Robotics vs. Product Distribution Conveyors

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Q: What should food manufacturers consider when adding a feeding system to their flow wrapper packaging lines?

A: Food manufacturers are always looking for ways to achieve higher outputs and lower costs, and automating their packaging lines is an effective way to achieve this goal. When selecting the appropriate feeding system for their facility and product, they often choose between Delta robots and product distribution conveyors. Delta robots, with their technological sophistication and flexibility, are usually better suited for complex applications that require high degrees of precision and flexibility, while product distribution conveyors work well with high-speed, high-throughput applications dealing with simple products — a traditional “workhorse” solution.

However, other variables will also drive a decision and it is critical to take a holistic view of all aspects of the packaging line to ensure an optimal solution. To help identify the best feeding solution for a packaging line, we created selection criteria to evaluate three key considerations: pack configuration, product characteristics and operating environment.

Q: What is “pack configuration,” and how does it impact whether processors choose robotics or conveyors for their packaging lines?

A: “Pack configuration” is the number and orientation of products within a package. For example, most candy bars have a very simple, single flow wrapped pack

configuration so conveying has a distinct speed advantage over robotics. Additionally, a conveying solution is especially suited for lines where product changeovers are minimal.

An example of a more complicated configuration is two cookies stacked two high, for a total of four cookies. Here, a robotics solution would be more suitable, especially if additional configurations are also required. If the packaging line needs to run different products or create multipacks, the flexibility of Delta robots often makes this the optimal solution. From an operational standpoint, changeover between product formats on Delta robots is often merely a matter of attaching different end effectors to the robot and switching to another recipe on the human machine interface (HMI), and can be completed in minutes. To enable quick production changes, relatively inexpensive changeover parts are available for other components of the robotic system.

Q: Which types of products are more suited for robotics, and for which products would a conveying system be ideal?

A: Product characteristics will influence feeder selection. Delicate products, such as soft or sticky bakery items and confections, need a feeding solution able to gently handle the product with no damage. In these cases, conveyors are often the best solution, especially for products with a gooey or high particulate or “dusty” topping, such as caramel or powdered nut toppings, as they cannot be gripped without damage by the vacuum suction end effectors of Delta robotics. Mechanical grippers can sometimes be used as a workaround, but they can significantly reduce the line speeds.

However, due to the wide selection of robot end effectors available, delicate items are sometimes able to be effectively and efficiently picked and placed by Delta robotics. This emphasizes that it’s ultimately a matter of first examining the product characteristics and testing the end effector technology. Either solution can be considered if the product is more durable and rugged. If flexible pack configurations are desired, Delta robots are often the better alternative as changeover is much simpler.

Q: How does the operating environment affect the choice between robotics and conveyors? Which environmental considerations should be made by manufacturers when making such a purchasing decision?

A: The operating environment can include factors such as available floor space and sanitation requirements. Product distribution conveyors often have a larger footprint than robots, occupying more factory floor space. Depending on the complexity and volume associated with the application, conveying configurations have curves, separate outgoing feeds and flighted belts that tend to sprawl across the factory floor. Conversely, a robotic cell compresses this product handling function and usually requires less floor space than a conveying solution. Delta robots have a distinct advantage when floor space is limited.

Regarding sanitation requirements, robots are advantageous if sanitation of the

equipment is critical and routinely performed. Robotic cells have exposed, open structures and limited product contact points, which make it easier to remove pathogens during the sterilizing process. This reduces time and cost required for the sanitation process. Additionally, stainless steel can be used for most of the product contact parts to ensure a higher degree of sterility. On the other hand, the sheer number of belts, product contact parts and transfer steps on conveyors tend to increase the time, labor and cost involved in any cleaning process.

Q: Is there a difference in cost and ROI when it comes to robotics versus conveying systems?

A: No capital investment analysis would be complete without considering the cost or payback time of the automation system. As a supplier of both robotics and product distribution conveyors, we have experienced that a thorough analysis of pack configuration, product characteristics and operating environment will result in the most efficient and effective feeding solution with the highest ROI. Additionally, we have found a minimal price difference when either solution could be used.

There’s also a perception that robotics are more expensive. However, the reality is that, where robots are appropriate, they often offer payback times of only 12 to 18 months.

Q: Does one method of feeding favor small or large operations more than another? Why or why not?

A: The size of the operation does not directly influence the decision. However, large operations tend to have products that are produced in quantities that justify dedicated packaging lines. In these cases, because product changeovers are infrequent and high speeds are necessary to achieve the desired production volumes, conveyors are often the most appropriate solution. Additionally, larger operations tend to have the floor space available for conveying solutions.

Smaller manufacturers may be hesitant to invest in robotics because of the perceived technical complexity. Yet with the new user-friendly software interfaces, even companies with no prior robotics experience can effectively and efficiently implement robotics in their plant.

Interview by Lindsey Coblentz, Associate Editor, Food Manufacturing

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