

Four Ways to Uncover Hidden Capacity

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Senior operating executives looking to produce a wider variety and higher volume of products may think it's time to expand the plant or invest in new equipment. But in many cases, they can improve their current output from their existing machinery. The methods described below look at how faster setup times and improved equipment performance can translate into increased capacity, more flexibility, reduced lead time and costs, and better quality and speed, reducing the need for capital equipment and inventory. The authors present four real-world examples of setup reduction opportunities for food and beverage manufacturing operations.



Supermarket shelves look quite different today than they did even 10 years ago. Food and beverage manufacturers have responded to market-segmentation opportunities with an explosion of product and packaging options, such as low-fat and gluten-free foods, as well as multi-pack and individual-portion offerings. As product and packaging variation has increased the level of complexity, manufacturers are finding that their production lines cannot keep up because of the additional shutdowns required to change from one product type to another.

Such capacity constraints naturally lead to outsourcing and capital expense requests to add new production lines and even build whole new plants. But there is an alternative. Shorter setup and changeover times can allow food and beverage manufactures to meet today's demands for greater product variety. They will be able to respond to seasonal demands, reduce finished goods inventory and boost output without making significant capital investments.

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Nearly 30 years after Shigeo Shingo introduced manufacturers to the fundamentals of rapid equipment changeovers (in the form of single-minute exchange of dies, or SMED), this discussion reviews some new ways to push beyond Shigeo Shingo's work to gain additional capacity. Here are some real-world examples of how food and beverage manufacturers have made major reductions anew in equipment changeover and setup times.

Capitalize on Employee Creativity

Rising demand for healthier food and beverage options has increased the number of stock-keeping units (SKUs) in plant warehouses and on retail shelves. This SKU proliferation has forced food and beverage manufacturers to increase the number of changeovers per shift. Secondary packaging options, such as single-serve or tray packs, also have contributed to higher-frequency changeovers or outsourcing.



Here's an example of an improvement that cut the changeover time to 36 minutes, a 55 percent reduction. One food processing plant that we work with was being hindered by capacity constraints in its bagging operation because of bag-size variations. The product moves from a scale to a chute that deposits the product into plastic or paper bags. The bags come in three different sizes. When operators needed to switch to another size, they had to shut down the bagging machine, remove the chute and replace it with a different attachment. The process took about 80 minutes to complete.

During a brainstorming session, plant employees came up with an ingenious idea to modify the chute so it could handle multiple sizes. The modification eliminated the need to shut down the machine and replace the chute each time they changed bag sizes.

Enlist Line Operators and Easy-to-Use Fixtures

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When food and beverage manufacturers cut changeover times, they can reduce batch sizes, which lessens the need to manage additional SKU requirements by increasing finished-goods inventory. Lower finished-goods inventory levels reduce product-handling and storage costs, spoilage and reduce working-capital requirements. In the following example, the solution helped the plant collapse the changeover time on a packaging line from nine hours to just 19 minutes. The change also completely eliminated the need for an off-shift changeover crew, and facilitated a significant reduction in finished-goods inventory of slower-moving SKUs.

To address long changeover times on its automated glass-packaging line that forced the plant to stockpile finished goods, a manufacturer of instant coffee and nondairy creamer assembled a cross-functional team. The team included an engineer, a couple of maintenance technicians and several line workers.

Working together, they redesigned the conveyor to eliminate the need for tools, so anyone on the line could perform conveyor rail adjustments. This allowed the skilled workers (mechanics) to focus on more complex tasks, such as adjusting the machinery, while the line operators adjusted the conveyor rails.

In addition, by designing clearly marked measuring blocks and fixtures based on product size for each machine, the team eliminated time-consuming measurements and the need for multiple adjustments after startup. They also hung color-coded parts on a wall near the line with all the tools needed to perform the changeover, shortening the time workers spent searching for tools.

Create Production Plans That Minimize Product Waste



One of the more costly consequences of poor setup practices is product loss. A manufacturer of frozen meals routinely dumped

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food because its production planning cycle was not sophisticated enough to minimize waste when the line switched to a new product. Machines would dispense mashed potatoes and gravy through two separate pipes into a tray. When they switched the line over to another meal configuration, workers dumped any product remaining in the pipes into a trash can before cleaning out the pipes for the next SKU.

Working with production managers, we discovered that they could reduce the food waste by aligning production so each pipe processed similar products in sequence. Now, if multiple meals call for mashed potatoes as a side dish, the plant processes those items consecutively rather than moving to a dinner that calls for pudding, for instance, and then back to mashed potatoes.

In this situation, the changes led to a yield improvement of 0.25 to 0.50 percent per day, converting food that would have been scrapped at a fee into sellable product.

Test Equipment Prior to Changeovers

A typical processor of French fries may pack 30,000 pounds of product per hour. The cost of stopping such high-volume food-processing lines quickly adds up. One manufacturer that we work with faced 30-minute shutdowns when it switched to a different type of heated jaws to seal the packaging bags. Adding to the downtime, thermocouples and heating elements would occasionally cause the replacement jaws to malfunction.

One of Shingo's core mandates for reducing setup times is to convert internal processes to external processes. Internal tasks are anything that requires the shutdown of a machine or line. External tasks can be performed while machines are running.



In this case, as part of a setup reduction initiative, the plant added a digital multimeter to its changeover carts. Prior to the changeover, operators now test the jaws with the multimeter to ensure they're working. If they are not working properly, the operator can fix the issue before the actual changeover.

This simple procedure change converted a maintenance task from an internal operation (while the line was down) to an external task that can be accomplished

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while the line was still running. This basic step saved about 30 minutes of downtime for each occurrence.

To Sum Up

Operational leaders don't have to accept average performance when it comes to equipment uptime. Each of the above examples capitalizes on the fundamental principles and practices for reducing setup and changeover times. By analyzing current performance, leveraging the creativity of employees and moving internal setup steps to external, food and beverage manufacturers can manage current demands with existing capacity and respond to new market opportunities as they arise.

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