Pick-and-place robot cell is cost efficient for small batch sizes

Sensor manufacturer Lenord + Bauer has used a MELFA RV Series robot from Mitsubishi Electric to optimise its manufacturing production cycle for frequent product changeovers. The robot cell has taken over monotonous manual pick and place tasks at its Gladbeck plant in North West Germany. Crucially the robot operates safely in close proximity to the rest of the workforce.

Simple set-up and operator controls allow the cell to be used cost effectively on a wide variety of batch sizes, releasing operators to perform more interesting and valuable work elsewhere in production. 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 modular, 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 is key to robot viability

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 six-axis articulated arm robot with a load capacity of 4 kg proved to be an ideal choice. The required pick-and-place tasks are now carried out to a positional accuracy of ± 20 μm. The cell – at 4 m² – 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.

To provide the complete solution, the robot is equipped with the MELFA SafePlus safety system along with a controller and teach box. The teach 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.

Since bulky enclosures can hinder the feeding and removal of parts to and from the cell, the SafePlus function 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 safety light curtain which sends an additional confirmation signal to the SafePlus safety system if an object is detected.
Connectivity for production systems

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.

Future developments are planned to include applications such as the robot taking parts directly from stacking stations and use in other production processes such as soldering and laser marking applications.

Image captions:

Image 1: An RV Series articulated arm robot from Mitsubishi Electric was used to create a flexible pick-and-place cell that could be deployed in different production areas at Lenord + Bauer in Germany.  
[Source: Mitsubishi Electric Europe B.V.]

Image 2: Pick-and-place tasks are carried out with a positional accuracy of ± 20 μm 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 m², 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 teach 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 Carolin Heel at DMA Europa – carolin@dmaeuropa.com.

About Lenord + Bauer

Lenord + Bauer is an international company specialising in motion sensors and integrated drive technology. With decades of experience in the mobility and machinery sectors, the company from Oberhausen offers services including the development, production and distribution of standard products and customised solutions. Its operations focus on rail transport as well as machine tools and packaging machines. Lenord + Bauer sees itself as a reliable solution partner with a high level of technical competence and expertise in customer applications. The company is certified to DIN EN ISO 9001 and 14001 as well as IRIS.

About Mitsubishi Electric

With nearly 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. Embracing the spirit of its corporate statement, Changes for the Better, and its environmental statement, Eco Changes, Mitsubishi Electric endeavors to be a global, leading green company, enriching society with technology. The company recorded consolidated group sales of approximately 40.7 billion dollars* in the fiscal year that ended on March 31, 2019.
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*At an exchange rate of 111 Yen = 1 US Dollars, last updated 31.03.2019 (Source: Tokyo Foreign Exchange Market)

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