



StoreConnect's Power Signature Analysis and Predictive Analytics Software

Solves Issues with Commercial Refrigeration Equipment Before They Become Critical

THE MARKET CHALLENGE

It's relatively easy to monitor isolated data points, such as temperatures, pressures, and liquid levels in commercial refrigeration applications. Most controllers offer some form of reporting that is typically threshold based and reactive, rather than proactive. Today's typical commercial refrigeration service business is emergency based, often including multiple repairs and focusing on symptoms, instead of root causes. To truly understand what is going on in a system, with so many different factors that can affect the operation, you can't stay at the surface. In order to automatically analyze, without significant human intervention, retailers and contractors have to connect the various pieces that make up a system, plus all the various environmental factors. Automatic analysis gives retailers predictive analytics and condition-based maintenance using both refrigeration and power consumption data.

StoreConnect's state of the art Predictive Analytics platform was developed to overcome current challenges in commercial refrigeration, pertaining to:

Technician Shortages and Increasing Service Costs

- StoreConnect sought to provide a solution to the severe, industry-wide technician shortage and difficulties with tracking the state of a refrigeration system over time, along with the growing service costs these challenges bring.

Using and Applying the Vast Amounts of Data

- While data exists, the application and insights from the data are sparse. StoreConnect uses both refrigeration controller data and power consumption data, at times being sampled up to 4,000 times per second to provide actionable intelligence to retailers and contractors.

Alarm Overload

- On average, retailers are faced with hundreds to thousands of refrigeration system alarms a day that are not easily identifiable, causing unnecessary stress and panic. StoreConnect needed to find an easy way to predict problems ahead of time in order to limit the high frequency of last-minute alarms.

THE STORECONNECT SOLUTION

The Predictive Analytics platform of StoreConnect makes it easier to track the state of a refrigeration system over time.

Predictive analytics uses several techniques to determine the overall state of a system and individual electro-mechanical components. Through early detection of refrigeration system issues, the Predictive Analytics platform gives retailers much needed time to plan ahead for service on their cases, removing the last-minute rush to fix a sudden system issue and find a technician.

More information on back.

POWER SIGNATURE ANALYSIS EXAMPLE

The example below shows the insight provided by high frequency power readings enabling advanced predictive analytics.

PROBLEM:

A major retailer was struggling to understand why they were experiencing multiple compressor failures in a newly installed refrigeration system.

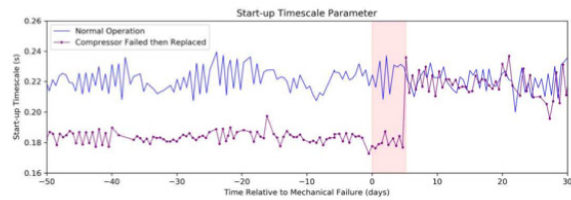
ANALYTICS FINDING:

There was a reduction in startup time which is indicative of reed valve failure and afterwards, there was a mechanical failure. The software then found intermittent low superheat. Upon failure, the retailer needed to replace the compressor.

SOLUTION:

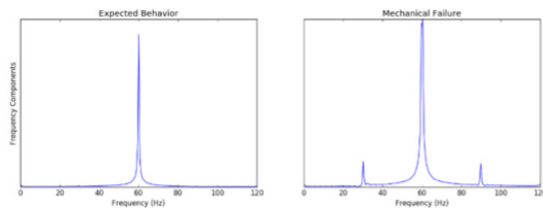
Monitoring and maintaining risks to reed valve health, such as a margin for superheat, is crucial to system health. The intermittent low superheat found by the software was the source of the compressor failure. After discovery of the issue, a technician was dispatched to quickly fix the issue, bringing the system back to running at optimal levels.

Figure 1



The StoreConnect derived parameter shown here is a representation of the start-up transient behavior of certain compressors. This parameter exhibits abnormal behaviour preceding mechanical failure, which occurs during the shaded time frame, as evidenced by the frequency analysis shown in Figure 2. Once the compressor is replaced at the end of the shaded time.

Figure 2



When the compressor is mechanically intact, frequency analysis shows a single peak at the line frequency of 60 Hz (left). Mechanical failures are evident by the appearance of additional peaks. During the shaded time shown in Figure 1, peaks are evident at 30 and 90 Hz (right), confirming mechanical failure.

THE RESULTS

UP TO 10%
REDUCTION IN SERVICE CALLS

\$2-7K
ANNUAL REPAIR SAVINGS

UP TO 5%
LESS PRODUCT LOSS

The StoreConnect Predictive Analytics platform accurately tracks the health of commercial refrigeration equipment to predict problems before they become critical. Once a problem is detected, a technician is dispatched to fix the issue right away without having to spend the time to diagnose the issue, reducing service costs and saving valuable time during an industry-wide technician shortage. Proactively addressing refrigeration system malfunctions before they become critical saves the retailer stress down the road. The platform gives retailers time to proactively plan and schedule technician services ahead of time so that there are no last-minute rushes to fix sudden failures. The StoreConnect Predictive Analytics platform defines, predicts and optimizes refrigeration system health for a better retailer experience.

SEE HOW YOU CAN IMPROVE YOUR REFRIGERATION SYSTEM OPERATIONS!

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