

THINKING OUTSIDE THE BOX AT KRAFT FOODS

The Situation

Kraft recognised that a significant increase in efficiencies could be achieved through the introduction of an automated robot distribution system for its immensely popular Roses and Heroes products. The investment would also benefit the company's ongoing commitment to the Kraft Foods Sustainability Programme; substantially reducing material usage by replacing cardboard boxes with reusable plastic tote bins and cutting daily vehicle movements through the accurate management of fixed cycling schedules.

The core brands of Cadbury Roses and Heroes are produced and packaged at the Bournville production facility. The wrapped chocolates that make up these assortments have traditionally been managed through the factory in cardboard boxes. With ten types of chocolates in Roses and six in Heroes, there are defined process lines at various locations within the plant. The palletised, stacked boxes, identifiable by barcode, were then transported across the factory to two packing plants, located on different floors.

The palletised boxes would be moved to an area adjacent to the appointed packing plant. A series of unit designated in-feed hoppers were manually topped up from the pallets by operators, to feed the automated packing operation. A number of operators would remove the boxes from the pallet stacks, open and tip the boxes into the designated hoppers, the empty boxes would then be crushed and removed from the packing area.

The Solution

Kraft commissioned CKF Systems of Gloucester as its project partner to design an automated re-circulating distribution system that met their production requirements, removed cardboard waste and provided safeguards to the assortment integrity. Experts in automation and robotic technologies, CKF had recently developed and completed a robot palletising solution for Kraft Sheffield, the collaboration providing immediate benefits to their manufacturing capability.

"The business had been pleased with CKF's achievements in Sheffield and had been particularly impressed with the company ethos as a solution provider," explains David Moreton, BD&E Project Manager, Kraft Foods UK.

"At Bournville, the challenges required a bespoke requirement with major design, mechanical, control and engineering complexities to contend with. We knew that CKF had the capabilities, technical resources and exactly the right mindset in their approach to a project of this nature. They also understand our business and the very high standards we demand."

Responsible for the complete turnkey project, CKF designed, installed and commissioned the system, located in three production areas and over two floors. It comprises an automated robotic system with high level delivery and return and (alongside) vision controlled distribution that automatically feeds the

two packing plants. The wrapped units are handled in open plastic tote bins allowing the high definition vision systems to identify product type using the latest recognition technology.

Four ABB 4-axis IRB 660 robots, complete with bespoke vacuum tooling are arranged in a balanced cell format. Recipe driven, the cell format allows the flexibility to meet the demands of all the packing derivatives and recipes when both packing plants are on demand. Each of the four cells has six pallet-feed conveyors to receive product and to discharge re-palletised empty tote bins. The pallet management is also handled within the robot cells, the tooling being designed for handling both tote bins and pallets.

By means of an information screen, product is selected, confirmed by one of two HD vision camera stations and loaded into the appropriate robot cell in-feed. This arrangement also determines the stack height of individual pallets and the orientation of the tote bins on the pallet. On demand from the packing plants, the robot de-palletises the tote bins with a custom designed vacuum head and places them onto the delivery system to the packing plants.

Delivery is achieved through an extensive conveyor system routed through the factory over two floors. The system incorporates spiral elevators and de-elevators, reject stations, intelligent accumulation, automated tote bin tipping and manual feed operations for each plant.

Key to the success of the system is its product recognition facility, utilising a total of seven HD cameras, capable of identifying both colour and shape, to ensure the right product is routed to the designated hopper.

HD cameras are located at the entry to each packing plant distribution system, this defines / distributes the correct unit to the correct hopper lane. Across both plants there are a total of 35 lanes with intelligent accumulation, giving sufficient buffer capacity prior to the automatic tipping machines. Developed specifically for the project by CKF, the tipping machines deliver units into the feed hoppers upon demand.

The returning empty tote bins from the packing plants are combined and a final vision system inspection ensures these are clean and suitable for re-palletising by the robot system. Contaminated tote bins are rejected for cleaning.

System control is via Rockwell PLC with Ethernet communication and safety controlled via a Guard Logix PLC. The HD camera software and robot software solutions were specifically developed for the demands of this application.

The four enclosed robot cells are defended with in-floor induction loops, light guards and secure gate access. An HMI interface is located in three control suites at the respective production areas. Specifically developed software provides a flexible and easy to use operator interface for automatic operation with manual override options.

“It was of paramount importance that operating the new equipment would be relatively easy and uncomplicated,” continues Moreton. “Additionally, the production volumes associated with these premier brands demanded that the new automated system was installed and commissioned alongside that of the existing operation and without any loss to our production schedules. This was a tough demand given the size and complexity of the project; CKF achieved it without disruption to our scheduled output.”

“There is now a user friendly interface that allows the operational team to have complete confidence in the control of this complex system. We are extremely pleased with the results”.

Through CKF and Kraft joint training programs, operational and maintenance personnel have embraced the introduction of the new technologies, paving the way for a smooth transition amongst the workforce from the manual to the automated operation.

The Benefits

“Significant benefits have been realised by the success of this project,” concludes Moreton. “Given the volumes of these two packing plants we have improved operational efficiency with additional positives brought about by the reduction in material movements, vehicle activity and cardboard usage. The automation has enhanced our environmental programme and, importantly, decreased the plant’s carbon footprint.”

“For Kraft, investment in robotic and automation applications is essential to remain competitive, protect the future of the business and reduce our environmental impact. It also allows us to make better use of labour resources and improve quality control. However, to achieve this, the right partnership is essential to ensure the project is implemented effectively and achieves the targets set out by the business. Without this you could regret the change; we have no regrets.”

“CKF’s expertise in this type of system provided the solution that in turn was installed and commissioned to a plan which ran smoothly and safely alongside our ongoing production. The results are very promising. We now have a system that is faster, more robust, requires minimal maintenance and meets all of the business investment expectations.”