

## Case Study: Vision-Guided Box Packing

Application: Picking & packing

Robot Model: Kawasaki RS007L general purpose robots

### OVERVIEW

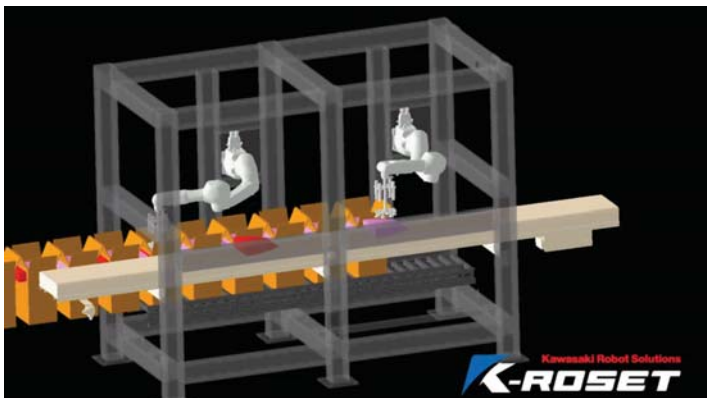
Today's labor market is changing; Deloitte projects as many as 2.4 million manufacturing jobs will go unfilled by 2028.<sup>1</sup> As human workers become increasingly difficult to find, automation gives manufacturers the power and flexibility they need to grow their business without depending on scarce human labor.

To avoid this issue, the customer reached out to Midwest Engineered Systems (MWES), a Kawasaki Robotics Preferred Integrator based in Waukesha, WI, to automate the box packing process for their packaged food product. MWES listened to the customer, and designed a custom box packing cell that utilized Kawasaki's high performance robots and software to surpass initial objectives.

### CHALLENGES

- Inconsistent labor resulted in inconsistent production
- Different box sizes and product types
- Requirement of 50 bags per minute with an 85% overall equipment effectiveness rate

The customer came to MWES Engineered Systems seeking an automated solution that would allow them to rely less on human labor, which had proved to be scarce and unreliable. This growing manufacturer also needed a system that facilitated growth through form and function: the design needed to be mobile, compact, and able to handle a variety of different product and box sizes.



Kawasaki's K-ROSET simulation software was used to design the cell.



Two compact, high-speed Kawasaki RS007 robots pick product off the bag conveyor, and place them in boxes on a secondary conveyor below.

### SOLUTION

- Two wall-mounted Kawasaki RS007L robots handle bagged product using vacuum grippers
- Conveyor tracking and Kawasaki K-VFinder vision software used to track product
- Custom, mobile cell designed to accommodate different box sizes and product types

The customer's existing bagging machine places bags onto a conveyor that feeds into the cell. Once the product is presented under the Kawasaki K-VFinder vision system, a camera takes a photo of the product. The vision system passes this data on to the first robot along with the conveyor tracking data, which is used to determine the position and series of pick points for each bag.

Simultaneously, boxes are loaded onto a secondary conveyor underneath the robots, which runs alongside the bag conveyor. Once a bag has been picked, the robot drops it into the box below. The second robot picks the remaining bags left on the conveyor, finishing out each box.

## Flexibility Achieved

When operators need to add a new product, they simply type the bag dimensions, weight and box size into the HMI, and assign a new product number. MWES installed a hand crank that adjusts the box conveyor's place in the cell, allowing for different sized boxes and giving the customer the flexibility they were looking for. When the operator needs to pack a different product, they just update the product number on the HMI and turn the hand crank to the correct count.

To add to the cell's flexibility, its compact size makes it possible for a forklift to pick it up and move it anywhere in the customer's facility. The cell only needs power, air and EtherNet connection, so the customer can get started in as little as one day. This is key for a growing manufacturer, says Steve Phelps, MWES Sales Engineer. "This is typical for a packaging environment... and with a customer that's just getting used to automation and is in a growth phase, they may need to move things around their facility periodically."



The Kawasaki RS007 robots are equipped with proprietary vacuum grippers designed specifically for picking bagged product.

## The Right Robot

MWES chose Kawasaki RS007L robots for this cell because of their reach, payload and high-speed capabilities. The robots' 7 kg payload, 730 mm reach, and flexible mounting options made them ideal for this compact cell, in addition to their through-arm cable design. These robots are designed to house vision cables, sensor harnesses, air lines and other components inside the arm structure, preventing interference with peripheral equipment, and allowing for operation in tight installation spaces.



A side-by-side view of the K-ROSET cell simulation and the robots in production.

## RESULTS

- Robots can pack up to 80 bags per minute, without drops
- Number of operators reduced by up to 3; redeployed to new roles within the facility
- System's compact and versatile design gives customer the flexibility they need

MWES says the Kawasaki RS007L robots are able to pack up to 80 bags per minute without drops, which exceeds the throughput and equipment effectiveness goals set by the customer. <sup>2</sup> The system has also allowed the customer to redeploy 2-3 workers each shift to higher-level roles better suited for their skills. <sup>2</sup>

According to the integrator, this system is conducive to further automation. A downstream palletizing system could prepare the boxes for distribution, or box erectors could be installed upstream for increased efficiency. <sup>2</sup>

1: Sharma, Anisha. "Manufacturing Industry Faces Unprecedented Employment Shortfall - Press Release." Deloitte United States, 7 Apr. 2019. [www2.deloitte.com/us/en/pages/about-deloitte/articles/2018-manufacturing-skills-gap-study.html](http://www2.deloitte.com/us/en/pages/about-deloitte/articles/2018-manufacturing-skills-gap-study.html).

2: Midwest Engineered Services "Robotic Food Product Case Packing Machine." <https://www.mwes.com/robotic-food-product-case-packing-m>.

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