CASE STUDY

How Boon Logic's Ambe helped AIONT provide unsupervised anomaly detection on their client's centrifugal compressor that saved them \$740,000 in potential repair costs and 15-18 months of operational downtime



"Amber alerted our client to the fact that they needed to stop and repair their compressor, which they did two months earlier than originally planned. That allowed them to see several cracks on their cooling bundle that if left unrepaired, could've caused way more damage, potentially even to their core unit which costs \$800,000 to repair and 15-18 months to replace. Instead they spent \$60,000 to repair the cooling bundle and were up and running again in 72 hours."

PAUL CHEN Systems Integrator, AIONT



AIONT provides condition monitoring and predictive maintenance services for industrial pumps and compressors. In 2021 they began using Boon Logic's Amber to provide unsupervised anomaly detection to their clients, including an industrial gas company serving the semiconductor industry.

HIGHLIGHTS

Challenge

After installing accelerometer sensors on the industrial gas company's centrifugal air compressor, AIONT needed to implement an unsupervised solution that could digitally and accurately detect anomalies in the machine — despite its age and complicated structure

Solution

AOINT discovered Boon Logic's Amber solution — an Al-based predictive maintenance and condition monitoring product that can be trained and deployed in hours without the use of highly skilled and hardto-find data science talent

Results

- Amber detected anomalies in stages 3 and 4 of the compressor that led to it being overhauled two months earlier than planned
- Thanks to the early detection, the cooling bundle was found to have cracks in it, and was replaced before it could cause potential damage or failure to the compressor's core unit
- Repairing the cooling bundle cost \$60,000 and 72 hours of downtime, instead of the potential 15-18 months of downtime plus \$800,000 to replace the compressor's core unit had it failed

CHALLENGES

Providing unsupervised anomaly detection that is **accurate** and **quick** to train and deploy

When AIONT discovered Boon Logic, they had recently finished creating a condition monitoring solution for an industrial gas company's Altas Copco Centrifugal Air Compressor.

Like many companies in the semiconductor industry, the industrial gas company had been running their compressor without sensors or other condition monitoring devices, and simply performed routine checks, maintenance, and repairs.

This was a risky move for the gas company, as their 10-year-old compressor was the only one they had, and should it be non-operational for any length of time they would be unable to manufacture or sell anything.

> To better remove this risk, the gas company engaged AIONT, a subsidiary of Taikkiso (a pump equipment and engineering solutions company), to help them **proactively protect** their all-important compressor through condition monitoring and preventative maintenance.

AIONT's process included installing accelerometer sensors on the four stages of air compression that the machine ran through; building a point of contact unit to collect the data; and setting up a dashboard that integrated the data and provided the gas company with a detailed look at the compressor's condition.

Yet even with this thorough condition monitoring in place, **there was one crucial capability missing:** knowing whether or not the compressor was malfunctioning or heading toward an operational issue.

SOLUTION

Al-based anomaly detection that is **easy to configure**, can be used on **equipment of any age**, and **doesn't require expensive talent** to train the model

AlONT began looking for a company that provided anomaly detection so they could give the industrial gas company this **extra level of preventative maintenance protection.**

They had **provided some supervised models of anomaly detection** to their clients in the past, but those had been on small pumps where it was doable for a human to configure the data collection and monitor the device.

Paul Chen, AIONT's system integrator, said they knew the only type of anomaly detection that made sense on large pieces of equipment such as the centrifugal compressor was an unsupervised model, but the level of expertise required for unsupervised anomaly detection was beyond their scope and the unsupervised tools available in the market were insufficient for the rate and complexity of the data. "We know our machines well and we know how to repair them, but for us to figure out what is going wrong with the machine and digitize it with an algorithm is very, very difficult," Chen said. "We needed to find a company that could provide this solution for us."

Chen said his search only turned up two companies that provided unsupervised anomaly detection: Microsoft and Boon Logic.

After reviewing both company's technology and their features and capabilities, Chen said Boon Logic's Al-based Amber was the clear winner.

"There are so many benefits to Boon Logic's Amber," Chen said. "First of all, the **configuration time is really short.** They can easily train the model and have it running within a couple days.

"Second, **the machine doesn't need to be new.** It can be 10, 20, or 30+ years old — as many machines are — and as long as it's functioning okay, Amber can be deployed on the machine and start collecting data.

> "Also, Amber allows you to monitor all different types of assets throughout your entire plant. That alone is unbelievable. It doesn't matter if your equipment rotates or reciprocates, Amber can do the anomaly detection on both types of machines. It's remarkable."

RESULTS

Anomalies detected, early maintenance performed, and lots of time and money saved

Chen said when Amber was deployed on the industrial gas company's compressor, the technology started showing anomalies on stages 3 and 4 of the machine.

Despite the level 2 alarm telling them to stop the compressor and repair it, the gas company initially chose to continue running their one and only machine, hoping to make it to their planned overhaul date on June 15.

Yet when Amber continued to alert them that there were still anomalies which had now grown to a level 3 alarm on stage 3 of the machine — the gas company decided to shut down the compressor for maintenance two months early.

When they did, they found that the cooling bundle had several cracks on it, which left unrepaired, could lead to damage or failure of the machine's core unit.

> "Seeing the cracks on the cooling bundle was really scary because the cooling bundles alone cost \$60,000," Chen said. "If they had waited and hadn't changed the cooling bundle when they did, they may have potentially damaged the core unit which costs \$800,000 to repair and takes 15-18 months to order and replace.



Visible cracks on the stage 3 cooling bundle above





View of inside cooling bundle



Aluminum tears in the cooling fin

"The fact that they were able to **shut down**, **perform the repair** of the cooling bundle for \$60,000 and within 72 hours is a big win."

Chen said AIONT's ability to use Amber as part of their condition monitoring process has **allowed them to expand the capacity** to which they serve their clients and give them more data and peace of mind.

"We have a very big client base, and telling them that **we have the ability to provide unsupervised anomaly detection** is very exciting for them," Chen said. "They've all been happy with the results."

> "As for AIONT, we've been happy that we're able to provide our clients with more monitoring services for their assets than we were previously able to do on our own. That's all because of Boon Logic. Their technology is really amazing, and it sets them apart from every other AI company."

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