The Green Light for Revolution in Automotive Manufacturing

The automotive industry, long criticized for its environmental impact, is undergoing a transformation that is as silent as it is profound. As the sector responsible for 23% of global greenhouse gas emissions, car manufacturers are under intense pressure to meet sustainability targets without sacrificing efficiency. To meet that goal, automation must increasingly serve as the engine of change.

Sustainability drives into the fast lane

As governments and industries intensify efforts to achieve net-zero targets by 2050, manufacturers face mounting pressure to balance sustainability goals with production efficiency. Recent data shows promising progress, with carbon emissions from new passenger cars dropping 28% between 2019 and 2023. However, fluctuating EV sales and tightening regulations underscore the need for innovative solutions.

Sustainability in the automotive industry represents both a critical aspect of corporate social responsibility and a key driver of business success. Beyond regulatory compliance, it offers strategic advantages: reduced operational costs, enhanced brand reputation, and increased appeal to environmentally conscious consumers. Companies that embrace sustainability through automation do more than fulfill corporate responsibility—they future-proof their operations in a market where strong environmental credentials have become a competitive necessity. As new emissions restrictions take effect globally and investors place greater emphasis on ESG performance, manufacturers that fail to adapt risk market exclusion and financial penalties—making sustainability not only an ethical responsibility but a business imperative.

Business impact of climate resilience

Companies that proactively integrate climate resilience strategies can strengthen their market position, lower costs, and enhance long-term sustainability in an evolving industrial landscape. Based on Mitsubishi Electric's research, there are three key approaches that manufacturers can implement to gain both environmental and business benefits.

Emission and power consumption reduction

The first pillar of climate resilience focuses on minimizing carbon footprint and energy costs through intelligent energy management. To achieve this, factories can implement a variety of tactics based on software- or hardware-focused solutions.

"Carbon footprint reduction can be achieved by integrating automated systems to track and report emissions, a practice that will soon be mandatory," explains Lucas Majewski, Global Director of Automotive/EV Industry at Mitsubishi Electric Factory Automation. "Energy conservation can be achieved by using AI-based analysis to detect potential areas of improvement and address inefficiencies."

Research and industry implementations have demonstrated remarkable results from these approaches. Advanced servo systems in manufacturing environments can achieve energy reductions of up to 96% in specific applications. Similarly, AI-powered energy management solutions are transforming how facilities monitor and optimize consumption patterns. EcoAdviser, for example, represents the type of intelligent system that environmental engineers increasingly recommend—analyzing operational data to identify inefficiencies that human operators might miss. Manufacturing facilities implementing such technologies have reported not only improved environmental performance but also substantial cost benefits, with some achieving a 25% reduction in contract power demand.

Maximizing Production Efficiency

The second strategy centers on maximizing operational efficiency through integrated automation systems. The GENESIS64™ software suite from Mitsubishi Electric Iconics Digital Solutions (MEIDS) enables real-time monitoring and optimization of production processes, providing

manufacturers with comprehensive visibility across operations. Implementations of this technology have consistently delivered measurable benefits: streamlined operations, reduced reliance on external developers, and enhanced real-time decision-making capabilities.

Another approach to improving production efficiency is deploying collaborative robots such as the ASSISTA Series to enhance automation and operational flexibility, while maintaining employee safety and inclusivity—both critical factors in adapting to changing market conditions.

100% Equipment Utilization

The third approach focuses on extending equipment lifespan and maximizing machine park utilization through predictive maintenance and intelligent asset management. Our experts highlight two solutions:

- MELSOFT MaiLab, an AI-powered data analysis tool, enables even non-specialists to leverage complex data for maintenance optimization.
- e-F@ctory technology facilitates real-time comparison between planned and actual production and enables quick issue detection and preventive maintenance. One manufacturer implementing these solutions reported a 30% reduction in repair costs while maintaining uninterrupted 24/7 operations.

“In the coming years, AI will play a key role in automotive production, with the continued development of smart manufacturing and predictive maintenance driving further advancements. AI will be crucial in optimizing and streamlining these and other processes.” - says Anthony Pawlak, Director of Global Industry Solutions at Mitsubishi Electric.

“Thanks to Gen AI, predictive maintenance will move to a new level: prospective maintenance. Prospective maintenance provides unparalleled insight into equipment condition. It doesn't just see the present but predicts the future and guides towards optimal performance.” - adds Giuseppe Polimeni, Director of Global Key Account Management and Japanese EU MEU at Mitsubishi Electric.

These three strategies demonstrate how building climate resilience delivers tangible business benefits beyond environmental compliance, positioning manufacturers for success in an increasingly carbon-constrained market. While these approaches directly enhance operational efficiency and financial performance, they simultaneously contribute to broader environmental goals—creating a synergy between business success and ecological responsibility.

Social impact through workforce transformation

Automation is not just addressing environmental challenges—it is also creating profound social benefits by transforming how people work in manufacturing. As experienced workers retire and fewer young people enter traditional manufacturing roles, knowledge retention becomes a critical need in many industries. Our automotive industry experts emphasize how AI-powered solutions can preserve critical expertise that would otherwise be lost. Systems like MELSOFT MaiLab capture and digitize the implicit knowledge of senior employees, transforming years of experience into accessible digital assets for future generations.

Additionally, to support inclusivity and employee safety, many companies deploy collaborative robots (cobots) to handle physically demanding tasks, allowing employees of all abilities to contribute meaningfully while reducing employee fatigue and cognitive strain

But cobots are not the only strategy: At Martinshof Werkstatt Bremen, a German workshop in the automotive sector, with over 2,200 employees, including 500 with disabilities, an innovative Poka Yoke-based solution was introduced to enhance both quality and accessibility. The Smart Work Navigator system, developed in collaboration with Mitsubishi Electric, uses sensors, cameras, and barcode scanners to guide workers through assembly, ensuring zero-defect production. Since 2018, these intelligent workstations have not only improved manufacturing precision but also created a more inclusive workplace. By eliminating waste from defective production, this approach supports both environmental and social sustainability, aligning with the UN Sustainable Development Goals on decent work and reduced inequalities.

The evolution of automation solutions

The journey toward sustainable manufacturing represents a continuous progression rather than a single transformation. This evolution follows a clear trajectory—from basic efficiency improvements to sophisticated, AI-driven systems that optimize entire production ecosystems. As Omar Esparza, Industrial Automation Business Developer (Automotive) observes, "Factory automation has already contributed to UN Sustainability Goals in 2024 through process improvement, equipment efficiency, waste reduction, and energy consumption reduction."

Today's leading automotive manufacturers are moving beyond isolated automation implementations toward integrated solutions that connect previously separate systems. This holistic approach enables comprehensive optimization that wasn't possible with earlier technologies.

Such evolution reflects a fundamental shift in thinking—from viewing automation as a tool for cost reduction to recognizing it as an enabler of comprehensive sustainability. By connecting environmental performance with operational excellence, modern automation creates a foundation for manufacturing that is both profitable and responsible.

The financial benefits are clear - energy savings, reduced costs, and improved efficiency all contribute to a healthier bottom line. But beyond the numbers, there's a larger picture. By embracing automation and driving sustainability, the automotive industry has the opportunity to redefine itself as a leader in innovative climate solutions.

As we look to the future, one thing is clear: the path to a sustainable automotive industry is paved with automation. It is time to shift gears and drive towards a greener tomorrow.

About the Report: "Drive the EVolution! Automotive Industry Factory Automation Expert Round-up Report 2025" combines insights from industry experts across Europe, Asia, and the Americas with real-world case studies and actionable recommendations for manufacturers aiming to stay ahead in a rapidly evolving industry.

About Mitsubishi Electric Corporation

With more than 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognized world leader in the manufacture, marketing, and sales of electrical and electronic equipment used in information processing and communications, space development and satellite communications, consumer electronics, industrial technology, energy, transportation, and building equipment. Mitsubishi Electric enriches society with technology in the spirit of its "Changes for the Better." The company recorded a revenue of 5,521.7 billion yen (U.S.$ 36.8 billion*) in the fiscal year ended March 31, 2025.
For more information, please visit www.MitsubishiElectric.com.

**U.S. dollar amounts are translated from yen at the rate of ¥150=U.S.$1, the approximate rate on the Tokyo Foreign Exchange Market on March 31, 2025.*

About Mitsubishi Electric Factory Automation Business Group

Offering a vast range of automation and processing technologies, including controllers, drive products, power distribution and control products, electrical discharge machines, electron beam machines, laser processing machines, computerized numerical controllers, and industrial robots, Mitsubishi Electric helps bring higher productivity – and quality – to the factory floor. In addition, its extensive service networks around the globe provide direct communication and comprehensive support to customers. The global slogan "Automating the World" shows the company's approach to leveraging automation for the betterment of society through the application of advanced technology, sharing know-how, and supporting customers as a trusted partner.

For more about the story behind “Automating the World”, please visit:
www.MitsubishiElectric.com/fa/about-us/automating-the-world