

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.



Axiom Cloud's Customer Web Portal

RESULTS

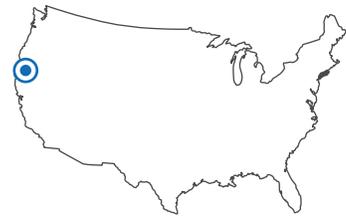
With Virtual Technician, this store's manager received a draft work order detailing the urgency, root cause, and financial impact of the leak, along with an interactive graph of the data to back it up. After a quick approval, a service technician visited the store to repair the leak and add refrigerant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

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

HOW VIRTUAL TECHNICIAN PREVENTED AN OUTAGE



Detected the refrigerant leak early



Estimated the likelihood and financial impact of an outage

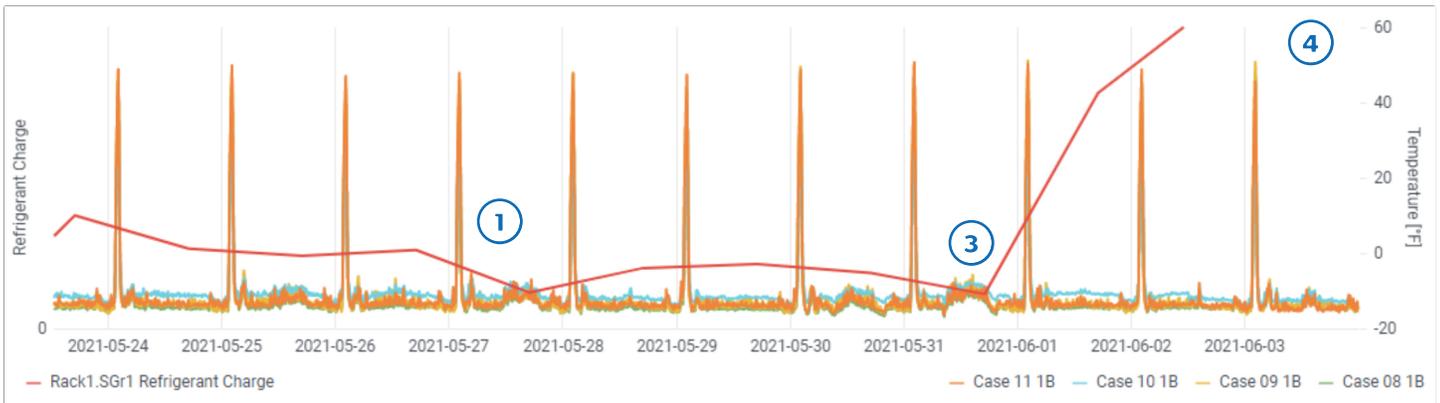


Notified the service provider with specific corrective action



Ensured the proper corrective action was taken

DETECTING LEAKS WITHOUT PPM SENSORS



High Urgency: Rack GRO Refrigerant Leak Fix Required - Case Outages

Possible
6 messages

Virtual Technician <virtualtechnician@axiomcloud.ai>
Fri, May 28, 2021 at 10:30 PM

Site: [REDACTED]
Address: [REDACTED]
Affected System: Rack GRO
Urgency: High - Immediate action required
Estimated Financial Impact If Not Addressed: \$4,790
Time and Date of Event Detection: 05/28/21 9:00AM
Incident ID: [REDACTED]

[Snapshot of Relevant Data:](#)

Suggested Actions:

1. Search for and repair leaks throughout the Rack GRO refrigeration system.
2. Add R-507 refrigerant to Rack GRO.
3. Review and address other unresolved anomalies while onsite.
4. Axiom will monitor the anomaly and confirm when the root cause has been adequately addressed.

Description and Root Cause:
Rack GRO is likely leaking refrigerant. This results in low rack capacity and cases unable to meet their temperature setpoint. If Rack GRO continues to leak, case outages are likely to occur during high outdoor air temperature conditions.

Risks and Potential Impact if No Action is Taken:

1. A potential de-merchandising event due to high case temperatures as a result of insufficient rack capacity. Potential costs include additional employee time, overtime technician time, rush equipment delivery, lost food sales.

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.

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Axiom Cloud's mission is to use software and automation to transform how the world's cooling systems are powered, operated, and maintained. To learn more about our apps for refrigeration, send us an email or visit our website.

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