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Mitsubishi Electric Türkiye Shapes Industry 4.0 with e-F@ctory and MAISART Technologies

Burcu Çöpür, SCADA & HMI and Data Science Product Manager at Mitsubishi Electric Türkiye Factory Automation Systems, emphasizes that e-F@ctory and MAISART technologies empower factories' digital transformation journeys by enabling flexible production, high speed, and enhanced efficiency.

1. **We have been discussing Industry 4.0, digital transformation, and smart factories for some time now. Where does artificial intelligence stand in this transformation process, and can AI act as a catalyst in accelerating this transformation?**

Over the past few years, unprecedented challenges have compelled companies operating in the global manufacturing sector to rethink how they can sustain their competitive advantage and maximize profitability. Manufacturers facing an extraordinary number of operational challenges are increasingly questioning how they can transform their operations to meet customer expectations and succeed in today's and tomorrow's markets. Core automation solutions that support flexibility and profitability, together with artificial intelligence, enable businesses to respond more rapidly despite a highly dynamic environment, meet customer demands even in challenging periods, and sustain growth successfully.

At this point, companies are encouraged to adopt innovative smart manufacturing technologies in a phased manner and to take a proactive approach to implementing data-driven technologies—such as data analytics, artificial intelligence (AI), and digital twins—which sit at the core of future-ready business strategies. These technologies support digital transformation strategies and unlock significant opportunities for building business intelligence.

2. **You provide solutions to industrial companies through your e-F@ctory concept and your AI brand, MAISART. Could you elaborate on the scope of these solutions and their impact on companies' production processes?**

As Mitsubishi Electric, with more than 145,000 employees operating in over 120 countries worldwide, we are one of the leading global groups active in a wide range of fields, including aerospace technologies, semiconductors, energy generation and distribution, communications and information technologies, consumer electronics, industrial automation, and building technologies.
As Mitsubishi Electric Türkiye, we have been operating in Türkiye since 2012 across many different areas such as factory automation, air conditioning and ventilation systems, elevator and escalator systems, visual data systems, and power generation facilities.

Today, manufacturers need to respond quickly to rapidly changing and increasing consumer expectations, as well as to fluctuating and growing demand. In an era where digitalization and automation in production are becoming increasingly prominent, AI-supported industrial solutions and automation systems play a critical role in enabling flexible manufacturing and ensuring that all production processes are carried out with minimal deficiencies and errors. With its innovative automation concepts and solutions that deliver high performance and efficiency, Mitsubishi Electric Factory Automation Systems supports manufacturers in completing their digital transformation journeys, building the digital factories of the future today, and gaining a competitive edge on a global scale.

One of our key priorities at Mitsubishi Electric is supporting industrial production with artificial intelligence. Through our Industry 4.0-ready digital factory concept e-F@ctory and our proprietary AI technology MAISART (Mitsubishi Electric's AI creates the State-of-the-ART in technology), we enable companies to maximize the benefits they derive from artificial intelligence. The use of Mitsubishi Electric robots in production processes provides significant advantages in areas such as mechatronic systems, system design, fast changeovers, and human-robot interaction. In assembly applications as well, Mitsubishi Electric robots offer substantial ease of use in these same areas.
The MAISART technology integrated into Mitsubishi Electric robots delivers both intelligent engineering tools that simplify the definition of new tasks and predictive maintenance functions that ensure continuous production. With MAISART, robotic cells can be commissioned rapidly and switched quickly from one product to another, making a significant contribution to flexible manufacturing. By continuously evaluating component lifetime parameters based on the robot's real-time operating performance, the AI autonomously makes active adjustments to the robot software to ensure faster and more efficient operation.

Through the e-F@ctory concept, Mitsubishi Electric also provides a comprehensive solution platform—covering both hardware and software—that manufacturing facilities can utilize across all processes, from procurement and production to sales and after-sales services. The e-F@ctory concept can be easily integrated with third-party systems such as vision sensors, sensors, and pneumatic systems. Easy robot-to-robot coordination, multiple robots controlled via a single controller on the iQ-R platform, and robots that communicate with one another, avoid overlapping workspaces, queue their operations, work in tandem when required, and use their reach areas efficiently all significantly simplify and accelerate factory processes. Within this concept, we also offer edge computing, data analytics, and cloud integration solutions that help manufacturers differentiate themselves from competitors.

Modern manufacturing requires flexibility. Manufacturers expect different products to be produced from the same cells and lines. Robots play a key role in enabling such structures. Rapid changeovers and the ability to introduce new products into production lines with minimal modification and effort significantly reduce manufacturers' costs. With Mitsubishi Electric's proprietary AI brand MAISART, robotic cells can be commissioned quickly and transitioned rapidly between products, making flexible production a reality. In our AI-enabled robots, advanced functions, predictive maintenance capabilities, and easy-to-use programming interfaces are provided as standard. Thanks to an open

communication infrastructure, it is possible to transfer not only the results of AI software running internally but also the outputs of software developed on external platforms via 5G communication. The absence of communication constraints enables a production approach that is fully shaped according to user requirements.

Using the Melfa Smart Plus card, which enables the use of MAISART technology, robots equipped with intelligent engineering tools analyze data from torque sensors and autonomously adjust their operating parameters. They calculate how a task can be performed in the fastest way while applying the least load to the system. With automatic coordinate matching between vision sensors and the robot, tasks that previously took 20 minutes can now be completed in just one minute. In addition, Mitsubishi Electric enhances safe human-robot interaction through its Melfa Safe Plus technology. When Melfa Safe Plus is used in industrial robots, sequential human-robot assembly scenarios can be implemented. The robot continuously monitors human intrusion levels within the cell, limits its working area, switches to torque mode, slows down, or moves to a waiting position as required, and then resumes operation automatically once the human exits the access area—without waiting for a new command. This enables manufacturers to establish hybrid human-robot assembly stations and increase production flexibility.

Examples include:
In one project, we used a vision sensor to locate food products arriving on a continuous production line and applied artificial intelligence to calculate the fastest processing route for the robot, resulting in increased production capacity.
In a painting application that would traditionally require tens of thousands of programs, we designed a solution that could be implemented with only five to six parameter settings. In this project, we used Mitsubishi Electric robots together with a compact PLC and ICONICS software. With an easy-to-use interface, operators were able to define tasks that previously took hours in just one or two minutes. This not only delivered significant man-hour savings but also enabled short-term production of alternative products. As a result, planned production continued uninterrupted while urgent demands were met