



Navigating the Cutting Edge of Industry News

**MARKET & STRATEGY
INTERVIEW**

Naveeth Menon

**EVENT REPORT
STUDER**

**GRIPPING
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Schmalz

**PRODUCT EDGE
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**BALLUFF'S
VISION FOR INDIA AND APAC:
Thomas Sattes**

Regional Vice President, Asia Pacific





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The Future is Now—And Industry is Writing It

When I gaze at the surge of innovations, transformations, and breakthroughs, it feels like every sector of industrialization has levelled up its game, reshaping its landscape with unprecedented force. The future isn't just approaching—it's accelerating at full throttle. From intelligent manufacturing to next-gen mobility, from energy-efficient pumping to the dawn of hyper-connected industries, innovation is no longer an option—it's the only way forward. And it's exhilarating to witness—every individual pushing past their own benchmarks, racing to the pinnacle of innovation and technological prowess. This momentum won't fade; it's like a seeker in relentless penance, unwilling to stop until they've found their god.

It's not just the technological breakthroughs stealing the spotlight—efficiency, the relentless focus of the human workforce, and sustainability are stepping into the limelight, driving industries toward a future that's smarter, sharper, and more responsible.

This edition brings game-changing innovations across industries. Connectivity is no longer just about communication; it's about intelligence. The rise of next-generation networks, powered by AI-driven optimization, is setting the stage for seamless, real-time decision-making. As industries become more interconnected, adaptability and security are emerging as critical priorities.

The pursuit of efficiency is shaping the next wave of industrial advancements. Smart technologies are redefining processes—automating tasks, minimizing waste, and maximizing performance. The focus is not just on output but on sustainability, ensuring that industrial growth aligns with environmental responsibility. What's unfolding is more than just progress—it's a reinvention of how industries operate, connect, and grow.

This second edition of our e-magazine is more than just a snapshot of today's industrial evolution—it's a front-row seat to the future. And trust us, this is just the beginning. With every new issue, we'll bring you sharper insights, thought-provoking discussions, and exclusive interviews with the visionaries shaping tomorrow. The next editions promise even more groundbreaking advancements, compelling narratives, and deep dives into the innovations that are rewriting the rules of industry. So, stay with us—because the future isn't waiting, and neither are we.

A handwritten signature in black ink, reading "Neha Basudkar Ghatge". The signature is written in a cursive, flowing style.

Neha Basudkar Ghatge

Editor In Chief,
Machine Edge Global

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VISION FOR

INDIA AND

APAC:

A Conversation with

Thomas Sattes

Regional Vice President,
Asia Pacific

INTERVIEWED BY: Sanjay Jadhav
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WE ARE THERE FOR YOU WORLDWIDE



With over 25 years of experience in Asia—including two decades in China and the past three years in Singapore—Thomas Sattes brings a deep understanding of regional market dynamics and cultural diversity to his leadership at Balluff Automation. As Regional Vice President for the Asia Pacific region, he has been instrumental in driving the company’s transformation, spearheading its shift to a 100% subsidiary model in India, and implementing a customer-centric, sales-driven strategy across APAC. In this exclusive interview with Sanjay Jadhav, Editor, Machine Edge Global, Sattes shares insights on his evolving leadership philosophy, Balluff’s competitive edge in the automation sector, and the future of industrial automation shaped by AI, IIoT, and sustainability. He also discusses the company’s expansion in India, the importance of empowering

local teams, and his vision for fostering innovation and efficiency in the rapidly evolving APAC market.

Q How has your leadership philosophy evolved during your time at Balluff, especially in managing such a diverse and dynamic APAC region?

» My leadership philosophy has evolved to be more adaptive, people-driven, and strategically agile. In APAC – a region rich in cultural diversity and varying market maturities – I’ve shifted from a traditional oversight model to one that empowers local teams. I equip leaders with the vision and autonomy needed for success while maintaining overall strategic alignment. My personal journey – spanning 25



- 37 subsidiaries for sales, production, logistics and development and further representations in 68 countries worldwide

🏭 10 production facilities

years in Asia, 22 of which were in China, and nearly 3 in Singapore, along with raising my son in a multicultural home – deeply informs my approach, blending global standards with local insights.

Q. Can you elaborate on the decision to transition from a distributor model to a 100% subsidiary in India in 2019?

▶▶ While Balluff had a distributor in India for many years, the growth I wanted to see hadn't materialized. With Prime Minister Modi's dynamic leadership sending a clear message that India is back and poised for sustained growth, I recognized the need for a more direct market approach. This 'Balluff First' mindset drives our strategy, as we grow fastest

in countries where we fully control our sales teams.

I like India – a country full of opportunity, well-educated people, and, of course, amazing food. Having first visited in 2001, I've witnessed firsthand the remarkable progress over the last decade. Operating as a 100% subsidiary – now Balluff Automation India – gives us complete control over our market strategy and operations. It enables us to engage more closely with our customers, offer tailored technical support, and adapt swiftly to local market dynamics, while allowing us to invest directly in local talent and execute a long-term strategy aligned with our global standards. Needless to say, it also enables us to loop back the market requirements of Indian customers to our research and development team so we can serve them even better.

I am, of course, grateful to BI India, our distributor

Positioning

EXACT POSITIONING OF ROBOTS, COMPONENTS AND WORK MATERIAL

 innovating automation

Robotic applications require precise position detection of robots, fixtures and workpieces. Balluff's magnetically encoded sensors are designed for precise positioning and velocity sensing in highly dynamic applications. The high-precision, fast-acting measuring systems are optionally equipped with magnetically encoded linear or rotative measuring bodies. They are suitable for both linear and rotary applications, for incremental or absolute position measurement. Inductive and photoelectric sensors can be used to detect the presence and correct position of workpieces and machine components.

before we had our own subsidiary, for reaching an agreement to merge their business into our newly established entity Balluff Automation India. This not only provided us with a solid foundation of skilled sales and technical teams but also reinforced our commitment to a unified, customer-centric approach in India.

Q. What strategies have been instrumental in achieving significant business development in India and other APAC countries?

▶▶ Our success is anchored in a strategic framework that combines regional scalability with local empowerment.

I believe in a sales-driven leadership approach where each Managing Director actively serves as the 'first sales engineer' in their market, engaging directly with customers to drive growth. This is supported by robust and scalable systems – a structured yet flexible framework that allows for consistent execution while adapting to local nuances.

We prioritize customer-centric execution by leveraging our deep technical expertise and application knowledge to deliver comprehensive, tailored solutions. Finally, building and nurturing high-performance teams is essential to translating our strategy into tangible results. This balanced approach has enabled us to achieve significant business development across India and the broader APAC region.



Q. How does Balluff maintain its competitive edge in the rapidly advancing industrial automation sector?

▶▶ At Balluff, a 100-year-old company with over 50 years of expertise in automation, our competitive edge comes from our unwavering commitment to innovation and deep industry knowledge. Our R&D center in Germany plays a pivotal role by gathering market requirements from diverse regions and converting them into next-generation sensors, industrial networking & IIoT solutions, and smart automation technologies that drive real-world efficiency. By embracing Industry 4.0, we integrate predictive maintenance and data-driven automation to optimize production processes.

Of course, our close collaborations with leading machine builders and integrators across nearly every industry – especially in the automotive sector, which has traditionally been at the forefront of automation developments – enable us to co-develop tailored solutions that meet the evolving needs of key global markets.

Q. How do you see the future of industrial automation evolving?

▶▶ I see several key trends shaping the future of industrial automation – trends that are not only close to my personal vision but also central to Balluff's strategic approach:

- **AI-Driven Automation:** We're moving toward an era where self-optimizing, predictive sensors and devices will become standard, significantly reducing downtime and boosting efficiency. I believe this will fundamentally transform operations across industries.
- **Seamless IIoT Integration:** As we progress toward Industry 5.0, the focus will shift from mere automation

“*Our R&D center in Germany plays a pivotal role by gathering market requirements from diverse regions and converting them into next-generation sensors, industrial networking & IIoT solutions, and smart automation technologies that drive real-world efficiency.*”

“

Ultimately, our focus on building strong, motivated teams across APAC is the cornerstone of our success. It empowers us to deliver innovative solutions, remain competitive in dynamic markets, and continuously push the boundaries of what we can achieve together.”

to fostering true human-machine collaboration. This evolution will create more intelligent and adaptive systems, where technology complements human expertise.

- **Sustainable Manufacturing:** There is a growing emphasis on energy efficiency and eco-friendly solutions. At Balluff, sustainability is a core element of our innovation strategy, driving us to develop technologies that not only meet stringent regulatory standards but also exceed market expectations.
- **Cost Competitiveness & Market Dynamics:** In today's competitive landscape, cost efficiency is becoming as important as technological advancement. I see machine builders, especially in the Asia Pacific region – including India – playing an increasingly critical role. Their ability to deliver advanced, economically viable solutions is reshaping global market dynamics.



Together, these trends underscore the need for agile, innovative approaches to meet evolving industry demands. At Balluff, we are committed to ensuring our automation solutions remain both cutting-edge and cost-effective, positioning us – and our customers – for success in the future.

Q. How is Balluff integrating sustainability into its operations and solutions in APAC markets?

» At Balluff, sustainability is a core element of our business strategy, especially in the APAC region. We are committed to reducing our own environmental impact while empowering our customers to achieve better automation and operational efficiency:

- **Energy-Efficient Solutions:** Our products are designed to optimize resource use, helping customers

reduce waste and lower energy consumption in their production processes.

- **Eco-Friendly Manufacturing:** We continuously improve our manufacturing processes to minimize our carbon footprint. We actively track our global CO₂ emissions and are committed to reducing them year over year.
- **Customer-Focused Automation:** By delivering advanced automation solutions, we help our customers enhance production efficiency, reduce waste, and achieve better energy management across their facilities.

Together, these efforts support our sustainability goals and enable our customers to operate more efficiently and responsibly, contributing to a greener future for the industrial automation sector.

Q. What initiatives are in place to further strengthen Balluff's presence and performance in India?

▶▶ India is not only a cornerstone of our APAC strategy but also a global focus country for Balluff. We are taking decisive steps to deepen our market presence and capabilities:

- **Expanding Local Footprint:** We are actively expanding our country coverage by establishing fully operational sales and service offices in key cities – Delhi, Kolkata, Chennai, Mumbai, and Bangalore – to start with, and we have a firm plan to roll out additional offices each year until we achieve full country coverage.
- **Strengthening Local Capabilities:** We are investing in our Indian team through comprehensive training and high-potential (HiPo) development programs, ensuring they are equipped with the technical expertise and leadership skills needed to drive our growth. Additionally, we are in the process of upgrading our ERP system from SAP B1 to SAP R3, aligning with the global standard for larger markets and enhancing our operational efficiency.
- **Enhancing Partner Networks:** In areas where we do not have our own presence, we are reinforcing our relationships with trusted system integrators and solution providers to ensure robust market coverage and customer support.

Ultimately, it comes down to having a strong, motivated, and experienced sales team. They are best positioned to deliver innovative solutions that empower our customers to be more competitive in a dynamic market.


Q. How do you ensure alignment and motivation across such a large and diverse team in APAC?

▶▶ For me, it all comes down to people. Our success is built on finding, hiring, training, and retaining the best talent, and fostering a culture where everyone feels a strong sense of belonging and is empowered to excel. We work hard to bring people together – ensuring they know each other, share a common purpose, and have the confidence to voice their needs and ideas. There was a time when our Asia colleagues were merely following directions from Europe; today, they provide clear guidance on what they need to succeed.

Here's how we do it:

- **Clear, Aligned Goals:** Every country team is fully briefed on our strategic vision and long-term priorities, ensuring that everyone – from local teams to regional leaders – works toward the same objectives.
- **Empowered Leadership:** We give local Managing Directors the autonomy to drive their markets, which builds trust and accountability. Our commitment to leveraging local expertise is evident in how team members, especially in key markets like India, hold influential roles both regionally and globally.
- **Regular Communication:** We maintain frequent town halls, leadership summits, and direct customer engagements, which keep our teams connected and aligned. This consistent dialogue reinforces a spirit of collaboration across the entire region.
- **Recognition & Career Development:** We assign challenging projects and great tasks that not only drive results but also foster personal and professional growth. By rewarding performance and nurturing career development, we ensure that every team member feels valued and motivated.

Ultimately, our focus on building strong, motivated teams across APAC is the cornerstone of our success. It empowers us to deliver innovative solutions, remain competitive in dynamic markets, and continuously push the boundaries of what we can achieve together.

Balluff's success in APAC is built on adaptive leadership, customer focus, and scalable systems. With a commitment to innovation, sustainability, and a deep understanding of regional dynamics – shaped by my own 25 years in Asia and a personal life enriched by cross-cultural experiences – we are well-positioned to continue driving growth and setting industry standards. 

**“NAVIGATING
CHALLENGES
AND SEIZING
OPPORTUNITIES”**



A Deep Dive into BAXY Mobility's Strategic Sales and Marketing Evolution with **Naveeth Menon**

In a highly competitive and price-sensitive three-wheeler market, BAXY Mobility has emerged as a frontrunner, driven by strategic sales transformations led by Naveeth Menon, Vice President of Sales & Marketing Operations. With a rich history of leading sales at Yamaha and Piaggio, Naveeth brings a wealth of experience in driving growth, dealer partnerships, and customer-centric marketing. In this exclusive interview, with Neha Basudkar Ghate, he delves into the unique challenges of the three-wheeler segment, outlines BAXY's innovative marketing strategies, and shares the vision for the company's growth trajectory in the evolving electric mobility landscape.

You have successfully led sales transformations at Yamaha, Piaggio. What unique challenges and opportunities have you encountered in the three-wheeler segment at BAXY Mobility?

Having led sales transformations at Yamaha and Piaggio, transitioning to the three-wheeler segment with BAXY Mobility brought its own set of unique challenges and opportunities.

The three-wheeler market is highly competitive and price-sensitive, with customers deeply valuing reliability, performance, and after-sales support. One of the key challenges was differentiating our brand in a segment driven largely by utility and cost-effectiveness. Additionally, establishing a strong dealer network and ensuring customer trust in a rapidly evolving electric vehicle landscape required focused efforts.

However, these challenges also presented significant opportunities. We leveraged BAXY Mobility's strong product lineup, combining power, efficiency, and eco-friendly technology to meet diverse customer needs. We strengthened dealer partnerships, expanded service support, and adopted customer-centric marketing campaigns that highlighted our vehicles' performance, savings, and reliability.

By staying agile, listening to market needs, and positioning BAXY as a brand built on trust and performance, we have not only driven sales growth but also strengthened our presence in Diesel, CNG and Electric segments.

BAXY Mobility has established itself as a leader in the three-wheeler industry. What differentiates your sales and marketing strategies from competitors in this highly competitive market?

Our sales strategies are designed to drive growth, strengthen dealer relationships and enhance customer satisfaction. Key strategies include:

- **Segment-Focused Approach:** Tailoring our offerings for passenger, cargo, and delivery segments with distinct value propositions for CNG and electric variants.
- **Dealer Empowerment:** Providing robust dealer support through training programs, and marketing initiatives to drive sales.
- **Localized Outreach:** We are beginning shortly regional campaigns and targeted promotions to address specific market needs and customer preferences.
- **Fleet and Institutional Sales:** Actively pursuing partnerships with e-commerce, logistics and fleet operators to boost bulk sales.
- **After-Sales Focus:** Strengthening service networks and ensuring quick spare part availability to enhance customer retention and satisfaction.

Our marketing strategies are built on a deep understanding of customer needs, a strong dealer network, and a commitment to innovation. We focus on segment-specific campaigns, combining traditional outreach with digital engagement to connect with our audience effectively. Our recent Bollywood-themed campaigns with Hindi taglines



“
Success in this industry is about passion, persistence and the ability to connect with both people and products

create a strong local connect. We are also planning ‘Dealer’s Corner’ series which will highlight real experiences, building trust. Additionally, we promote our product range with powerful, relatable storytelling that resonates with our target audience. This customer-centric innovative ideas and insight-driven approach sets us apart in the competitive three-wheeler market.

With a diverse product portfolio covering both passenger and cargo three-wheelers, how does BAXY Mobility identify and capitalize on emerging market demands?

We constantly analyze market trends, customer feedback and emerging regulatory landscapes. This allows us to identify unmet needs and tailor our offerings to capitalize on new opportunities in both passenger and cargo segments, ensuring we deliver the right solutions at the right time. We are heavily focused on data analysis to track emerging market demands, and proactively design solutions to fulfill them.

BAXY Mobility’s growth has been supported by a strong distribution network. What key initiatives have you implemented to strengthen channel partnerships and dealer networks?

We have implemented several key initiatives to strengthen our dealer network and channel partnerships:

- **Dealer Empowerment Programs:** Providing regular

training, sales support and performance-based incentives to drive growth.

- **Digital Support Systems:** Efficient communication with dealers and making sure we help with showroom branding, any marketing collateral needed are provided to them.
- **After-Sales Service Strengthening:** Expanding service centers and ensuring quick spare parts availability to support dealers and customers.
- **Regular Engagement:** Organizing dealer meets, feedback sessions, dealer awards and recognition programs, elite dealer club like ‘BAXY ke Sitare’ to celebrate top performers.

How do you balance short-term revenue targets with long-term brand building and market positioning?

Balancing short-term revenue targets with long-term brand building and market positioning is a common challenge for businesses. At BAXY we face this challenge by align our short term revenue goals with long time brand objectives. While doing this we kept customer at core by providing exceptional customer experience which help us to meet our short term business targets and at the same time develop our brand in a long term perspective. Being agile is always helped us to achieve the short terms objectives without compromising the brand positioning. Brand Consistency and unified messaging in all the market communication is another initiative has helped us to get a better ROI on our investment

With BAXY Mobility's strong presence in the three-wheeler industry, how do you envision its growth trajectory over the next five years?


- **Building on our newly launched vehicle Portfolio:** We recently launched 10 new electric three-wheeler models, catering to various segments and customer needs, such as passenger and cargo transport. Our aim is to capture a larger share of the electric three-wheeler market.
- **Enhanced Distribution Network:** To cater to growing demand, we will expand more our dealership network, ensuring wider reach and accessibility for customers

What are the biggest industry disruptions you foresee in the commercial mobility sector, and how is BAXY Mobility preparing to stay ahead?

The shift towards alternative fuels and electric vehicles in the commercial vehicle mobility sector, particularly in the three-wheeler industry, is indeed a significant disruption. With more than 50% of three-wheelers sold today being electric, the industry is already witnessing a substantial transformation. However there are challenges to further adoption, primarily related to infrastructure development and the availability of CNG. Ensuring the electrical grid can handle the increased load from widespread EV charging

is crucial. At the same time the number of CNG refueling stations needs to be increased to support a larger fleet of CNG-powered vehicles. By addressing these challenges and leveraging government initiatives, the three-wheeler industry can further accelerate the adoption of electric and alternative fuel vehicles, contributing to a cleaner and more sustainable future

As a leader in the automotive industry, what advice would you give to emerging professionals aiming to excel in sales and marketing within this sector?

- **Understand Your Customer:** Listen closely to customer needs and market trends to craft solutions that truly add value
- **Master the Product:** Deep product knowledge builds confidence and helps you communicate benefits effectively
- **Focus on Relationships:** Build strong, lasting partnerships with customers, dealers and colleagues
- **Embrace Digital Tools:** Use social media to drive targeted and impactful campaign. Don't hesitate to bring in innovative ideas. Experimenting is the key
- **Stay Agile and Innovative:** The automotive industry is evolving rapidly—be ready to adapt and experiment with new approaches
- **Lead with Integrity:** Trust and transparency are key to long-term success in sales and marketing 





STUDER Looks Back on a Solid 2024 Financial Year



FROM LEFT:
Stephan Stoll - COO,
Sandro Bottazzo - CEO,
Daniel Huber - CTO

The Swiss manufacturer of precision cylindrical grinding machines improved its market position worldwide, driving forward technological innovations and further increasing operational efficiency.

*With a strong emphasis on technological evolution, sustainability, and operational efficiency, **STUDER** continues to set industry benchmarks in precision grinding solutions. **Neha Basudkar Ghate** had the privilege of attending the **STUDER** press conference on behalf of **Machine Edge Global**, witnessing firsthand the company's advancements in precision cylindrical grinding technology and its strategic market positioning.*

This year's press conference was held live from the Fritz Studer AG studio in Steffisburg in front of numerous international media representatives. "Thanks to the high diversification of our portfolio, we can look back on a solid financial year 2024 with growth in several markets and industries," said Jens Bleher, who has been CEO of STUDER since 2018 and will join the management of the UNITED GRINDING Group as COO on April 1, 2025. Bleher is handing over the CEO position to longstanding CSO Sandro Bottazzo. The challenging economic and geopolitical environment required particularly intensive efforts, as Bleher emphasizes. "In addition to quality, the focus of activities at STUDER is therefore on increasing productivity, intensive cost management, and the introduction of new, innovative technologies. STUDER remains a reliable partner for our customers and sees itself in an excellent position to face global competition," says Bleher.

STUDER maintained its market share worldwide and even expand it in individual countries and regions, explained Sandro Bottazzo, new CEO and Chairman of the Management Board since March 1, 2025. He added: "We are continuing to expand our leading position in the universal cylindrical grinding machine market step by step." The development of new customers was very positive, with a year-on-year increase to around 43%. Strong segments were the Asian automotive and supplier industry, tool and die, and the machine tool industry. STUDER continued

to expand its presence in the aerospace sector and strengthen its market position, similar to the previous year. Overall, order intake was only slightly below last year's figures, as anticipated.

Another Record Turnover in Customer Care

The quality manufacturer of cylindrical grinding machines recorded a very good development in incoming orders, particularly in North America. Asia, which remains the largest sales region, and the Latin, Northern, and Eastern European countries also posted strong results. By contrast, Central Europe, and Germany in particular, fell short of expectations.

The Customer Care division performed very well, again posting record sales in 2024. The consistent expansion of international and multilingual service coverage with customer-facing and decentralized service specialists proved to be a complete success, Bottazzo emphasized. The spare parts business, maintenance and machine overhauls and conversions achieved record sales, and the service business also remained at the previous year's very high level of capacity utilization.

An important pillar of STUDER's success was again its broad portfolio. The CNC universal cylindrical grinding machine segment was particularly strong, with the S33 as the best-selling machine, followed by the S31, and the favoritCNC. Sales of the ultra-modern S41 in the premium segment were also solid. The

second strongest segment was machines for internal cylindrical grinding with a robust sales performance. By contrast, sales of production and conventional machines fell short of expectations.

New favorite CNC and Innovative Grinding Technology

Innovation and the development of modern and reliable grinding technologies for the benefit of customers remained the focus for STUDER in 2024, said CTO Daniel Huber. One of the main development projects was the new generation of the popular favoritCNC universal cylindrical grinding machine. Among other things, it now features the latest FANUC controls and a 'Conventional Mode'. This mode gives customers the option of working as they would on a conventional grinding machine, making the transition to CNC particularly easy. The many other new features include the option of automation and more powerful grinding spindles.

Another development focus is the new universal W-axis, which will be available for the S33 and S31. This is integrated onto the Z-slide and enables different workpiece lengths to be ground automatically and without operator intervention. The two main components - the tailstock with fixed center and the tailstock spindle with driven center as well as other assemblies such as measuring heads - offer innovative grinding technology advantages: As an absolute innovation, the direct force measurement allows a real force-controlled clamping process and

thus maximum precision, repeatability and enables small clamping forces for fragile parts.

New Applications for SmartJet® and WireDress®

Huber was delighted with the industry wide success of the SmartJet® coolant concept developed by STUDER. Last year, the field of application of this particularly efficient and sustainable system was further expanded, including optimizations for thread grinding and plug-in coolant nozzles for different grinding wheel profiles. There are also new developments for the innovative WireDress® dressing process developed by STUDER for metal-bonded CBN and diamond grinding wheels. “We have further developed WireDress® for dressing internal grinding wheels,” said Huber. This means that the innovative non-contact dressing system can now be used for external and internal grinding wheels in the same setup.

In addition, the CTO emphasized that the conversion of all relevant CNC platforms to C.O.R.E. has now been completed. The UNITED GRINDING Group’s modern and uniform hardware and software architecture is revolutionizing the operation and capabilities of grinding and machine tools. Based on C.O.R.E., the Group will continue to develop state-of-the-art software and features for the benefit of customers in the future.

Enhanced Spindle Expertise

Stephan Stoll, COO of STUDER, then gave an overview of the Operations division. Despite the generally tense market situation, the manufacturing and assembly resources were largely utilized with the STUDER machine business, the extensive inter-company activities within the UNITED GRINDING Group, and the development of future-oriented prototype systems. Several relevant optimization projects were successfully implemented,

such as the strategically important expansion of internal spindle expertise. In addition to the commissioning of an automated, highly efficient spindle shaft production facility, all assembly processes were consolidated and enriched with state-of-the-art inspection and testing equipment. Highly specialized specialists and powerful assembly, data analysis, and diagnostic tools allow STUDER, as a Group-wide competence center, to produce and further develop spindles to the highest standards.



We are continuing to expand our leading position in the universal cylindrical grinding machine market step by step.”

— Sandro Bottazzo, CEO

The internal electrical pre-assembly has also been completely renewed. “We are now able to produce everything from individual cable sets to fully wired, complex electrical control cabinets in a highly efficient, order-specific, and just-in-time manner,” said Stoll.

In addition, intensive planning for the comprehensive redesign and automation of the internal logistics infrastructure was completed last year. The implementation of this major STUDER project is already in full swing - commissioning is scheduled for December 2025.

Lighting Converted to LED

STUDER was also committed to increasing sustainability and efficiency in its own operations in 2024. The switch to LED lighting was largely implemented and various systems for operational supply were replaced with the latest

generation of energy-efficient devices. The new logistics facility will also make a significant contribution to reducing energy consumption at STUDER.

In addition, a wide range of digitalization projects are being driven forward to tap into further efficiency potential in all areas of operations, Stoll emphasized.

Jens Bleher concluded by emphasizing the great importance of excellently trained and motivated employees for STUDER’s long-term success as a technology compa-

ny. “We are fully committed to vocational training. More than 11 percent of our work-force are apprentices,” said Bleher.

Conclusion

STUDER’s 2024 financial year reflects its resilience, adaptability, and forward-thinking approach in an evolving global landscape. From expanding its presence in key industries to pioneering innovations like the next-generation favoritCNC and the revolutionary WireDress® technology, STUDER reaffirms its leadership in precision grinding. The company’s commitment to sustainability, digital transformation, and talent development further underscores its vision for the future. With a new leadership transition on the horizon, STUDER is well-positioned to continue its growth trajectory and drive the next wave of advancements in the grinding industry. 

FROM BLUEPRINT TO ROAD: The Making of BGauss Electric Scooters

During our visit to the state-of-the-art BGauss manufacturing facility in Chakan, Pune, we gained insights into the company's meticulous production process, stringent quality control measures, and commitment to 'Make in India'. From advanced battery testing to precision-driven assembly lines, every aspect of the plant reflects BGauss' vision to redefine electric mobility in India.

*India's electric two-wheeler market is evolving rapidly, driven by the need for sustainable mobility solutions. **BGauss**, a brand under the RR Global umbrella, has emerged as a key player in this transformation by focusing on innovation, reliability, and superior engineering. Established in 2020, BGauss has built a strong foundation in electric mobility, emphasizing safety, performance, and localized manufacturing.*



WRITTEN BY: Neha Basudkar Ghate

Editor In Chief

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BGauss, a brand under the RR Global umbrella, is redefining electric mobility with a steadfast focus on safety, comfort, and reliability - key differentiators in an evolving industry. Started in 2020, BGauss is built on a foundation of meticulous manufacturing and advanced engineering, BGauss ensures superior product quality and performance. Its flagship models, the RUV 350Max in two models and BG C12i Max in three models,

are available in variants each, catering to diverse consumer needs. With over 80 patent filings, the company continues to drive technological advancements in the Electric two-wheeler (E2W) segment.

BGauss has developed its state-of-the-art manufacturing facility at Chakan, Pune which manufactures around 3,000 vehicles in a month and daily in one shift around 50 vehicles are manufactured. The plant highlights BGauss' commitment to 'Make in India', with a strong focus on

localisation, stringent quality control, cutting-edge engineering and precision driven production process to develop world-class EVs. By developing its self-reliant EV ecosystem, BGauss aims to lead India's electric mobility transformation.

Operating from its Chakan-based facility with an annual production capacity of 1 lakh units, BGauss has built a strong customer base of 50,000 happy riders. With an expanding dealer network of 110 outlets, the company is set to grow

to 250 dealerships by next year.

BGauss is strengthening its market position by making electric mobility more accessible. Following a successful ₹161 crore funding round, the company plans to introduce a new product range priced at approximately ₹80,000. Additionally, BGauss is set to launch one new product in June and another in July, with premium vehicle introductions planned for 2026.

The BGauss RUV 350 Max is a cutting-edge electric scooter designed for urban commuters seeking a blend of performance and convenience. Equipped with a powerful 3500W PMSM in-wheel hyper drive motor, the RUV 350 Max delivers a top speed of 75 km/h and an impressive range of 145 km on a single charge. Its 3 kWh CAN-enabled LFP battery ensures reliable performance. The scooter features a 5-inch TFT display with turn-by-turn navigation, call notifications, and ride statistics, making it a smart choice for tech-savvy riders. With cruise control, hill hold control, and regenerative braking, the RUV 350 Max offers a safe and comfortable ride, while its sleek design and robust build make it a standout in the electric scooter market.

BGauss C12i Max 2.0 the BGauss C12i Max 2.0 sets a new standard in electric mobility with its advanced features and

exceptional performance. This model is powered by a 2500W PMSM HUB motor, offering a top speed of 60 km/h and an extended range of 135 km. Its 3.2 kWh CAN Enabled battery, featuring Advanced 21700 Lithium Ion Cells, ensures long-lasting power and reliability. The C12i Max 2.0's CAN Enabled Digital Console keeps riders informed, while regenerative braking, and CBS provide added safety. With a robust build and superior suspension, this scooter is designed to handle various road conditions, making it an excellent choice for both urban and suburban riders.

Both electric scooters are powered by a Hyperdrive Motor, which is directly attached to the wheel rather than functioning as a hub or neutral motor. This design ensures maximum power delivery, giving riders a thrilling, energy-efficient, and dynamic riding experience.

Additionally, BGauss is set to launch a two-wheel cross motor, an innovative new technology developed as part of its patented advancements. With a strong combination of technological expertise, sustainable practices, and a rapidly expanding market presence, BGauss continues to lead the way in shaping India's electric two-wheeler future.



Behind the Scenes: Building the BGauss RUV 350 Max & C12i Max 2.0



Streamlined Material Handling & Quality Control at BGauss

The manufacturing process for both electric scooter models begins with the incoming materials, sourced from 82 different suppliers. The majority of these suppliers are located near Pune, with 5-10% from Aurangabad, 2-3% from Ahmednagar, and 1% from Bangalore. Pune was strategically chosen as the manufacturing hub due to its strong automotive ecosystem, ensuring easy access to well-established vendors and cutting-edge technology.

Upon arrival, the materials undergo invoice verification, where quantities, part numbers, and names are checked for accuracy. Next, a source person conducts a physical

count to confirm all details. If everything is correct, the materials are sent to the Incoming Quality Control (IQC) area for further inspection.

At IQC, specialized engineers examine the materials based on three key commodity categories:

1. Sheet metal components
2. Fabrication and plastic-rubber parts
3. Electrical and electronic components

A sampling inspection plan is followed for each part, using a predefined checklist that covers aesthetic, dimensional, and functional aspects. If a material meets all quality standards, it is moved to the storage area. However, if defects are found, it is sent to the rejection



area with proper identification tags for further review.

This rigorous quality control process ensures that every component used in BGauss electric scooters meets high-performance and reliability standards before moving forward in production.

Panel Checkers: Ensuring Dimensional Accuracy

One of the crucial aspects of manufacturing involves measuring complex vehicle parts. While straight components can be measured with a vernier, convex and concave shapes require specialized tools like panel

checkers. These devices simulate the shape of the vehicle and help detect any warpage in the parts, which is a common issue during production.

To certify a part's accuracy, it is placed on the panel checker and clamped. If the gap between surfaces is within the 2-3 mm tolerance range, the part is deemed acceptable. This step is vital in ensuring proper fitment of body panels and eliminating alignment issues during assembly.

Chassis Inspection: The Skeleton of the Vehicle

The chassis serves as the structural

foundation of the vehicle, with various mounting points for components. Any deviations in bracket positioning or hole alignment during welding can cause assembly challenges, leading to misaligned parts. To mitigate such issues, two chassis samples from every lot undergo rigorous quality checks to verify hole placements and structural integrity.

If the chassis meets the required standards and body parts show no signs of warpage, the vehicle's fit and finish are flawless. This meticulous validation process prevents unnecessary adjustments during assembly, ensuring a precise and reliable build.



Runout Testing: Detecting Wheel and Rim Imperfections

Another essential quality control process is checking for facial, axial, and radial runout. When a vehicle wobbles during movement, it often indicates a defect in the wheel or rim alignment. Engineers inspect these components in a controlled environment to identify and analyze any deviations. Certified components are then approved for use, ensuring smooth and stable rides.

Electrical Component Inspection

Every electric two-wheeler is equipped with essential electrical components such as switches, speedometers, throttles, ignition locks, motors, indicators, and headlights. These components undergo rigorous testing as part of the invoice inspection process. Engineers connect them to a power supply setup and verify that each function operates correctly before final approval. A comprehensive checklist is maintained to ensure that no defects go unnoticed.

Additionally, quality checks are performed at the vehicle level, ensuring that all inspected parts work seamlessly when assembled. Once the parts pass quality inspection, they are

handed over to the production team for final assembly.

Training for Quality Assurance

At the plant, ongoing training ensures that new personnel can differentiate between acceptable and defective parts. Deliberate placement of non-conforming components helps trainees understand variations in fitment, reinforcing their ability to maintain high-quality standards.

To document inspections, an incoming inspection check sheet is maintained for every part. This includes details such as part number and name, ensuring traceability and accountability in the manufacturing process.

Battery Testing and Validation

The battery is a critical component of an electric vehicle, and BGauss ensures its reliability through a dedicated battery testing lab. The company sources its batteries from Trontek, a supplier based in Delhi, and all batteries are ICAT certified.

To ensure quality, each battery undergoes thorough testing to validate key parameters. Engineers log battery data and verify compliance with testing benchmarks. Given the importance of batteries in EVs—alongside the motor and MCU—BGauss maintains a 100% inspection rate to guarantee safety and performance.

The plant handles multiple battery variants, including a 48 AH battery pack, a smaller 32 AH variant for C1-2 models, and additional options like 45 AH and 68 AH packs. Battery weight varies between 26.5 depending on the model. The company primarily uses lithium-ion and lithium iron phosphate (LFP) batteries, with LFP offering better longevity despite a slight cost variation.

Alongside battery testing, charger inspections are also conducted. Chargers undergo a 100% inspection, similar to the battery and motor, ensuring consistent quality across components.

Electric Scooter Production Process

1. Production Line Overview

The production line is divided into two key areas:

- **Sub-assembly Area:** Components that cannot be fitted directly on the main line are pre-assembled here.
- **Main Line Area** – The final vehicle assembly takes place here.

There is also a dedicated Chassis Sub-assembly Area, where chassis components are pre-assembled before integration into the main production line.

2. Initial Process: Vehicle Identification Number (VIN) Assignment

- The production process begins with the Vehicle Identification Number (VIN) being punched onto the chassis.
- The VIN determines the vehicle model and the corresponding components to be assembled.

3. Assembly Process

A. Chassis Sub-assembly Area

- The assembly process starts with the chassis.
- The sub-assembly ensures that all child parts are installed before moving to the main assembly.
- Missing parts at this stage can cause major delays and rework at later stages.

B. Sub-assembly Area

- Components like headlamps, brake levers, and cables are pre-assembled.
- Ensures efficiency by preparing parts before they are mounted on the main line.

C. Main Assembly Line

- The vehicle progresses through multiple stations where different parts are fitted.
- The production follows a mass production line methodology.

- Workstations: 10
- Production capacity: 150 electric scooters in 8 hours.
- Conveyor line design ensures seamless movement of parts and assemblies.

4. Quality Control Measures

- Quality Gates are implemented throughout the assembly process.
- A Maker & Checker system ensures defects are caught early.
- Each workstation has designated quality check sheets to document progress.
- Mid-line Inspection: Conducted at the 6th station for left and right-side operations.
- Final Inspection: Conducted at the 12th station by five analysts.
- Rework Station: Station 13 is dedicated to addressing any defects.
- Error-Free Verification: Station 14 ensures the final product meets all standards before rollout.

5. Handling Defects

- **Minor defects:** Addressed on the production line.
- **Major defects:** Handled offline to avoid impacting the production output.
- After all quality checkpoints, the vehicle undergoes final testing before dispatch.

6. Testing and Homologation

- **Vehicle Testing:**
 - » Aesthetic checks
 - » Dynamometer Testing for performance validation
 - » Road tests for 10-20% of vehicles
 - » Alignment checks for front and rear wheels
- **Homologation Process (ARAI Certification):**
 - » Each part must be marked with a QR code for traceability.
 - » Vehicle parts, such as grab rails, are engraved for identification.
 - » The ARAI team audits

manufacturing processes and suppliers to verify compliance with Make in India policies.

» Random vehicle testing ensures compliance with declared parameters.

7. Battery and Charging

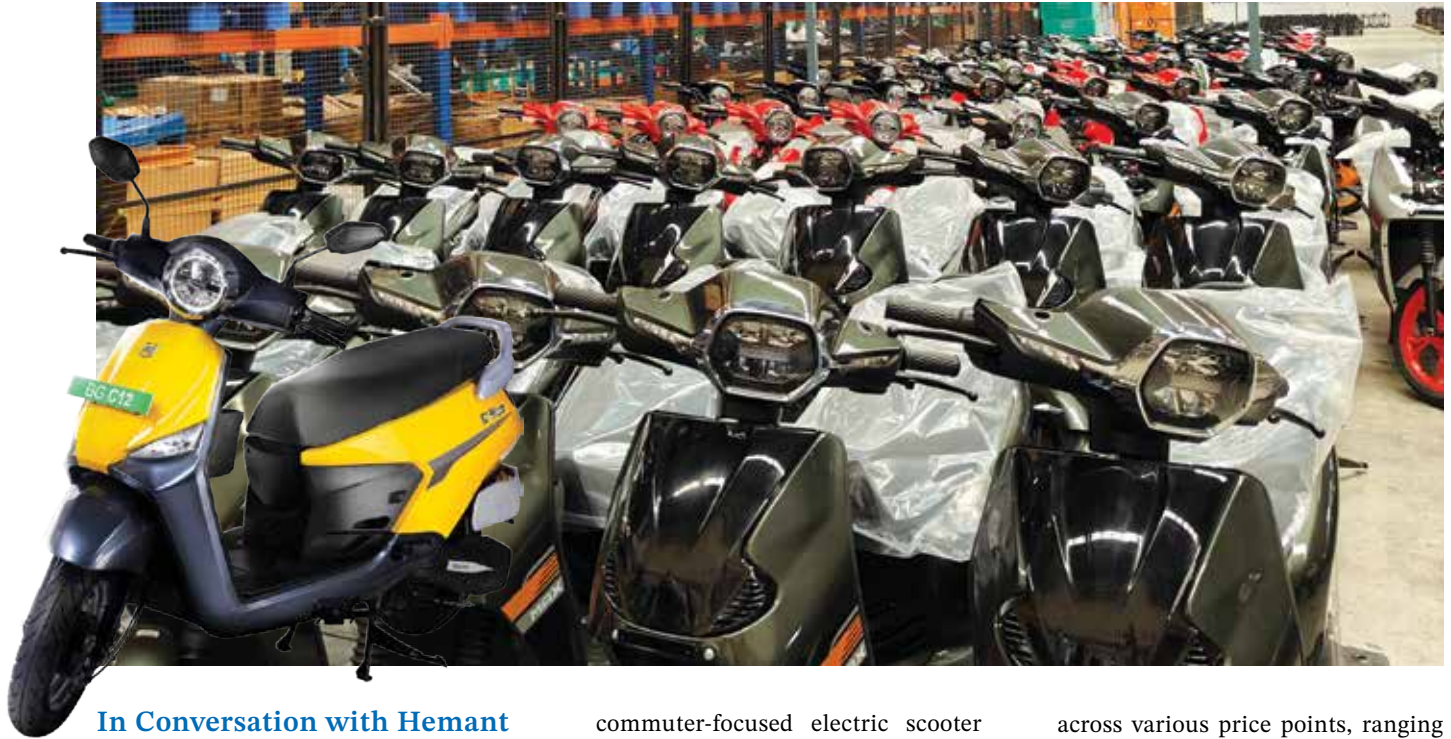
- **Battery Charging Times:**
 - » 500W charger: 5.5 hours
 - » 840W charger: 3.5 hours
 - » 350W charger: 2 hours
- **Battery Safety Features:**
 - » Lessons from industry best practices have been implemented to enhance safety.
 - » Vehicles are designed to prevent any charging-related incidents.

8. Production Output & Logistics

- **Production Rate: 18 vehicles rolled out every 5 minutes.**
- **Batch Production Model:**
 - » 50% of C12i sales are in BG Blue color.
- **Vehicle Transport:**
 - » 40-vehicle trucks for out-of-state orders.
 - » 24-vehicle trucks for Maharashtra deliveries.

9. Product Range and Export Plans

- **Color Variants:**
 - » C12i Electric Scooter: 7 color options (White, Black, Solid Green, Yellow Techno, Matte Blue, Matte Red, Matte Green)
 - » RUV Model: 5 color options (Blue, Red (Dual Tone), Silver, Green, Anthracite Grey)
- **Certifications:**
 - » ISO 9001:2015 (Quality Management)
 - » ISO 14001:2015 (Environmental Management)
 - » ISO 45000:2018 (Occupational Health & Safety)
- **Export Plans:**
 - » Exports starting in April.
 - » Orders received from France (B2C Market).
 - » Homologation process ongoing for South America.



In Conversation with Hemant Kabra, Founder and Managing Director, BGauss Electric

- **Investment Plans and Fund Allocation:** BGauss has raised a total capital of ₹161 crore, with ₹100 crore infused into the company as planning capital. The primary focus of this investment is twofold:
- **Product Development & CAPEX:** A significant portion of the funds will be allocated towards product development and capital expenditures (CAPEX) to strengthen BGauss' electric two-wheeler offerings.
- **Marketing & Branding:** The company plans to intensify its marketing and branding initiatives to enhance visibility and market penetration.

Upcoming Product Launches

BGauss is set to launch two new electric two-wheelers within the next year:

- **June-July 2025 Launch:** A

commuter-focused electric scooter positioned at a competitive price point of approximately ₹80,000. This product aims to cater to the mass market and fall within the 'sweet spot' for electric vehicles in India.

- **February 2026 Launch:** Another new electric scooter, details of which will be shared closer to the launch date. Both upcoming models are nearly ready for market introduction.

Market Strategy & Innovation


- BGauss is actively working on refining its component selection process to ensure reliability, efficiency, and energy optimization.
- The company is focusing on smart and locally integrated architecture, incorporating advanced safety features.
- The target audience spans across diverse consumer segments, with specific models designed to appeal to different demographics, including family-centric users and male riders.
- Future expansion plans include introducing additional models

across various price points, ranging from ₹80,000 to ₹1,00,000, offering multiple variants tailored to specific market needs.

Production & Cost Optimization

- BGauss is implementing measures to optimize production costs, which is expected to lead to a reduction in Electric Vehicle (EV) prices.
- The company anticipates that within the next six months, the price difference between EVs and petrol-powered two-wheelers will diminish significantly, making EVs a more attractive option for consumers.

Conclusion

BGauss is committed to expanding its footprint in the electric two-wheeler market through strategic investments in product development and marketing. With upcoming launches, innovative design architecture, and cost reduction strategies, the company aims to position itself as a key player in India's EV sector. 



Enhancing Automated Material Handling with Advanced Layer Gripping Technology



Lightweight Layer Grippers ZLW

The global manufacturing landscape is undergoing a transformative shift, driven by automation and smart technologies. Industries are increasingly adopting robotic solutions to enhance efficiency, precision, and scalability. Automated systems streamline production, reduce dependency on manual labor, and ensure consistency in quality. With the rise of Industry 4.0, manufacturing units are integrating robotics, IoT, and AI-driven technologies to create connected and intelligent workflows.

India, as one of the fastest-growing industrial economies, is witnessing a rapid adoption of automation. The push for smart factories and digital transformation is being fueled by factors such as increasing labor costs, demand for higher productivity, and the need for error-free production. Sectors like automotive, pharmaceuticals, food and beverage, electronics, and logistics are actively investing in robotic automation to stay competitive. Palletizing, depalletizing, material handling, and packaging are among the key processes being automated to improve operational efficiency.

How Automation Transforms Manufacturing

Integrating automation into manufacturing workflows brings multiple advantages. Increased production speed allows companies to

meet growing market demands without compromising quality. Reduced labor dependency helps mitigate workforce shortages and minimizes fatigue-related inefficiencies. Enhanced workplace safety ensures that employees are not exposed to hazardous lifting tasks, preventing workplace injuries. Moreover, automation contributes to cost savings by reducing material waste, optimizing energy consumption, and lowering operational expenses.

However, automation is not just about robots replacing manual tasks—it is about enhancing collaboration between humans and machines. Human-Robot Collaboration is becoming a critical aspect of modern manufacturing, where lightweight robots and collaborative automation tools assist workers in repetitive and physically demanding tasks. This is where advanced gripping solutions play a crucial role in optimizing material movement across production lines.



Introducing the Lightweight Layer Gripper ZLW: A Smart Handling Solution

To fully leverage the benefits of automation, manufacturers require adaptable and efficient material handling tools. The Lightweight Layer Gripper ZLW from Schmalz is designed to optimize palletizing, depalletizing, and various intra-logistics processes with high precision and minimal effort.

Its modular and lightweight design makes it ideal for cobots and smaller robotic systems, ensuring seamless integration into automated workflows.

This innovative gripper extends beyond palletizing to multiple production and packaging applications. It plays a critical role in logistics and warehousing, where it automates depalletizing and goods movement between different stages of packaging and distribution. In the food and

beverage sector, it efficiently handles packaged goods such as cartons, jars, cans, and plastic-wrapped products while ensuring hygienic and damage-free transportation. The pharmaceutical industry benefits from its precision when handling medicine boxes, vials, and sterile packaged goods, meeting strict hygiene and safety standards. Additionally, it enhances consumer goods packaging through pick-and-place applications, transitioning

HANDLING CAPABILITIES AND WORKPIECE VARIABILITY

One of the key advantages of this solution is its ability to manage a broad spectrum of workpieces. It efficiently grips cardboard boxes, shrink-wrapped packages, plastic containers, metal cans, glass jars, and irregularly shaped products. The adaptable sealing options ensure a firm hold on both smooth and uneven surfaces, making it suitable for delicate as well as robust materials. This flexibility eliminates the need for frequent tool changes, optimizing workflow and productivity.

items between production lines and final packaging. For automotive and manufacturing, the gripper facilitates line changeovers, transferring components between workstations, and moving finished products into storage or final packaging.

It is designed to accommodate a variety of handling requirements and is available in different sizes, ensuring suitability for diverse applications. Its lightweight aluminum construction

minimizes the load on robots, maximizing efficiency. The gripper handles varying load capacities, making it suitable for both small and medium-sized workpieces while maintaining a secure grip on different materials. Customization options allow for adaptation to specific industry needs. The sealing elements come in two configurations—plug-in suction cups, ideal for uniform and stable surfaces, and sealing foam, which offers a secure grip on irregular or delicate items. An optional floating flange compensates for height variations within a layer, ensuring consistent performance. The vacuum system can be tailored to specific operational requirements, with options for external vacuum connection for high-power applications or an integrated vacuum generator for a compact, self-contained setup. Additionally, an optional rounded safety frame enhances protection in human-robot collaboration environments.

How It Works

Equipped with advanced vacuum technology, the gripper secures and transports workpieces with precision. Once mounted onto a robot or gantry system, it positions itself over the target layer. The vacuum system activates, generating negative pressure to ensure a strong grip. If a floating flange is included, it automatically adjusts to height variations for even gripping force. Once secured, the system smoothly transfers the workpieces to the desired location, whether for palletizing, line transitions, packaging, or production movement. The vacuum is then released efficiently, enabling seamless integration into automated workflows.


Optimizing Material Handling Beyond Palletizing

While widely used in palletizing

and depalletizing, this gripper offers significant advantages in production line transitions, where it assists in moving products between workstations for line changeovers. It also plays a key role in transferring finished goods to packaging stations, ensuring a smooth workflow through the final stages of manufacturing. Additionally, it simplifies the handling of goods for packaging, speeding up the movement of items into cartons, crates, or wrapping machines. These capabilities make it an indispensable tool for modern automated manufacturing and logistics operations.

Key Advantages

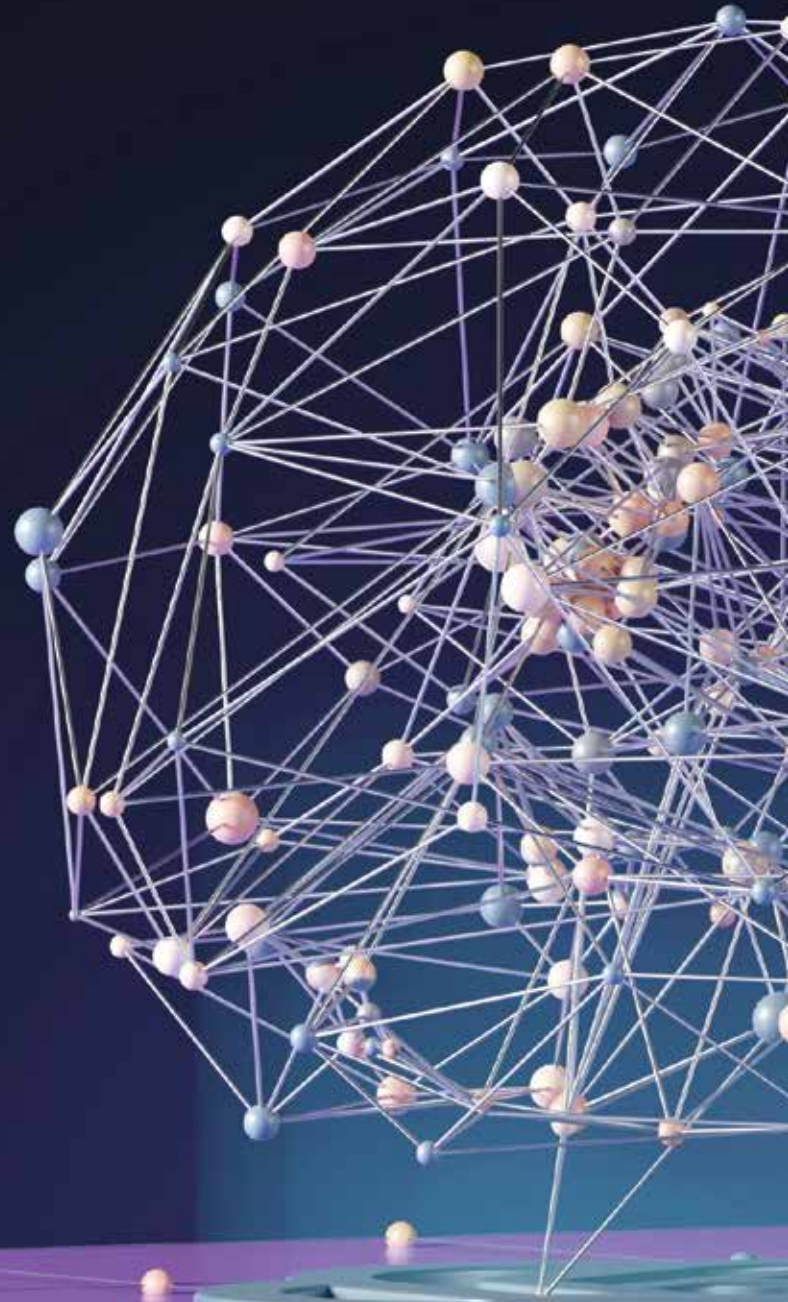
This technology delivers multiple benefits that enhance usability and efficiency. Its lightweight structure reduces payload demands, making it ideal for collaborative robots and smaller automation systems. The modular configuration allows users to customize the gripper based on specific handling tasks, whether through different sealing elements, vacuum sources, or safety features. Energy efficiency is a standout feature, as optimized vacuum generation minimizes power consumption while maintaining superior gripping performance. Additionally, the high compatibility ensures easy integration with various robotic and automated systems, while safety-enhanced operation makes it suitable for HRC applications without compromising workplace safety.

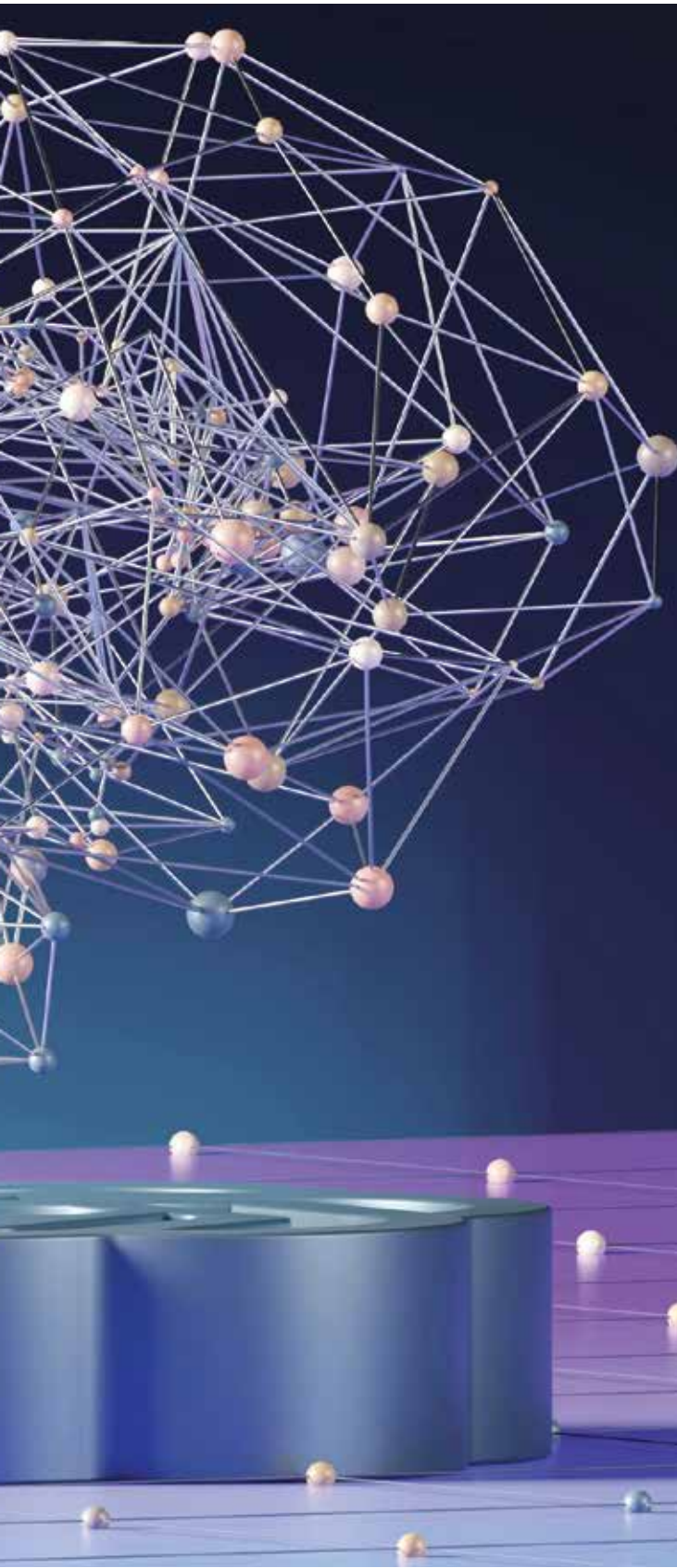
With its flexibility, efficiency, and precision, this lightweight gripper streamlines material handling across production, packaging, and logistics. Its adaptability and customization enhance automation, boosting productivity, safety, and process reliability. 

Credit- SCHMALZ



Dr. Sachin Kumar,
A. Director of AI COE (Centre of Excellence),
Innovation for Generative Artificial
Intelligence (Gen AI)





THE QUANTUM LEAP:

Harnessing
Generative AI
for High-Speed
6G Network
Communication



The Dawn of 6G Communication

As we transition from 5G to the upcoming 6G era, the demand for ultra-fast, reliable, and intelligent communication networks has reached unprecedented levels. High-speed communication is poised to redefine industries, from autonomous transportation and smart cities to telemedicine and immersive entertainment. Generative AI (Gen AI), particularly advanced Large Language Models (LLMs), is emerging as a critical technology to address these challenges, driving innovation in real-time data processing, intelligent decision-making, and adaptive network management. This article delves into the novel applications of Gen AI in network communication, particularly focusing on its potential to transform 6G wireless communication. From technical advancements to Return on Investment (ROI) considerations, we explore how Gen AI-powered 6G can bridge the gap between current limitations and future possibilities.

Revolutionizing Network Communication with Generative AI

- **Intelligent Network Optimization:** Generative AI models can analyze vast amounts of real-time network data to predict traffic congestion, detect anomalies, and optimize resource allocation. By leveraging deep learning and reinforcement learning, LLMs can simulate multiple network scenarios, creating predictive insights that ensure seamless connectivity. For instance, Gen AI could dynamically adjust bandwidth allocation for Ultra-Reliable Low-Latency Communication (URLLC) in industrial automation.
- **Adaptive Communication Protocols:** Traditional communication protocols are rigid and require manual intervention for updates. Gen AI introduces adaptability by enabling networks to learn and evolve autonomously.

Using reinforcement learning algorithms, networks can adjust to varying environmental conditions, such as interference in urban areas or changing user density in real-time, ensuring optimal performance.

- **Enhanced Security Through AI-Driven Cryptography:** In the 6G era, network security is paramount. Gen AI can design and implement adaptive cryptographic algorithms that respond to evolving cybersecurity threats. This includes dynamic encryption techniques, anomaly detection in user behavior, and the generation of secure communication pathways, enhancing trust in high-speed data transmission.
- **Real-Time Edge Intelligence:** Generative AI models, deployed at edge computing nodes, can enable real-time decision-making by processing data closer to the source. This reduces latency and empowers applications such as autonomous vehicles, augmented reality, and remote surgery, which demand ultra-fast response times and high reliability.

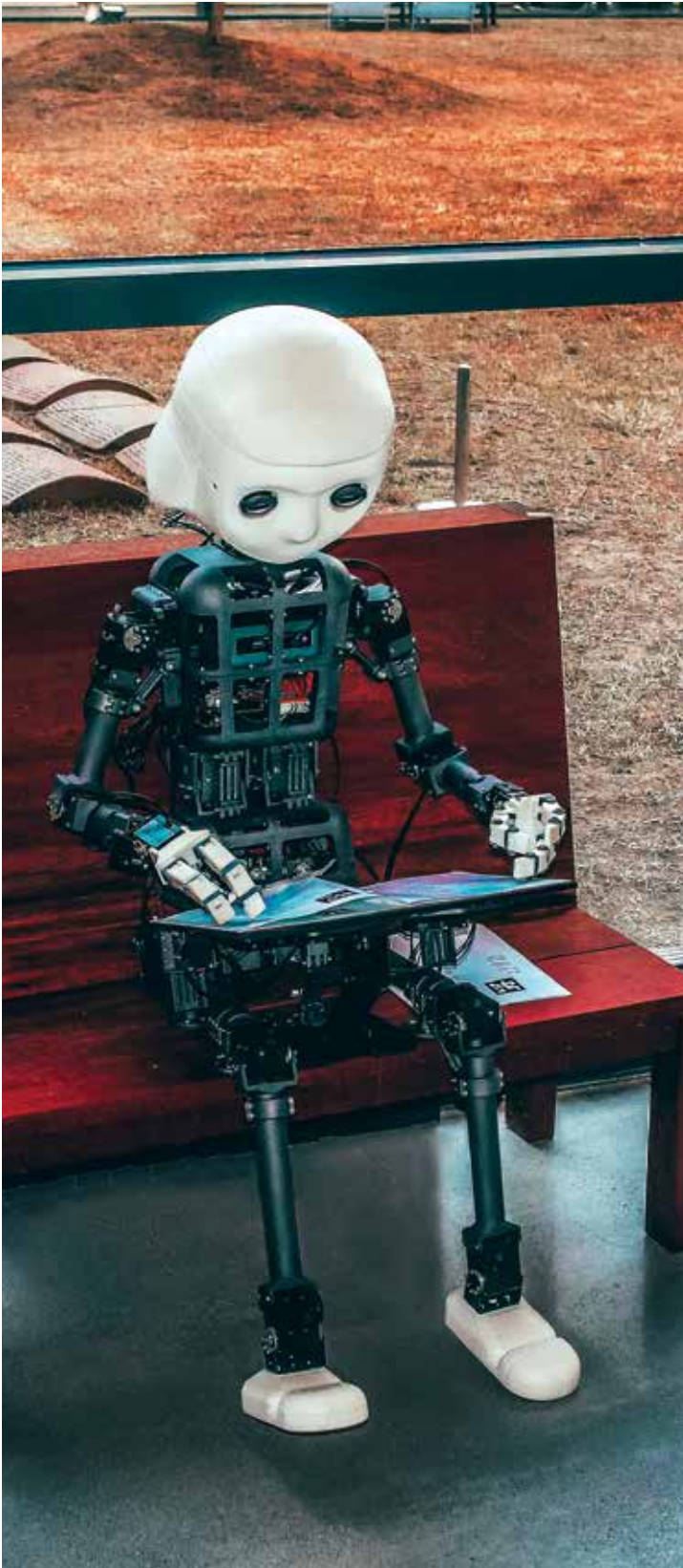
Technical Aspects of Gen AI in 6G Communication

- **Multi-Agent Reinforcement Learning (MARL):** MARL frameworks allow multiple AI agents to collaborate within the network, optimizing data routing and resource sharing. For example, MARL-powered Gen AI can manage spectrum sharing among devices, ensuring fair distribution and minimal interference.
- **Neural Architecture Search (NAS):** Using NAS, Gen AI can design optimized neural networks tailored for specific communication tasks. This includes creating lightweight models for energy-efficient IoT devices and high-performance models for base stations.
- **AI-Driven Beamforming:** Gen AI algorithms can optimize beamforming techniques, enhancing signal strength and coverage in millimeter-Wave (mmWave) frequencies, a key component of 6G communication. These algorithms dynamically adjust the direction and focus of signals to maximize user experience.

Future Needs and Solutions: The Road Ahead for 6G

- **Bridging the Digital Divide:** Gen AI-powered 6G networks can ensure equitable access to high-speed communication, even in remote or underdeveloped regions. By using AI to optimize satellite-based communication, affordable and reliable internet connectivity can become a reality for all.






- **Supporting Emerging Technologies:** Technologies such as the Internet of Everything (IoE), holographic telepresence, and digital twins require unprecedented bandwidth and low latency. Generative AI will play a central role in supporting these innovations by managing and optimizing data transmission in real time.
- **Sustainable Networking:** Energy-efficient AI algorithms can reduce the carbon footprint of 6G networks by minimizing energy consumption in data centers, edge devices, and communication infrastructure. This aligns with global sustainability goals, ensuring that technological progress does not come at the cost of the environment.

ROI Value and Business Benefits

- **Cost Savings:** By automating network optimization, Gen AI reduces operational costs associated with manual configuration, troubleshooting, and resource management. Real-time anomaly detection minimizes downtime, ensuring continuous service delivery.
- **Revenue Growth:** 6G-enabled services, powered by Gen AI, unlock new revenue streams for businesses, such as immersive VR experiences, smart city solutions, and AI-driven healthcare. Companies that adopt Gen AI early will gain a competitive edge in capturing these emerging markets.
- **Enhanced Customer Satisfaction:** Gen AI enhances user experience by ensuring seamless connectivity, low latency, and personalized services. Improved customer satisfaction translates to higher retention rates and brand loyalty.

The Generative Future of High-Speed Communication

Generative AI is not just a tool but a transformative force for the future of network communication. By seamlessly integrating intelligence, adaptability, and sustainability into 6G networks, Gen AI is set to redefine connectivity for the digital age. The ROI potential is undeniable, offering cost savings, revenue growth, and unparalleled user experiences. 

ELGi STABILISOR – Revolutionizing Industrial Air Compression


The ELGi Stabilisor is a groundbreaking innovation designed to optimize industrial air compression like never before. This globally patented technology transforms compressor performance in plants with dynamic air demands by addressing inefficiencies, reducing wear, and enhancing operational stability.

The Stabilisor system's unique 'Recirculate and Recover' approach dynamically adjusts compressor capacity to match plant air demand. By employing controlled recirculation and recovery techniques, it stabilizes airflow using precision-engineered progressive and on-off valves. This optimized process minimizes load/unload cycles, extending equipment lifespan and maintaining peak performance across varying demand conditions.



KEY BENEFITS

- **Up to 15% Energy Savings:** Optimized airflow reduces energy loss, significantly cutting operational costs.
- **Enhanced Equipment Lifespan:** Fewer load/unload cycles lower wear and tear on critical components.
- **Stable Airflow Management:** Low-pressure recovery techniques and stabilizing zones ensure smooth performance.
- **Supports Sustainability Goals:** Reduces energy waste, promoting eco-friendly manufacturing practices.

To cater to diverse operational needs, the Stabilisor system is available in two versions. The Light Version is designed for field fitment, offering energy savings and enhanced reliability, while the Heavy Version is factory-fitted to deliver superior energy efficiency and comprehensive stability. By eliminating the inefficiencies of traditional solutions like Variable Frequency Drives (VFDs) and reservoir volume increases, the Stabilisor sets a new benchmark in compressed air technology. Its innovative design and global patent protection ensure unparalleled performance, dependability, and sustainability for modern industries. 



SMART PUMPING SOLUTIONS:

Transforming Industrial Operations



Dr. Ravindra Utgikar,
SBU Head and Vice
President, Wilo Mather and
Platt Pumps Pvt. Ltd

In today's rapidly evolving industrial landscape, efficiency and sustainability have become key priorities. Smart pumping solutions are at the forefront of this transformation, redefining traditional pumping systems with advanced technologies. With industries increasingly focused on reducing energy consumption and minimizing environmental impact, intelligent pumping solutions offer a pathway to enhanced productivity and sustainability.

By integrating energy-efficient designs, real-time monitoring, and automated controls, these innovations are reshaping industrial operations, ensuring optimized performance while aligning with global sustainability goals.

Enhancing Industrial Efficiency and Sustainability with Smart Pumping Solutions

Smart pumping solutions are reshaping industrial operations by

integrating advanced technologies into traditional pumping processes. This shift has become necessary due to the rising focus on sustainability and the need to enhance operational efficiency. Efficient pumping systems have a direct impact on industrial productivity, and many industries are working to incorporate sustainability into their operations.

Energy efficiency is a critical component of smart pumping solutions, connecting directly with the need for sustainable industrial practices.



Approximately 27% of global energy consumption is attributed to pumps and pumping systems. As industries implement projects like Zero Liquid Discharge to prevent water waste, energy-efficient pumping solutions play a crucial role in reducing carbon and energy footprints.

Achieving these efficiencies begins with selecting the right pump, a process that requires precision. Often, oversized pumps are chosen to accommodate safety factors, leading to inefficient operations and unnecessary energy use. However, when pump requirements are accurately defined with the system resistance curve, optimal selection and energy savings can be achieved. For industries considering future expansion, Variable Frequency Drives (VFDs) are a practical solution. By modulating the pump speed according to demand, VFDs reduce energy

consumption, especially in applications where demand fluctuates.

Ensuring that these solutions are efficient and sustainable demands adherence to strict standards. Companies developing smart pumping solutions follow rigorous efficiency standards in pump design, measured through Minimum Efficiency Index (MEI) values. In Europe, an MEI greater than 0.7 is considered optimal. By using AI algorithms and extensive design data, manufacturers work closely with research institutions to push innovation in sustainable pump solutions.

Leveraging Technology for Smart Pumping Efficiency

Technological integration further strengthens the capabilities of smart pumping solutions. The Internet of Things

(IoT) plays a pivotal role, with sensors and IoT devices embedded in pumps enabling real-time monitoring of performance, flow rates, and energy use. Accessible remotely, this data supports quick response to issues, helping maintain operational efficiency. Smart pumps equipped with sensors, VFDs, and intelligent controllers adjust their operation based on real-time data, optimising performance and energy use.

This focus on real-time data and smart technology is especially relevant in wastewater transport, where challenges like increasing solid content and stricter regulations require efficient solutions. Integrating SCADA systems and cloud computing platforms enhances centralised monitoring, data analytics, and remote control of pumping operations, aligning with the industry's need for sustainable and efficient solutions.




Driving Sustainability Through Smart Pumping

Energy audits serve as a critical link in maintaining efficiency, helping industries identify inefficiencies and optimise pump selection. By understanding the energy use within pumping systems, industries can implement corrective measures, reduce operational costs, and minimise environmental impact, aligning with broader sustainability goals.

Ultimately, smart pumping solutions not only reduce operational costs through optimised energy use but also enhance reliability and productivity. Predictive maintenance and real-time monitoring help prevent unexpected failures, while automated and optimised systems ensure smooth operations, supporting industries in meeting production targets and improving profitability. By integrating smart pumping solutions, industries can experience significant improvements in performance, cost-effectiveness, and sustainability across sectors.



The Future of Smart Pumping in Industry

The adoption of smart pumping solutions marks a significant step toward energy-efficient and sustainable industrial practices. By leveraging advanced technologies like IoT, AI-driven optimization, and predictive maintenance, industries can achieve enhanced reliability, reduced operational costs, and improved productivity. As regulatory standards tighten and the need for sustainable solutions grows, integrating smart pumping systems will be crucial for industries looking to stay competitive while minimizing their environmental footprint. The future of industrial operations lies in intelligent, data-driven solutions that balance efficiency, sustainability, and performance. 

Powering the Future: How EV Charging Guns Are Driving India's Electric Revolution



ISHAAN PARWANDA,
Director, Trinity Touch

The global shift towards Electric Vehicles (EVs) marks a transformative moment in the history of transportation, with profound implications for sustainability and energy efficiency. Now, India stands at the doorstep of this change, where increasing demand for an EV market goes hand in hand with rapidly evolving charging infrastructure, but the lesser-known hero moving the EV landscape forward is none other than the EV charging gun. This is an often overlooked critical component in enabling the safe, efficient, and widespread adoption of electric vehicles.

Evolution of EV Charging Technology: From Basic Outlets to Advanced Smart Connectors

The history of the journey of EV charging technology was rather poor, as their early systems were suited only to low power requirements and were centered around two-wheelers and three-wheelers. Well, at that time, a standard 16A outlet could suffice for the nascent market.

However, as electric cars and commercial vehicles developed with far higher power requirements in the respective ecosystems, so did the necessity to develop more complex charging solutions. Along with these advancements, charging guns have seen incredible development in overcoming issues of safety, performance, and user experience.

In modern charging equipment, the



task of the charging gun is way beyond just providing power to the vehicle. They are epitomes of advanced engineering and safety characteristics, which would ensure that the energy transfer goes on smoothly and without any possibility of short circuits or overheating. The connector includes a communication mechanism, which dynamically interfaces with the vehicles, providing real-time data for anomalies and automatic power cutoff in case of emergencies. This integration of data communication with Live, Neutral, and Earth connections shows the sophisticated capabilities of modern EV charging systems.

Adapting EV Charging Guns to India's Unique Environmental and Regulatory Landscape

The environmental challenges of India have also led to the development of charging guns. While in most global markets, climatic conditions are known in advance, the Indian environment is very different, demanding extremely durable connectors. Ingress Protection (IP) ratings such as IP67 ensure that connectors are dustproof and waterproof, essential features for ensuring consistent performance across varied terrains and climates. Connector pins are silver-plated for superior conductivity and are designed to withstand the high temperatures generated during fast charging. Ergonomic designs enhance user experience in high-traffic public charging stations.

The Indian government's proactive approach has further accelerated the adoption of EVs and their supporting infrastructure. By mandating a unified set of standards for connectors, such as CCS2 (DC) and Type 2 (AC), India has avoided the fragmentation that plagued early EV markets in other parts of the world. This foresight ensures that every EV on Indian roads is compatible with public charging networks, fostering consumer confidence and reducing barriers to entry.



Pioneering the Future of Vehicle-to-Grid (V2G) Integration

The charging connectors now occupy a pride of place among global energy innovations, especially as Vehicle-to-Grid (V2G) technology takes center stage. V2G conceives of a future in which the battery in an electric vehicle serves a purpose greater than that of moving vehicles—its stabilization of the energy grid or providing power backup to a house, for example. Under this vision, the charging gun opens the full possibility of an EV in an integrated energy system.


Key Enablers of India's EV Growth and Sustainable Mobility

India's EV market reflects the potential of such innovations, with sales surging from 160,000 in 2019 to 1.5 million in 2023. However, the journey is far from complete. While two-wheelers and three-wheelers dominate the market, the adoption of electric cars and commercial vehicles is gaining traction, underscoring the need for continued advancements in charging technology. The number of public charging stations has grown exponentially, yet gaps remain, especially in rural and semi-urban areas.

Charging guns, with their evolving capabilities, hold the key to bridging these gaps and ensuring equitable access to EV infrastructure.

The charging gun is crucial in the movement of India and the world towards sustainable mobility. These connectors are not just a tool for function but are the enablers of the clean energy revolution, smoothly connecting vehicles to the power sources that fuel them. Their evolution symbolizes the broader progress of the EV movement—a testament to human ingenuity and the collective will to build a sustainable future.

The Future of EV Charging: Innovation, Safety, and Sustainability

In the coming years, further innovation in charging connectors will determine the future of electric mobility. It will continue to ensure safety and reliability under different conditions while also supporting such transformative technologies as V2G. The charging gun is, therefore, a symbol of what can be done when technology and vision are combined. As the electric vehicle revolution accelerates, this unsung yet indispensable component will continue to lie at the heart of efforts for a greener, cleaner future. 



ENHANCING BATTERY

Longevity & Reliability
for a Sustainable Future



Innovative Solutions for a Sustainable Energy Future



Samrath Singh Kochar,
Founder and CEO, Trontek

The transition to renewable energy sources is accelerating worldwide, and lithium batteries are at the forefront of this transformation. Their high energy density, long cycle life, and rapid charging capabilities make them a preferred choice for energy storage across various applications, from electric vehicles to grid stabilization. With ongoing advancements in battery technology, lithium-based storage systems are becoming even more efficient, reliable, and sustainable. By integrating cutting-edge materials, smart battery management, and enhanced recycling processes, the industry is ensuring that lithium batteries continue to drive the future of clean energy solutions.

Material Innovations for Enhanced Durability

Lithium batteries are at the forefront of energy storage innovation, with continuous advancements enhancing their durability and performance. Modern research focuses on advanced materials like solid-state electrolytes, lithium-sulfur, and silicon-based anodes to significantly improve cycle life and energy density. Cutting-edge solutions such as nanotechnology-enabled coatings and advanced separators are being developed to minimize capacity loss and enhance thermal stability, ensuring batteries remain reliable even under long-term usage.

The exploration of hybrid



chemistries, combining lithium-ion with materials like sodium-ion or aluminum-ion, aims to further enhance longevity while maintaining cost efficiency. These innovations underscore the robust potential of lithium batteries, making them an ideal choice for sustainable and long-lasting energy solutions.

Efficient Thermal Management Systems

Heat generation during charging and discharging significantly impacts battery reliability. Excessive heat can cause accelerated aging, reduced efficiency, and safety risks. Innovative cooling

solutions, including phase change materials, liquid cooling systems, and AI-driven thermal management, are being integrated into battery storage systems to maintain optimal temperatures and extend operational lifespan. These advancements help prevent overheating and ensure consistent performance across diverse environmental conditions.

Another emerging technology is direct immersion cooling, where battery cells are submerged in non-conductive cooling fluids to dissipate heat effectively. This method reduces thermal stress and enhances energy efficiency. Additionally, AI-based thermal monitoring can predict overheating risks and adjust cooling mechanisms in real time, further improving battery longevity.

Smart Battery Management Systems (BMS)

The incorporation of intelligent Battery Management Systems (BMS) has revolutionized battery storage reliability. AI-powered BMS continuously monitor parameters such as voltage, temperature, and state of charge (SoC) to optimize performance and prevent potential failures. Predictive analytics and machine learning algorithms can forecast battery health, enabling timely maintenance and reducing unexpected downtimes. These advancements improve safety, extend battery lifespan, and enhance overall efficiency in energy storage applications.

A major focus of BMS innovation is self-healing battery technology, where AI algorithms detect and repair minor internal damages before they lead to system failure. By integrating real-time diagnostics with automated corrective measures, self-healing systems can significantly extend battery life and reliability.

Sustainable Recycling and Second-Life Applications

End-of-life battery management



is crucial for long-term sustainability. Recycling technologies are being developed to recover valuable materials such as lithium, cobalt, and nickel, reducing dependency on virgin resources. Advanced hydrometallurgical and direct recycling processes are making battery material recovery more efficient and cost-effective.

Additionally, repurposing used batteries for secondary applications, such as grid storage and backup power, extends their usability and minimizes environmental impact. For example, retired EV batteries, which still retain 70-80% of their capacity, can be repurposed for stationary energy storage. Governments and industry leaders are collaborating to establish standardized recycling frameworks and circular economy models for battery waste management.

Policy and Financial Incentives for Sustainable Storage Solutions

Supportive regulatory frameworks and financial incentives play a pivotal role in fostering innovation in battery storage. Governments worldwide are implementing policies to encourage research and development, promote domestic manufacturing, and provide subsidies for adopting advanced storage technologies. Public-private partnerships and investments in energy storage infrastructure are essential to making high-performance, long-lasting batteries more accessible and economically viable.

In India, for instance, the Production Linked Incentive (PLI) scheme for advanced battery manufacturing aims to boost domestic production and reduce reliance on imports. Additionally, tax

incentives and grants for battery recycling startups are being introduced to promote a sustainable energy ecosystem.

Enhancing the longevity and reliability of battery storage systems is a critical step toward achieving a sustainable energy future. Through material innovations, advanced thermal management, AI-driven monitoring, sustainable recycling, and supportive policies, the industry is making significant progress. A collaborative approach among researchers, manufacturers, policymakers, and investors will ensure that battery storage technologies continue to evolve, supporting the global transition to clean and efficient energy solutions. By addressing these challenges proactively, we can pave the way for a more resilient and sustainable energy infrastructure that meets the demands of the future. 

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