strategy. Using data-driven analytics, the tool provides estimates of carbon emissions for Internal Combustion Engine (ICE) vehicles and energy losses in Electric Vehicle (EV) powertrains. This tool aims to reshape the industry by guiding the selection of bearings according to sustainability goals and promoting eco-friendly engineering practices. Alagesan Thasari, Director, Automotive India and Southeast Asia, said, “By making our products lighter, more efficient, long-lasting, and serviceable, we help our customers achieve significant energy savings and carbon reductions. This Auto CO_2 calculator tool is another example of how we are continuously developing solutions to help our customers understand and accelerate their journey towards sustainability”.

Auto CO_2 calculator tool

SKF India | Pune

Multi-point rotary latch pull system

Southco has introduced a new cable accessory for its Surface Mounted AC-15 Rotary Latch Actuators, the first multi-point rotary latch pull system on the market. This accessory is ideal for applications on trucks, RV’s buses, and other vehicles where components must be lightweight, compact, and sturdy. The AC-15’s surface-mounted profile ensures that minimal interior space is used, and no extra brackets are needed for mounting. The new accessory’s remote latching capabilities make it ideal for larger panels, where multiple latches are needed and there is a significant distance between the most optimal actuator placement and latch placement. Overall, the remote release accessory for AC-15 Rotary Latch Actuators brings unprecedented multi-point and remote latching possibilities to a variety of industries. The AC-15 Rotary Latch Actuator further distinguishes itself as a highly durable and versatile solution for large panels that need to withstand long-term exposure to the elements. Glass-filled reinforced nylon housing provides the first level of protection for the mechanism inside.

AC-15 Actuator

Southco | Pune

Shoulder milling solution for aluminium machining

YG-1 expands its YG SM3 MILL portfolio by introducing TPCT-AL inserts, a 3-corner 90° shoulder milling solution for aluminium machining. The well-received TPKT inserts are now expanded with TPCT-AL inserts in the SM3 line. The introduction of the TPCT-AL inserts, a variant of the TPKT inserts, is a response to the positive market feedback. YG-1 broadens into the TPCT-AL inserts in the SM3 line, addressing the specific needs of aluminium machining. The TPCT-AL inserts are periphery ground and designed with a high-helix cutting edge to reduce cutting force and provide smooth cutting; the high positive rake angle geometry provides optimised chip evacuation and minimises burrs; and the newly designed curved cutting edge minimises mismatch in step machining. It designed for highest surfaces quality and improved tool life for machining of aluminum and non-ferrous materials are offered with the dedicated grade YG50. TPCT-AL inserts are compatible with all TPKT’s cutters.

TPCT-AL inserts

YG-1 | Bangalore

Highlights: March 2024

» EV Charging Infrastructure

In an era where sustainability takes center stage, the automotive landscape is undergoing a transformative shift towards electric mobility. As businesses align their strategies with eco-conscious initiatives, the demand for Electric Vehicle (EV) Charging Infrastructure has surged, becoming a critical component in shaping the future of transportation. This section will throw light on the dynamic realm of EV Charging Infrastructure, delving into the intricacies of its technological landscape.

» Titanium Machining

As industries increasingly turn to advanced materials for their exceptional properties, the demand for cutting-edge machining solutions has never been more critical. This is where Titanium Machining emerges as a pivotal player, redefining the benchmarks of precision and performance. This feature takes you on a journey through the realm of Titanium Machining, showcasing its role in shaping the future of manufacturing processes.

» Drones in Manufacturing

A groundbreaking advancement that has emerged as a game-changer is the integration of drones into manufacturing processes. These Unmanned Aerial Vehicles (UAVs) represent a transformative force, bringing unprecedented efficiency, accuracy, and safety. This article explores how these cutting-edge aerial systems are elevating precision and productivity in industrial settings

» MRO Technologies

In the industry, where precision, efficiency, and reliability are paramount, MRO Technologies emerges as a vanguard of innovation. Specialising in Maintenance, Repair, and Operations (MRO) solutions, this forward-thinking company has become a beacon for businesses seeking to elevate their technical capabilities. This feature will throw light on how MRO Technologies is reshaping the landscape through cutting-edge technological solutions where technical prowess meets industry-leading expertise, setting a new standard for innovation.

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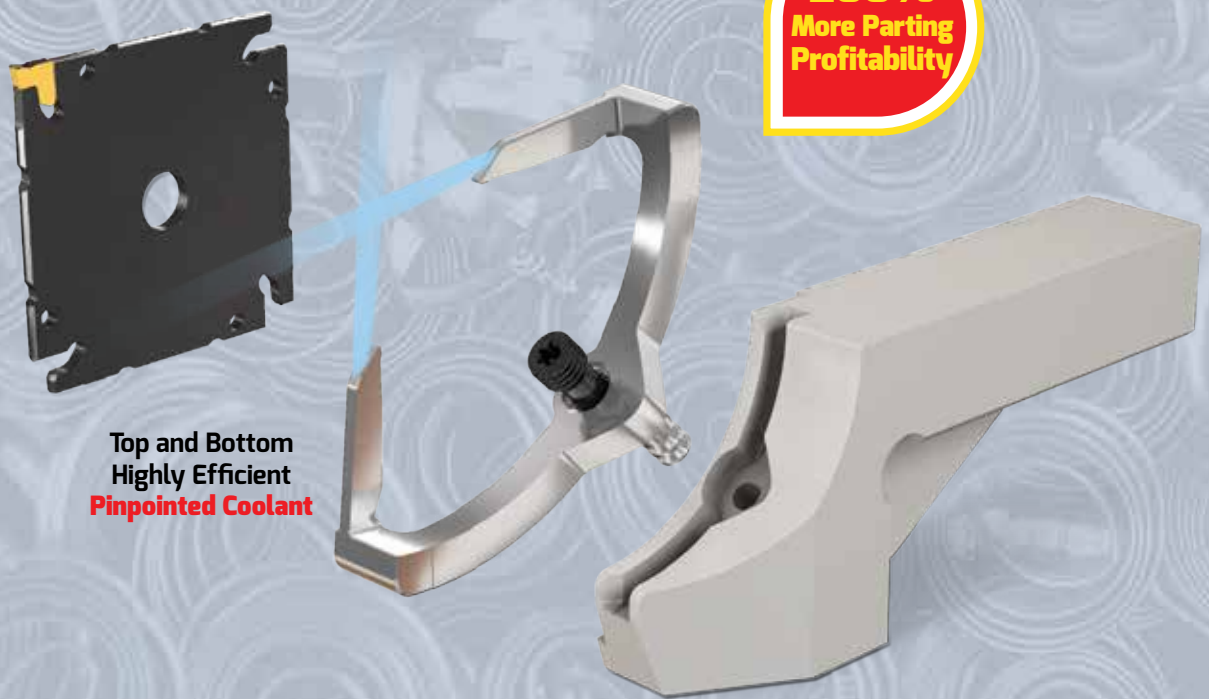

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