

Using IoT Data to Improve Quality in the Cold Chain

8 Real-Life Use Cases from the Food Industry



A Carrier Company



Executive Summary

For food, pharmaceuticals and other temperature-sensitive products, maintaining the highest level of product quality possible throughout the supply chain is a key requirement for controlling compliance, profitability and consumer satisfaction.

Given the fast-paced nature of the supply chain, it can be challenging for companies like yours to protect products from points of origin to final destinations. Without clear, real-time visibility into the location of your cargo and its current condition, it can be difficult for you to maintain product integrity, meet compliance mandates, control costs and manage risks.

Companies that use data-driven visibility programs to collect, manage and analyze their supply chain data can now use analytical intelligence to improve product quality and operational efficiency. These companies are increasing compliance, decreasing labor costs, improving response time, reducing product loss and developing better supplier relationships.

Thanks to the use of cargo monitoring sensors based on the Internet of Things (IoT) technology, you can now use comprehensive real-time temperature and location data to achieve these benefits. This white paper will discuss how to build a data-driven visibility program and it will share how eight different food industry customers use this data to effectively achieve game-changing results.



Data-Driven Visibility: Improving Quality—And More...

Managing complex global cold chains in the food industry is a daunting task for you and any quality, logistics, operations, and purchasing personnel in your company. However, an effective IoT data-driven visibility program for monitoring and improving your supply chain operations can help. The good news is that such a program goes beyond just improving product quality—and it can help improve operations while achieving lower labor costs, improved compliance, faster response times, less product loss and developing better supplier relationships.

In fact, companies are using real-time IoT data from cargo monitoring sensors to get unprecedented insights into their food products from the moment they leave their origination until they are delivered to consumers. These sensors, which carefully monitor temperature-sensitive product, travel with the cargo, rather than tracking only drivers, shipping containers or trailers. And they can even track your cargo right down to the item level for greater in-the-moment details.

The sensor data, once analyzed properly, can provide you with greater granularity into all the insights you need to be assured that your cargo is in the most optimal condition at any given moment. It can also provide you with the visibility you need to drive:

TIMELY TRANSACTIONAL DECISIONS

Collecting the real-time and historical data can help you make day-to-day tactical decisions such as acting on alerts to intervene on in-transit shipments, or using data to facilitate dock-level accept or reject decisions by shipment on arrival.

CONTINUOUS IMPROVEMENT OPTIMIZATIONS

Aggregating your cold chain data over time can help you develop in-depth analyses which will enable you to identify trends and patterns, facilitate efficiencies in quality control and operations and create long-term continuous improvements.



Building an effective IoT-data visibility program

There are three overarching data strategies that drive the optimal collection, management and analysis of your cold chain data:

1. Collect clean and comprehensive data in order to drive actionable outcomes and gain measurable improvements.
2. Consume data in a way that facilitates both tactical and strategic decision making.
3. Analyze the data and collaborate with supply chain partners to improve quality, reduce costs, and increase efficiency.

Data must be comprehensive yet not extraneous

Data analysis is only as good as the data itself. If you are using poor quality data, it can actually lead to bad decisions, which can be costly for your company. That's why it's important to ensure you are collecting the right data at the right time.

The first step toward better quality data is to use the correct data collection devices. For instance, it's imperative for companies who monitor temperature-sensitive food products to transition from outdated manual devices to hands-free ones. Devices that are equipped with radio frequency and real-time capabilities are ideal, as they allow you to take action almost immediately upon implementation and help you rapidly realize savings in labor costs.

You'll also want to augment time, temperature and location data with other complementary data from your telematics devices, as well as shipment information from ERP, transportation, and logistics systems and product quality information. With the right technology, you can automate your data collection and integration, which can save you additional labor cost while improving your data integrity.

With the help of the appropriate real-time technology and data management, you'll gain insights and visibility that were never available before. You'll be able to integrate analytics into your business processes and go from making tactical dock-level decisions to more strategic ones that can have a direct and indirect impact on improved quality and operations.



Putting the Data to Work: Better, Faster, and More Intelligent Decisions

Here are eight food industry companies that are taking advantage of a Sensitech data-driven visibility program to drive results such as enhanced product quality, increased cost savings, better operational efficiency and improved supplier relationships.

USE CASE #1

Comprehensive farm-to-fork visibility

Here's a look at a major fast-casual restaurant chain and an early adopter of a visibility program that included hands-free, real-time temperature and location IoT-based monitoring sensors.

Thanks to this program, the restaurant chain eliminated the need to manually retrieve and download data. Temperature, light and location data gave the company significant visibility into its supply chain so the company could react proactively to exceptions both in real time and in the future. For example, with real-time alerts, the chain can now intervene immediately when temperature and transportation issues occur. It also has a better understanding of route performance, and most importantly, it has been able to reduce rejected loads and product loss.

The chain's IoT devices travel with the product, rather than the driver, trailer, or refrigerated unit. This allows for real-time monitoring of every step of the product's journey from its suppliers and distribution centers all the way to the restaurants. With comprehensive end-to-end visibility and automated segmented analysis of the data, the chain can more easily pinpoint where cold chain and logistics breaks are occurring, resulting in decreased labor costs, improved response time and reduced product loss.

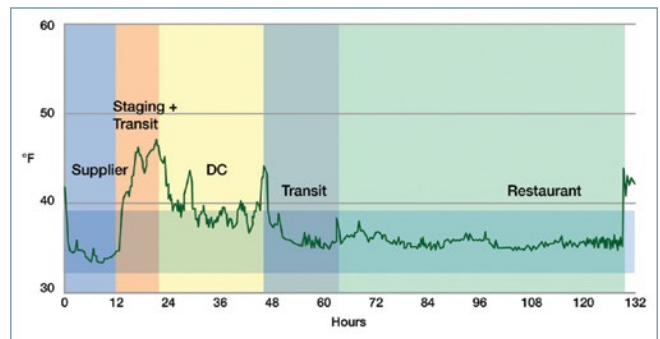


Figure 1: Real-time alerts from IoT sensors allow this major fast-casual restaurant chain to intervene immediately when temperature excursions occur.

USE CASE #2

Quicker problem identification and resolution

Oftentimes, it is helpful to invite external industry experts from a company like Sensitech to review your cold chain data in order to drive deeper insights and deliver recommendations on how to improve supply chain visibility programs. In this example, a team of Sensitech experts used comprehensive analytics to help identify a cold chain problem within the shipping segment of a fast-casual restaurant chain.

The chain was experiencing higher-than-desired temperatures on some of their routes where frozen french-fried potatoes were shipped via rail cars. The chain asked Sensitech to perform an on-site cold chain evaluation to uncover the root cause of the issue. To do this, our team implemented a program where they used monitors to collect product and ambient temperature data over time, throughout the shipment cycle, while observing the entire shipping process.

Using the time and temperature data collected while the product was in transit, our experts were able to quickly identify a carbon dioxide (CO₂) issue that turned out to be the cause of the high temperatures. The CO₂ that was supposed to keep the product at an optimal temperature was dissipating before the shipment arrived at its final destination, causing the temperature to rise.

With these insights, the customer discontinued the use of CO₂ rail cars, and with this process change, adopted a shipping process that kept the product at the appropriate temperatures.

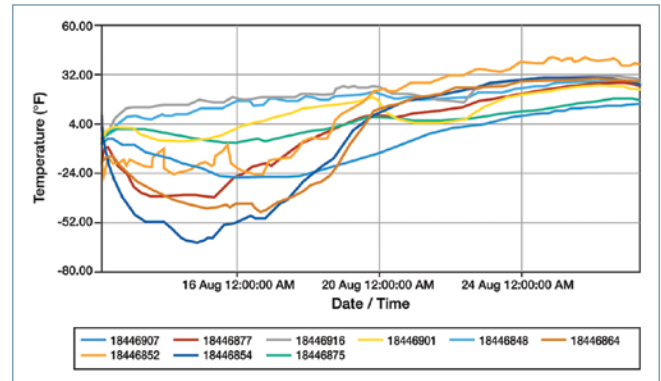


Figure 2: An on-site analysis and review of data helped identify the source of this customer's temperature excursions.

USE CASE #3

More efficient role-based decision making

A major U.S. food distributor strategically incorporated data to improve almost every aspect of its supply chain. To do so, the customer used Sensitech's comprehensive visibility platform that helped its food safety, transportation and product managers make better, more informed decisions regarding daily tasks for inbound, outbound, storage and shuttle yard operations.

These managers now can document and execute corrective actions for exceptions thanks to data that is reported and consumed in real-time and accessed through a role-based customizable dashboard.

From the dashboard, the distributor has access to analytics that help identify trends and pinpoint the causes of exceptions for quicker decision making. While the managers have role-based access to all the tools they need to manage everyday business, corporate and regional directors gain extensive data visibility from executive-level strategic views.

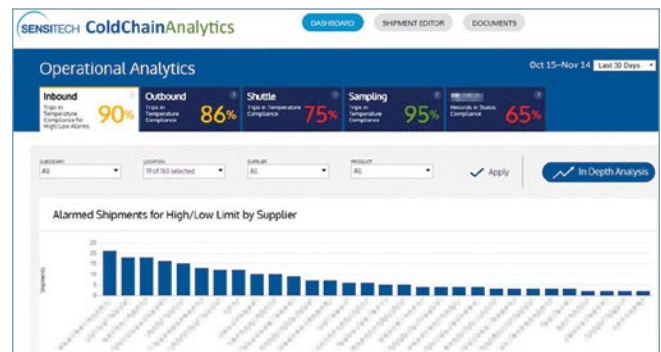


Figure 3: The analysis of temperature alerts helped this company take corrective actions and reduce excursions over time.

USE CASE #4

Improved product quality in inbound shipments

A leading U.K. supermarket chain recently transitioned from conventional monitoring devices to real-time IoT devices to better manage its inbound shipments from various suppliers to its distribution centers. The company wanted to use real-time data to achieve greater efficiency and improve quality in the receiving process.

The chain also completed a system integration with its ERP system where product information and logistics details are automatically connected to the monitoring devices, allowing for the collection of additional data and enabling further improvements.

The company also asked Sensitech to help them develop and implement a traffic light alerting system to use as triage methodology for assessing temperature-abused product and addressing in-transit delays. The alerting system categorizes shipments based on the severity of temperature abuse and delays during transit. For instance, a green light indicates

product that is 100% acceptable, while amber means the product is of questionable quality, and red means the product has experienced a temperature excursion or incident that renders it unacceptable.

The ability to triage inbound shipments in this way significantly improved the efficiency of the receiving process and ultimately, the ability to make better dock-level decisions.

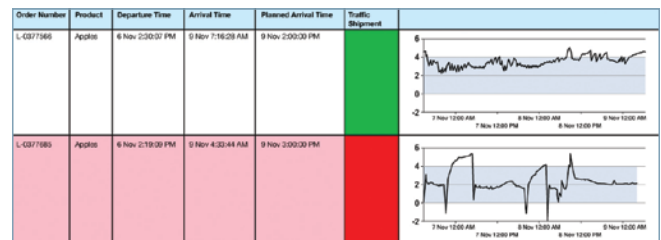


Figure 4: This customer uses a traffic alert system that helps triage accept and reject decisions.

USE CASE #5

Improved vendor accountability

The use of comprehensive data can help drive continuous improvement through a more effective engagement of partner stakeholders such as suppliers, carriers and receivers. Oftentimes this is through sharing quality assurance (QA) standards, making joint decisions when exceptions occur, and looking at historical data across the supply chain to identify opportunities for continuous improvement.

For instance, a producer of organic chicken used data from its real-time devices to monitor in-transit temperatures and better manage delivery logistics.

With the help of Sensitech's experts, the company developed a "Carrier Score Card Report" that grades carrier performance based on a combination of how well ambient temperature is maintained during transit and the consistency of on-time arrival rates. Armed with this information, the producer can now make tactical decisions based on temperature and delay alerts, and strategic decisions about its carrier partnerships. As a result, the company has improved the fulfillment of its KPIs significantly.

Carrier	Destination	Count	Avg Trip Days	Late Arrival Count	On Time Arrival %	Avg Mean °F	Avg Min °F	Avg Max °F	Total Time (hrs) Above 35°F	Summary
ABC Logistics	Atlanta, GA	34	2.5	1	97.06%	26.5	22.1	39.2	19.33	Grade B
	Chicago, IL	11	2.5	0	100.00%	26.6	22.8	35.8	4.17	Grade A
	Denver, CO	1	2.6	0	100.00%	27.5	24.0	48.4	1.17	Grade C
	Los Angeles, CA	10	2.1	0	100.00%	27.2	24.0	40.8	8.00	Grade B
	Phoenix, AZ	7	2.6	1	85.71%	28.1	17.9	41.4	3.50	Grade A
	Portland, OR	5	2.9	0	100.00%	25.6	22.4	35.4	1.50	Grade A
DEF Logistics	Atlanta, GA	5	2.6	1	80.00%	27.0	23.6	37.3	0.17	Grade A
	Chicago, IL	3	2.2	0	100.00%	27.3	23.0	37.4	0.17	Grade A
	Denver, CO	2	3.3	1	50.00%	28.4	23.4	37.1	0.00	Grade A

Figure 5: This producer can make fact-based decisions on the quality of service from its suppliers

USE CASE #6

Better quality through shared data

Similarly, a fast-food chain shares its quality and compliance analysis with its suppliers and distribution centers on a weekly, monthly and quarterly basis to better manage compliance and quality. The company also gives out annual awards to encourage its supply chain partners to make operational changes to improve performance.

By sharing this data, the chain has been able to reduce the percentage of non-compliant shipments from 6.4% to 0.5% in just three years. This chain has been diligent in taking action to train suppliers and receiving distribution centers on best practices. The company also conducts frequent supplier visits and other related continuous improvement activities.

The company is also in the process of merging its quality and compliance data with complaints from its restaurants to make the corrective-action process more efficient.

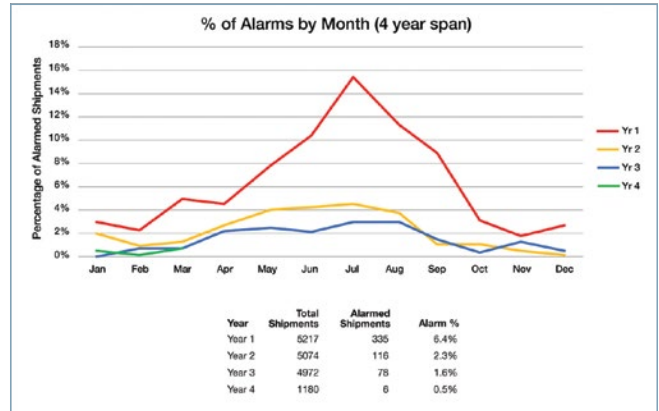


Figure 6: This fast-food chain shares reports like this with third-party vendors to improve performance.

USE CASE #7

Improved route management

An international burger chain incorporated cold chain monitoring into its supply chain management protocol so it could share responsibilities of managing quality and logistics with its partners. As part of this process, suppliers were given the task of acknowledging and addressing real-time temperature alarms. In addition, all stakeholders—suppliers, receivers and logistics managers—had the responsibility of tracking shipments to address transit delays and any necessary rerouting of shipments. The company could then use a tracking system to uncover how it should re-route trucks during a hurricane that impacted a majority of the U.S. East Coast.



Figure 7: Real-time and predictive data help this company choose new, safer routes for its product.

USE CASE #8

Continuous improvement through trend analysis

A produce cooperative worked with Sensitech to evaluate historical data and drive continuous improvement in its cold chain. Initially, over 12 years of historical data was combined with four years of more recent real-time data collected from newer IoT-based sensors. The company then aggregated and analyzed the data to gain insights into long-term benefits of its cold chain monitoring program.

This is an ongoing program where historical data is used to measure non-compliant performance over time through KPIs, such as mean temperature as well as rate and percentage of shipments out of spec. For example, as seen in the graphic, the data shows that the average mean temperature month over month and year over year continues to decrease, which translates into improvement over time.

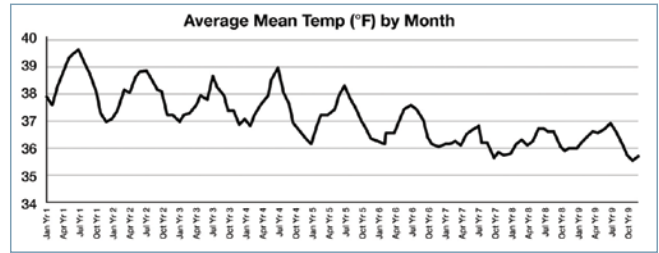


Figure 8: This historical analysis helped this customer measure continuous improvement year over year.

The historical data is also broken down by supplier, carrier and receiver. In one case, the data led to on-site evaluations to identify the root causes of issues. Data collected for product temperature loaded on the wall versus off the wall helped identify that product was improperly loaded onto a truck and placed directly against the truck walls. The company updated its standard operating procedures (SOPs) and made operational changes that eliminated these improper practices.

Driving strategic results with data pays off

A comprehensive visibility program that collects, manages and analyzes data is important for any company that wants to improve its supply chain quality. As the examples in this white paper show, data can drive visibility, which is an imperative for improving quality and operational efficiency.

To achieve these benefits, start building a program today that includes:

- Well-developed processes for collecting, consuming and using your data
- Innovative software for managing and analyzing the data
- Expert personnel that can help you address and simplify complex chain management while helping customers gain operational efficiencies.

To learn more about the technology and services behind this program and the successes discussed here, contact Sensitech Professional Services today.

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About Sensitech

Sensitech Inc. is a global leader in delivering supply chain visibility solutions. Our innovative monitoring products and services help to maintain the quality, integrity and security of our customers' valuable products at every step in their journey, all around the world. For 30 years, leading companies in the food, pharmaceutical, industrial, consumer goods and other industries have relied on Sensitech to help protect their products—and their bottom lines.



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