

Global Beverage Company Reduces Unplanned Downtime with C3 AI Reliability



A multinational beverage company is one of the world's largest producers of alcoholic beverages and soft drinks, with operations in more than 50 countries. A top priority for the company is to deliver high-quality products to customers with efficient manufacturing processes, including minimal unplanned downtime and maintenance costs.

Prior to engaging C3 AI, the company lacked a predictive maintenance solution to identify equipment reliability risks in its filling and packaging process. Maintenance was reactive, with frequent equipment failures requiring manual, time-intensive root cause investigation from experts and operators. Furthermore, new operators struggled to conduct investigations on their own and relied heavily on guidance from more experienced peers.

Without a predictive maintenance solution, equipment failures caused significant unplanned downtime and product losses in the company's breweries. Production disruptions lowered throughput and increased unexpected maintenance, contributing to lower revenue and higher operating expenses.

The company partnered with C3 AI and deployed C3 AI Reliability hosted on Google Cloud to enable predictive monitoring at scale for its breweries. The team started with bottle filling assets ("fillers"), the largest driver of unplanned downtime in the company's beverage packaging process. With C3 AI Reliability, the company can now predict equipment risks in advance and provide prioritized alerts and prescriptive recommendations to operators.

By using C3 AI Reliability to monitor fillers across its global facilities, the company can generate up to \$6.3 million in annual economic value from avoided unplanned downtime, reduced product loss, and decreased maintenance costs. After a successful pilot, the company is now exploring scaling C3 AI Reliability to monitor additional equipment types such as bottle washers, labelers, and palletizers to enable predictive maintenance across 27 breweries globally.

Project Objectives

- Predict and reduce unplanned downtime for fillers in the beverage packaging process
- Reduce operating costs by minimizing unexpected maintenance activities
- Provide prescriptive recommendations to operators with likely root causes and failure modes
- Configure the C3 AI Reliability application to visualize and interact with ML insights in a user-friendly interface.

Results

\$6.3M

potential annual economic benefit when deployed to monitor fillers across global facilities

30%

potential reduction in unplanned downtime for fillers

11.4M+

bottles of potential product losses avoided per year

100%

of filler underfilling failure events predicted in production

Challenges

Prior to partnering with C3 AI, the global beverage company used an in-house outlier detection system to assess its global operations. The system retroactively recorded unplanned downtime by region, brewery, production line, and equipment type, but the tool could not predict equipment downtime risks in advance or identify anomalies in near-real time.

The filling and packaging process represented a significant source of unplanned downtime across the company's global operations. Fillers failed more frequently than any other equipment type, followed by labelers, palletizers, and bottle washers. When an asset unexpectedly failed, operators had to abruptly shut down the production line and work alongside packaging experts to identify the root cause and execute emergency maintenance. The process relied on institutional knowledge of packaging experts and often took longer than expected. New operators often struggled to troubleshoot and had to wait for advice from packaging experts to begin maintenance activities. As a result, breweries faced high product losses, lower throughput, and decreased revenue.

Condition monitoring specialists conducted analysis to understand the drivers of equipment downtime after the fact. However, operators did not consistently reference the analysis to understand root causes and potential failure modes, hindering continuous improvement.

In turn, the company searched for a predictive maintenance solution that could warn operators and packaging experts of upcoming equipment failure risks and provide prescriptive recommendations to accelerate investigation and maintenance.

Approach

In 6 months, the company worked with C3 AI to configure and deploy C3 AI Reliability to predict unplanned downtime for 4 production lines at a brewery. The team ingested over 2 years of process and operational data including batch historian data, failure events, maintenance history, asset hierarchy, and production data to create a unified data image.

The joint team deployed 4 machine learning (ML) models and advanced analytics on top of the unified data image to predict downtime for fillers up to 8 hours in advance. The team trained models with user feedback to rapidly reduce the number of predictive alerts for packaging experts from 25 to less than 5 alerts per week during the pilot.

The ML models successfully predicted 100% of filler underfilling failure events in production. With a small number of accurate and actionable alerts, condition monitoring specialists and packaging experts could proactively investigate upcoming equipment failure risks, create maintenance orders, and collaborate with operators to execute maintenance and avoid unplanned downtime.

The C3 AI Reliability application user interface was configured to meet the company's needs, with the ability to predict equipment

About the Company

- \$15+ billion in annual revenue
- 50+ countries of operation
- 100+ breweries globally
- 30,000+ employees

Project Highlights

- 6 months from project kickoff to production-ready application
- Up to 8 hours of advance warning of potential equipment failure risks
- 2 years of historical data from 5 source systems integrated
- 4 machine learning models deployed to predict unplanned downtime events
- Configured C3 AI Reliability application user interface
- Hosted on Google Cloud



failure risks, provide alerts with prescriptive recommendations, and create maintenance work orders. With C3 AI Reliability, the company can now minimize unplanned downtime and product losses in its packaging process, reduce maintenance costs, and maximize brewery throughput.

Due to the success of the pilot, the company has deployed the application into production and configured live data connections to raise alerts in near real-time. In the next phase of scale-out, the company is planning to implement C3 AI Reliability across additional equipment types at 27 breweries and 84 production lines globally.

Solution Architecture

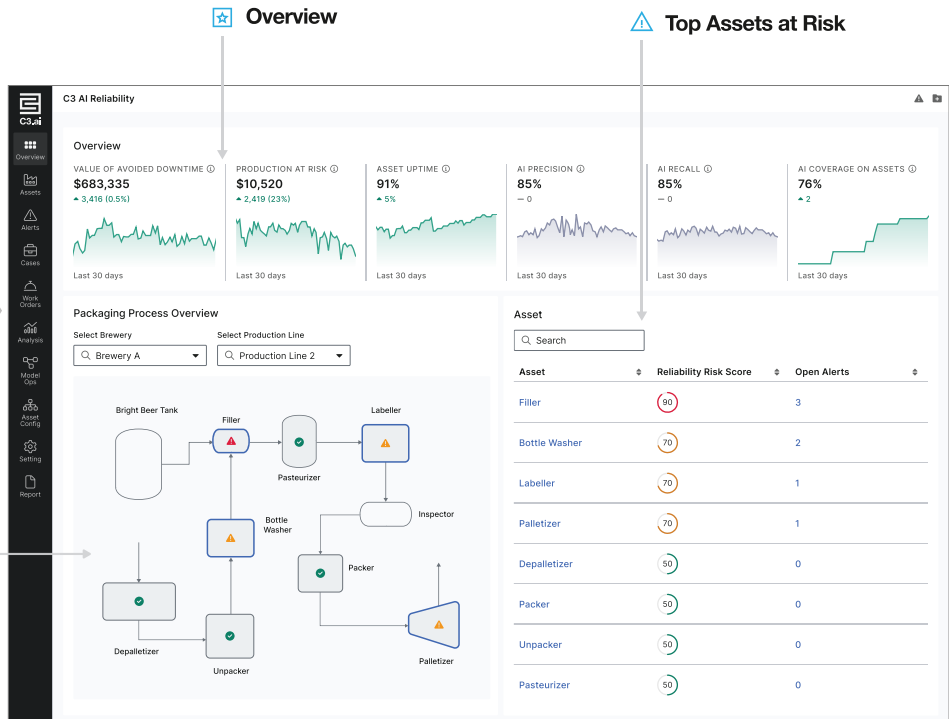


Enterprise Data

- Asset Hierarchy
- Sensor Data
- Failure Events
- Maintenance History
- Manufacturing Execution System



Process Flow Diagram



Benefits

Generate

\$6.3 million in potential annual economic benefit when deployed at scale to monitor fillers across breweries and production lines

Avoid

11.4 million bottles of potential product losses per year by reducing downtime

Predict

100% of filler underfilling failure events in a production deployment

Reduce

unplanned downtime across equipment types, including fillers, bottle washers, labelers, and palletizers

Scale

predictive maintenance solution globally to 27 breweries and 84 production lines

Minimize

false positive alerts with less than 5 alerts per production line per week

Proven Results in 6-Month Pilot

Visit C3.ai/get-started