System Overview

ColdTrak® Product Emulation

Internal Temperature for Critical Cold Chain Decisions

Shelf life, quality, and food safety depend on good cold chain management practices. Transport vehicles and cold storage facilities are typically equipped with some form of temperature monitoring device for tracking ambient air, in order to verify proper conditions are being maintained.

Fresh and frozen products react in their environment based on the condition of surrounding air, and usually change more slowly than the air temperature. Additional factors affecting their rate of change are mass, density and type of packaging. Measuring ambient air temperature is not an effective way of knowing the actual state of products when critical decisions must be made for cold chain management and food safety.

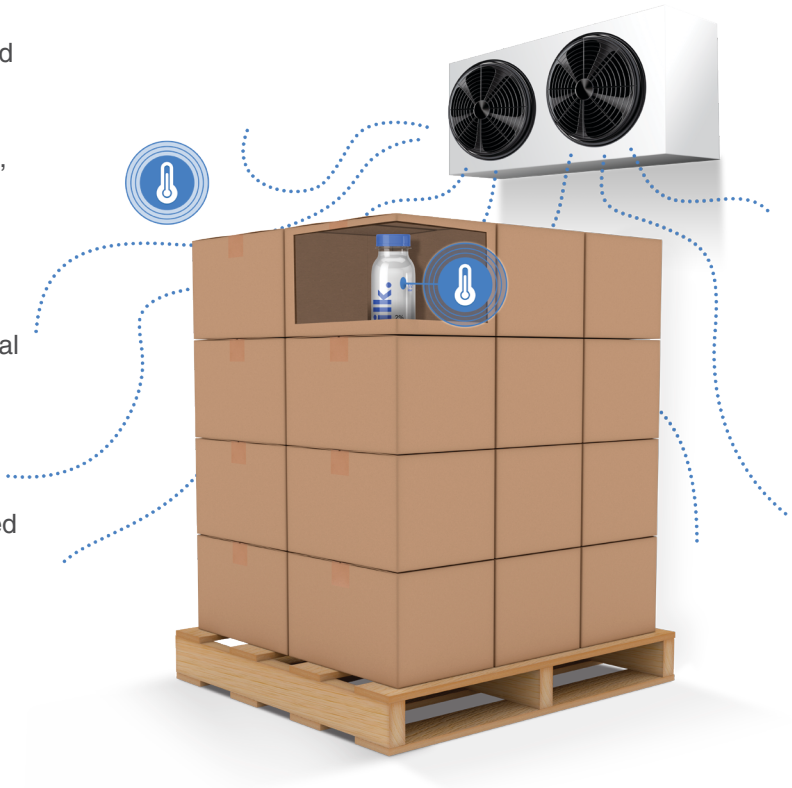
Product Emulation

Internal temperature is more important than ambient temperature

It's more relevant to know how internal temperature is responding to changes in the environment. Tracking core temperature of products as they move through the cold chain, means having accurate profiles of their condition to better establish shelf life, quality, and possible food safety threats.

While most systems only report ambient temperature, product emulation has the capability of measuring internal product temperature in real-time. Data is uploaded, accessed and archived in ColdTrak Data Central. This non-invasive method uses a proven mathematical algorithm to accurately calculate internal temperature based on collecting surrounding air temperature, and eliminates the need for external probes and manual testing.

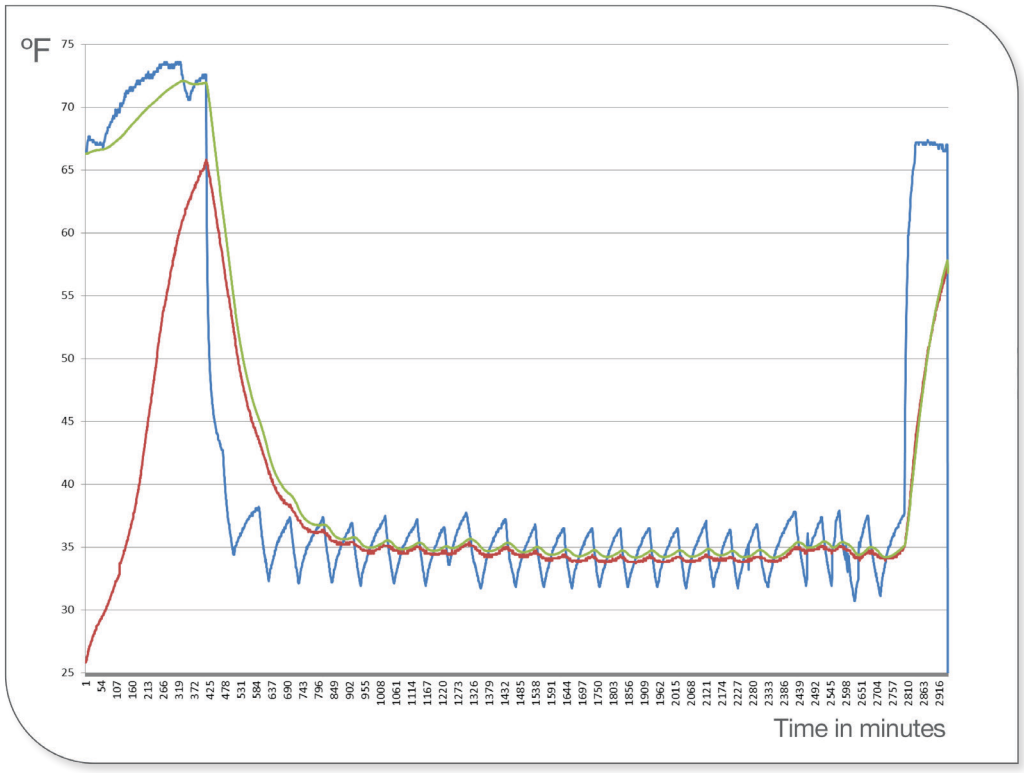
Customized product emulation coefficients are derived to fit specific applications for facility monitoring and delivery routes. Laboratory testing and on-site verification are done in order to determine the most precise product emulation coefficient for each situation. Third party validation for accuracy and effectiveness of this system has been performed and documented by the University of South Florida.



Fluctuations in ambient air can affect quality and cause food safety issues, however, changes are sometimes minimal and have insignificant effect on product temperature. The only way to be certain is by using product emulation, in order to have a complete history of internal temperature readings throughout the cold chain.

This actionable data is used to increase efficiency in managing refrigeration and cooling, improve inventory control, storage and distribution practices, and provide information for making decisions related to other areas of cold chain management, such as processing and packaging. FlashTrak Telematics' automated alert feature also means that personnel can discover problems in time to take corrective actions and make informed decisions based on real data.

Emulated product temperature calculated based on ambient temperature



This graph demonstrates the accuracy of product emulation. Actual internal product temperature is measured with a probe, and product emulation is calculated using a mathematical coefficient applied to ambient air temperature in a refrigerated environment.

- Actual Product Temperature
- Emulated Product Temperature
- Ambient Air Temperature

Key Features

- Non-invasive, continuous internal product monitoring and reporting
- Complete temperature profile for inbound shipments, storage facilities and distribution routes
- 24/7 access to real-time data from ColdTrak Data Central cloud service
- Alerts sent to specific personnel when out-of-range conditions occur
- ColdTrak dashboard interface with maps, graphs, tables and summary analytics
- Robust network between loggers and receivers
- Logs and stores data during power outages and communication interruptions

Advantages and Benefits

- Accurate profile of actual product conditions
- Actionable data for cold chain management and inventory decisions
- Pin point where breaks occur in the cold chain
- Reduce or eliminate temperature related claims
- Mobile application provides product temperature en route and at time of delivery
- Facility application eliminates false alerts when there is no significant change in product temperature, such as defrost cycles and normal door openings
- Non-invasive method eliminates damage to product and packaging

DeltaTrak® is a leading innovator of cold chain management, environmental monitoring and food safety solutions for the food, pharmaceutical, life sciences and chemical industries.
Contact DeltaTrak by phone at 1-800-962-6776 or by email at marketing@deltatrak.com.
Additional information can be found at www.deltatrak.com.

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