

Automation trends in pharmaceutical production

Ratingen, Germany 21st October 2020

The pharmaceutical sector is constantly adapting to market requirements that change frequently and quickly – just as many other industries do. Changes are being influenced by factors such as regulation, skills availability and digital transformation. To turn these challenges into opportunities, companies are increasingly relying on solutions such as human-robot collaboration and the use of artificial intelligence to manage intensive data processing.

Michael Suer, Director Life Science EMEA, Factory Automation, Mitsubishi Electric Europe B.V., looks at four key technology trends within the pharmaceutical industry that are having a steadily growing impact: collaborative robots, cooperative robots, artificial intelligence and edge computing technology.

One clear trend in the pharmaceutical sector is the increased demand for collaborative robots (cobots) for direct use next to humans, doing everything from dosing, mixing, counting, dispensing, inspecting and marking medications in pharmaceutical laboratories. The cost-effectiveness and ease of programming of these cobots mean they are not restricted solely to use in large facilities but are equally suitable for use in small labs or in multi-labs.

Working alongside humans, cobots present an opportunity: they can relieve people of monotonous, tiring and physically stressful tasks, and so increase the efficiency and quality of human work. They can bring greater reliability, consistency and precision to the pharmaceutical laboratory, completing repetitive tasks with great accuracy and helping to protect sterile environments from contamination.

As an example, Mitsubishi Electric's cobot the MEFLA ASSISTA has a surface that is easy to clean, prevents dirt traps and can eliminate the risk of injury from crushing edges. It also achieves a repeat accuracy of ± 0.03 mm, close to that of the company's industrial robots (± 0.02 mm).

A further feature of these cobots is their simple control and programming functionality, which easily can be carried out by operators within the pharmaceutical business. In addition, they can be deployed quickly and flexibly in many application areas within the laboratory.

Cooperative robots without physical protective barriers

With their inherent safety features, cobots can work alongside human operators without presenting any danger. In contrast, industrial robots have traditionally needed to be operated behind physical barriers to ensure worker safety. But this requirement can have an impact on productivity, as the robot has to be stopped before it can be approached. In addition, there are complex restart procedures required after an emergency stop or if protective barriers have been opened.

Manufacturers are looking to address this limitation through the use of optical safety systems in place of physical barriers. Laser scanners are increasingly being used to monitor defined zones around the robot: as a human enters the outer zone, a speed reduction function slows the robot down. If that person continues on into the area where there is a danger of direct contact with the robot, the robot stops immediately. Once the area is clear, the robot resumes operation quickly and automatically.

Mitsubishi Electric offers such a solution through its MELFA SafePlus technology. This limits the speed, range of movement or torque of the robot when safety sensors are activated, allowing operators to work safely in close proximity to a moving robot.

Artificial intelligence

Artificial intelligence is a further trend that could impact on the pharmaceutical sector. In robotics, artificial intelligence can provide the ability to react appropriately to unforeseen and non-programmed situations.

Today, the latest MELFA FR robot series from Mitsubishi Electric is available with AI functions and can increase the yield in pharmaceutical assembly and insertion operations. For example, in robotic handling of delicate objects, force sensors are used for contact detection or for object insertion and fitting. AI can adjust parameters automatically for force sense control to reduce set-up and tact times. As the operation is repeated, AI optimises control parameters, positions and speed.

This AI technology is also offered within Mitsubishi Electric's MELIPC edge computing solution. That provides a gateway between the plant floor and the higher-level systems, while offering additional functions for monitoring and analysis of extracted data (data mining) from the shop floor level.

Edge computing technology

Against the backdrop of a desire to increase OEE (overall equipment effectiveness) by means of digitalization, there is a high demand for data mining from production. This is real-time data that needs to be acted upon, but it is also often sensitive data which needs to be handled securely. Here, edge computing offers a solution, enabling internal evaluation of sensitive recipe, batch and production data within pharmaceutical manufacturing.

OEE is also impacted by the efficiency of the production line itself, which is reliant on the condition and operating profile of devices. Edge computing solutions like the MELIPC from Mitsubishi Electric provide valuable information that can be extracted on the status of wear parts for example, enabling predictive maintenance strategies with significant potential for reducing service costs.

There are a number of technologies that will benefit the pharmaceutical manufacturing sector, boosting production capabilities and efficiency as well as enabling operations such as the efficient production of individual medicines. Importantly, the technology to deliver these aspects of pharmaceutical production are already available, and it could be economic to use.

Image Captions:



[Source: Mitsubishi Electric Europe B.V.]

Image 1: Michael Suer, Director Life Science EMEA, Factory Automation, Mitsubishi Electric Europe B.V.



[Source : Mitsubishi Electric Europe B.V.]

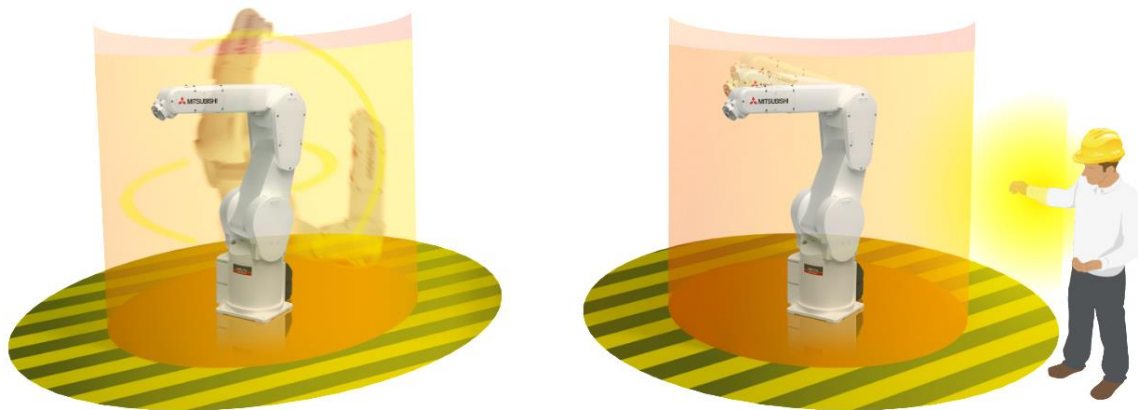
Image 2: A clear trend in the pharmaceutical sector is the increased demand for collaborative robots for direct use next to humans, for tasks including

dosing, mixing, counting and dispensing in pharmaceutical laboratories.



[Source: Mitsubishi Electric Europe B.V.]

Image 3: Real-time control, predictive maintenance, improved quality and enhanced productivity can all be enabled with the Mitsubishi Electric MELIPC edge computing solution.



[Source: Mitsubishi Electric Europe B.V.]

Image 4: Industrial robots can work alongside human operators without physical protection barriers by using laser scanners to monitor defined zones around the robot: As a human enters the outer zone, a speed reduction function slows the robot down or will come to a complete stop if an operator comes too close, thanks to MELFASafePlus technology.



[Image 5 - Source: Optimal Industrial Automation]



[Image 6 - Source: Robotronics AG]

Image 5 - 6: Robots bring greater reliability, consistency and precision to the pharmaceutical laboratory, completing repetitive tasks with great accuracy and helping to protect sterile environments from contamination.

About Mitsubishi Electric

With nearly 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation 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, mobility and building technology, as well as heating, cooling and air-conditioning technology.

Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavours to be a global, leading green company, enriching society with technology.

With around 146,500 employees the company recorded consolidated group sales of 40.9 billion US Dollar* in the fiscal year ended March 31, 2020.

Our sales offices, research & development centres and manufacturing plants are located in over 30 countries.

Factory Automation EMEA

Mitsubishi Electric Europe B.V., Factory Automation EMEA has its European headquarters in Ratingen near Dusseldorf, Germany. It is a part of Mitsubishi Electric Europe B.V. that has been represented in Germany since 1978, a wholly owned subsidiary of Mitsubishi Electric Corporation, Japan.

The role of Factory Automation EMEA is to manage sales, service and support across its network of local branches and distributors throughout the EMEA region.

** At an exchange rate of 109 yen to the US dollar, the rate given by the Tokyo Foreign Exchange Market on March 31, 2020*

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