

Maintaining Your Cool

Keeping perishables at proper ranges is easier with latest monitoring devices. *By April Terreri*

On any given day, about a half-million dollars worth of beef hangs in the coolers at Booker Packing in Booker, TX. “We have to chill the cattle down and temperature control is very critical to our company,” says Tony Orel, Booker’s plant manager. “Temperature control monitoring is extremely important from a food safety perspective in preventing bacterial growth.”

Monitoring the temperatures of refrigerated farm-to-fork products helps deliver safe, high-quality products with longer shelf lives—resulting in less chance of shrink and associated financial losses.

End-users can configure reading intervals of temperature, time or other factors like humidity, according to product requirements. Programmable equipment responds to critical situations and sends alerts either by e-mail or phone pages. A common alert might involve a failed cooler where there could be 50,000 pounds of meat threatening to warm, says Dick Fettig, executive vice president of customer service at Dallas-based FreshLoc Technologies Inc.

“An alert is sent as soon as the system realizes there’s a potential problem,” he says. “Or you may have a trailer full of milk or vegetables—and temperature failure up or down can be a problem. Our products can quickly alert the proper personnel, saving the company tens of thousands of potentially lost dollars.”

Digital electronic data loggers can store data from multiple trips so companies can compare the performance of all their cold chain participants.

“Today’s data loggers really broaden the capabilities of understanding what’s going on throughout the transport of perishable commodities,” says Sylvia Todor, marketing manager of DeltaTRAK, based in Pleasanton, CA. “Our digital products begin the logging process [when someone pushes] a button at the point of origin.” If someone forgets to start the units, they automatically log because they are in a continuous logging mode.

With about 3,800 available data points, DeltaTRAK’s FlashLink loggers collect temperature and time data and also do auto-scaling. “When the graph prints out, it scales according to maximum and minimum temperatures so you get a visual definition of what happened during transit,” explains Todor.



KEEPING COOL: Drivers can concentrate on other things knowing that temperature monitors are keeping tabs on the refrigeration in their trailer.

DeltaTrak also offers data storage and analysis in its ColdTrak program and will launch a wireless, hand-held unit to collect data from DeltaTRAK’s data loggers, giving instant pass/fail information on the contracted temperature range. “This will really speed up the process on the docks, which can be hectic,” Todor says.

In fact, dock dwell time for carriers of refrigerated and frozen foods is longer than for any other industry. “The main reason is you generally can’t stage these products as long and they are usually not picked until the driver arrives,” says Greg Sargis, executive vice president of ShipXpress, Jacksonville Beach, FL. “The dock exchange is critical because warehouse space and truck equipment for these products is more expensive than for dry-goods; trucks also must keep their refrigeration operating.”

Sensitech Inc., Beverly, MA, will launch the industry’s first in-transit radio-frequency (RF) temperature monitor this year. The units will provide instant downloads to a reader from a range of between 100 feet and 300 feet and are expected to “save time in the receiving process at a retailer, where they can quickly review the results,” says Susan Bonacci, director of marketing for Sensitech.

“Loggers make a difficult job easier, and our products can incorporate a company’s HACCP (hazardous analysis and critical control point) plan,” says FreshLoc’s Fettig.

“All data is fed back to FreshLoc’s central service via the Internet and customers can enter their user ID authorization code to review their data.”

Cold Chain Technologies, Holliston, MA, offers KoolWatch, a temperature indicator. “Our product is an economical way (about \$6 for single-use units) to assure perishable products stay within temperature ranges during shipment,” says Rick Cahill, national sales manager. Units, run on computer chips and are factory-programmed to within high and low temperature parameters set by customers. Pushing a button starts the recording process on the unit, which is approximately the size of a label and about a quarter-inch thick. An LED screen displays either an ‘OK’ or ‘Not OK’ symbol so the receiver knows immediately whether the product stayed within temperature range during shipment.

“By holding down the start button for three seconds, the unit tells you at what temperature it went out of range and how long into the transit period it happened,” Cahill says. Newly launched at press time, KoolWatch is already getting a lot of interest from both pharmaceutical and food industries.

The iButton Thermochron is the latest temperature and data logger that Dallas Semiconductor/Maxim Corp. brings to the marketplace. Clients can program the tiny stainless steel units within a range of minus-

40 degrees Celsius to 85 degrees Celsius. With 2,048 data points available in the unit's memory, up to 1 million temperature readings are possible for the units. A quantity of 100 units cost less than \$11.

"Grocery stores assure the quality of their deliveries and restaurants find the units easy to use for data collection in preparing their HACCP reports," says John Young, iButton sales manager for the Dallas-based company.

An international hotel chain uses the units to assure food is stored and processed according to international standards. A major global food company places the units in chiller compartments of its fleet of ice cream delivery trucks to assure product integrity.

Data in the Thermochron can be uploaded into a PDA or PC for further online processing or stand-alone applications, says Young.

Carrier Transicold manufactures truck, trailer and container refrigeration units equipped with microprocessor controls to provide temperature control and data recording capability. "We provide both integrated and independent data recorders," says Mike Murdock, trailer product manager for the Syracuse, NY-based company.

"Our microprocessors record everything happening with refrigeration equipment, such as when the trailer door was opened or closed and what the set point is," explains Murdock. "We can record all that data showing proper temperatures were maintained throughout the entire journey"

Data from Carrier Transicold data recorders can be downloaded using a PC card, or using a serial port hookup. Carrier Transicold sells both single-temperature and multi-temperature trailer units, ranging from \$700 to \$1,000.

The Smart Reefer-2 interface system manufactured by ThermoKing Corp., Minneapolis, offers two integrated data loggers with audible and visible warning alerts to keep the operator aware of potential problems. "Our Service Watch logger records every possible system parameter operating a reefer system," says Brian Meagher, electronics product manager at ThermoKing. "Our optional logger, Cargo Watch, monitors temperature and system data for HACCP plans."

This logger was designed as an independent temperature logger for load verification, he adds. "It really simplifies the process at the point of origin, providing cargo data similar to any independent recording system available today."

The system supports six remote temperature probes, four door switches and humidity sensors—all providing proof-of-product verification and protection. "This system lets you know when your doors are open and the length of time they are open, and, from a security point of view, this is important data," Meagher says.

Perishable Losses

- All sales in U.S. supermarkets for 2002 were \$483.1 billion; 50.4 percent of that total was perishables; perishables represent 59 percent of all store shrink.
- Annual U.S. retail sales (supermarkets) for perishable food in 2002 was \$243.6 billion (Source: *Progressive Grocer*) – This category includes meat, seafood, dairy, deli, produce, frozen food, in-store bakery, bread

Cool Customers

Manufacturers also offer consulting services at the front end. For example, Sensitech conducts product audits, creating profiles and mapping how a particular product travels through its cold supply chain. Customers might request audits due to excessive shrink, consumer complaints about a product or poor product quality at the receiving end.

"Our plant-to-shelf audit creates a profile of the entire cold chain; we can identify where hot spots might be using our proprietary software to analyze data," says Sensitech's Jeff Leshuk, general manager, professional services. Hundreds—sometimes thousands—of temperature monitors are placed in boxes of product, from the point of origin to the point of use.

Thermal mapping creates a three-dimensional representation of the conditions under which a product is shipped and includes data such as trailer or holding facility temperature over time, loading patterns, temperature going into the trailer, trailer condition and how the refrigeration unit was programmed. "Based on the data, we create a dynamic 3-D image of the trailer or facility showing where hot spots occur by location and time," explains Leshuk.

A major retailer shipping bananas cut its shrink from about 5 percent down to nearly zero after implementing audit recommendations. An ice cream company had sporadic problems with product temperature.

"We identified a certain series of trailers that was not performing as well as the others," Leshuk says. The problem became apparent only after data collection and analysis. The company replaced the faulty units, resolving the problem.

"A major fast-food restaurant chain was very concerned about the quality of its lettuce," added Todor. Quality improved once the ColdTrak system discovered products were staged on loading docks too long at the distribution center and restaurant employees were not putting away the lettuce quickly enough, Todor says.

Booker Packing doesn't baby-sit its coolers anymore either. The company processes about 600 head of cattle daily. "Every few weeks someone would have to stay in our processing plant all night to make hourly checks of chill rates to make sure the sides are chilled to under 40 degrees Fahrenheit," explains Orel. "Now we have it all document-

and baked goods, and floral.

- Estimated annual U.S. supermarket perishable food shrink was \$5.7 million in 2002 (Source: *National Retail Research Group*)
- Annual U.S. supermarket shrink in 2002 was 2.32 percent (Source: *National Retail Research Group*)
- Shrink related to damage (including temperature) was 5 percent of the 2.32 percent. (Source: *National Retail Research Group*)

ed using FreshLoc's RF batch process temperature monitoring equipment and I can get an accurate and real-time picture of the entire plant's refrigeration system from my home computer."

Public refrigerated warehouses are yet another link in the cold chain. There, owners also are responsible for maintaining product integrity when items arrive at their warehouses, explains Michael Black, vice chairman of the trends committee for the International Association of Refrigerated Warehouses (IARW), based in Alexandria, VA. "If incoming products do not meet temperature criteria our customers set, we contact them to find out how they want us to deal with the situation."

Third-Party Validation

"Companies want real-time information in tracking temperatures and other conditions of their transported food products," says FreshLoc's Fettig. "There's integrity in the temperatures recorded because the data is stored off-site from the companies we serve so there's third-party validation."

Sensitech's Bonacci says, "consumer demand for consistent high-quality products year-round requires managing your cold chain effectively."

DeltaTRAK's single-use units have individual serial numbers, allowing easy third-party validation for a particular shipment should anything go wrong, says Todor.

Although some mystery and 'fudge factoring' has shrouded the overall journey of perishables, say some experts, today's new technologies make history of those mysteries. "My observation is there is no magic bullet, but RFID may be the Holy Grail in temperature protection to identify if a product has been abused along the cold chain," says Jack Ampuja, managing partner of Logistics Solutions International, Buffalo, NY.

RFID product identification is still a ways off. "The cost for RFID units appears to be borne by the distributor, but that will all get sorted out over time," says Ampuja. "If companies want to help set guidelines, it behooves them to get in early, though the costs will be high for early pioneers."



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