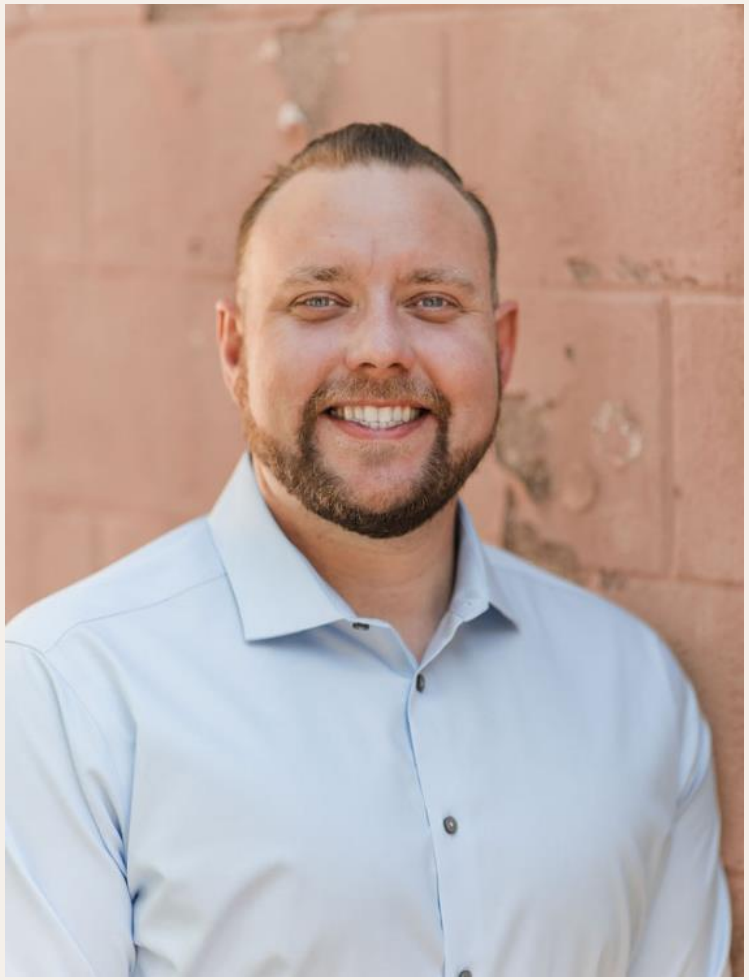
Nanoprecise
Intelligent Reliability

From Signals to Confident Maintenance Decisions:

How AI turns machine data into operational clarity



Patrick Heiser

Vice President of Sales

How many of you have been surprised by an equipment failure this year?

Most teams are not lacking ***sensors***. They are lacking ***clarity.***

The gap between "*something changed*" and "*here is what to do about it*"
remains frustratingly, expensively wide.

This session is about **closing it.**

THE PROBLEM:

Detection is solved.

Decision-making is not.

The Alert Problem

Alert Overload

Teams can't investigate most of what fires. Critical signals get lost in the queue.

Days of Validation

Alert-to-action cycles that should take hours stretch to 5–7 days of manual review.

Alert Fatigue

When everything looks urgent, nothing feels trustworthy, and real warnings get ignored.

The uncomfortable reality:

60–95% of alerts in typical predictive maintenance programs are not caused by actual equipment failure.

They stem from loose sensors, configuration gaps, process fluctuations, and environmental coupling.

That is not a data problem. It is an architecture problem.

THE FOUNDATION OF THE SOLUTION

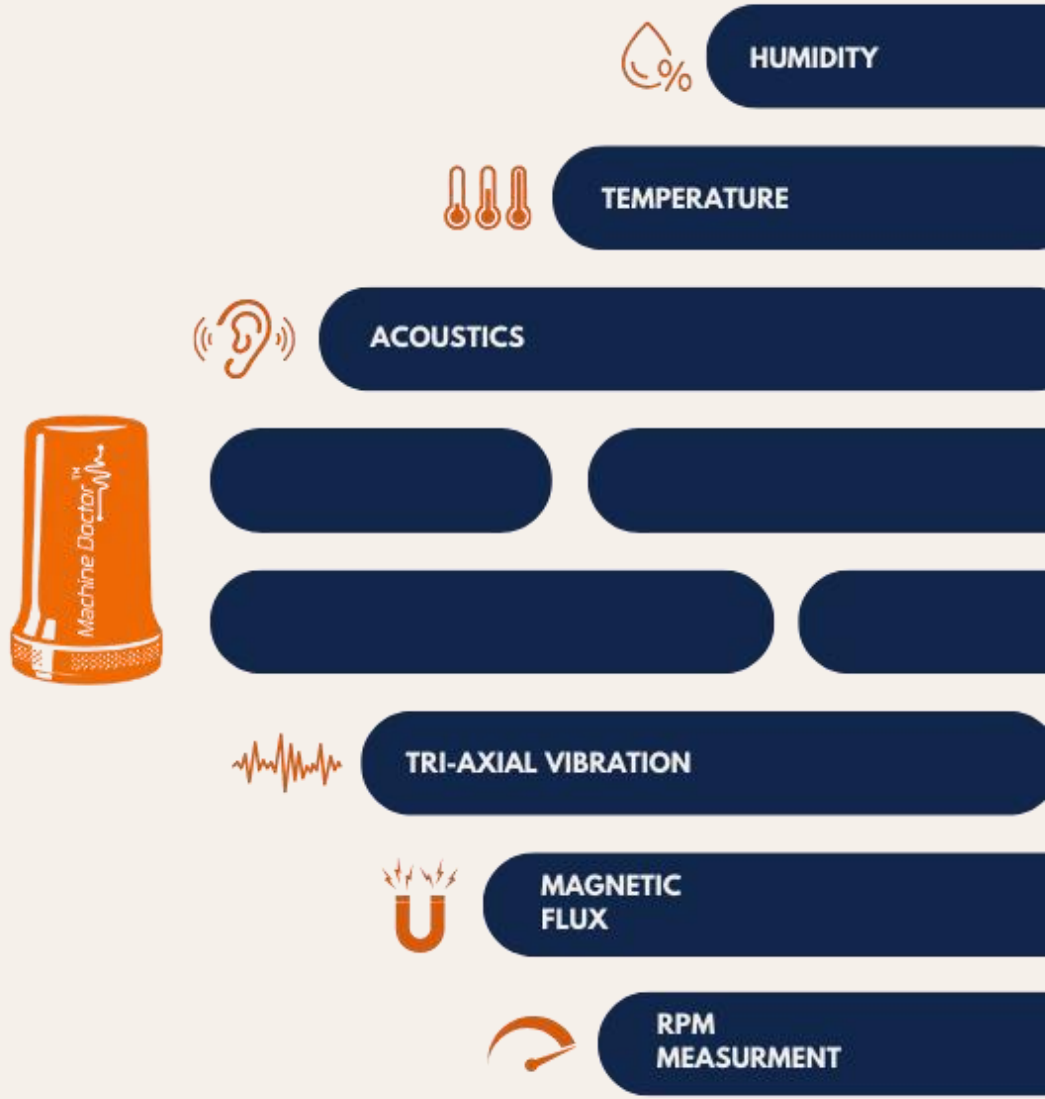
The 6-in-1 Sensor: Capturing what others miss

The 6-in-1 Wireless Sensor

One device. Six signals. The full picture of machine health.

Built for Industry

- Certified cybersecure
- Edge computing - reduces false positives, extends battery life
- Cellular communication - no plant network dependency
- Bluetooth for time-synced multi-sensor reading
- Globally scalable, non-intrusive installation



THE AI ARCHITECTURE

Condition Intelligence:
Layered, explainable, built for trust

Condition Intelligence

How most PdM systems work

- X Intelligence applied in a single step
- X Confident even when it shouldn't be
- X Silent about the uncertainty it carries
- X Humans compensate for upstream noise
- X False positive rate: 60-95%
- X **Result: Alert fatigue, deferred decisions**

How Condition Intelligence Works

- Layered Approach - each with a specific job
- Uncertainty surfaced explicitly, not buried
- GenAl runs downstream of verified evidence
- Expert validation at the final mile
- 2-4x improvement in true-positive accuracy
- **Result: teams trust what they're seeing**

The Layered Architecture

Mirrors how the best engineers decide — step by step, not all at once

Alerting	
Detects genuine behavioral change	Unsupervised PCA across vibration, speed, acoustics. Filters noise before it reaches your team.

Pattern Recognition	
Reveals how signals evolve	Extracts spectral patterns, harmonics, sidebands, order-related behavior across operating conditions.

Behind the Scenes Analysis	
Applies context & reasoning	LLM reasons over asset config, maintenance history, sensor integrity, operating environment.

Expert Validation	
Expert-validated, action-ready	CAT II–IV vibration experts review, validate severity, confirm recommendation before it reaches your dashboard.

Output

Before – Threshold Alert

"Vibration: 14.2 mm/s - ALERT"

After – Condition Intelligent Insight

Bearing fault — Stage 3.
RUL: 18–25 days.
Energy cost: $47/day.
Action: Replace bearing within 2 weeks.
Validated by CAT III analyst.

One tells you something changed.

The other tells you what it is, what it costs, when to act, and that a human expert has confirmed it.

COMBINING EDGE AND PLATFORM

Prioritization, visibility, and the decision to act

Platform Visibility: 35,000 ft to 3 ft

C-Suite

- Portfolio health across all sites
- Total energy waste & ROI
- CO_2 / ESG metrics

Plant Manager

- Site equipment health summary
- Active fault list by severity
- Maintenance backlog

Reliability Engineer

- Machine-level health trends
- Fault history & recurrence
- Effectiveness tracking

Technician

- Today's prioritized work list
- Specific prescriptive action
- Feedback loop to AI

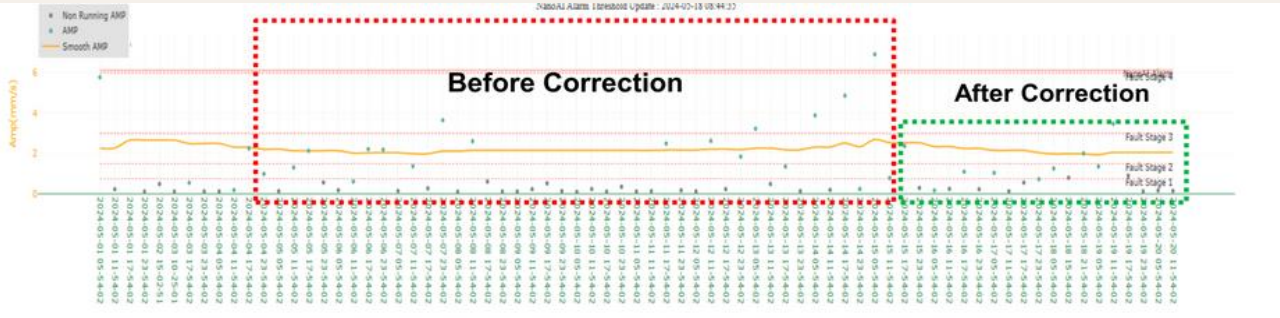
REAL OUTCOMES

Case Studies

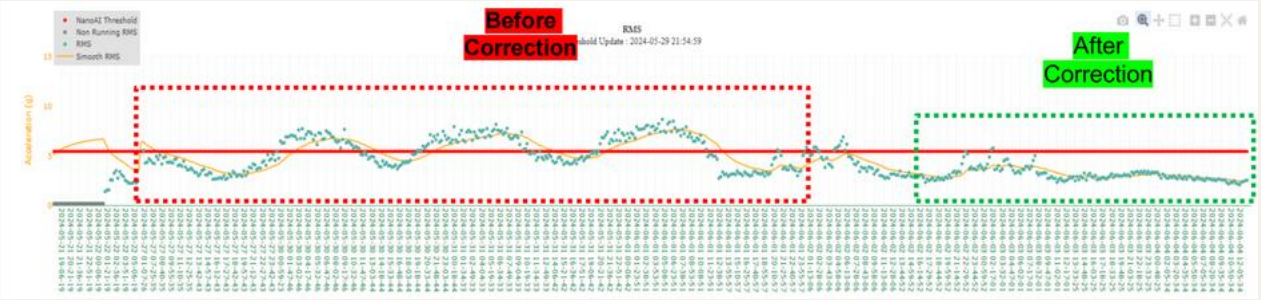
Food & Beverage Manufacturer:

Preventing Downtime and Energy Waste

Distillery Hammer Mill Motor



Distillery Vacuum Pump



Context

At a global distillery frequent unplanned failures in pumps, fans, and hammer mills caused production losses and energy waste.

Findings

Detected coupling misalignment, bearing wear, and lubrication issues across multiple machines; alerts validated by analysts and addressed through planned maintenance.

Solution

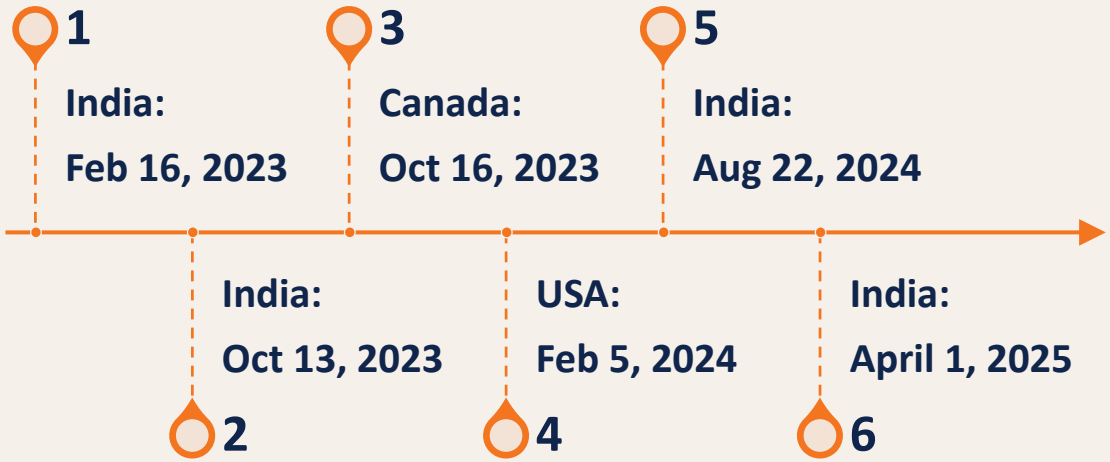
MachineDoctor sensors and the Condition Intelligence platform deployed on critical assets supporting key processes including bottling, milling, distillation, boiler, and fermentation. Priority given to machines without redundancies and those essential to product quality.

Outcome

Nanoprecise proved that their critical alerts and Human In the Loop CMaaS was effective in preventing issues from escalating. No unplanned downtime across monitored assets has been seen. Verified fault correction within two weeks and measurable energy improvement post-maintenance.

Global Pharmaceutical Manufacturer:

Scales from 1 to 6 facilities after quick ROI at first site



Context

A global pharmaceutical manufacturer faced frequent maintenance challenges across cooling systems, pumps, and vacuum units operating under strict environmental and compliance requirements as well as staffing issues.

Findings

The system identified faults such as unbalance in cooling tower fans, bearing looseness in pumps, and lubrication issues in motor drive ends. Early alerts enabled planned interventions, preventing prolonged equipment stress and energy inefficiencies.

Solution

Nanoprecise installed MachineDoctor sensors across hundreds of assets in six facilities, monitoring vibration, temperature, acoustics, humidity, and magnetic flux. Centralized visibility through the Condition Intelligence platform enabled consistent health tracking and early fault detection.

Outcome

Success at the first facility where the project prevented 136 hours of unplanned downtime and revealed $42,800 in excess energy usage, leading to targeted maintenance improvements led to a rapid ROI. After confirming the ROI, the customer planned expansion to five other sites to reap additional benefits.

3 Questions to Ask Before You Leave Today

What % of your maintenance is currently reactive?

- If it's above 30%, you have a prioritization problem, not a sensor problem

Do you know what each active fault on critical equipment is costing in energy per day?

- If not, you're missing the earliest, most quantifiable signal available.

When your team gets an alert, how long to confident action?

- That gap is exactly where value is lost and where CI delivers immediate return

QUESTIONS?