Accountability Drives Food Quality

When lean Six Sigma intersects with statistical process control

by Thomas Cutler

Lynne Hambleton, author of “Treasure Chest of Six Sigma Growth Methods, Tools, and Practices” writes, “Decision making must be data driven.” Indeed, the lean Six Sigma DMAIC—define, measure, analyze, improve, and control—is at the heart of food quality because excellence can only be achieved through accountability.

Lean success is scarce across most industries, with nearly two-thirds (63%) of food manufacturers demonstrating only minimal or basic capability according to a Booz & Company survey of 116 plant managers. Pharmaceutical and automotive manufacturers had higher scores, with 61% and 59%, respectively. Chemical and transportation ranked lower than the food sector, with 81% and 71% demonstrating only minimal or basic capability, respectively (see Table 1, p. 42). Only 13% of the food sector received the high level of lean efficiency as determined by the top two lean category rankings: “composite best observed” and “industry best observed.”

“Make or Break: How Manufacturers Can Leap from Decline to Revitalization,” by Grichnik, Winkler, and Rothfeder, notes the following: “Despite their initial enthusiasm for lean manufacturing systems, Western companies were unable to develop the rigorous internal discipline and learning processes that were required if these new approaches were to evolve within their operations. Instead, they anxiously implemented quick fixes and grew disenchanted when they realized that the commitment required to generate long-term returns was beyond the culture of their companies.”

ISO 22000 and HACCP

Efforts to meld ISO 22000 and hazard analysis and critical control point (HACCP)—as well as lean Six Sigma—with statistical process control (SPC) metrics often leave food quality professionals in a similar quandary. While these two quality standards define systems for ensuring the safe production and packaging of food, implementing maintainable metrics is much more challenging than receiving compliance and certification.

Various sources say statistical process control’s power lies in its ability to monitor both process and variation. Collecting data from food samples at various points within the process enables detection and correction of variations in the process that would affect the end product’s quality. Along with reducing waste, SPC lessens the likelihood that problems will be passed on to the customer. With its emphasis on early detection and prevention of problems, SPC has a distinct advantage over rudimentary quality methods, such as inspection, that apply resources to detecting and correcting problems in the end-deliverable food product.

Evan J. Miller, developer of Hertzler Systems’ GainSeeker Suite, an automated SPC software system, cited a recent benchmarking report by the Aberdeen Group, “The Cost of Quality: Benchmarking Enterprise Quality Management,” which states that automated SPC is the number one tool used by best-in-class manufacturers. The research shows that best-in-class performers were nearly three times more likely to be using automated SPC systems and that use of these systems had the strongest correlation to performance than all other quality tools available.

Automated SPC can have a powerful impact in a number of areas affecting food quality. Often the fastest payback comes in the areas of net weight control and product giveaway reduction. This is especially true with skyrocketing food and petroleum prices. Automated SPC also has a profound impact on other areas, including HACCP data, process data such as processing temperatures and pressures, and even some of the soft, transactional data such as transportation cycle times and on-time delivery.

Automated SPC gives food processors instant knowledge of process variation and, because it is far more sensitive to shifts in the process than pass/fail data, response time is that much faster when problems arise. Moreover, this data can be used in aggregate to improve a manufacturer’s understanding of the underlying causes of variation, making it possible to systematically drive variation out of the process.

In addition to reducing waste, SPC often leads to a reduction in the time required to produce the food product; the diminished likelihood that the final product will have to be reworked may also result from using SPC data to identify bottlenecks, wait times, and other sources of delay within the process. Process cycle time reductions, coupled with improvements in yield, have made SPC a valuable tool from both cost reduction and customer satisfaction perspectives.

Leverage HACCP Data

Food quality executives must leverage existing HACCP data by using modern statistical techniques to help improve process stability over time. SPC data must record measurements for variable data in a database for easy analysis and reporting and must immediately
identify unstable conditions using statistical alarms, which are much more sensitive than pass/fail data. Cross-tabulations of SPC data must analyze and report results based on product lines, point in process, shift, operator, and other defined variables, including the ability to track on-time data collection by department, shift, and operator to ensure compliance with safety standards.

As quality efforts pay off in reduced defect costs and consistently low defect levels, many food manufacturers move to implement variable SPC. This system gives them the ability to measure and track critical product features at chosen time intervals using sample sizes much smaller than those needed for attribute SPC. Not only are inspection costs reduced by decreasing the size and frequency of samples inspected, but this new type of data also helps to evaluate the stability of the process.

Bottom-line lean result: Recognize small process changes before they become big enough to produce bad product. Real-time statistical alarms help prevent bad product from reaching customers because you, not the product, control the process. Many organizations spend a great deal of time and money designing and maintaining bullet-proof process control systems; this level of process control—without the high cost of in-house design and maintenance—is affordable with new SPC technology solutions.

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References