Axiom Cloud: Apps for Commercial Refrigeration
Virtual Technician™ Case Study - Refrigerant Leak Detection

OPPORTUNITY

Unplanned refrigeration outages are one of the most costly and painful aspects of operating a grocery store, and refrigerant leaks are one of their most common causes. Because PPM sensors cannot cover every square foot of the store and liquid receiver levels vary so much over the course of each day, there is often no way to detect a leak until it is too late.

At this Grocery Outlet in Northern California, Axiom Cloud's Virtual Technician app identified a slow leak that was invisible to the store's existing PPM sensors. By detecting this leak early, Axiom Cloud helped the store manager avoid a major unplanned outage, save money on emergency maintenance bills, and significantly reduce their Scope 1 emissions.

> "Without Virtual Technician's early notification of the leak, this store would've experienced unplanned downtime and a big maintenance bill in the coming weeks. We prevented a potentially catastrophic service call!"

- Frank Davis, Director of Refrigeration Engineering, Energy & Sustainability at Grocery Outlet

SOLUTION

Unlike refrigerant PPM sensors, Virtual Technician* continuously estimates refrigerant charge using existing receiver level sensors, condenser heat rejection calculations, weather data, heat reclaim status, condenser split status, and other available data. If these leak detection algorithms indicate that a rack's normalized refrigeration charge is decreasing over a period of 3+ days, a draft work order is delivered to the proper personnel to alert them to the urgent issue.

Over a few days in May 2021, Virtual Technician noticed a clear downward trend in normalized refrigerant levels at this store that could only mean one thing - a slow leak was invisible to the store's existing PPM sensors. Unless a technician visited soon to stop the leak and add refrigerant, the inevitable outcome would be case temperature alarms, frantic employees, and unhappy customers.

RESULTS

With Virtual Technician, this store's manager received a draft work order detailing the urgency, root cause, and financial impact of the leak, along with an interactive graph of the data to back it up. After a quick approval, a service technician visited the store to repair the leak and add refrigerant before case temperature alarms or business interruptions occurred.

Axiom Cloud's Customer Web Portal

Customer
Grocery Outlet

Location
Northern California, USA
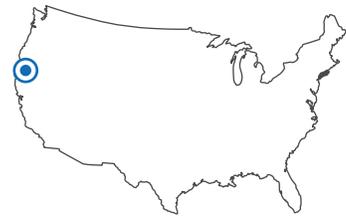
Apps Provided
☑ Facilities Analyzer

☑ Virtual Technician

☐ Virtual Battery

Highlighted Feature
Refrigerant Leak Detection

*The California Air Resources Board (CARB) lists Virtual Technician™ as an Automatic Leak Detection (ALD) system.

Refrigeration System Architecture
CPC E2 Controller
Med. Temperature: 12 HP, R507
Low Temperature: 30 HP, R507

Estimated Benefits
$4,790
from an avoided rack outage

AXIOM CLOUD

510.683.5200 | sales@axiomcloud.ai | AXIOMCLOUD.AI

HOW VIRTUAL TECHNICIAN PREVENTED AN OUTAGE

Detected the refrigerant leak early

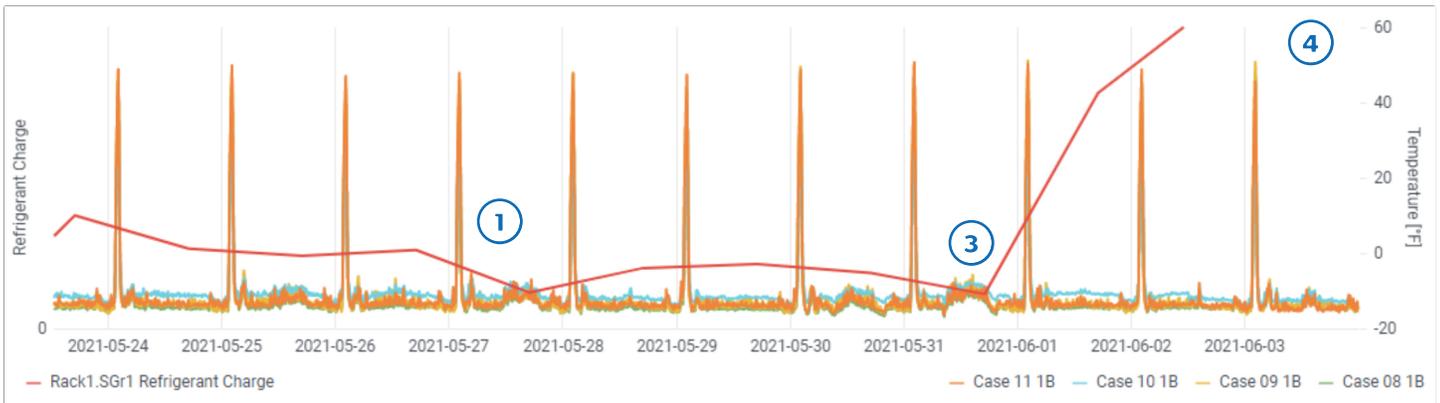**Estimated the likelihood and financial impact of an outage**

Notified the service provider with specific corrective action

Ensured the proper corrective action was taken

DETECTING LEAKS WITHOUT PPM SENSORS

Refrigerant Charge / Temperature [°F]

— Rack1.SGr1 Refrigerant Charge   — Case 11 1B   — Case 10 1B   — Case 09 1B   — Case 08 1B

Leak Detection   ①

By tracking refrigerant receiver levels and normalizing them with weather, heat load, and other factors, Virtual Technician detected a slow refrigerant leak that was invisible to the store's existing PPM sensors.

Notification   ②

As soon as Virtual Technician detected the leak, a notification was sent to the store manager and service provider. The notification included the estimated impact of an outage, root cause analysis, and a link to the most relevant data.

Resolution   ③

Because this anomaly could not be solved remotely, a tech was sent to site to find the leak and add refrigerant **before** an unplanned outage.

Ongoing Monitoring   ④

Even after refrigerant was added, Virtual Technician continues to monitor the system to ensure the root cause of the leak was resolved.

AXIOM CLOUD