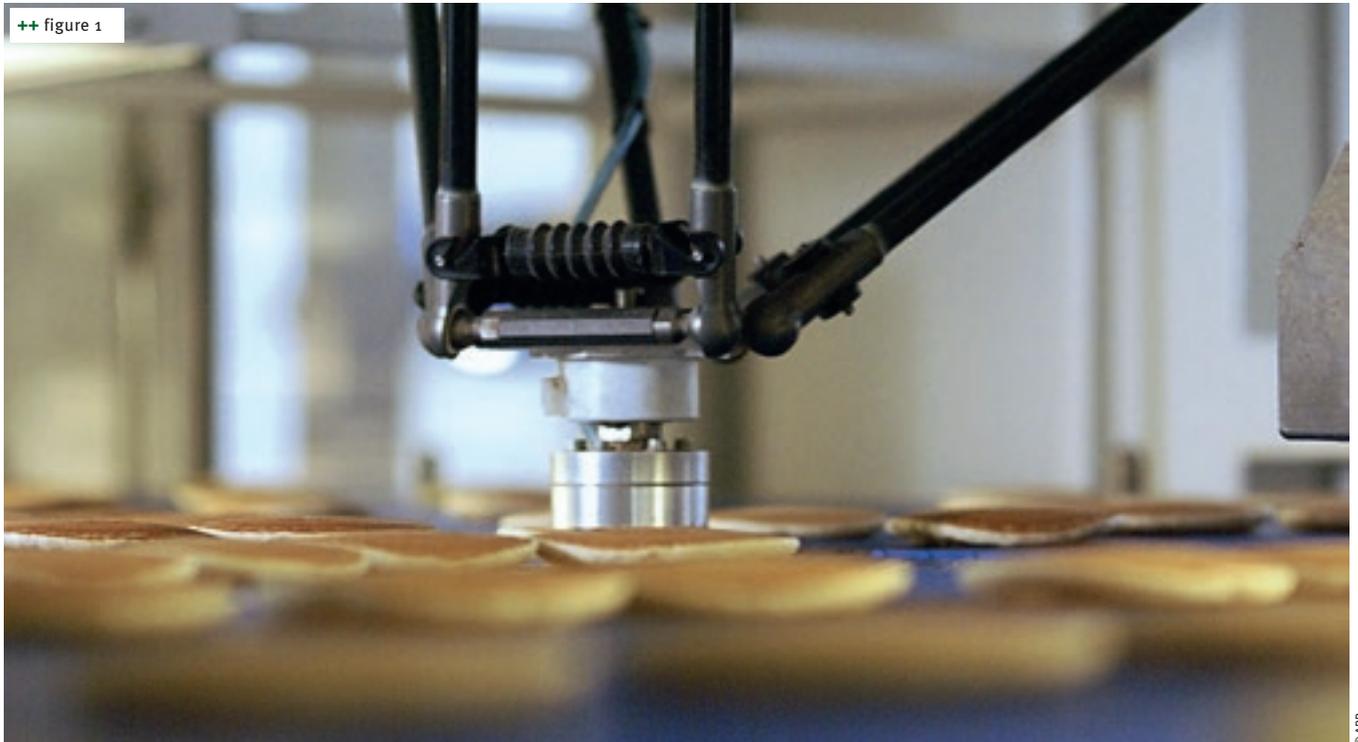


# High-tech for packaging processes

HIGH PRODUCTIVITY AND FLEXIBILITY WHEN PACKING FOODSTUFFS ARE NO LONGER POSSIBLE NOWADAYS WITHOUT AUTOMATED PRODUCTION AND PACKAGING PLANT. TWO EXAMPLES FROM THE BAKING INDUSTRY SHOW HOW TAILOR-MADE SOLUTIONS MAKE ROBOTIC LINES MORE EFFICIENT



++ figure 1

Two robot lines ensure the flexible, more productive and perfectly hygienic stacking of pancakes for a fully automatic packing and labelling plant

**+** One of the reasons for the growing trend towards replacing manual work with robots are the strict hygiene requirements in the food industry. However, robots also offer a whole range of other benefits, such as more flexibility, higher productivity, increased reliability and safer production. They also guarantee uniformly high processing quality because they do not suffer from the fatigue factor and thus loss of concentration, one of the main causes of errors and quality fluctuations in manual work. The requirements also apply if there are frequent product changes. Vision systems with fast image processing and data evaluation are indispensable for this purpose.

## Robots stack pancakes

Honeytop Specialty Foods Ltd. in Dunstable, UK, is a leading manufacturer of high-quality flatbreads and other Indian baked specialties in Great Britain. As well as Indian bread varieties, Honeytop also produces fresh American pancakes. The company has developed a separate automated line for this product group, although the line is also able to manufacture tortillas and other types of flatbread. In the past the manual stacking of the pancakes represented a bottleneck, so the plan was to automate this process. Because customers' requests change several times a day, quick changeovers on the plants are often necessary.

The contract to develop and build an automatic packing line was awarded to the robot systems integrator RG Luma Automation Ltd. located in Worcester, UK. The use of components from ABB Automation GmbH, Friedberg, Germany, made the robotic plant more efficient: pancake packing now uses four camera-controlled FlexPicker IRB 360 units on each of two robotic lines. The irregular arrangement and sometimes even the overlapping of the pancakes on the feeder belts can cause one of the upstream robots to slightly push aside the other cakes when picking up a pancake, or they slip of their own accord. This changes the position data on the conveyor belt. However, the downstream robots must be given precise information about these changes to enable calculation of the movement pathways needed for the pick-and-place tasks. That's why every robot has its own vision and evaluation system. So ABB's Pickmaster software package with its image and object recognition and belt sequence control ensures that the robots operate intelligently and semi-autonomously. In this process the software compares thousands of data per minute, such as the exact information about the location and position of the pancakes arriving on the feeder belts and the position and current height of each stack of cakes on the central product conveyor belt. In practice a situation repeatedly occurs in which pancakes overlap one another on the feeder belts. Until now the FlexPickers were unable to achieve pick &

place in such situations. To solve the problem, RG Luma's specialists configured the Vision software so it recognizes such overlappings correctly and sends the appropriate data to the robot controller. For the first time the robots can now also master precise pick & place even with overlapping items.

Another important criterion for the plant's efficiency is a uniform feed to the packing and label printing plant. To achieve this the FlexPickers must turn the irregular stream of products into a uniform one. For this purpose the system integrator integrated an intermediate storage station above the central conveyor belt in the entrance area of each robotic cell. The FlexPickers put individual pancakes down on this as a buffer. This buffer ensures that stacks of pancakes of the required height on the central belt arrive continuously at the packing plant at all times.

#### Communication in the robotic network

The French company De la Ballina Frères SAS in Maleville specializes in packing plants for industrially fabricated baked goods, and for this it uses high-tech solutions such as vision systems and robotic technology. The image processing that is used must provide high precision and short response times. To enable these demands to be satisfied, the company has until now relied on fixed wiring and low-power field buses. With the development of a new generation of machines, De la Ballina Frères wanted to implement an integrated automation solution. The requirements for this were clearly defined: increased performance, productivity and energy efficiency together with reduced implementation and maintenance costs. The choice of the communications protocol is especially important in this situation. It forms the basis of an integrated architecture for the machine automation. The main criteria for the network technology were that it had to operate deterministically (precision < 1 ms) and be especially efficient. ►



++ figure 2  
The FlexPicker IRB 360 at work

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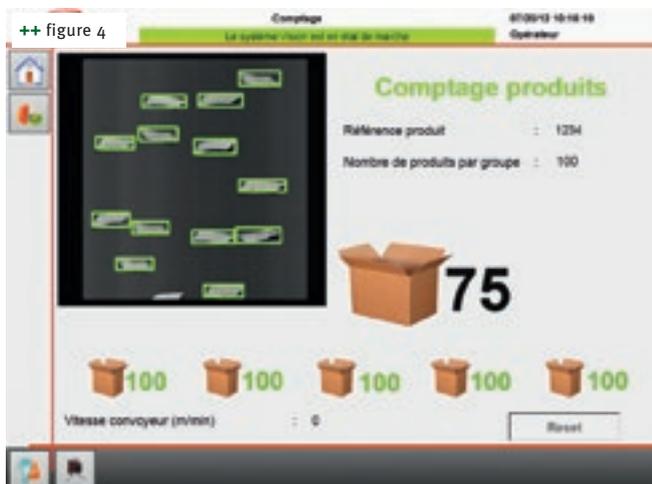


++ figure 3

For half a century De la Ballina has manufactured machines to pack industrially fabricated baked goods. The French manufacturer always relies on high-tech solutions when implementing its plants

Powerlink from the Austrian automation specialist B&R (Bernecker + Rainer Industrie-Elektronik Ges.m.b.H., Eggelsberg) achieves these requirements effortlessly, with an accuracy of down to 10 ns, cycle times of as little as 100  $\mu$ s and response times of markedly less than 1 ms. So this real time protocol was quickly chosen as the basis for the new generation of machines.

The image processing system which De la Ballina develops itself was also incorporated via Powerlink to yield a fully integrated automation architecture. The image processing system involves PC-based technology with a Linux operating system. Due to its open structure, Powerlink is very easy to integrate. A Powerlink device can be used either as a master or a slave. The activities in the network are controlled via a master. All the other active devices are slaves. The communication in Powerlink networks takes place cyclically, each cycle starting with the broadcast of a frame by the master. Immediately after the broadcast of this initial frame, the master sends a query to each slave. The slaves that are addressed then reply. The replies can be received by any master and by all the slaves in the network. This procedure prevents network collisions and at the same time enables deterministic time behavior. A fixed time point in the network cycle is reserved for asynchronous data, and is used for example for image processing, diagnosis and the firmware upgrade.



++ figure 4

As part of modernizing the plants, De la Ballina also redesigned the visual display of the machines: it presents relevant information to the operator clearly and understandably

Powerlink technology fully and completely satisfies De la Ballina's requirements. It has paved the way for a highly efficient integrated architecture in the French plant manufacturer's new generation of machines. Precisely because Powerlink is an open technology, integration into the image processing system was associated with only small costs and has achieved a considerable increase in performance. +++

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