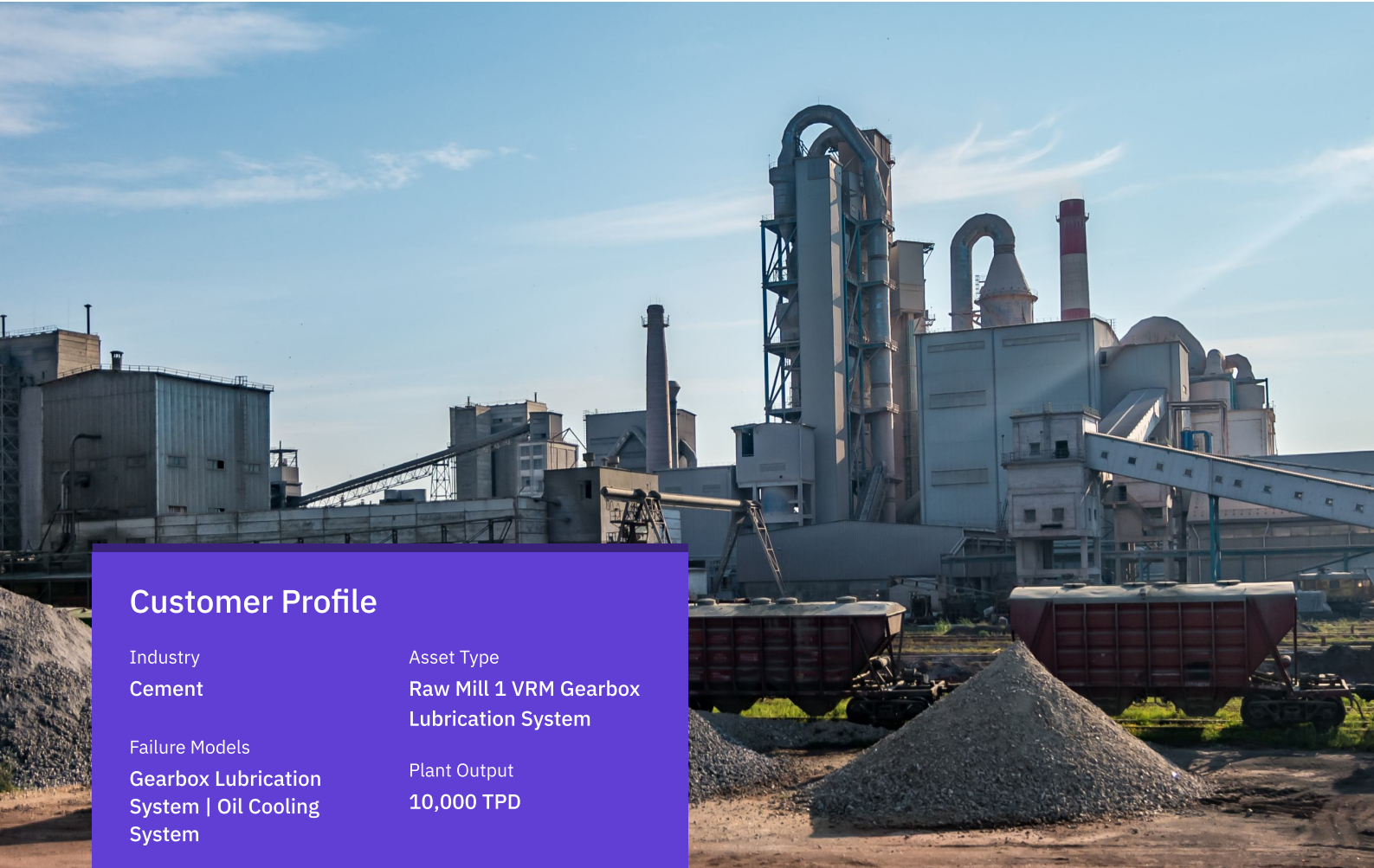


UptimeAI Prevents Gearbox Lubrication System Failure and Saves \$500 K at a Leading Cement Plant



Customer Profile

Industry
Cement

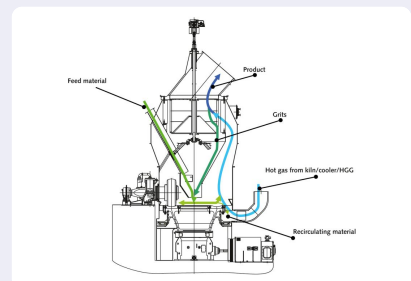
Asset Type
Raw Mill 1 VRM Gearbox
Lubrication System

Failure Models
Gearbox Lubrication
System | Oil Cooling
System

Plant Output
10,000 TPD

The Role of Raw Mill VRM in Operations

- Ensures consistent raw-meal particle size for optimal kiln feed
- Delivers 20 – 40 % energy savings compared to ball mills
- Supports uninterrupted production by grinding raw materials into fine powder, reducing energy intensity by up to 30 % in continuous operations



Detection of Gearbox Lubrication System Anomaly

On March 18, 2025, UptimeAI's OEx platform detected a steady decline in gearbox oil pressure from 2.5 bar to 1.6 bar, while thrust-pad temperatures rose from 45 °C to 70 °C—trends confirmed by time-series analysis showing an average increase of 8 °C per day and a pressure drop of 0.15 bar per day . Alerts were issued on March 18, March 20, and March 23, highlighting abnormal lubrication behavior before any critical thresholds were crossed. By March 24, 2025, the site team followed UptimeAI's prescriptive recommendation and replaced the heat exchanger—preventing a lubrication system failure and restoring optimal flow one week early.

How UptimeAI Expert Helped Identify the Root Cause?

Verifying the Anomaly

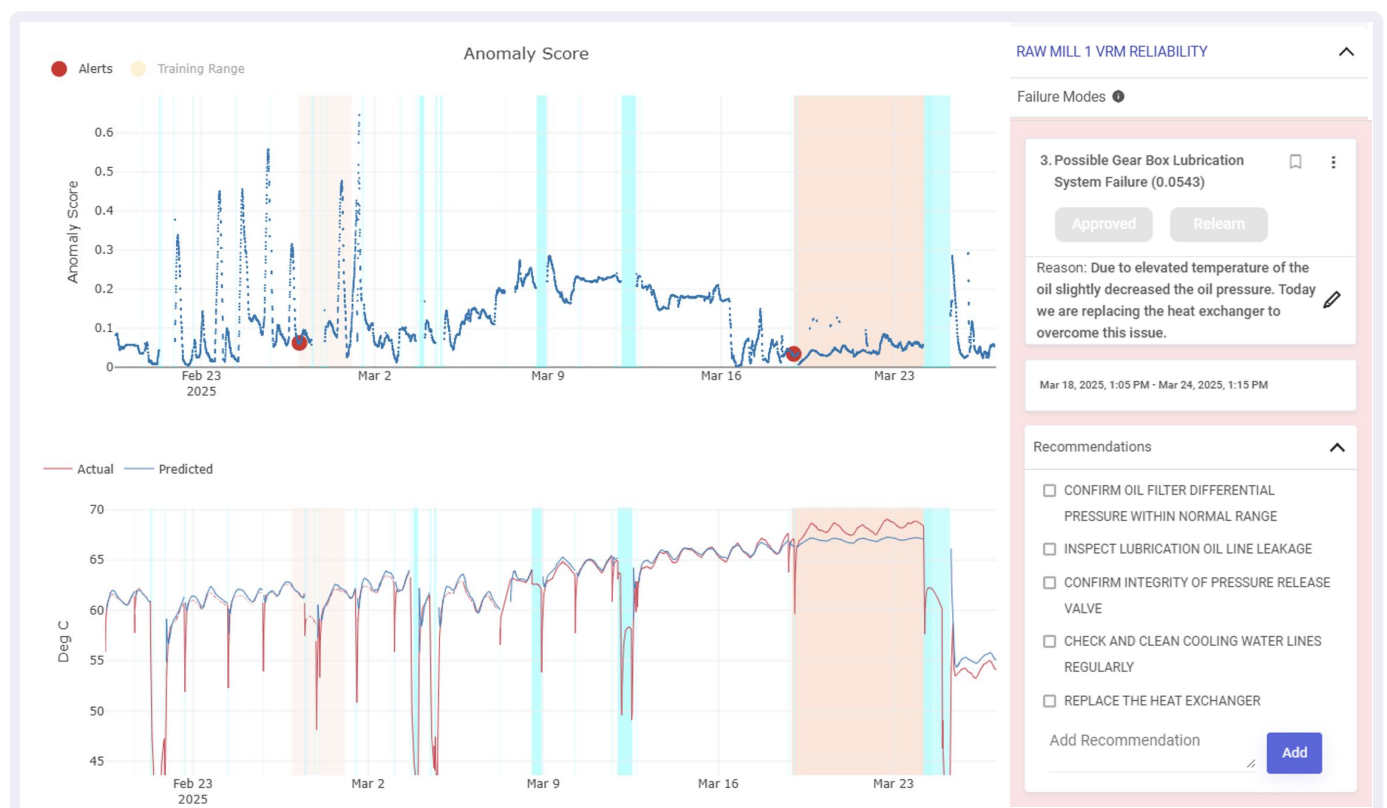
- Continuous AI monitoring flagged oil pressure dropping below safe limits and thrust-pad temperatures exceeding baseline
- Charted time-series plots revealed a linear pressure decline (0.15 bar/day) alongside an exponential temperature rise (8 °C/day) between March 18–23
- Multi-date alerts enabled the plant team to validate the trend before irreversible damage occurred

Isolating the Fault

- Correlation analysis across oil-sump temperature and thrust-pad sensors ruled out gearbox misalignment and load variances
- AI-driven failure-mode library pinpointed cooling-loop degradation (heat-exchanger issue) as the root cause
- Historical temperature and pressure trends confirmed accelerated wear on the lubrication heat exchanger

Corrective Action

- UptimeAI's prescriptive recommendation called for heat-exchanger replacement in the next maintenance window
- Spare parts were staged in advance, eliminating lead-time delays
- On March 24, 2025, the heat exchanger was successfully replaced, restoring stable oil pressure and temperature readings



Key Benefits & Reliability-Driven Maintenance in Cement Plant Operations

- In cement operations, VRM reliability underpins up to 30 % of grinding efficiency and accounts for 25 % of plant energy usage
- Zero Unplanned Downtime:** Prevented a 24-hour production halt valued at \$500 K (10,000 TPD × \$50/ton)
- \$500 K Saved:** Through avoided downtime and expedited parts replacement