Introduction to robotics in packaging
Robotics is fast becoming an integral part of many industrial processes. Machines using robotics bring additional flexibility to repetitive manufacturing and packaging tasks and their mechanical design and electronic control allow them to be easily re-programmed to move between high-speed product handling, picking and placing items, cartoning, case packing and palletizing.

Our clients typically use robotics for manufacturing applications. However, the use of robotics extends throughout the packaging line as the ideal partner for speeding up factory-to-market time and for high-variety, secondary and end-of-line packaging, where multiple pack configurations and products are produced on the same line.

The advantages of robotics will become increasingly important as the rise of industry 4.0 drives automated on-demand packaging, as well as packaging in small series and low volumes.

Advantages of robotics

Robotics brings a number of advantages to the packaging industry. Robots are typically compact in design with a small footprint, which optimises available space, making it possible to integrate robotic solutions into many different factory settings, including those where space is limited.

Mounted on a pedestal, robots can rotate around their own axis with 360 degrees of freedom and pick up and place products using their robotic arm. This makes it easy to integrate them into packaging systems that serve multiple lines and connect to packaging machines upstream and downstream. The nature of their design allows for quick and easy changeovers to be realised through reprogramming rather than retooling. We design robotic cells which allow the manufacture of a wide variety of different product concepts on the same base machine.

With their robust construction, robots are highly reliable and offer operational longevity with minimal maintenance and low total costs of ownership. They are highly effective in performing a range of automated packaging requirements, from repetitive tasks to packaging on-demand. Robots have a high degree of flexibility and can work fast but with very precise and gentle product handling.

Robots are very effective for repetitive tasks that tend to strain human workers or might be dangerous because of the interaction with other machinery.
Automating such time-consuming and tedious tasks releases workers to perform more valuable duties. In certain cases, collaborative robots or co-bots can work together with human workers without the need for guard rails. Using a force sensitive base, the robots can identify any outside forces acting on the robot and stop when required – facilitating a safe and mutually beneficial robot and human work situation.

Applications

Robotics are typically used in secondary and end-of-line packaging applications, such as cartoning, case packing and palletizing. Mpac Langen has long-standing strategic partnerships with leading global robotics companies to provide fully integrated robotic solutions, depending on the application and customer requirements. This enables our customers to realise change-overs quickly and to handle a wide variety of products.

Our fully automated robotic and combined solutions for case packing and palletizing commonly employ robot technology suitable for almost any application, followed by stretch wrapping. Our highly flexible standard solutions frequently handle regular slotted containers (RSC), half slotted containers (HSC) and tray containers.

Our secondary and end-of-line robotic packaging solutions include:

**LRC-400**

Robotic top load cartoner to run carton blanks or planos. This application is built with individual modules for carton forming, loading and sealing.
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LRC-500
Fast and flexible robotic case packer, with an open guard design, for demanding applications with a small footprint, allowing for a variety of infeed options, enabling quick changeovers.

LRC-600
Fast and flexible robotic palletizing system, available from single-cell to multi-cell centralized systems, for demanding applications requiring a small footprint, enabling quick changeovers.

LRC-700
Fast and flexible combined robotic palletizing system and top-load tray/case packer in one cell, for demanding applications with a small footprint, enabling quick changeovers.
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Future of robotics: Cartoner 4.0

The advantages of robotics will become increasingly important in future packaging applications in line with industry 4.0. Commonly referred to as the fourth industrial revolution, industry 4.0 is a global trend of automation and cloud-based data exchange in manufacturing. Industry 4.0 is a response to changing consumer behaviour, which demands higher levels of responsiveness, mass customisation and product availability. This, in turn, puts ever-increasing pressure on inventory. Coupled with the rise of e-commerce and increasing global competition, this creates a demand for more intelligent packaging solutions.

Mpac’s Cartoner 4.0 concept is a robotic cartoning machine that has been developed in line with industry 4.0. It uses two collaborative, vision-system-equipped robots to enable efficient and cost-effective packaging without the need for changeovers or adjustments. The prototype recognises when a product is present – triggering one robot to pick up the corresponding carton and erect it and the second robot to pick up the product, load it into the carton and then seal it.

The Cartoner 4.0 is particularly well suited to on-demand packaging, as well as packaging in small series and low volumes. The current prototype can pack up to 15 to 20 cartons per minute and handle a multitude of different products and cartons on demand. A solution that can seamlessly process a variety of products in this way is perfectly suited to cope with the changing face of e-commerce warehouse distribution.

This enhancement allocates more time to value-added activities by eliminating the 15-20 minutes of human intervention typically required for a changeover. The Cartoner 4.0 is a highly flexible, small footprint solution that can be integrated seamlessly and safely alongside existing human workers.