Facing a tight labor market, wage inflation and high employee turnover, meat and poultry processors are increasingly turning to automation. Simply defined, machine automation is any information technology that is designed to control the work of machines. Advances in robotics and technology have made it possible for machines to perform some tasks previously performed by people.

In a recent report from CoBank titled Help Wanted, profiles of Schwartz Farms, a pork producer headquartered in Minnesota, and Case Farms, a North Carolina poultry processor, provide a glimpse of how the industry’s labor woes are preventing expansion and negatively impacting profits. Their stories are echoed throughout the industry.

“In the meat business, we have pretty high employee turnover, both operational and mechanical,” says Steve Valesko, vice president of engineering for Butterball. “The more we can automate, the better it’s going to be for us because it’s so hard to fill these positions.”

In a 2017 report from PMMI (The Association for Packaging and Processing Technologies), The Trends Shaping Meat, Poultry and Seafood Processing, three of four firms surveyed already use automation in parts of their operation. The meat industry significantly lags other types of manufacturing. Just 13% of all robot sales in 2017 were to the food, beverage or personal care industry, compared to 34% for automotive.
any meat processors are reconsidering automation because labor costs have been rising while the cost of automation has been declining (see chart above). There have also been significant advancements in robotic technology. Much of the initial focus on automation in the meat industry has been on packaging.

WHICH PACKAGING PROCESSES CAN BE AUTOMATED?

Loading products into the primary packaging machine or unloading finished products off the end of the packaging machine are two of the most common tasks that can be automated. The process of loading primary packages into secondary packages, as well as shipping containers or boxes, can also be automated. Repetitive motion tasks and tasks that require multiple people are prime candidates for automation.

“Human beings can do many things in these categories—sensory, thought process, vision, that is hard to replicate with machine control,” says Ken Harding, senior director of Engineering for MULTIVAC, a supplier of packaging machinery. “You need repetition and consistency for machine control to work.”

According to Harding, all thermoformed packages and preformed trays are possible candidates for automated loading. Virtually any primary package can be auto-loaded into secondary packaging.

Butterball uses automation for case packaging. A robot picks up either trays with ground turkey or cartoons with frozen turkey burgers and places those items into a box. “Automation is one of our big initiatives,” says Yalesis. “Where we can see efficiency and improvement and reduce labor costs, we are going to attack it.”

“HYGIENIC DESIGN GOES FAR BEYOND BEING ABLE TO WASH DOWN EQUIPMENT”

Source: Ken Harding Sr. Director of Engineering, MULTIVAC

“Higher volume production will often necessitate some level of automation, and you always look for return on investment, but that is not always the determining factor in the decision to automate,” says Harding. “With the workforce for manual labor decreasing and wages on the rise, automation can often be the logical alternative.”

Automated case packing inspection uses cameras to detect, reject and sort faulty packages. It offers several benefits over manual inspection, including more accurate, validated data on 100% of packages. Unlike manual inspection where risk varies from person to person, the risk of an automated system is low and remains constant.

According to Bob Doyle, vice president of the Robotic Industries Association, advancements in robotic technology have greatly expanded the uses for robots within manufacturing. Vision-assisted robots now can pick appropriate product and place it where it needs to be so packaging or other work can be completed. Soft grippers can pick up a delicate product without damaging it.

RETURN ON INVESTMENT

When calculating a return on investment (ROI), it’s important to remember that the cost of automation includes not only the cost of robotics, but also the cost of material-handling systems, sensors and other technology needed to ensure the safety and effectiveness of the operation. ROI comes when the labor savings justify the expense. An ROI Robot System Value Calculator (available on robotics.org) takes into account the number of shifts per week, the average labor cost, the number of operators removed per shift, the percentage of labor retained to operate the machine, and expected productivity gains.

“There is no reason to be afraid of automation,” says Harding. “An automated case-packing robot is no more complex than a packaging machine. It’s just not as commonplace. Once meat suppliers get some experience with automation, they typically embrace it.”

INCREASED THROUGHPUT

Unlike humans, industrial robots don’t get distracted, lose attention, get tired, or take vacations. When combined with vision systems and other technologies, robots allow for packaging at far higher throughput levels than is possible manually. Robotic loading and unloading of packaging can be accomplished with greater accuracy, especially at high speeds. Downtime and waste caused by human error is eliminated.

QUALITY CONTROL

Automatic loading of packaging machines improves the reliability and consistency of the loading process through mechanization with sensory feedback.

Automated inspection systems also improve quality control by monitoring attributes such as cosmetic or physical defects, the presence of the product in the package, label errors, and the position of the product and label. When packages deviate from acceptable parameters, the product is identified and removed from the line.

FOOD SAFETY

“The more products are touched with human hands, the greater the risk of introducing bacteria,” says Harding. “Automation removes or reduces the human element when it’s used to load products into a packaging machine, improving food safety.” PMMI’s Industrial Robot Opportunities in Food and Beverage Processing cites meeting regulations on food hygiene as one of the reasons for slow adoption of automation in the food and beverage sector. “The concern is that equipment could be designed with bacteria-harboring areas that are impossible to clean and inspect,” says Harding. “Eventually bacteria could grow and contaminate the product.”

Food packaging consultant Gary Kestenbaum cautions processors that might assume all robotics sold into the industry meet the standards for hygienic design. “When you commission new equipment do not assume that the manufacturer has vetted the design parameters against the application(s) through a certified food safety expert,” he says. “Rather, inquire, verify and document in writing before proceeding.”

“When are there many innovations with limited knowledge of food safety who are designing and manufacturing custom automation in many industries,” says Harding. “By comparison, MULTIVAC incorporates standard hygienic design principles in all of our equipment.”

Hygienic design enhances sanitation, decreasing the risk of biological, physical or chemical contamination. Robots used in processing applications may have features such as stainless steel motors, food-grade grease for lubricating mechanical components, plastic rather than steel components, and improved sealing to allow for wash-down of the robot.

GETTING STARTED

If you are new to automation and want to know where to start, Bob Doyle suggests identifying the pain points—areas of inefficiency or where you have trouble keeping employees. “Choose one project that can be successful,” he says. “If you don’t have engineering staff available, identify trusted suppliers who can walk through your facility and identify what might work best for a first application.”

“Take time to define your objectives. What is the consistency of the product to be packaged? What are the space considerations? What kind of speed is desired? Consider the pros and cons of retrofitting an existing packaging machine vs. planning an entirely new packaging line.”

“When you purchase a completely new packaging line, you have many options for throughput, equipment footprint, controls integration, etc.” says Harding. “The entire system will be designed for maximum efficiency. When you retrofit automation to an existing packaging machine, you will often have to compromise in one or more areas.”

Custom Automation Solutions

MULTIVAC automation systems are custom-designed using proprietary robotic components. The process of bringing product for packaging into the loading robot portal, to tooling of the robot end-effector in contact with the product, and the programming of the robot, is application or project specific. A consultation helps to clearly define and prioritize the objectives in order to develop a comprehensive project scope. The typical time needed to get an automation solution up and running is 26 to 40 weeks.

MULTIVAC is expanding engineering and manufacturing of robots from Germany to the United States as well as application support. “We are gearing up to lead times and to increase support for a growing customer base,” says Harding.

The MULTIVAC T800 is an automated tray sealer suitable for MAP and vacuum-skin packaging
10 PRINCIPLES OF HYGIENIC DESIGN

"Hygienic design goes far beyond being able to wash down equipment," says Harding. "The reason we entered automation more than 10 years ago was because none of the robotics suppliers had systems that could meet our requirements." Manufacturers of meat and poultry processing and packaging equipment must meet hygiene standards NSF/ANSI/3-A SSI 14159-1.

1. Equipment should be cleanable to the microbiological level.
2. Construction materials must be compatible with the product, environment, cleaning and sanitizing chemicals, and the methods of cleaning and sanitation. Materials should be stainless and food-grade plastic construction.
3. Equipment must be accessible for inspection, maintenance, cleaning and sanitation.
4. Equipment should be self-draining to ensure that liquid does not pool on the machine, where it might promote the growth of bacteria.
5. Hollow areas of equipment, such as frames and rollers, must be eliminated or permanently sealed.
6. Equipment should be free of niches, such as pits, cracks, corrosion, recesses, open seams, gaps, lap seams, protruding ledges, inside threads, bolt rivets and dead ends.
7. Operating the equipment should not contribute to unsanitary conditions or the harborage and growth of bacteria.
8. Equipment should feature hygienic maintenance enclosures and human machine interfaces, such as push buttons, valve handles, switches, and touchscreens. Product residue or water cannot penetrate or accumulate in and on the enclosure or interface.
9. Ensure hygienic compatibility with other plant systems.
10. Validated cleaning and sanitizing protocols must be clearly written and designed, and proven effective and efficient.

*Sourcethe Sanitary Equipment Design Principles, Foundation for Meat & Poultry Research and Education

ADVANTAGES OF MULTIVAC AUTOMATION

| Complete packaging line vs. multiple components | • Greater line efficiencies as all components are coordinated
| | • Single source of responsibility for line performance, maintenance and repair
| | • Complete lines are fully tested before shipping, reducing the start-up curve in the customer’s plant
| Comprehensive understanding of the needs of meat processors | • 50 years of experience in meat packaging
| | • Equipment is built to withstand cold, wet environments
| | • Hygienic equipment design
| | • Food safety knowledge
| | • Focused on maximum uptime
| U.S.-based manufacturing and engineering in 2019 as well as continued U.S.-based applications engineering | • Shorter lead times
| | • Increased availability of engineering support
| Top quality control components | • 100% Allen Bradley components with Rockwell hardware used for all intelligent devices such as Servo Motors, Servo-Amplifiers, PLC, PC, Safety PLC, HMI, etc.
| Automation experience | • 600+ robots on more than 450 projects in 10 years
| Technical support | • 80 full-time U.S.-based technicians
| | • Remote troubleshooting and support

MULTIVAC HAS SUPPLIED 600+ ROBOTS ON MORE THAN 450 PROJECTS DURING THE LAST 10 YEARS.

Contact your trusted MULTIVAC sales advisor for more information on automated packaging line solutions.