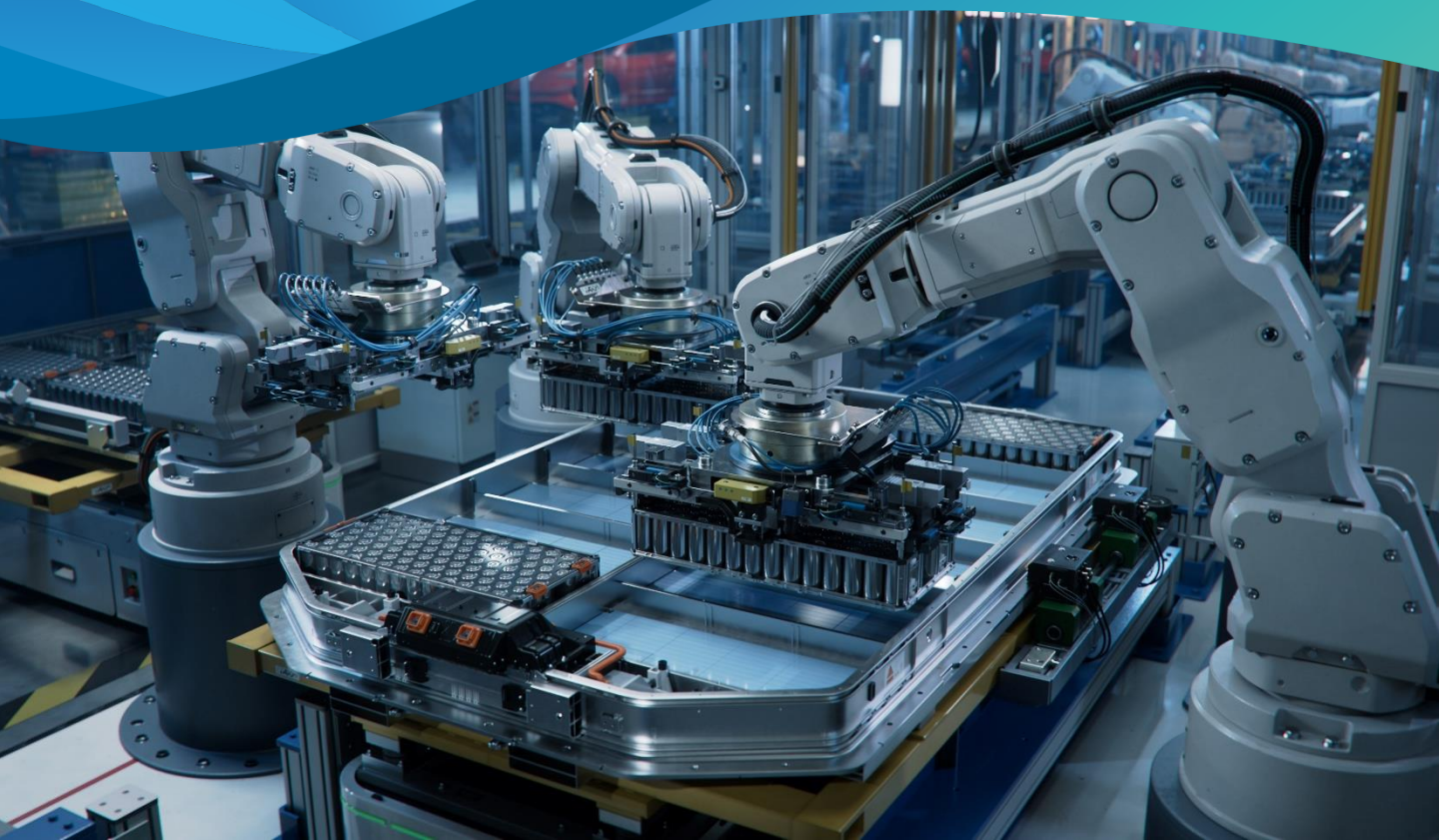
ITC INFOTECH

Business-friendly Solutions

Powering the future of Mobility -

Digital Manufacturing for High-speed Next-Gen EV Battery Manufacturing

CASE STUDIES



The Future of Mobility

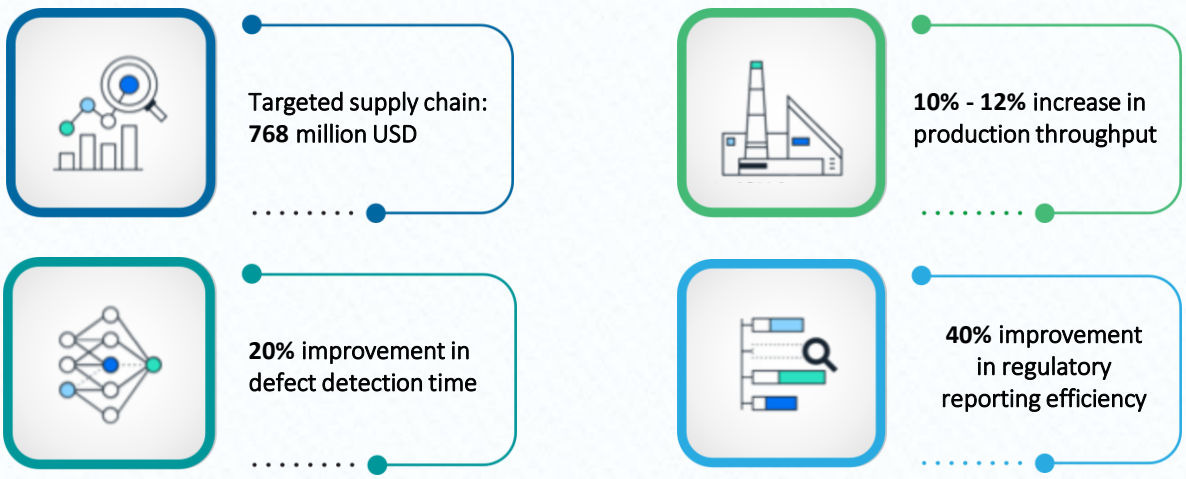
The Automotive Industry is experiencing transformative changes driven by several trends that are here to stay. The electric vehicle (EV) revolution is in full swing, reshaping the way we think about transportation to become an USD 800 billion market in 2025. With rising environmental concerns and a global push toward sustainability, EVs are no longer just an alternative—they're becoming the norm. But at the core of this transformation is something far more crucial than sleek designs or autonomous driving: It's the battery. The battery determines how far an EV can go, how fast it charges, and ultimately, how accessible it is for everyday drivers. As demand for EVs skyrockets, the race is on to manufacture batteries faster, cheaper, and more efficiently than ever before.

But here's the challenge—scaling up battery production isn't as simple as just building more factories. Speed and efficiency are critical, yet manufacturers must also ensure every battery meets strict safety and performance standards. This is where Product Lifecycle Management (PLM) and Manufacturing Execution Systems (MES) come into play. While PLM helps manage design, material sourcing, and regulatory compliance, a capable MES ensures smooth, high-speed production on the factory floor. MES connects real-time data from machines, automates quality checks, and optimizes production workflows, making sure that every battery rolling off the line meets the highest standards. Together, PLM and MES create a powerful digital ecosystem that enables manufacturers to meet the growing demand for EVs while maintaining efficiency, quality, and sustainability. The future of electric mobility depends on solving these manufacturing challenges, and with the right innovations, we are on the path to making EVs truly mainstream.

The result? Faster, smarter, and more resilient EV battery production that drives the future of sustainable mobility.

Navigating Complexity: Tackling the Scale and Scope

A leading global EV battery manufacturer faced a significant challenge in scaling its operations to meet the demands of next-generation Gen 5 and Gen 6 battery production. The company needed to increase throughput while ensuring high standards of quality, safety, and regulatory compliance to support the growing global demand for EVs. The challenge was to accommodate all the manufacturing processes used by the organization (discrete, batch, and continuous manufacturing) under a single umbrella of solution with a highly harmonized ERP and PLM platforms to support high-speed manufacturing.



[Highlight of the overall solution and value delivered]

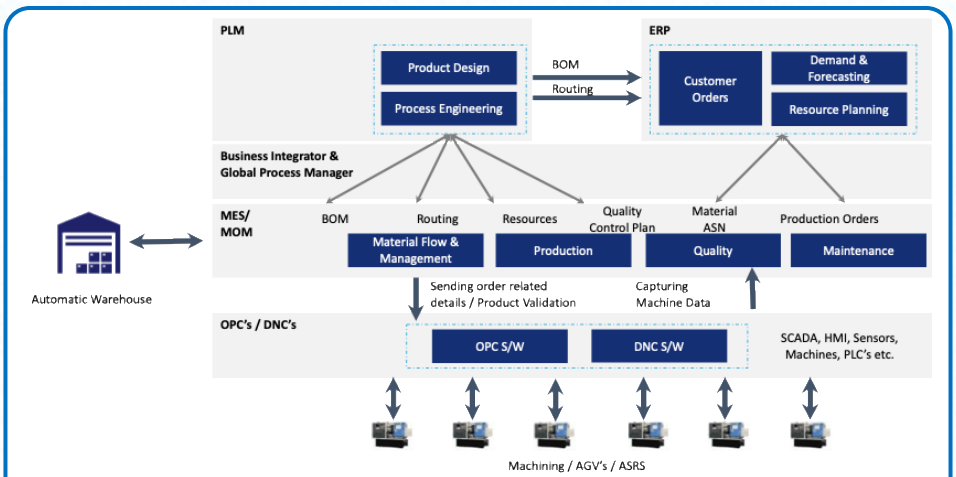
The existing infrastructure struggled to accommodate the high-speed production demands, while supply chain dependencies, particularly for raw materials like lithium, nickel, and cobalt, required stringent quality control and traceability. Variability in manufacturing processes led to inconsistencies in yield, making standardization a concern. Regulatory compliance issues added complexity, requiring enhanced data capturing and reporting to meet global safety and environmental standards. Inefficiencies from manual processes increased error rates and production inconsistencies

Digital Manufacturing Solution for High-speed Next-Gen EV battery manufacturing

ITC Infotech addressed these challenges with integrated Digital Thread of Product Lifecycle Management (PLM) and Enterprise Resource Planning (ERP) systems, along with implementing a battery module-wise recall and containment strategy. An advanced MES & MOM solution offered real-time insights into manufacturing processes, ensuring consistent quality and enhanced operational efficiency. A robust factory automation with end-to-end digital integration, enabling seamless connectivity between shop floor equipment, sensors, and enterprise systems is designed. Leveraging real-time data collection and analytics, the solution monitors production performance, identifies bottlenecks, and optimize process parameters to enhance efficiency and yield.

Automation minimized manual interventions, reducing errors, and ensuring consistent quality. Robotic process automation (RPA) and artificial intelligence (AI)-driven predictive maintenance resulted in high uptime and prevent unexpected equipment failures. Advanced traceability mechanisms within MES allowed for granular tracking of raw materials, components, and finished battery cells, ensuring compliance with stringent regulatory standards.

Intelligent scheduling and dynamic workflow management within MOM enhanced production flexibility, enabling rapid adjustments to changing demand and supply chain conditions. Digital twins and real-time simulations further helped refine manufacturing strategies, improving decision-making and reducing waste. By implementing a data-driven MES-MOM framework, a scalable, high-speed battery production system was designed with enhanced quality, reliability, and regulatory compliance, ensuring a competitive edge in the rapidly evolving EV market.

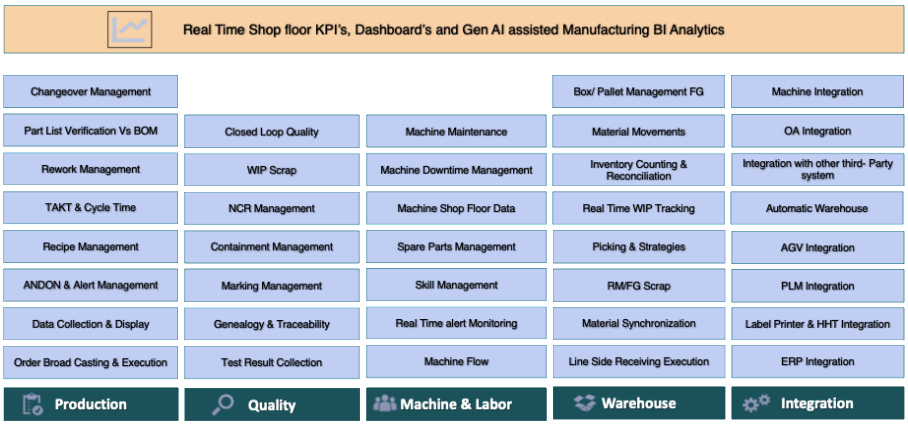


[Schematic of designed solution]

The Impact of ITC Infotech's Digital-First Approach

The implementation of a digital thread and a robust MES (Manufacturing Execution System) and MOM (Manufacturing Operations Management) system resulted in 12% enhanced production efficiency. These systems streamlined operations, improved real-time monitoring, ensured strict quality control (40% improvement in compliance reporting), and enabled traceability, resulting in reduced downtime, optimized processes, and higher consistency in product quality.

A comprehensive view of the entire process through a Gen AI-assisted business intelligence analytics platform provided real-time visibility for shop floor executives to top floor managers. This visibility was crucial in driving user adoption and improving operational efficiency



[A summarized view of the shopfloor KPIs managed]

The ITC Infotech advantage:

ITC Infotech solution sets itself apart through its highly harmonized Digital Thread of ERP, PLM, MES, and MoM platforms, ensuring seamless integration and operational efficiency for businesses. With deep domain expertise in high-speed manufacturing processes, the company leverages its experience from deploying similar solutions in ITC Ltd.'s factories to drive efficiency and scalability. Additionally, ITC Infotech has been an early adopter of AI in MES solutions, enabling smarter decision-making, real-time insights, and enhanced productivity for manufacturing enterprises. The integration of AI-driven automation, such as advanced machine learning models for predictive maintenance and process optimization, further enhances operational performance.

Incorporating Automated Guided Vehicles (AGVs) into manufacturing workflows has also significantly improved material handling, reducing downtime and streamlining logistics within factory environments. This synergy of AI and AGV technologies is revolutionizing the production process, contributing to higher throughput, lower operational costs, and improved safety.

The successful deployment of Digital Thread with MES & MOM in high-speed Li-ion battery manufacturing has transformed production efficiency, quality assurance, and traceability. Adoption of digital transformation technologies has enabled EV battery manufacturers to scale operations efficiently while ensuring high-quality, regulatory-compliant manufacturing.

As battery technology advances towards solid-state batteries and ultra-fast charging solutions, further innovations in AI-driven predictive analytics, AGV-based smart logistics, blockchain-based traceability, and energy-efficient manufacturing techniques will be crucial in defining the next-generation production landscape. The convergence of these technologies promises to optimize manufacturing processes, increase sustainability, and enable the rapid adaptation to evolving market demands.

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About ITC Infotech

ITC Infotech is a leading global technology services and solutions provider, led by Business and Technology Consulting. ITC Infotech provides business-friendly solutions to help clients succeed and be future-ready, by seamlessly bringing together digital expertise, strong industry specific alliances and the unique ability to leverage deep domain expertise from ITC Group businesses. The company provides technology solutions and services to enterprises across industries such as Banking & Financial Services, Healthcare, Manufacturing, Consumer Goods, Travel and Hospitality, through a combination of traditional and newer business models, as a long-term sustainable partner.

ITC Infotech is a wholly owned subsidiary of ITC Ltd. ITC is one of India's leading private sector companies and a diversified conglomerate with businesses spanning Consumer Goods, Hotels, Paperboards and Packaging, Agri Business and Information Technology.

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