

# Quality, Compliance and the **BOTTOM LINE**

Warehouse control systems and statistical process control software give bakeries the tools to fine-tune operations and integrate processes.

BY THOMAS R. CUTLER

**W**arehouse management systems (WMS) are often insufficient for baking production and supply chain efficiency. The batch data often used by a WMS in the baking industry falls short of the real-time data needed to meet the strict Hazard Analysis Critical Control Point (HACCP) requirements. And the real-time pick-and-pack requirements for bakeries on the plant and warehouse distribution floor are rigorous because the Bioterrorism Act necessitates near immediate responses for possible contamination. Increasingly, warehouse control systems (WCS) are being used to overcome these mandates.

A bakery warehouse without a WCS operates as separate islands of automation, with each system working independently. Without a WCS, the conveyor system may decide where to route a carton with no information from the other systems. The decision to divert a carton (or not) to a specific zone will depend on whether the carton has a "1" or "0" in the barcode. Another approach would be to load a routing table into the programmable logic controller. However, this fixed table does not allow flexibility.

"Both of these techniques are very basic and give little or no control," said Jerry List, vice-president of QC Software, Cincinnati, OH. "One alternative used by many

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baking companies is to enlist a single supplier to provide all material-handling equipment. The equipment provider supplies the control software and interfaces to the host system. However, the system will be very basic, and any changes to the equipment layout will require modification to the software code. This is the easiest option, yet often the most expensive.”

Some baking operations choose a WMS that already has built-in integration to the material-handling equipment systems. Some equipment suppliers provide interfaces; many do not. Customized modifications to the WMS are cost prohibitive.

**LESS COSTLY OPTION.** Making modifications to any software package can be a double-edged sword. While WMS modifications will make the system closely fit requirements, they incur a maintenance problem of reapplying those modifications with every upgrade. Mr. List noted, “The cost of upgrading may prevent baking and snack companies from taking advantage of some new functionality that would benefit the operation. A system integrator can build a complete system, selecting the best WMS and ma-

terial-handling equipment for baking needs; they are, in effect, building a custom WCS.” Such modifications have the inherent problems of any custom baking software project including “bugs,” delays, maintenance and high costs.

ToolBox Software North America, Inc., New York, NY, manufactures the baking supply chain management software Cabtool (Computer-aided baking). “Paperless baking and production planning as well as process management are critical to optimization and simulation. These elements lead to production control and retraceability,” said Ralf Ulmer, president. Technologies like these can interface with various machinery in the production including weighing systems (flour silo, water mixing, sponge, scales), thermometers, mixers, ovens, transponders, barcode printers and barcode scanners.

**GAINING CONTROL.** Taking a broader view of control, statistical process control (SPC) in the baked foods industry

▼ Statistical process control systems ensure maximum production can be quantified en route to the warehouse.

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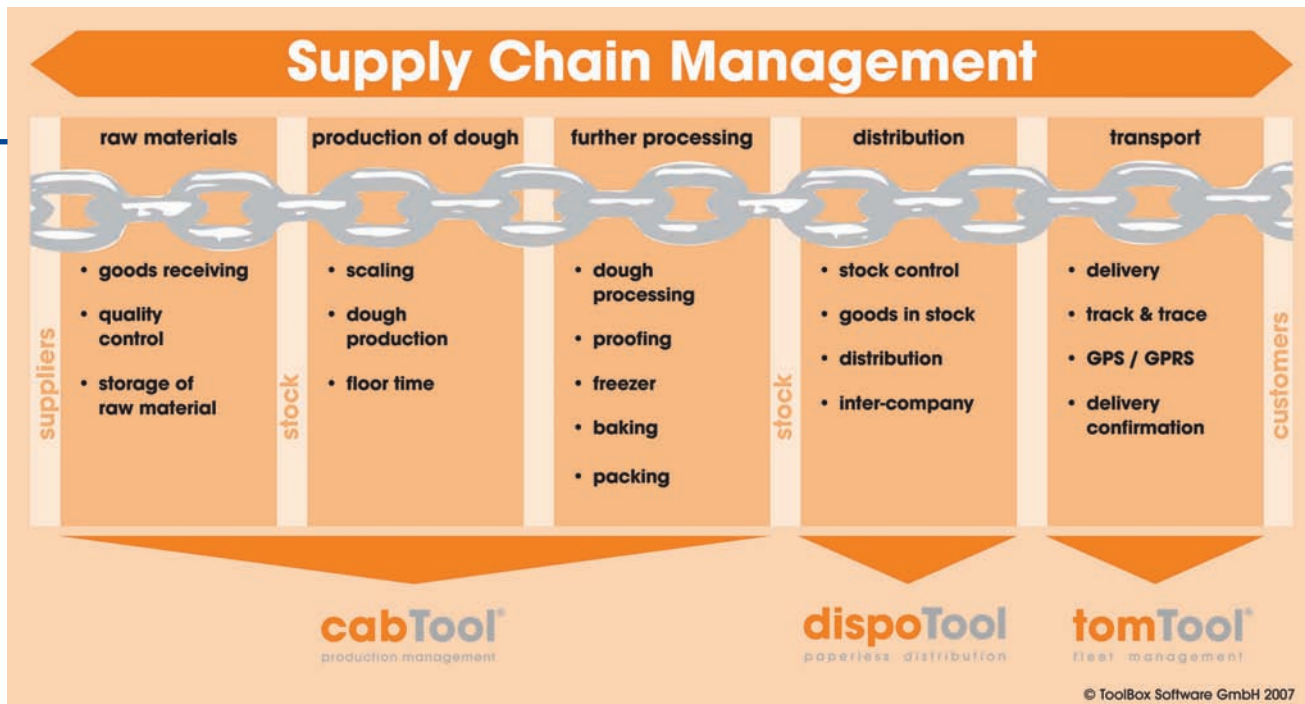
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▲ Supply chain management software interfaces with various equipment throughout plants to help bakers achieve production control and retraceability.  
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## 1900s Era Cookie Recipe Big Hit in St. Louis!



**D**ad's Original Scotch Oatmeal cookies, an old fashioned crisp cookie, are still baked and sold in a building that opened in St. Louis, Missouri in 1912. The business, and its 1900s era oatmeal cookie recipe, has been in Dad's President Ken Hastey's family since 1938.

Dad's produces eight varieties of cookies, but the oatmeal cookies account for 87-percent of Dad's production. Every baking shift starts off with at least 500 pounds of oatmeal. In addition to 300 wholesale accounts in the St. Louis area, Dad's has a large corporate gift business and mail order business that ships nationally.

Customers can still buy cookies in bulk from the old glass and wood cases at Dad's. A St. Louis tradition, Dad's customers bring in their children to buy cookies at the same bakery their grandparents knew. Ken Hastey knows what creates that kind of loyalty: consistency in the taste of Dad's oatmeal cookies. "We still use the original 1900 era recipe and keep our ingredients in line with what was available back then," Ken relates. "Shortenings change, the way of processing oats changes, but the taste must remain the same."

When Ken bought Dad's from his uncle in 1988, he also received this advice: "Never use anything but International® B&V® Dry 16-to-1 for Dad's oatmeal cookies. It's the best product to use and don't ever change."

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is being used more frequently to ensure that maximum production can be quantified en route to the warehouse. Reducing overpacking and material costs at the same time is becoming vital as ingredient costs continue to rise. "When baking companies overpack, they are giving money to their customers, and when they underfill, they are giving money to the regulators," said Evan J. Miller, president, Hertzler Systems, Goshen, IN. The company's SPC system GainSeeker monitors this process and demonstrates that overpacking is just giving away product. In high-volume operations, this quickly adds up to tens or hundreds of thousands of dollars. If bakeries underfill, the fines and damage to company reputation are even more costly.

The first task of any net contents program is to meet the requirements of NIST Handbook 133 and other governmental regulations for compliance to net content declarations on packaged goods. However, the National Institute of Standards and Technology (NIST) 133 standard does not specify limits for overfilling; that becomes a costly challenge for baking and snack firms. Fill weights must be above the maximum allowable variance (MAV) but as close as possible to the label declaration. The classic method of meeting the regulation is to shift the curve up, so that the average is at or above label, and the lower tail is just above MAV. SPC technology solutions allow bakeries to tighten the curve so that there are no MAVs and less overpack.

Streamlining data collection by connecting directly to all brands and models of scales and balances provides either simple or complex calculations to derive volume, whether immediate or "roaded." As each new measurement is entered into the system, real-time statistical tests to this data will immediately alert production if a process change is detected. Beyond reacting to real-time alerts, powerful analysis tools to pinpoint sources of variation in the baking and fill processes make it easy to discover which fill heads, material suppliers, operators, product lines and other variables have the greatest impact on process variation — individually or in combination. Armed with

this information, bakers are making better decisions on process improvements that reduce process variation and shift average fill weights closer to the declared label weights.

One reason why SPC solutions are widely used in the baking (and other food and packaging industries) is that they easily convert raw data (such as overpack weights) into something everyone understands — money. Mr. Miller gave this example: "Imagine reporting, 'last month we gave away \$43,221.53 of product' instead of 'last month we had an average overpack of 22 g per product.'" Accurately calculating overpack costs by linking directly to a baking cost accounting system and production systems provides the kind of lean accountability that is normative in new technology solutions.

Under the US Food and Drug Administration (FDA) Code of Federal Regulations (21 CFR Part 11) establishes the criteria under which electronic records and electronic signatures will be considered equivalent to paper records and handwritten signatures. Manufacturers of products regulated by FDA must apply this rule to records in electronic form that are created, modified, maintained, archived, retrieved or transmitted. Not all SPC solutions support 21 CFR Part 11; this is an immediate selection criteria qualifier.

ISO 22000 and HACCP define a system for ensuring the safe production and packaging of food. Mr. Miller noted that any SPC solution for the baking industry must leverage existing HACCP data by using modern statistical techniques to help improve process stability over time. These solutions must record measurements for variable data in a database for easy analysis and reporting as well as the ability to immediately identify unstable conditions using statistical alarms, which are much more sensitive than pass/fail data. SPC technology must allow baking companies to analyze and report results based on product lines, point in process, shift, operator and other critical variables such as track on-time data collection by department, shift and operator to ensure compliance with safety standards.