

How Simple, Automated Technology Improves Packaging Line Changeovers

Everyone knows the frustration of having a smooth drive interrupted by a stoplight...and another one...and yet another one. Delays that may last only a handful of seconds can seem like an eternity. Yet there's not much that can be done until that light finally turns green.

Packaging changeovers work much the same way. Whenever there's a significant change in product size, shape, flavor, or material, the system is brought to a standstill so that machine settings can be adjusted. And just as a "jackrabbit" start often does an impatient motorist little good (e.g., wasted gas, few time savings, or the unwanted attention of a law enforcement officer), bringing a restarted line up to speed too quickly can result in damaged and wasted product, and lost time to tweak the settings even further.

Decrease variety or increase costs? Packagers no longer have to choose

With an explosion in the number of products and variants designed to meet consumer preference and regional packaging needs driving the demand, the need for efficient changeovers has never been greater. Given the limitations of conventional changeover procedures, however, packagers may see changeover downtime as an immutable part of doing business. As a result, packagers may choose not to customize packaging to local market needs, or dedicate lines to specific SKUs, which would then occupy more floor space and decrease overall production capacity while increasing operating costs. Thanks to modern line changeover technology, packagers no longer have to choose between reducing the variety of products, potentially losing market share, and increasing costs, which would reduce profits.



In production facilities where changeovers are frequent, a variety of proven solutions can automate the changeover process, greatly reducing downtime and ensuring higher, more consistent throughput. And because precise technology eliminates the risk of incorrect adjustments, post-changeover startup waste and jams can be vastly reduced, thereby enhancing a packager's productivity and competitiveness.

Keeping up with small batches, large demands

Though packagers have always strived to make their changeovers as quick, efficient, and accurate as possible, the process has gained heightened attention in recent years due to the convergence of trends such as on-demand and customized packaging to cater to a wider, more diverse range of customers. Both require smaller, more varied "batches" of production runs, rather than the hours- or even days-long runs of a single product.



As such, many packagers can no longer rely on manual system changeovers as “good enough.” In addition to being time-consuming, they are not always repeatable. Even the benefit of a skilled operator’s eye and judgment can still result in errors, lost time, and wasted material. More batches mean more machine variables, and more settings to remember or refer to, creating another potential failure point when machine setup information is misinterpreted.

Then there’s the fact that labor itself has become expensive. Experienced, capable employees are a treasure to any business, but the ability to replace that knowledge and skill as they move on is by no means guaranteed.

These and other factors can put a packager at a serious cost and productivity disadvantage in what has become a highly competitive industry, particularly for contract operations and other consumer goods manufacturers. Time has truly become money, and minutes spent with the system offline for a changeover, or one that can accommodate only a limited range of products, erode a company’s profitability. Changeover issues can likewise cost a contract operation business, as delays and limitations will usually send clients in search of new suppliers, and compromise their ability to attract new ones.

Changing technology improves line changeovers

An automated changeover system, on the other hand, can eliminate most or all of these problems by replacing hand wheels, mechanical stops, and other manually adjusted components with intelligent sensors, drives, a programmable logic controller (PLC), linear units, and human-machine interface (HMI) displays.

In most cases, an automated changeover system’s components and cabling can be easily retrofitted into an existing packaging line regardless of its complexity or the type of machines it contains, and those that may contain elements from different manufacturers. This helps preserve and even enhance what is often a system owner’s most significant capital investment.

Though an automated changeover system may sound “high-tech,” its functions can be quite simple. Because the fundamental changeover commands are pre-programmed in a controller, operators simply input the necessary machine settings for each type of product via the HMI using an intuitive step-by-step process that requires no controller knowledge or programming skill.

Flexibility on demand = increased productivity

An automated changeover system can be used for an entire machine or one module/part of the machine. In addition to the operation of the system being intuitive, the system provides a step-by-step process for new recipe configuration that adds value to packagers. It helps them understand the corresponding relationship between automated and manual changeover. This system can provide as much flexibility to packagers as they need. For example, the ability to fine-tune a particular recipe; program a particular seasonal change point or time frame; or replace a motor or a drive are some of the many possibilities. This system ensures that the knowledge and expertise acquired by packagers through years of experience can still be input to the system while mundane and tedious tasks are done by the machine. Similarly, formats can be changed in parallel or in sequential order, depending on the needs of the production process.

Each customized configuration of machine stops is stored as a separate “recipe” within the controller. When it’s time for a product changeover to occur, an operator selects and executes

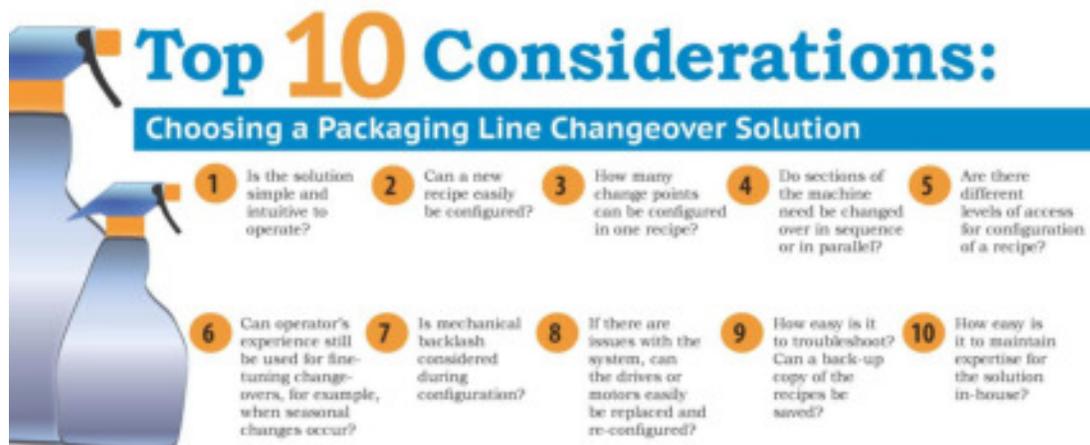
the desired configuration. The settings are automatically repositioned with pinpoint accuracy, allowing full production of the next batch to get underway in a matter of seconds.

Of course, each packaging line is different, and the time necessary to integrate an automated changeover system and familiarize personnel with its operation varies among companies and even within facilities. But the return on investment can begin almost as soon as the system is activated. Packers are assured of accurate machine settings for each product the system handles, whether it's a frequently produced item or a one-time, specialty run. That results in less system downtime and material waste, increased productivity, and more reliable production quality and traceability.

Automated changeover systems can also benefit a packager's workforce. Operators can focus on other aspects of the production process, while maintenance staff need not be distracted from other assignments to help correct jams or other malfunctions resulting from manual changeovers. Safety and hygiene in the work environment is also vastly improved, as there's less risk of injury resulting from human intervention with a packaging system's moving parts, and contact with food products.

Considerations for choosing a system

When choosing an automated changeover solution, what should packagers look for?



Minneapolis-based SICK developed these 10 key considerations.

1. Is the system easy and intuitive to operate? Does the operator have to physically go to every section of the packaging machine? The more steps the operator has to go through during changeover, the greater the risk of errors.
2. Does the system need PLC knowledge or programming skills, or is it an intuitive, step-by-step procedure on an HMI? How easy is it to configure/add a new recipe in the future? Using a step-by-step process more closely aligns with the procedure used for manual changeovers, helping to increase the rate of changeover system acceptance by operators.
3. How many change points can be configured in one recipe? Are there more than 100? The current number of change points should be considered as well as future needs.
4. Do different sections of a packaging machine need to be changed over in sequence or in parallel? Sequential sections could allow for products to be packaged in one section while the other section is being changed over.
5. Can the packager have a different level of access for recipe configuration vs. normal operation? Restricted access enables ownership of recipe configuration.
6. Can an operator's experience still be used for fine tuning changeovers due to external changes like seasonal temperature fluctuations? This flexibility strikes a balance between the skills used for manual changeover and those skills needed for an automated process.

7. Does mechanical backlash need to be considered during configuration? Be sure to take into consideration whether it is automated or manual.
8. If there are issues with the system, can the drives or motors be replaced and re-configured easily? If no specialized skills are necessary, the cost of maintaining that expertise drops.
9. How easy is it to troubleshoot? Can a back-up copy of the recipes be saved? How good and quick is the technical support?
10. Is the system easy enough to maintain system expertise in-house? Dependence on an external supplier should be taken into consideration.

Bottom-line benefits

Along with being simple to implement, automated changeover systems are quite versatile. They can replace manual adjustments in virtually any type of packaging operation for any product in any industry.

At a bottling plant, for example, an automated changeover system can accommodate frequent alterations in bottle sizes and labels, fill amounts, capping, and packaging filled, capped, and package quantities/types. Even a subtle change such as label or package configuration can be implemented with just the touch of the HMI display button.

Likewise for prepared foods, a single packaging line equipped with automated changeover can better accommodate varieties of foods, packaging sizes, and product- or customer-specific features such as labels and other contents.

Another advantage of automated changeover systems is with production versatility and scheduling. A packager need not be limited to a particular type of product, or have to juggle schedules and staffing to work in a specialty batch with the least amount of downtime. Automated systems also make it easier to handle product runs of any size, from hundreds to a mere handful.

With these and other benefits of automated changeover systems, a packager can truly be “all things” to all its customers, and sell products based on targeted customer needs, without the offsetting loss in system uptime due to a manual changeover process. The result is the opportunity to serve a larger customer base while increasing revenue and profitability, and the flexibility necessary to keep up with the ever-changing dynamics of 21st Century packaging.

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