

Pacemaker with a sense of rhythm

13th of May, 2014

Mitsubishi Electric robots and servos ensure the correct handling speed on a minimal footprint

“Vial” is the technical term for the small bottles used to hold medication, for example vaccines. They have a special closure that guarantees the purity of the contents. The doctor inserts a needle into the rubber cap and can then withdraw the fluid easily and cleanly. The contract packer of an international pharmaceutical company based in Germany was seeking a solution for the supply and packing of such vials of different sizes for an existing system, but barely two square metres of floor space was available to add this facility on. Having outlined this request to Mike Weber, managing director of the Swiss firm Robotronic AG, the plant manager promptly received a suitable proposal for a solution, as Robotronicspecialises in robot-aided handling systems with a minimal footprint. Modular robot technology, or MRT for short, forms the principle behind this. This is the name of a flexible mode of system construction based on the modular principle that has been developed by Robotronic. With a footprint of 1.0 x 1.30 metres, the compact basic module of the MRT cell is roughly the size of a europallet and around 2.20 metres in height. Robotronic uses only industrial robots from Mitsubishi Electric in its systems.

Customised overall concept

The solution that Mike Weber proposed to the contract packer to solve the handling problem consists of two MRT cells, each with an articulated-arm overhead robot from Mitsubishi Electric, and a conveyor line with a total of eight positioning screws driven by Mitsubishi Electric servo motors. The line into which

the MRT cells were to be integrated consists of an upstream conveyor section for the vials and a downstream box supply chain. Once filled with the vials, the packing units or blisters are transported to the boxing and final packaging process. A thermoforming machine that produces the blisters is located adjacent to this. To configure the optimum interaction between the individual areas, Robotronic had to construct the handling system and also adapt the adjacent systems to some extent, giving rise to a customised overall concept with twelve Mitsubishi Electric servo drives in all.

The two type MELFA RV-4FL industrial robots built into the MRTs are operated using a Mitsubishi Electric multi-CPU platform, the iQ Platform, comprising two robot CPUs Q172DRCPU, a motion CPU Q172DCPU plus a PLC CPU Q03UDECPU. The robots assume responsibility in the solution for handling the vials, lifting two rows consisting of five vials each from the positioning screws using vacuum grippers and placing these vials in the waiting blisters. The packing units are then supplied to the downstream packaging process. The box supply chain operates in a continuous cycle without interruption, and so the blisters must reach the supply chain at the correct moment. The preceding process must be executed at a corresponding rate, as the robots fill 60 blisters per minute with 300 vials in all.

Servos with a sense of rhythm

The conveyor line transports the vials to eight receiving stations equipped with positioning screws in the MRTs. Each screw is driven by a MELSERVO MR-J4 servo motor from Mitsubishi Electric, which indexes the small bottles into the lanes and readies them in groups of five. A new positioning process in which the vials are placed directly on the screw for alignment saves space and contributes to the compact construction of the MRTs. The integral monitoring functions check for the correct number of vials. A robot is assigned to two lanes in each case, and its vacuum gripper removes two rows of five vials each and inserts them into the waiting blisters.

The dynamics of the Mitsubishi Electric servos come into their own especially in

the conveyor system with its fast acceleration and high braking torques combined with a very gentle start-up and deceleration. An automatic vibration suppression function prevents oscillation of the system, while an additional filter masks mechanical resonance. “The movements must be executed extremely gently, because the small glass containers are sensitive. At the same time, speed is called for to keep pace with the feed. Mitsubishi Electric servos precisely satisfy these requirements,” Mike Weber explains.

The thermoforming machine posed an additional challenge for Robotronic. “The customer originally wanted to retain the old blister format,” Mike Weber recalls, “but that wasn’t feasible for our MRTs. To achieve the optimum clock time we developed a new packing unit format jointly with the customer.” The thermoforming machine is connected directly to the MRT cells and linked via servo-controlled conveyor lines. This system uses several MR-J4 drives to move, separate and accurately position the packing units.

“The precise dynamics of the servo drives are also particularly important when providing the blisters for filling by the robots, because the indexing conveyor system has to position new blisters every 300 milliseconds to keep pace with the second-by-second cycle of the boxing supply chain. This is why we also work with two robots that can fill two blisters at a time with their double arm gripper. Naturally the positioning of the blisters must be absolutely exact so that the robots can insert the vials accurately,” describes Mike Weber.

Mission accomplished

Key features of the compact vial handling solution from Robotronic are the high processing speed of 300 units per minute and the integration of the complete handling process in the minimum of space. Switching between different vial formats is quick and easy with the aid of change grippers and quick-change tools. The solution can be reproduced virtually any number of times and its capacity expanded by incorporating additional modules in the form of MRT cells.

Mike Weber concludes that “the task was accomplished very well, even in the

space available of just two square metres or so, thanks to the compact dimensions of the MRT and the slimline overhead robots from Mitsubishi Electric. The extreme degrees of freedom that characterise the robots offer us great flexibility with regard to installation. They work very quickly, yet with extreme accuracy, just like the servos. This is the only way that the high output of 300 vials per minute can be achieved.”

Since it was established in 2008, Robotronic has been the exclusive robotics distribution partner of Mitsubishi Electric for the Swiss market. Mike Weber has over 30 years’ experience of working with Mitsubishi Electric and he values the high level of reliability and long service life of the products. “Up to now the robots and other Mitsubishi Electric components like servos or controllers have always operated perfectly. The servos in particular are of great interest to us as an add-on product, because with these we can activate up to eight servo axes directly from a robot controller.”

A host of possible applications

The basic framework of the MRTs is always the same. Robotronic offers two cell formats that can be freely combined with one another. They differ by virtue of the positioning option of the robot as an overhead, wall-mounted or upright construction. Mike Weber says “we normally use overhead robots, and the space gained thereby is used as a working area for the robot.” The MRT concept comprises a complete component assembly kit including conveyors or separating, rotary or camera systems that can be assembled to meet specific requirements, thereby saving time and money on development and design.

The concept was originally developed for the watchmaking industry as well as for component suppliers to the watch and automotive industries. It can be used for handling tasks in many different industries, however. “After all, space is in short supply in most production facilities,” says Mike Weber. To meet the requirements of the pharmaceutical packaging industry, Robotronic has developed the system further. The robotics specialist uses only high-grade steel where possible in its MRTs, but at least equally high-quality metals, plastics and closed surfaces. The

compact system is thus easy to clean and conforms to the stringent hygiene conditions of the medical equipment industry, the food industry and the cosmetics industry.

Robotronic's customers include international companies, and its close partnership with Mitsubishi Electric is advantageous in this respect also. Mike Weber says "We market our MRTs internationally, so it is good to know that the Mitsubishi Electric technology and the know-how of the experts are available worldwide."

Picture captions



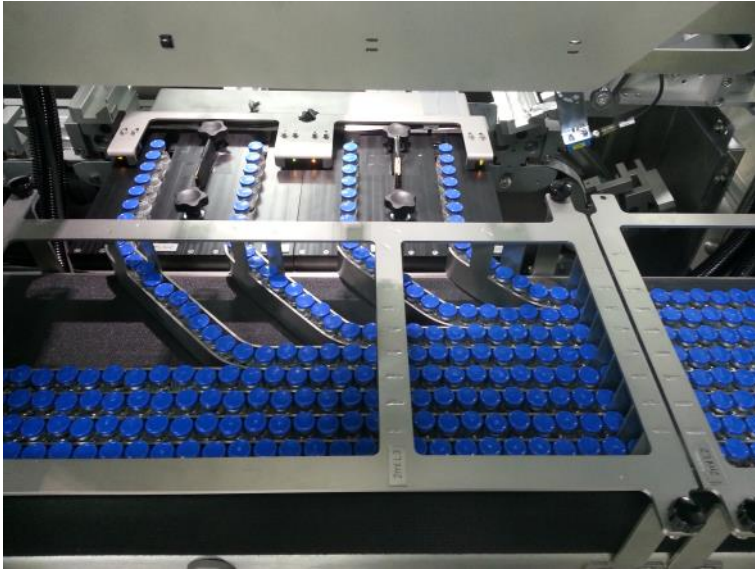
Picture 1: Mike Weber, managing director of the Swiss firm Robotronic AG



Picture 2: The dynamics of the Mitsubishi Electric servos come into their own especially in the conveyor system, due to fast acceleration and high braking torques combined with a very gentle start-up and deceleration.



Picture 3: One MELSERVO MR-J4 servo motor drives a positioning screw in each case, indexing the small bottles into the lanes and readying them in groups of five.



Picture 4: The conveyor line transports the vials to the eight receiving stations equipped with positioning screws. The positioning screws are driven by Mitsubishi Electric servo motors.



Picture 5: The MELFA RV-4FL robot uses vacuum grippers to lift two rows of five vials in each case from the positioning screws and place them in the waiting

blisters.



Picture 6: The vials handling solution consists essentially of two MRT cells, each with an articulated-arm overhead robot from Mitsubishi Electric, and a conveyor line equipped with Mitsubishi Electric servo motors.

Note to Editor: If you would like text in another language please contact Nicola Bigmore at DMA Europa – Nicola@dmaeuropa.com

About Robotronic AG

Robotronic AG is the distribution partner of Mitsubishi Electric for the Swiss market in the field of robotics. The company handles sales, advice, support and service. In addition to Mitsubishi Electric robots as components, its portfolio includes various other automation components such as camera systems, grippers, feeder systems and robot cells, which have been designed especially for Mitsubishi Electric robots. With a wide range of automation components and extensive know-how in the automation field, Robotronic offers high-level support for automation projects. It also works with partners to develop customised complete solutions.

Further information:

www.robotronic.ch

About Mitsubishi Electric

With over 90 years of experience in providing reliable, high-quality products to both corporate clients and general consumers all over the world, 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, as well as in products for the energy sector, water and waste water, transportation and building equipment.

With around 121.000 employees the company recorded consolidated group sales of 29,5 billion Euro* in the fiscal year ended March 31, 2013.

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

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The role of Industrial Automation – Ireland Branch is to manage sales, service and support across its network of local distributors throughout Ireland.

**Exchange rate 120,69 Yen = 1 Euro, Stand 31.3.2013 (Source: Deutsche Bundesbank)*

Further Information:

ie3a.mitsubishielectric.com/fa

www.mitsubishielectric.com

Press contact:

**Mitsubishi Electric Europe B.V. Ireland
Branch**

Factory Automation

Rachel O Brien

Marketing Executive

Westgate Business Park, Ballymount,

Dublin 24

Tel.: +353 1 4198856

rachel.obrien@meir.mee.com

PR agency:

DMA Europa Ltd.

Mr. Roland Renshaw

Europa Building, Arthur Drive, Hoo Farm
Industrial Estate, Kidderminster, Worcestershire,
UK

Tel.: +44 (0)1562 751436

Fax: +44 (0)1562 748315

roland@dmaeuropa.com

www.dmaeuropa.com