

Food Logistics

GOLD CHAIN MANAGER'S GUIDE

Checking The Mercury

When it comes to ice cream, there's nothing worse than bringing home a pint of Ben and Jerry's only to find that it's hard as a rock, or even worse, that it has melted and refrozen. Your treat has turned into an unappealing mess.

Nestle Davigel, which distributes Nestle ice cream throughout France and Belgium, appreciates this and has taken steps to ensure its ice cream arrives at its 40 regional DCs in perfect condition. Using Thermochron iButton temperature logging systems, the company is able to monitor temperatures from start to finish of a driver's route.

Each of Nestle Davigel's 450 trucks is equipped with two Thermochrons. At the start of a shift, each driver places the Thermochron in the chiller compartment, where it stays throughout the duration of the shift. When the route is completed, the driver removes the Thermochron and downloads the information into a PC. Driver start and end times are entered into the program.

The accompanying software checks for any alarms during the route period and prints out a report. The data is sent to the driver, the regional manager and the QA manager at the regional DC. All of the corresponding information about each driver, vehicle, and route is then maintained in a database.

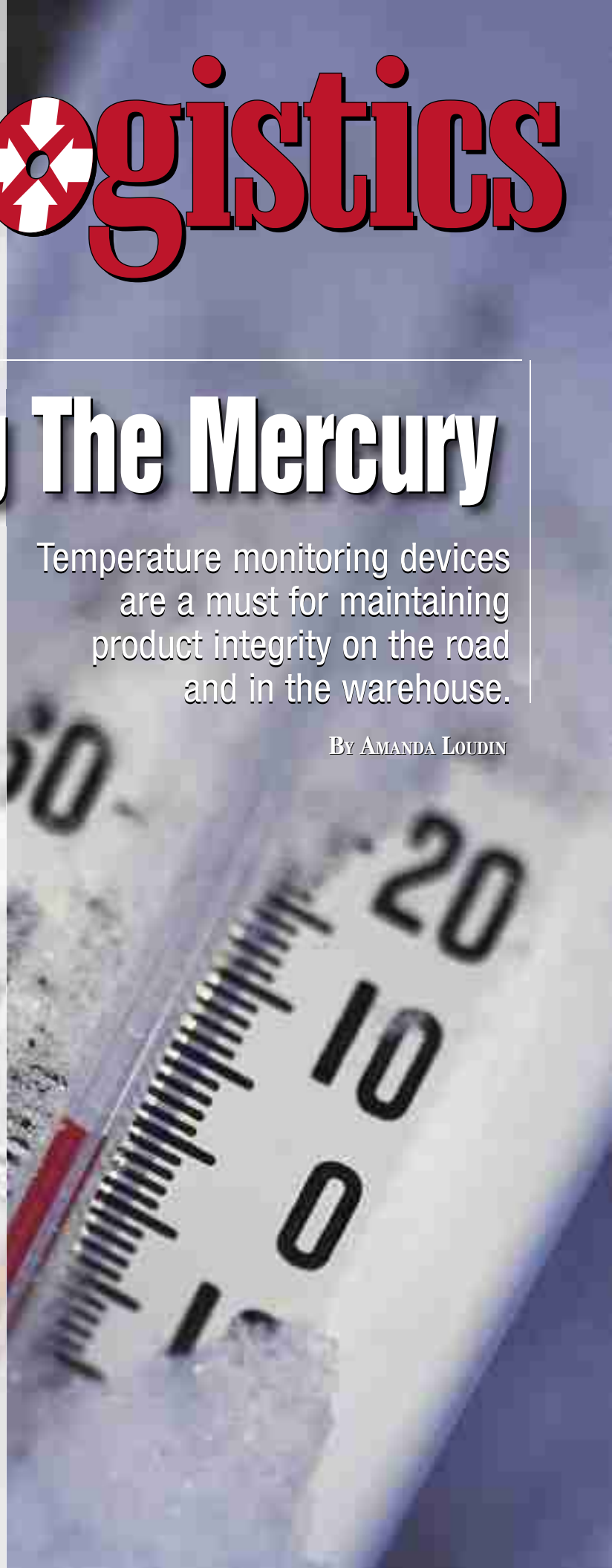
From A To Z

Devices for monitoring temperature can be used both in transit and in storage. "Logging or recording devices are used more frequently in transit than non-logging devices for the obvious reasons," says Dick Fettig, executive vice president at Freshloc Technologies, based in Dallas. "You don't care what the temperature is now, as much as what is was during the trip."

Temperature monitoring in its most basic form—a pencil, paper and thermometer—has been in use in the food industry for about 80 years. Just about as old

Temperature monitoring devices are a must for maintaining product integrity on the road and in the warehouse.

By AMANDA LOUDIN





as this original method are analog or mechanical monitors. These self-contained, battery operated devices come with pressure-sensitive chart paper. In spite of the fact that they're very basic, mechanical monitors are still widely used. Their advantage is that when a driver arrives at a site, he can simply pull the data out and have it. However, says Steve DiRubio, vice president and general manager for international food at Sensitech, based in Beverly, MA, "their use is growing only modestly."

Another basic form of temperature monitoring devices are temperature indicators. These consist of dye strips that indicate when a temperature has reached a lowest acceptable point. Other similar devices can give information about temperatures hitting a mark higher than desired. "The advantage of devices like this is that you get instant gratification," says Skip Leach, vice president, sales and marketing at DeltaTRAK, based in Pleasanton, CA.

The disadvantage, however, is the potential for a lack of accuracy, according to Rick Cahill, national sales manager at Cold Chain Technologies, based in Holliston, MA. "You may get false positives," he says.

However, Avery Dennison Corp., Pasadena, CA, recently released TT Sensor active labels which it says can provide food distributors with a cost-effective method of monitoring cold chain integrity. The labels have a two-piece design comprised of an indicator label and an activator label. Once activated, the label will change color from yellow to pink at a pre-determined rate based on time and temperature exposure.

"As opposed to existing time-temperature indicators, TT Sensors do not need to be refrigerated prior to label application," says Bill Hartman, business development director. "The label will deliver an accurate temperature abuse indication even after exposure to excessive heat prior to activation, a crucial factor when monitoring products such as seafood, dairy, meat and other perishables."

Next up the ladder are slightly more sophisticated temperature monitoring devices known as electronic temperature loggers. "These are much more common," says DiRubio. "They are small and very portable and can be placed inside a trailer load to accompany food in transit."

Such devices can sample temperatures at pre-determined intervals. At the end of the trip, the user can download the information and see where the temperature was throughout the route. "You can print out the information you collected onto a small stand-alone device for review right in the receiving area," explains Leach.

While these types of devices are commonly used, they have their shortcomings. "Recording devices such as chart recorders and digital data loggers are used when data integrity is essential or when manual monitoring is impossible or impractical," says Fettig. "These units store or record data, but they have space limitations, so the data must be gathered before it can be used. This means downloading or copying."

In spite of the need to download information, most providers of temperature monitoring now have sophisticated software to help companies extrapolate information. DeltaTRAK's software, for instance, can help users identify frequent temperature abuse among suppliers, analyze the effects of temperature during transport on shelf life, and can be used as evidence to support insurance claims.

John Young, iButton sales manager at Dallas Semiconductor, says that the cost and equipment needed for downloading information from a logger into a PC is both affordable and easy. "You need only a \$35 cable and adapter to read iButtons from a PC," he says. "We also have several partners that make handheld readers."

Another advantage to electronic devices is that they have no moving parts and they're impossible to tamper with. They tend to be more accurate and precise than mechanical devices that at times might produce charts that are difficult to read.

Regardless of the type of monitor used, end users must determine where to place it for the best return of information. "We don't stipulate where customers place their devices," says Young. "But our devices are so small they can be placed just about anywhere."

Fettig says that today most devices are placed in the area—a cooler, freezer or trailer—or among the product load on a few pallets. "The trend for the future will be to track and capture as much information as possible from farm to fork. Some more technology advances will be required before it is practical to track every product on every pallet. Today, it is with wireless and even with digital data loggers that tracking the handling of lots and loads is possible and practical."

Real Time

While manual and mechanical devices have their place in temperature monitoring, it is real-time monitoring, whether wired or wireless, that is making headlines today. "Real-time information is much more valuable because it is current and can be acted on," says Fettig. "Wired devices have a high upfront cost and lack flexibility. Wireless devices can be placed easily and even more importantly, they can be moved easily or be used on products that move."

Based on active RFID technology, the wireless devices simplify the transmission of information collected by a monitoring device, says DiRubio. "If you're using a basic mechanical/electric device, you have to locate the device, remove it, connect it to a PC and download the information," he says. "With a wireless device, when a trailer backs up, the device is recognized by a network and the information is transferred into a database immediately."

This would be a big boon to a retailer, for instance, who could instantly determine if the data doesn't hold up to standard business rules. The retailer could take instant action, refusing to accept the load if it fell out of standard.

"There are other, more subtle advantages of wireless loggers," says Steve Knuth, president of T&D U.S., in Saratoga Springs, NY, "such as real time monitoring over a distance or in environments where motion is a factor. After all, there can be substantial benefits in being able to determine that a problem is occurring in time to do something about it, rather than finding out about it after the fact, which is what most conventional loggers tell you."

Wireless loggers can transmit any information you would need, such as the availability to store and transmit in many states temperature, humidity and door status. Fettig says that when coupled with a real-time alerting system, potential disasters can be easily avoided.

Still, the devices have a way to go before becoming widely used. "Low cost, portable data loggers with wireless connectivity are still relatively new to the market," says Knuth. "Once awareness of just how affordable they have become begins to grow, we'll see them commanding an ever-increasing share of the market."

Determining which type of device is right for your needs depends on several factors. "You need to determine the specs you need," says

Young. "Consider factors like temperature range, number of data points, resolution, accuracy and cost."

Fettig agrees. "It depends on what you need to do," he says. "Processors, for example, are required to constantly measure and report on the continuous handling of their products. There must be a high level of integrity in the data to protect them and the consumer. Distributors, on the other hand, often only have to prove that their facilities maintain the proper environment and temperature. When they transport product, however, they are exposed and then they would turn to loggers to record in-transit temperatures."

Since cost is usually a factor, it's important to know that the price of these devices varies widely. "Commercial- and industrial-grade temperature sensors typically run \$100 to \$150," says Fettig. "Loggers range from \$20 for a single use to \$220 for multiple uses."

DiRubio says that when figuring out cost based on trailer load, you can expect mechanical devices to run about \$10 to \$20 per shipment, electrical devices to come in less than \$30 per shipment, and wireless devices to range from \$30 to \$35 complete.

The important thing is that you find the right type of monitor for your needs, as Nestle did. Because in today's competitive market, runny ice cream just doesn't cut it. ❄

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Finding Hot Spots In The Cold Chain

Maintaining optimal temperatures throughout the cold chain is vital for perishable, refrigerated and frozen products. Whether in the warehouse, on the loading dock or in the trailer, failure to keep goods at the proper temperature can significantly shorten their shelf life or even render them dangerous.

Sensitech Inc., Beverly, MA, has developed a thermal-mapping system that allows distributors to monitor temperature in the warehouse as well as through transit. "Thermal mapping is a service that enables companies to find the hot spots and cold spots in either a facility or a trailer," says Jeff Leshuk, Sensitech's general manager of professional services. "The thermal maps are able to characterize the variation in temperature from location to

location and over time."

According to Leshuk, the benefits of Sensitech sets up its TempTale electronic temperature monitors in a grid pattern throughout a facility or trailer to record temperatures. The monitors can capture up to 16,000 data points and measure temperatures in intervals of five minutes. In a facility, the monitors are in place for at least a week. "We prefer to get two weeks of data, however, because most facilities tend to operate on a weekly cycle, so we want to catch that variation over time," says Leshuk. "For example, you might not be operating a facility on a Sunday and all the doors might be closed so the temperature may be colder, and you'll have a different temperature profile at that time."

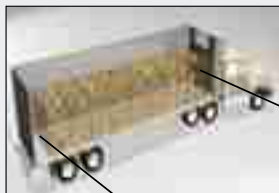
In a trailer, the monitors are in place during the duration of the entire trip and are recovered at the destination. Typically, an operator will map a sample of trailers—not the entire fleet.

The information collected by the monitors is downloaded into Sensitech's Cold Chain Manager reporting tool, which generates a map that provides three-dimensional views of temperature patterns. The thermal maps reveal temperature abnormalities, much like a weather map. "We show the gradients of temperature by color," says Leshuk. "The warmer spots are a reddish color and the colder spots are blue. Those colors will change over time and you can essentially run a video that shows the variation in temperature from location to location. It makes it very easy to identify hot or cold spots and then you can take action to correct those problem areas."

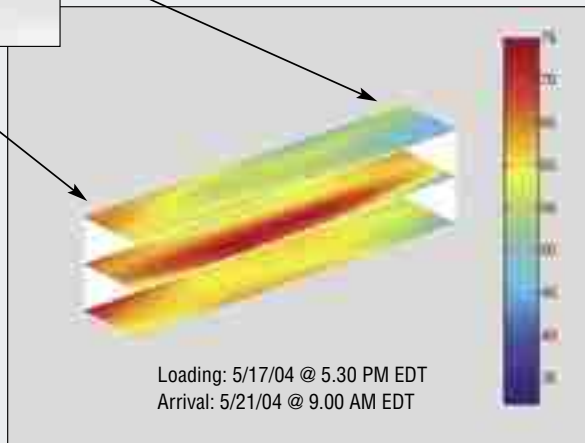
Most problems are process oriented, not mechanical, Leshuk points out. "Every time we do a thermal map, whether it's for a trailer or a facility, we find opportunities for improvement. Quite often, especially when the facilities are older, people tend to blame temperature problems on the mechanical refrigeration system, but we find that the problems relate more to the process of how that trailer or facility is being operated," he says.

"We usually find that employees are leaving doors open too long, or insulated panels have been damaged or that there's not proper air circulation—particularly when we're talking about trailers. We see wall damage from forklifts in trailers or bad seals. Loading patterns are very important in trailers—that's often overlooked."

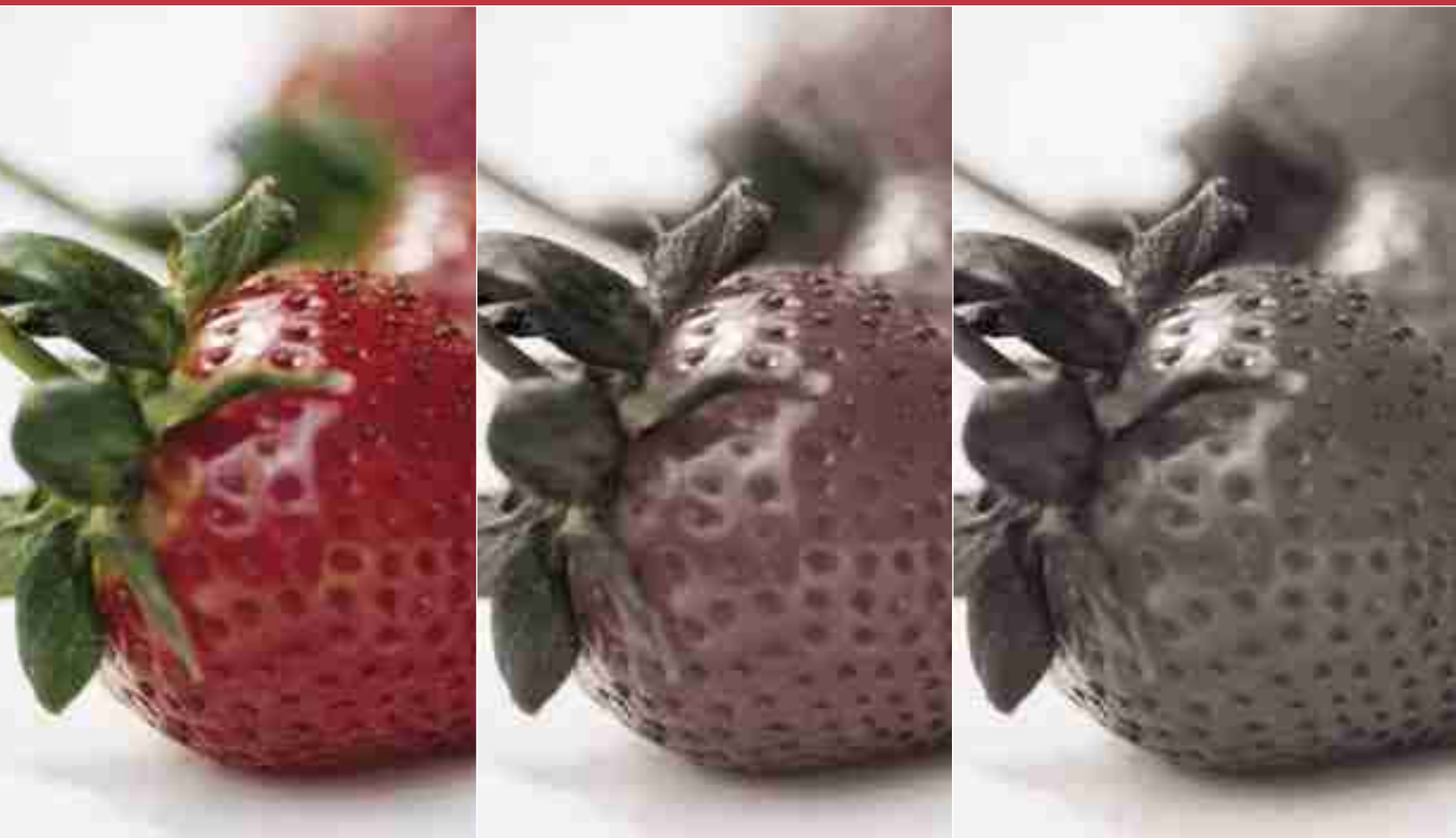
Thermal mapping projects start around \$10,000, depending upon the size and complexity of a facility, as well as the length and the number of stops on a truck run.



THERMAL MAPPING: Sensitech's map provides a 3-D view of temperature patterns. The process can be done in either a trailer or a warehouse.



MORE THAN HALF OF THE FRESH PRODUCE GROWN AND SOLD IN THE U.S. IS LOST BETWEEN THE FIELD AND THE PLATE



IT DOESN'T HAVE TO BE THAT WAY

Improved temperature management ensures delivery of high quality products.

In the last decade Sensitech has protected more than \$200 billion of their customers' assets around the globe. Sensitech's proven programs combining products and services help companies improve supply chain visibility to save money and reduce loss.



TempTale® 4



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Contact us to find out how we can enable you to manage the business challenges within your cold chain.

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