



The Future of Automation

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Summary

When we look at potato processing as it is done today, and try to imagine how it will look in the future, what do we see? What trends are emerging today that may be in full force in the coming years? What economic realities must we face that we may have avoided in the past?

In 20 years, I expect to see essentially lights-out potato processing plants with virtually no operators on the production line. I expect that sensors will collect and report equipment and product parameter data that will be used to control processes and enable the line to operate at peak performance without routine human intervention. This extreme level of automation will minimize the cost of labor, reduce production line downtime and improve both product quality and yield.

The Drivers Fuelling Automation

The most obvious driver fuelling automation today is the cost and availability of labor. Limiting the discussion to a pure cost analysis for a moment, a plant must weigh the cost to acquire, train and retain labor against the cost of purchasing and maintaining automation technology. In industrialized nations where labor is scarce, this analysis is increasingly favoring automation as the preferred solution. Potato processing plants in industrialized regions are searching for alternatives to alleviate their reliance on operators while maintaining high product quality and production line efficiencies.

A less obvious labor-related driver has to do with the relative benefits and deterrents of labor in comparison to automation. The concept that human proximity to product is a primary source of quality problems has long been accepted by many pharmaceutical and computer chip manufacturers where cleanrooms are the norm. In those industries, access to the product during processing is always strictly controlled, and nearly eliminated. The idea that labor can have a negative impact on product quality is just starting to be addressed in the food processing industry. At the forefront of this trend are potato processing lines, which rely heavily on automation after the fryer – the last kill step on the line – to minimize the chance that microbes will be introduced by line operators. This and other facets of human contact with food will ultimately be eliminated in the future.

Another element fuelling interest in automation is line control. Ultimately, virtually every human function can be replaced by automation. In most situations, automation has the potential to be more objective, more repeatable, more accurate and quicker to respond, which lends to drastically reduced unplanned downtime for the line. On potato processing lines where the cost of lost production is often \$20,000 to \$40,000 per hour, maintaining line efficiencies is a high priority from a cost standpoint. Of course, enhancing line performance can improve product quality and yield as well as line efficiencies.

Automation Today

Automation has been replacing manual operations since before the industrial revolution. Now, we are poised to take the next step in automating production by using sensors to measure and monitor the automated processes. Sensors can make machines more reliable by improving self-detection and self-reporting, which is paving the way for these systems to become self-correcting.

One example of this type of on-board sensor is an accelerometer used on some vibratory conveyors to measure and report speed and stroke. In addition to providing real-time analysis of shaker function, this type of sensor can also monitor line-flow conditions and trends at-a-glance. Sending an alert when speed or stroke are out of tolerance, such a device can prevent downtime and reduce labor, while providing the opportunity to improve process efficiencies.

Additionally, sensors are being added between processes to augment line control. One example of such technology is the use of a peel scanner after the peeler. This camera-based vision system detects residual peel and automatically adjusts the upstream peeler depending on the condition of the product it views. It optimises the peeler to maximize product quality and yield.

Illustrating the outer limits of automation in use in the potato industry today are cold storage plants that have reduced the oxygen within the facility to reduce the potential for fire. These facilities are fully automated simply because there is not enough oxygen to sustain workers. It is an example of using automation not as a reaction to the cost of labor, but in an effort to maximize the quality of product and provide a safe environment.



Figure 1: Increasing Implementation of Sensors and Smart Software will Control Processes and Enable the Line to Operate at Peak Performance without Routine Human Intervention.

Automation of the Future

Ultimately, sensors can be developed to measure any touch point currently monitored by an operator. Anything that an operator can hear, see or touch can be monitored by a sensor, often with greater accuracy and speed. For example, the temperature of a drive can be measured by a sensor and a system can be developed to send an alert if the temperature spikes. Such technology exists today but is not typically in use in potato processing lines simply because the cost of the potential problem does not yet warrant the cost of the solution. But this is changing.

The primary reasons to use sensors to keep a production lines running at peak performance include reducing labor, increasing line efficiencies, optimising product quality and maximizing yields. Since the value of these drivers is changing, the cost-benefit analysis of sensors is changing with it.

The value of reducing labor increases as the cost of labor increases. The value of production line uptime is a function of both the inherent value of the product and the speed of the line since a higher throughput costs more in lost product for every second that it is down. The value of product quality and food safety is a function of both our legal system – the cost of defending the company in litigation and the potential damages rewarded – as well as the more-difficult-to-measure consequences of a tarnished reputation.

With the speed and efficiency of communications today, via the Internet and social media as well as more traditional news channels, the value of maintaining high product quality has increased. This is because quality problems, once discovered by the public, can cause serious and costly problems for a company very quickly. Most companies understand that protecting consumer trust by maintaining product quality is of paramount importance.

At the same time the value of automation is rising, the cost of automation is falling. Thus, the equation is rapidly shifting in favor of automation. Forward-leaning potato processors understand this and are increasingly looking for new solutions. Forward-leaning suppliers understand this and are developing new technologies, starting with those that offer the greatest value and the fastest payback for their customers.

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