



Multinational Supermarket Saves \$25M in First 12 Months

Panasonic

Industries: Retail, Supermarkets, Cold-Chain, HVAC, Refrigeration

Use Case: Cold-Chain Predictive Maintenance

Architecture: Knowledge-First AI (k-Oracle)

A large multi-national retail customer of Panasonic operates tens of thousands of refrigeration systems across their supermarket chain footprint. Unplanned equipment downtime leads to hundreds of millions of losses annually. By applying Aitomatic Knowledge-First AI—with the ability to predict equipment and component faults in advance—Panasonic has been able to help this customer save \$25M in the first 12 months of operation alone.

“ Before, We Could Only Detect System Anomalies, Not Truly Predictive Maintenance. After Applying Knowledge-First AI Architectures On The Aitomatic Platform, We Were Able To Achieve Real Fault Prediction. ”

\$25M
Operating Costs Saved

6mths
Time to Market

Priceless
Industrial-AI Capability Value

The Problem

Machine Learning Is Not Enough

The refrigerated supply chain (cold chain) is a \$250B industry globally. Trucks pick up fresh produce. Sea vessels transport food across the ocean. Neighborhood grocery store refrigerators maintain ideal climate-controlled conditions until you make the purchase. It’s all about keeping things fresh. Because of that, unplanned downtime is costly in repairs, associated produce loss, and disruptions to the supply chain.

Panasonic is a world-leading maker of cold-chain equipment. Among its customers is a supermarket multinational, which uses Panasonic refrigeration systems. Under service contracts, these systems are monitored in real-time. Yet unplanned equipment downtime still leads to hundreds of millions of losses annually. Preventive maintenance—replacing parts based on regular wear-and-tear schedules—has helped reduce downtime, but is still far from perfect.

Panasonic and the industry’s holy grail is predictive maintenance: being able to predict—

weeks ahead—the probabilities of failure of various systems and their individual components, so that highly targeted truck rolls can be dispatched and the exact components can be maintained or replaced just ahead of likely failure. Less than that and you get catastrophic downtime. More than that and you waste on unnecessary maintenance expenses.

The main challenge for all machine-learning-based predictive maintenance solutions to date is that there are insufficient labeled failure data, for a variety of reasons. Either data has not been collected, or there is data but actual failure events are insufficient for ML training, and equipment models are always changing under different operating conditions, etc.

In other words, Panasonic and other companies have tried, but have been unsuccessful at building and deploying real predictive maintenance solutions, i.e., predictive maintenance with actual Fault Prediction

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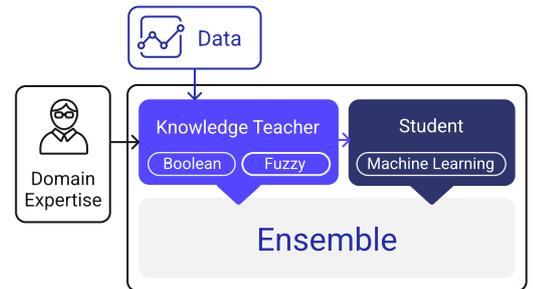
The Solution

Knowledge-First AI Comes To The Rescue

- 1 Identify anomalies with ML
- 2 Encode expert knowledge to predict actual faults
- 3 Integrate both in Knowledge-First "Oracle" architecture

With Knowledge-First AI and Aitomatic, Panasonic has been able to achieve Fault Prediction. The basic principle is straightforward: even though there is not enough failure data, Panasonic has plenty of engineering domain expertise, or human knowledge, to diagnose and predict potential equipment faults in advance. The only challenge is how to automate and make it scalable across a global footprint. Panasonic decided to employ the k-Oracle architecture on the Aitomatic Knowledge-First AI platform.

K-Oracle Knowledge Can Be Encoded Directly As A Teacher



In k-Oracle, Panasonic worked with their own domain experts—who have decades of knowledge and experience with the design and operation of the equipment—make a collection of heuristic statements about various failure conditions. These are encoded into the k-Oracle "Teacher" component.

Next, because knowledge models are great with rules but not exceptions, the Teacher is used to train a machine-learning Student model, that can handle edge cases more smoothly and tend to generalize better as well.

The third, major component in the k-Oracle architecture is an Ensemble to combine Teacher and Student decisions in such a way that it is better than either Teacher and Student alone.

The Ensemble output predicts the probabilities of failure of each system and component.

With this approach, Panasonic is finally able to go to market with a commercially viable predictive maintenance solution in a few months. Panasonic's retail supermarket

customer has been able to save an estimated \$25M annually since deployment.

This has opened up an exciting new business opportunity that's more profitable and predictable to OEMs. Instead of buying costly capital equipment, customers rent them the manufacturers under an operating-expense model, consisting of a Base Leasing Fee and a Performance Bonus.

The Results

\$25M

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6mths

Time to Market

Priceless

Industrial-AI Capability Value

About Aitomatic

Aitomatic is the world's only Knowledge-First App Engine for Industrial AI. We help companies encode their domain expertise, combine it with machine learning, and automate everything on a single SaaS platform.

Contact: XXX <https://aitomatic.com>