

FAN BEARING CLEARANCE



DIAGNOSIS

DETECTED ANOMALY

PROGRESSIVE BEARING WEAR

PROBABLE ROOT CAUSE

EXCESSIVE BEARING CLEARANCE

DETECTION LEAD TIME

TWO WEEKS IN ADVANCE

UP
TO **85k€**

ESTIMATED AVOIDED COST
bearing replacement and
downtime.

LOCATION: Portugal

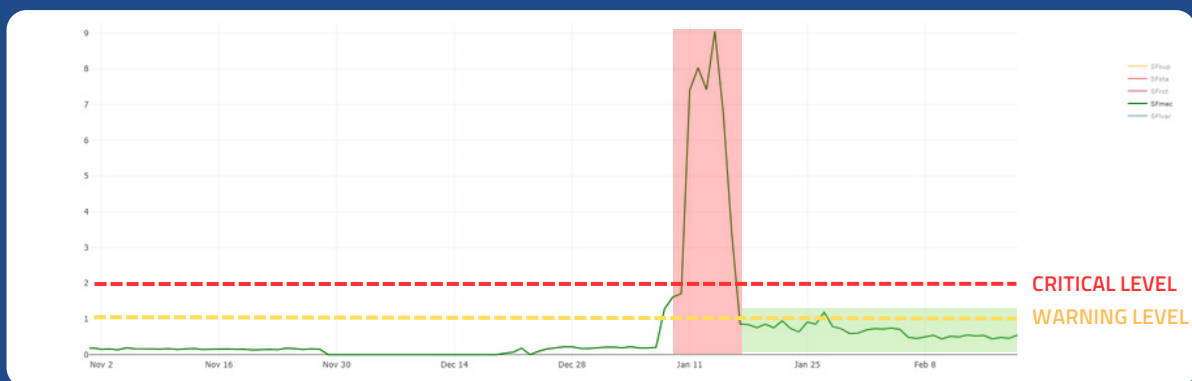
ASSET: Fan

SECTOR: Cement

4000 V / 430 A / 250 kW / 50Hz

The diagnosis was generated without additional sensors, relying solely on electrical measurements.

During normal steady-state operation, PreditMot identified a sudden and sustained upward trend in the Mechanical Severity Indicator, exceeding predefined alarm thresholds.



TREND OF MECHANICAL FAULT INDICATOR

KEY OBSERVATIONS

- The deviation occurred without changes in process demand
- The increase was abrupt and persistent
- Alarm severity escalated rapidly, triggering a high-criticality alert

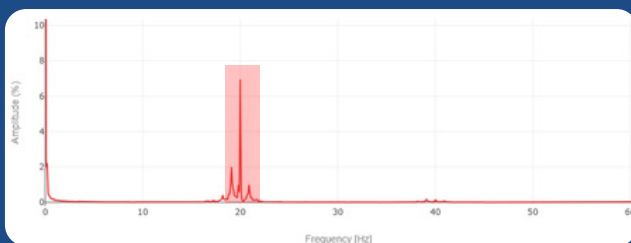
This behavior indicated abnormal mechanical looseness inconsistent with normal fan operation.

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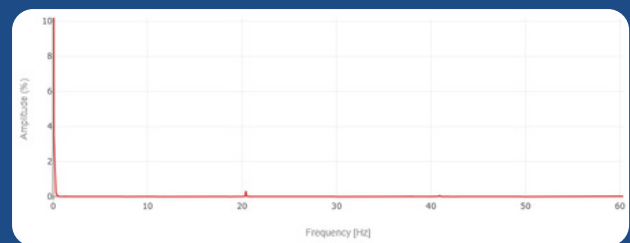
A detailed frequency-domain analysis of the stator current revealed:

- Emerging low-frequency modulation components associated with mechanical looseness
- Amplification of harmonics related to torque oscillations
- Absence (or very low magnitude) of these components under baseline conditions

The spectral pattern was consistent with progressive bearing clearance affecting rotor stability and load transmission.



SPECTRAL ANALYSIS UNDER DEVELOPING PROBLEMS
(RED ZONE)



SPECTRAL ANALYSIS UNDER NORMAL OPERATION
AFTER INTERVENTION (GREEN ZONE)

Client Action

Upon receiving the alert, the client decided to proactively stop the equipment for inspection. A targeted mechanical inspection of the fan assembly was carried out and confirms the existence of:

- Excessive clearance in the bearing housings

After corrective action, the indicator returned to nominal values, confirming direct correlation between the electrical signature and the mechanical condition.

IMPACT & BENEFITS

- ✓ Prevention of catastrophic fan failure
- ✓ Avoidance of unplanned maintenance downtime
- ✓ Reduced corrective maintenance scope
- ✓ Increased asset reliability

KEY TECHNICAL TAKEAWAY

This case demonstrates how electrical variables can reliably reflect mechanical degradation and how ESA enables early, physics-based fault detection in industrial assets, even in harsh industrial environments where conventional sensors are difficult to deploy.