

# LOCTITE PULSE HELPS OIL AND GAS REFINERY DETECT A \$625,000 POTENTIAL FAILURE IN ADVANCE.

## OIL & GAS INDUSTRY

A large US-based diversified downstream energy company, focused on providing safe, reliable energy, sought to enhance the reliability of its oil refinery operations. With a significant crude throughput capacity and a commitment to supplying critical energy to small communities across the western United States, any downtime could result in demand-supply gaps as well as substantial financial losses – both in terms of lost production and costly repairs.

One of the biggest challenges in oil refineries is balancing thorough equipment inspections with minimal operational disruptions. To address this, the company deployed **LOCTITE Pulse's Smart Rotating Equipment solution** on its critical assets, ensuring continuous monitoring and greater operational visibility.

Soon after deployment, the system detected a rapid bearing and coupling failure in a boiler draft fan.

Typically, a failure such as this would lead to approximately

\$125,000 in repair costs and more than \$500,000 in lost production over 10 days of downtime.

### ASSETS MONITORED

- Compressors
- Steam turbines
- Gearboxes
- Electrical motors
- Fans



## Customer Case Study

### 1. THE CHALLENGE

Refinery boilers are high-temperature and high-pressure environments, subjecting equipment to significant material fatigue, accelerating wear and tear. One of the most critical components of boiler operations is the draft fan, which ensures proper airflow for combustion. Despite undergoing recent repairs, high physical stresses made the long-term reliability of the fan uncertain. Given its essential role in maintaining boiler efficiency, continuous monitoring was crucial to preventing unexpected failures and ensuring operational stability.

### 2. THE SOLUTION

Since impending failures often manifest as subtle changes in vibration and acoustics, early detection is essential. The company deployed **LOCTITE Pulse's Smart Rotating Equipment solution** 6-in-1 wireless sensors on critical machinery to continuously monitor equipment health. Shortly after deployment, the system detected increased acceleration levels in a boiler fan, followed by a sudden rise in harmonic content. An automated fault notification was immediately sent to maintenance personnel, alerting them to the emerging issue.

### 3. ACTIONS

The system identified a rapid-onset bearing failure and promptly alerted plant personnel of the quickly escalating problem. The late-stage notification signaled the need for immediate attention to the affected equipment.

Due to logistical issues, maintenance teams could not intervene, and the failure escalated before action could be taken, resulting in costly repairs and downtime. A postmortem revealed that following the **LOCTITE Pulse's Smart Rotating Equipment solution** notification would have prevented the catastrophic failure/losses.



### OUTCOMES



FASTER MAINTENANCE WORKFLOWS



POTENTIAL TO AVOID SIMILAR DOWNTIMES



INCREASED VISIBILITY INTO MACHINE HEALTH



### OBSERVATIONS AND ANALYSIS

- 1 Sensors placed on the turbine, gearbox, and fan bearings were monitoring vibration, acceleration, and acoustic variations, among other parameters with results wirelessly transferred to the app.
- 2 A rapid increase was observed in the peak acceleration trends of the fan, which exceeded the **Loctite Pulse** automated threshold criteria (Figure 1). A notification was immediately generated and sent to maintenance personnel on-site.

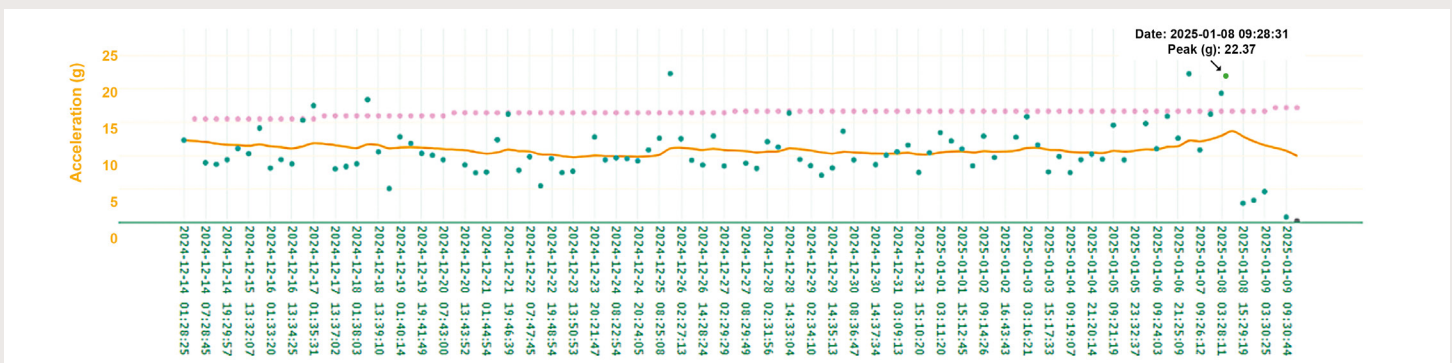


Figure 1: Fan sensor peak acceleration trend (z-axis)

- 3 The following day, a sudden increase in harmonic content was observed, triggering an automated fault-specific amplitude notification.
- 4 Significant increases in RMS velocity and peak acceleration were also detected in the gearbox data (Figure 2). Notifications were sent out as these levels exceeded both automated thresholds and user-set custom thresholds.

## Customer Case Study

**5** Additionally, a sudden increase in harmonic content triggered fault-specific amplitude notifications for the gearbox, indicating an output shaft misalignment.

**6** Further investigations and a root cause analysis performed by maintenance staff found that the fan bearings had become stuck on the shaft, with the entire bearing rotating in the housing. This also led to a coupling fatigue failure, as the axial thrust of the fan was no longer mitigated by the bearing. Damage also occurred to the gearbox, where looseness developed.

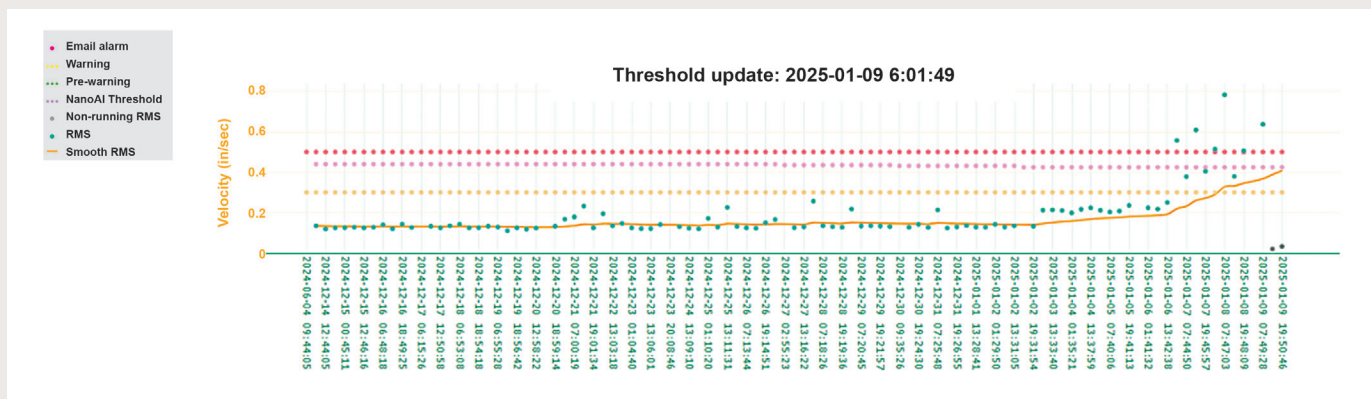


Figure 2: Gearbox sensor, output shaft, RMS velocity trend (x-axis)

## CONCLUSION

By implementing **LOCTITE Pulse's Smart Rotating Equipment solution**, the refinery gained improved visibility into equipment health, allowing for early detection of emerging failures. While the system provided timely alerts, the delay in acting on these warnings led to significant financial losses to the tune of **\$125,000 in repair costs and more than \$500,000 in lost production**. Moving forward, the refinery has

revamped its maintenance protocols to act swiftly on alerts, ensuring long-term reliability and optimizing operational efficiency.

**LOCTITE** Pulse

Listen to your equipment's heartbeat.

Henkel