



Putting RFID Temperature Data Loggers To Work Brings Big Profits



By Michael Petersen

It is estimated that 30% of perishable food crops are lost in transit, costing billions of dollars in profits and putting additional pressure on already high food costs. With biofuels diverting crops formerly grown for food, such unnecessary losses are now driving the problem into the realm of national security.

According to Forbes magazine (2007), global waste from perishable goods in the supply chain amounts to \$35 billion annually. In U.S. supermarkets perishables account for more than half of all shrink, while temperature-related shrink per store averages almost \$80,000 a year, or \$40 million across a 500-store chain (2003/2004 Supermarket Shrink Survey).

Lost customer confidence, bad publicity and tarnished brands are other consequences of cold chain breaks that producers, wholesalers, and franchise owners can ill afford in today's competitive marketplace. According to a study conducted by Sensitech Inc. (www.Sensitech.com), Beverly, MA, of the observed occasions where a product exceeded temperature specifications, 30% occurred between the supplier and the distribution center; another 15 percent of violations took place between the distribution center and the store. In situations where the product temperature fell below

specification, 19% of incidents occurred between the supplier and distribution center and 36% between distribution center and the store.

Monitoring cold storage shipments is good for your company's bottom line, according to a presentation at the Thafx Conference entitled "Keeping The Food Supply Safe

"Loss of quality can happen at any point from the origin until the food is displayed at the store. Loss of control of the cold chain may compromise significantly Food Safety"

and Profits Fresh". From a detailed study by the University of Florida's Food Distribution and Retailing Lab of strawberry shipments in the United States, a new concept in inventory management of refrigerated goods emerged. FEFO stands for "First to Expire First Out", as opposed to traditional FIFO (First In First Out) inventory management.

The FEFO concept is based on some simple premises: 1) temperature control must be monitored; 2) temperature varies greatly inside a storage room or reefer container or truck; 3) even a few degrees of temperature variation affects the remaining shelf life of produce, and temperature exposure has a cumulative effect; 4) by identifying the temperature exposure of individual pallets or cases of produce, inventory management can be prioritized on the basis of remaining shelf life rather than simple transit and storage times.

To build a good FEFO system, we must know two things: a) the exact temperature accumulations

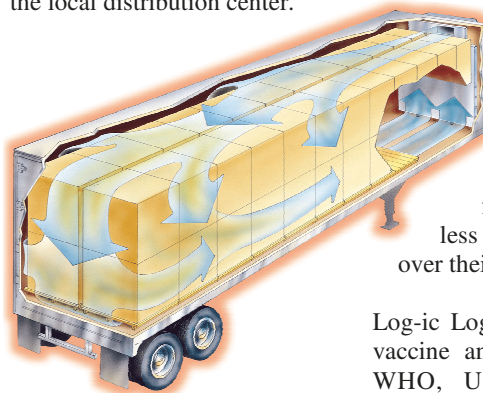
in small granularity within each area of the truck or storage facility; and b) so-called shelf-life modelling, which determines how different temperatures cumulatively affect the remaining life of the product. The experts at the University of Florida used inexpensive RFID temperature data loggers, available from Information Mediary Corporation (www.log-ic.biz),



A simple experiment can determine remaining shelf life based on temperature exposure over time. Source: University of Florida

could be prioritized based on the estimated remaining shelf life. Some product could even be rejected completely if it were known that it would arrive spoiled, even if it "looked fine" prior to shipping.

which were placed at least one per pallet throughout and remained with the produce from the processing facility to delivery to the local distribution center.



Temperatures inside a refrigerated truck vary greatly, affecting the remaining shelf life of perishable foods and medicines.

As a result, rather than shipping just any incoming pallet of produce to just any outgoing distribution center, inventory

Flat, flexible, 5 sq. cm. RFID Data Loggers can capture thousands of readings and store the temperature history in memory. Just 6 grams light, they are waterproof, food-safe, and cost less than \$1 US per trip over their six-month useful life.

Log-ic Loggers are approved for vaccine and food shipments by WHO, UNICEF and USDA. Because they are RFID loggers, they require no cable or adaptor, and they do not need to be removed from the packaging to capture their data, and the data can be read as often as desired en route.

(Continued on page 2)

Michael Petersen is an internationally respected expert on intelligent packaging technologies, and Global Managing Director of Information Mediary Corporation, of Ottawa Canada, with Regional Headquarters in Bangkok, Thailand. Log-ic RFID temperature data loggers are available worldwide through distributors and agents. Michael can be reached via email at mpetersen@informationmediary.com.

Putting RFID Temperature Data Loggers To Work Brings Big Profits



It is important to choose a CE EN12830 certified device, such as Log-ic® RFID Logger, approved by USDA and WHO, available from Information Mediary Corp. (www.log-ic.biz) and under the Log-ic ThermAssureRF brand from Evidencia LLP. (www.evidencia.biz).

In this real-world example of a trailer load of strawberries, it was found that by using RFID Temperature Loggers to predict shelf life and prioritizing distribution based on the FEFO model:

- 2 pallets never left origin
- 2 pallets were rejected at arrival
- 5 pallets were sent immediately to stores
- 8 pallets were sent to nearby stores
- 7 pallets received no special attention

thus turning a loss-making load into a profit for a total return of \$15,379 US as compared to handling the load using the traditional FIFO method.

The cost of Data Loggers? According to Information Mediary Corporation, the cost of monitoring is under \$1 US per trip for its Log-ic Logger product which can be used repeatedly over a six-month period. The return on investment on RFID Cold Chain Data Loggers works out to \$600 for every \$1 invested.

In summary, the benefits of using RFID Temperature Monitors were identified as:

- Liability issue resolution
- Verification if the products are within the temperature range and safe for consumers
- Useful if shipments arrive later than expected

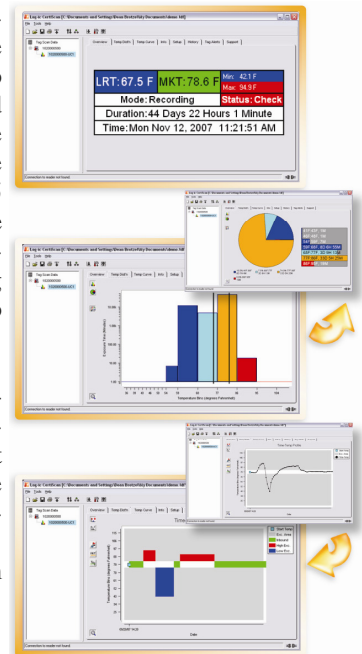
“More impressively, applying FEFO to just 5 trailers per week to this distribution center RFID-supported FEFO Models will bring an additional \$3,399,760 in profit per year.” J.P. Emond, University of Florida

- Better, more consistent quality of product in the store
- Reduce waste
- Detect weaknesses in the distribution network
- Increase sales and profits

It is important to use only high-quality Data Loggers, and the *de facto* international standard to which loggers should be certified is the European EN12830 Device Standard. Such loggers guarantee an accuracy of better than ± 0.5 degrees Celsius, keep accurate time and respond quickly to temperature changes. When shipping food to the USA it is important to use a USDA-approved device.

The financial benefits demonstrated in the University of Florida study are so convincing that many retailers and distributors are now beginning to develop FEFO-based inventory control. Further pressure comes from regulatory agencies that are

increasingly concerned about food safety and costs. Mandated food safety tracking and tracing programs, including possible temperature monitoring requirements, are well under way in the US, China, Australia and Europe. “It is no longer a matter of being



Modern data loggers give instant overview of shipment conditions. The above display was obtained in less than one second by swiping an RFID reader wand over the Log-ic RFID data logger without removing it from the packaging. Source: Information Mediary Corp. (www.log-ic.biz)

afford to deploy RFID Data Loggers to monitor perishable shipments, but rather it is a matter of being foolhardy not to” according to one industry insider in the audience at this year’s Thaixex Coldchain Seminar.

Are inexpensive data loggers accurate?

A lot of devices definitely are not, and if a manufacturer has not bothered to undergo stringent EN12830 certification there is probably something to hide. Log-ic is known to be the most accurate low-cost device on the market, having been certified by the prestigious French Laboratory Cemafruid (www.cemafruid.fr) to be within ± 0.2 degrees centigrade and is therefore fast becoming the device of choice for pharmaceutical logistics operations. Many data logger manufacturers make claims that each logger is “calibrated”. In a way this is true for all data loggers using so-called thermistors (chip-based sensors), because each thermistor is already laser-trimmed and measured to 3-point accuracy at the semiconductor factory. However, 3-point device calibration performed by a measurement laboratory would cost at least \$75 US per logger, so it is neither affordable nor required for every device. Laboratory certification is done every few months to verify

the quality assurance (QA) process, and is based on a few random samples. The word “calibrated” is thrown about liberally by data logger suppliers and confuses buyers into thinking that each device underwent laboratory standard calibration, when in reality, only a small production sample has been tested and found to be within the claimed specifications.

Testing can be performed in two ways: 100% of devices or a percentage of devices. If only a percentage is tested, there must be a validated, documented procedure in place to assure that all devices within a production lot will perform at least as well as the randomly chosen test sample. Some companies use a confidence interval of 95% (i.e. 95% of the lot will perform to the promised standard), whereas some guarantee a confidence interval of 99% or better. Log-ic Loggers are 100% tested and certified for accuracy.

Information Mediary Corporation has succeeded in designing and building devices that always meet specification and never go out of calibration. In the case of the Log-ic Logger, it is not even possible to feed calibration data to the tag. During QA, each and logger is turned on for 48 hours to check timing accuracy (it must be better than 2 minutes per month) and temperature (better than 0.5 degrees centigrade). A proprietary, patent-pending measuring algorithm assures that less than 0.5% of all tags produced fail to meet the specified accuracy during final QA and these are discarded. Log-ic Loggers are guaranteed to hold their accuracy levels for the life of the device. Re-testing and re-certifying Log-ic Loggers is possible (usually required by GMP standards to be done every six months), but is not cost effective. Because of the low cost of the Log-ic Logger, after six months it is cheaper and simpler to purchase new ones.