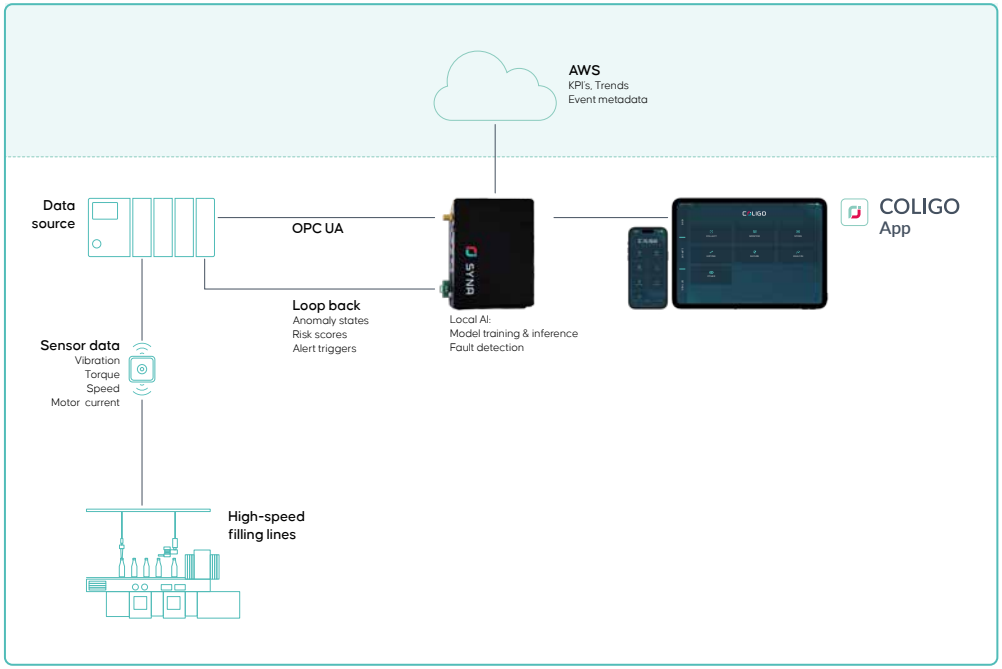
Predictive Maintenance for Filling & Packaging Equipment

- Torque drift on capping heads leading to misalignment or jams
- Conveyor speed fluctuations resulting in back-pressure faults
- Labeler slippage causing cumulative micro-stops
- Mechanical wear across fillers, cappers, labelers, and inspection units impacting OEE

Executive Summary

High-speed filling and packaging lines (fillers, cappers, labelers, conveyors, inspection units) generate large amounts of time-series data. COLIGO uses edge intelligence to transform this data into actionable predictions that prevent stoppages and protect throughput.

The Solution



COLIGO combines the SYNA EdgeBox and the COLIGO App to deliver edge anomaly detection directly on high-speed filling, capping, labeling, and packaging assets:

- OPC UA connectivity to PLCs for collecting vibration, torque, speed, and motor-current signals
- Local AI running on the EdgeBox identifying signal drift and wear signatures in real time
- No-code configuration enabling:
- Data acquisition
- Model creation and drift detection
- Alerting rules
- Operator dashboards and asset-health insights

When a deviation is detected:

- COLIGO raises actionable alerts with component-level indication (e.g., "Capper head #3 torque rising")
- Operators intervene immediately and adjust/repair the affected mechanism
- Maintenance workflows trigger automatically through tablets, HMIs, or email
- Corrective action is taken before defects propagate or line stoppages occur

The Challenge

Packaging systems face rapid wear due to mechanical stress and high duty cycles:

- Bearings degrade → vibration increases
- Cappers experience torque drift → misaligned caps & jams
- Labelers slip → micro-stops accumulate
- Conveyors slow under load → back-pressure faults

Traditional maintenance relies on:

- Fixed intervals (wasteful + misses hidden failures)
- Manual inspection (inconsistent)
- Delayed feedback through historian/ SCADA (too late)

This leads to:

- Unplanned downtime (very expensive in F&B)
- Lower OEE due to micro-stops
- Safety risk if not caught earl

Manufacturers need a solution that:

Detects early mechanical wear signatures that traditional SCADA and fixed-interval maintenance miss

Operates in real time at the edge to support fast-moving production lines without cloud latency

Requires no data-science expertise, enabling engineers to configure and maintain the system independently

Data & Model Information

Attribute	Configuration
Data types	Vibration, torque, cycle time, motor current, speed signals from PLCs and sensors
Data acquisition	OPC UA connection from PLCs → SYNA EdgeBox for full-resolution streaming
Model type	Unsupervised anomaly detection for torque drift, vibration rise, and speed instability
Edge processing	Real-time inference on SYNA EdgeBox with no cloud dependency
Visualization	COLIGO App dashboards with anomaly scores, component-level alerts, and trends
Workflow Integration	No-code maintenance-task triggering (tablet/HMI/email)

Results & Customer Benefits

KPI	Outcome
Downtime reduction	25–40% fewer unplanned stoppages due to predictive alerts handled during planned changeovers
OEE increase	+10% by eliminating micro-stops and stabilizing line speed
Maintenance cost reduction	Lower costs through condition-based replacement and fewer emergency repairs
Scrap & product damage	Decrease in defective batches through early detection of misaligned caps/labels
Workforce productivity	Teams focus on assets requiring intervention instead of manual inspection rounds