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WHITE PAPER

The role of AI in Blower monitoring in Industrial Applications

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Executive Summary

Fans and blowers are indispensable in the process industry.

They circulate process air in cement kilns, provide draft in power boilers, enable mine ventilation, support dust extraction in metals, and ensure safe, regulated airflow in chemical and fertilizer operations. When a fan fails unexpectedly, entire processes can come to a halt, causing safety risks, lost production, and increased maintenance costs. Harsh environments, dust accumulation, vibration, and lubrication challenges make manual inspection unreliable and increase the risk of catastrophic breakdowns.

This paper explains the critical role of fans and blowers, the challenges of monitoring them in real-world conditions, the importance of selecting the right sensors, and how PlantOS, our Industrial AI platform, detects early-stage fan faults.

We also present deployment results across 3,150 monitored fans in six industries, demonstrating how predictive maintenance enabled:

- >99% availability
- 9,338 faults detected and diagnosed early
- 17,955 hours of downtime avoided
- 20% reduction in Mean Time to Repair (MTTR)
- Significant improvement in safety by reducing manual inspections in hazardous areas

The results prove that AI-driven predictive maintenance for fans and blowers is not optional but an essential strategy for reliability, cost savings, and workforce safety.

Challenges in Blower Monitoring

Monitoring fans and blowers poses unique operational challenges:

Dust or material deposition on blades causing imbalance and vibration.

Bearing failures from improper or infrequent lubrication.

High wear of blades or drive-train components leading to sudden failure.

Access difficulty for fans in confined or remote locations (e.g., cooling towers, mines).

Safety hazards from manual inspection in high-risk environments.

These challenges make automated, real-time monitoring the only reliable way to detect issues before they escalate into catastrophic failures.

Why Sensor Selection Matters

The effectiveness of predictive maintenance depends heavily on the sensors used to collect pump health data.

Electricity Powered Sensors (High-Frequency Capture)
- Capture vibration, temperature & flux every 3–5 seconds.
- Ideal for critical blowers where early-stage fault detection is vital.
- Provide the richest datasets for AI fault models.

Wireless, Battery-Powered Sensors (Low-Frequency Capture)
- Capture data less frequently to conserve battery life.
- Best suited for auxiliary or less critical fans where continuous monitoring is not essential.

Piezoelectric Sensors (Crystal-Based with Stainless Steel Body)
- Highly sensitive to vibration, resistant to harsh industrial environments.
- Long lifespan and reliable performance in extreme temperature , abrasive and corrosive settings such as mining or fertiliser plants.

Choosing the right sensor strategy ensures the balance between cost, coverage, and the diagnostic accuracy needed for critical assets like fans and blowers.

How PlantOS Identifies Early-Stage Faults

PlantOS, the Industrial AI platform, ingests high-frequency sensor data and applies advanced analytics to detect faults at their earliest stages:

- **Data Capture:** Streams raw vibration and temperature signals into the platform.
- **Feature Engineering:** Extracts 70+ engineered features from each dataset.
- **Adaptive AI Models:** Continuously learn normal vs. abnormal behavior.
- **Fault Classification:** Identifies failure modes such as detects imbalance, bearing clearance, lubrication, blade wear, resonance, and more.
- **Prescriptive Insights:** Goes beyond detection, PlantOS recommends the most likely cause and the intervention required.

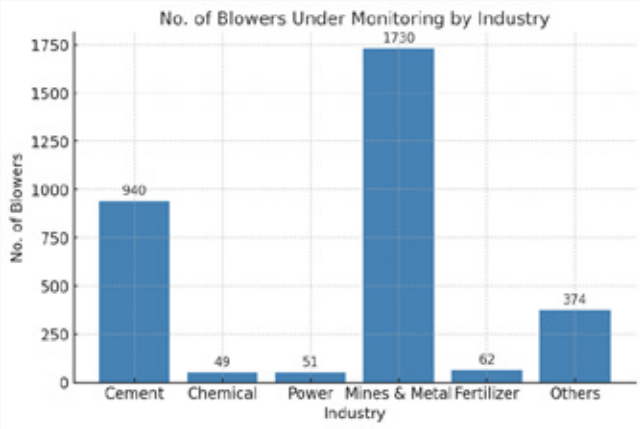
This **closed-loop AI system** reduces false alarms and builds trust with plant teams by aligning predictions with real-world outcomes

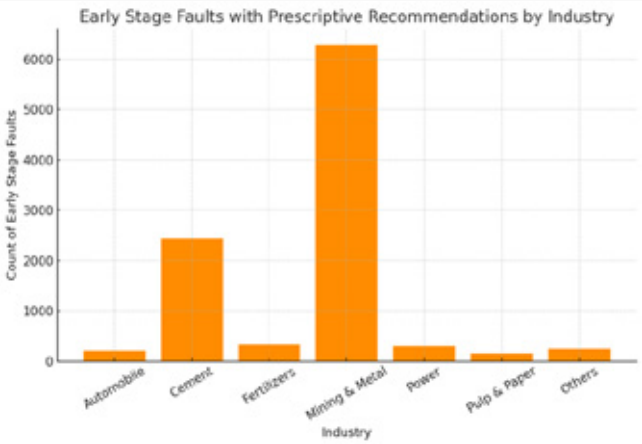
Deployment and Results

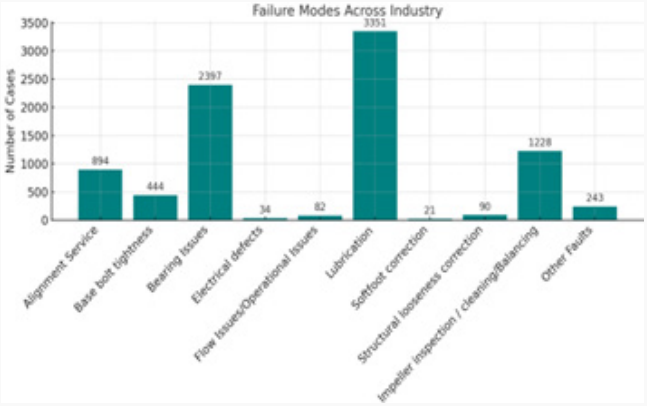
Across 3150 monitored blowers in cement, mines & metals, fertilizers, tyre and power industries, PlantOS has delivered measurable outcomes:

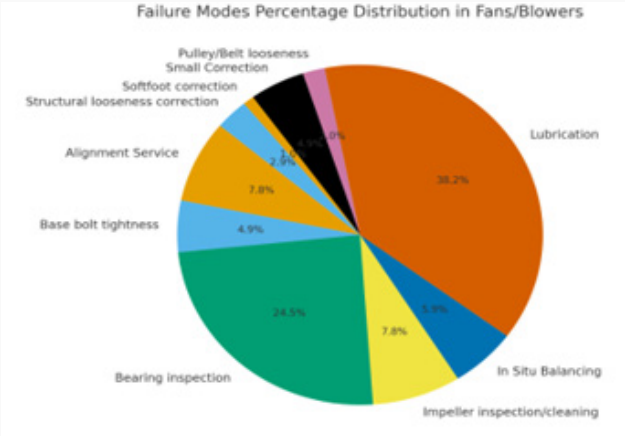
- **Faults Detected:** 9,338 across categories including bearings, lubrication, misalignment.
- **Downtime Avoided:** 17,955 hours across these deployments.
- **Availability:** >99.9 % with almost no breakdown.
- **Maintenance Efficiency:** Mean Time to Repair (MTTR) reduced by 20%.
- **Safety:** Significant reduction in manual inspection in hazardous areas.

Data Visualisations









Conclusion

Fans and blowers are mission-critical to industrial production. AI-driven predictive maintenance, enabled by PlantOS, transforms maintenance from reactive to proactive. Early fault detection, prescriptive insights, and optimised scheduling ensure higher uptime, safer operations, and reduced costs.

This benchmark project proves that predictive maintenance for fans and blowers is no longer optional, it is essential for sustained competitiveness and operational excellence.