

# Drive & Control profile

## Chocolate bars uniquely packaged



Besides being really fast the new loading unit with up to 4 delta robots only needs a small surface.

Loading unit with three delta robots uses only one control.

Packaging containers can sometimes be quite elaborate. Although you rarely hear consumers ask themselves how the products in their shopping cart got into their packaging, this extremely interesting process continuously spurs packaging machine manufacturers to innovate. The faster, the better, the more accurate so as not to damage delicate products. This

is the challenge for pick-and-place robots and the control technology behind them.

Chocolate, for example, is one such product that must be handled with care so that it is not marked or deformed during the packaging process. To ensure gentle handling, delta robots are often used for this

### Challenge:

Develop an end-of-line packaging machine for multiple robots that maintains speed and accuracy, while reducing overall size and cost

### Bosch Rexroth Solution:

- Rexroth IndraMotion MLC motion logic and control unit for packaging
- IndraDrive and IndraDyn drive system
- IndraWorks engineering software

### Benefits:

- Functions of multiple robots are seamlessly integrated into one system, eliminating the need for multiple communication interfaces between individual robot controls
- Modular IndraDrive systems reduce cabling by 40 percent
- Control system installed in one control cabinet, saves space, simplifies installation and cuts the machine's footprint by 50 percent.
- Modularity of the IndraMotion controller allows integrate camera systems and programming

process. Deltas can pick up products in an extremely precise way at high speed without interrupting the product flow.

Demands for greater speed and efficiency have spurred innovation in the technology, like the new delta robot system from Cama (Lecco, Italy [www.camagroup.com](http://www.camagroup.com)). Cama has manufactured individual machines and complete robotic production lines for the secondary packaging industry for 30 years. It offers high-tech robotic packaging lines for the handling of primary packaging such as pouches, cups, cans, etc. from picking through palletizing. The company's latest invention is a loading unit, which can integrate up to four delta robots, named the "Triaflex." The robot arms are all controlled by a single IndraMotion MLC, a combined motion logic and robotic control unit from Bosch Rexroth (Hoffman Estates, IL [www.boschrexroth-us.com](http://www.boschrexroth-us.com)).

A single "Triaflex" delta robot achieves speeds of up to 120 cycles per minute. Through the simultaneous picking of several products using a "multi picks" gripper system, the delta robot can handle up to 300 products per minute. The "Triaflex" system provides dynamic belt synchronization to pick up and place



The gripper system can pick several products.



A single Rexroth MLC control moves all the robots and does intelligent load balancing.

products at speeds of 110 meters per minute (or 360 feet/min). This also allows for the placement of individual products into secondary packages for over-wrapping.

#### **Only one control for all delta robots**

First, the unsorted chocolate bars arrive from production on a belt. Each of the three delta robots is responsible for picking products from certain rows on the belt: the bars are picked up and placed into trays on a transfer belt, which takes the products to the next station for secondary packaging. A camera system locates each chocolate bar and transmits its position and orientation on the belt to the Rexroth MLC controller. Based on this platform, Cama achieves an automatic load distribution, which distributes the right number of chocolate bars to each of the individual "Triaflex" delta robots. They are capable of picking the products from the belt as required and positioning them precisely in the proper trays.

The unique approach of this new multi-robot platform in comparison to other systems available on the market is that Cama utilizes a single controller for the entire machine and no longer controls each individual robot with a separate controller. Cama matched its expertise with Rexroth's knowledge of the packaging industry and comprehensive application experience to develop the innovative solutions that lead to success for both sides, like calculating several kinematics on one control to control and synchronize several robots.

While all three "Triaflex" delta robots are operated by a single Rexroth IndraMotion MLC motion logic controller, even the operation of a fourth robot and two additional belt axes would be possible without any degradation in line performance. Multiple communication interfaces between individual robot controls are no longer necessary. In multiple control networks, these interfaces are required to ensure the transmission



IndraMotion for Packaging offers all components for a complete machine automation.

of camera system information and the coordination of the robot units to prevent collisions.

“There are many solutions in the market, but only Rexroth offers us the needed performance,” said Daniele Ballente, Cama’s CEO. “Another factor is that with the drive and control technology from Rexroth we can not only realize robots, but are also able to automate our complete machine portfolio, including cartoners and tertiary packaging machines.”

In view of multi-tasking performance and flexibility, the IndraMotion MLC control offers high computing power, scalability and modularity. Up to 16 kinematics can be controlled simultaneously, each with a maximum

of eight interpolating axes and up to four synchronous belts. In addition, machine manufacturers can implement their own kinematics quickly and easily. Rexroth’s IndraMotion for Packaging makes it easy to integrate camera systems and programming with RCL (Robot Control Language) or IEC 61131 robotics function blocks. The company’s standardized IndraWorks engineering software simplifies project planning, parameterizing, programming, visualization and diagnostics of all Rexroth components.

#### **New technology saves space and effort**

The ability to control multiple delta robots with the Rexroth motion logic control offered Cama a whole series

of advantages over its competitors. All functions are integrated in one control system, while the number of interfaces and component costs were cut. With the use of Rexroth’s modular IndraDrive drive systems with dual axis drives, the cabling effort was reduced by up to 40 percent. In addition, this solution saves space: the footprint was cut by 50 percent and the control cabinet size was reduced by 40 percent. Consequently, Cama can install the entire “Triaflex” control system for three robots in one control cabinet. This helps to reduce the costs for cabling further and simplifies the installation.

“The new compact loading unit with three integrated delta robots allows us to achieve the speed demanded by the end customer. And we save considerable space when compared to a solution consisting of delta robots connected in series, each with its own control cabinet,” said Ballente.

With regard to specific project requirements, it is flexible enough to add new functions or to switch the production to other product configurations at any time, for example, from chocolate bars to cookies.

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