

## Cost efficient handling of variable batch sizes with a flexible robot cell

**Sensor manufacturer Lenord + Bauer has used robot automation to optimise its manufacturing production cycle for frequent product changeovers and a wide variety of batch sizes. The robot cell has taken over monotonous manual pick and place tasks, releasing operators to perform more interesting and valuable work. It operates safely in close proximity to the rest of the workforce. The solution is flexible, efficient and provides integration into the company's higher-level enterprise systems. This constitutes an ideal platform for future developments such as the planned implementation of a Kanban warehouse.**

Founded in 1965, Lenord + Bauer is a leading manufacturer of precision motion sensors, controllers and integrated drive technology. The company manufactures products such as compact encoders for logging speed and position in highly dynamic systems, including machine tool spindles. The products are designed to be easily tailored for different individual requirements using customised cable assemblies and connectors, this results in a wide variety of batch sizes from single units to large-scale production runs.

The high levels of customisation and the varying sizes of production runs presented a challenge for more traditional forms of automation. Set-up had to be fast and flexible otherwise the automation wouldn't be worth doing, so engineers from Lenord + Bauer approached Mitsubishi Electric to explore the options open to them.

"We didn't have a fully prepared set of requirements at that time, but Mitsubishi Electric gave us all the support and advice that we needed for our first foray into robotics," says Ulrich Marl, Head of Business Production at Lenord + Bauer. "Besides a compact design, our main requirements included a high level of precision and flexibility - while complying with safety standards, as well as the ability to integrate with our in-house IT systems."

## Achieving fast programming, precision operation and compact size

The high variability of batch sizes the company manufactures makes frequent retooling necessary, as a result Lenord + Bauer required precision operation and for re-programming to be carried out as quickly as possible. A Mitsubishi Electric RV Series articulated arm robot therefore proved to be an ideal choice. The required pick-and-place tasks are now carried out with optimum precision, thanks to the six-axis robot having a load capacity of 4 kg and delivering positional accuracy of  $\pm 20 \mu\text{m}$ . To provide the complete solution, the robot is equipped with the MELFA SafePlus safety system along with a controller and teaching box. The teaching box was ideal as it enables the complete system, comprising robot and controller to be intuitively programmed by the operator in a matter of minutes.

The cell – at 4 m<sup>2</sup> – is very compact, and it can even be moved using a pallet truck if required. This was made possible by using a CR750-D controller - just like all Mitsubishi Electric robot controllers it is extremely compact and can be installed in a 19" rack.

Since bulky enclosures can hinder the feeding and removal of parts to and from the cell, the robot is equipped with the MELFA SafePlus safety module that allows it to operate in close proximity to the workforce. Two laser scanners on opposite corners of the square-footprint frame each monitor an area 180° wide. As soon as a person, or object enters this safety zone, a signal is sent to the robot controller in real time to reduce the speed of the robot to a pre-defined setting.

If a person or object then further encroaches into the safety zone, entering the operating space or collision zone of the robot, a further signal stops the robot immediately. The frame of the robot cell is also fitted with a light curtain and mirror deflector strips which send an additional signal to the SafePlus safety system if an object is detected.

### **Connectivity for automatic production process control**

With future production requirements in mind, Lenord + Bauer was keen to integrate the solution into its higher-level enterprise systems such as ERP and quality assurance. As part of the continuous optimisation of production, a Kanban warehouse is to be implemented for the sub-assemblies required for the manual final installation process, so a futureproof solution was important.

As soon as sub-assembly stocks drop below defined minimum levels, the warehouse will communicate autonomously with the robot and production will be increased accordingly. Thanks to an extensive coverage of protocols, interfaces and connectors, Mitsubishi Electric robots can be easily integrated into factory control and IT networks without any additional development work.

System integration was carried out by TAR Automation – part of the Lenord + Bauer corporate group – the team constructed the robot cell using a third-party panel controller. This was easily accommodated as Mitsubishi Electric robot systems work both with MELSEC controllers and operate seamlessly with third party hardware.

The existing robotic application will serve as a basis for further automation and inspire developers to design new products, with the capacity for automation in mind right from the start. Examples of other applications include the robot taking parts directly from stacking stations, use in other production processes such as soldering or laser applications and completely safe human-robot collaboration.

### **Image captions:**

**Image 1:** To enable orders for variable batch sizes to be carried out quickly and effectively, an RV Series articulated arm robot from Mitsubishi Electric was integrated into the production process at Lenord + Bauer.

[Source: Mitsubishi Electric Europe B.V.]

**Image 2:** Pick-and-place tasks are carried out with optimum precision by the RV Series articulated arm robot from Mitsubishi Electric.

[Source: Mitsubishi Electric Europe B.V.]

**Image 3:** The overall size of the robot cell is just 4 m<sup>2</sup>, which is made possible by the compact dimensions of Mitsubishi Electric's CR750-D robot controller.

[Source: Mitsubishi Electric Europe B.V.]

**Image 4:** The user can intuitively program the Mitsubishi Electric robot in a matter of minutes using the teaching box.

[Source: Mitsubishi Electric Europe B.V.]

**Image 5:** Ulrich Marl, Head of Business Production at Lenord + Bauer: "Mitsubishi Electric gave us all the support and advice that we needed for our first foray into robotics."

[Source: Mitsubishi Electric Europe B.V.]

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**Note to Editor:** if you would like the text in another language please contact Philip Howe at DMA Europa – [philip@dmaeuropa.com](mailto:philip@dmaeuropa.com).

## About Mitsubishi Electric

With nearly 100 years of experience in providing reliable, high-quality products, Mitsubishi Electric Corporation (TOKYO: 6503) is a recognised 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, as well as in products for the energy sector, transportation and building equipment.

With around 145,817 employees the company recorded consolidated group sales of approximately 40.7 billion dollars\* in the fiscal year that ended on March 31, 2019.

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., 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.

\*Exchange rate 111 Yen = 1 US Dollars, last updated 31.03.2019 (Source: Tokyo Foreign Exchange Market)

## Editor Contact

DMA Europa Ltd : Philip Howe

Tel: +44 (0)1562 751436

Fax: +44 (0)1562 748315

Web: [www.dmaeuropa.com](http://www.dmaeuropa.com)

Email: [philip@dmaeuropa.com](mailto:philip@dmaeuropa.com)

## Company Contact

Mitsubishi Electric Europe B.V. : Monika Torkel

Tel: +49 (0)2102 486-2150

Fax: +49 (0)2102 486 7780

Web: [eu3a.mitsubishielectric.com/fa](http://eu3a.mitsubishielectric.com/fa)

Email: [Monika.Torkel@meg.mee.com](mailto:Monika.Torkel@meg.mee.com)