

i-ALERT Diagnostics Prevents Pump Failure

By identifying a stage 2 bearing defect in an electric motor, i-ALERT saved one metal refinery countless operating costs and unplanned downtime.

To monitor the health of their pumps, some companies rely on monthly, or even weekly, walk-arounds to gather data. However, this method is often unable to provide early notification of asset deterioration, which could result in pump failure and unplanned downtime.

Fortunately, the i-ALERT Diagnostics system can provide 24/7 monitoring to catch issues as they arise. And that's how one metal refinery was able to catch a catastrophic failure before it occurred – and resolve the issue days later.

Key Highlights

Safety: i-ALERT's remote monitoring allows users to avoid entering dangerous areas for data collection

Speed: conventional walk-arounds would have missed this failure, which occurred only five days after i-ALERT's Stage 2 diagnosis

Background

Prior to i-ALERT, this particular refinery required an employee to submit a work order request for condition monitoring on any equipment. By the time this employee would detect an increase in vibration, most bearing defects would have already reached Stage 4 or Stage 5, likely resulting in unplanned pump failure.

Another major concern at this facility was safety. The pumps were located over a H₂SO₄ vessel, requiring employees to don a full chemical suit prior to entering. This led to unnecessary slowdowns, and a lack of condition monitoring across the board.

Finally, although the facility had a history of unplanned failures, there was little to no data to back them up. With no current information on past failures, there was no way to pre-detect future failures – although they measured flow and current, vibration history was not tracked.

That is, of course, until the facility decided to install i-ALERT on bad actor pumps A and B, both located in the H₂SO₄ area. And within a week, it proved to be an invaluable decision.

Timeline

The schedule of events, from initial diagnosis to motor replacement, shows how quickly pumps can deteriorate and how essential i-ALERT is to combat the issue.

November 18, 2021

i-ALERT Diagnostics was set up on Pump “B”, a vertical pump arrangement over the H2SO4 vessel. Immediately, initial diagnostics began.

Right away, i-ALERT detected a bearing defect on the motor.

November 26, 2021

By now, i-ALERT had captured 3 sets of vibration spectrums on all 2x sensors for the pump and motor to establish a baseline of the initial conditions.

November 28, 2021

i-ALERT detected an Early Stage 1 / 2 bearing defect, or a “**Slight Motor Bearing Wear**” fault.

December 1, 2021

i-ALERT detected a Stage 2 bearing defect, with a fault elevation to “**Moderate Motor Bearing Wear**”.

At this stage, the overall vibration trend had not been increasing, but i-ALERT’s incredibly sensitive and accurate sensor was able to detect the change.

December 3, 2021

The overall vibration began to increase. ITT engineers were able to predict that a severity fault increase was likely, and that there was not much life left in the motor due to the trend angle.

At 2:23 pm, i-ALERT detected a Stage 3 bearing defect, which elevated the diagnostics to “**Serious Motor Bearing Wear**”. This information moved to the maintenance team within an hour, and they determined that the pump needed to be shut down the following morning to change the motor.

By 8:00 pm that night, vibration crossed alarm level, leading to a diagnostic of “**Extreme Motor Bearing Wear**”.

December 4, 2021

Engineers shut off the pump, as planned, and replaced the motor.

After restarting the pump, *overall vibration levels were less than halved* from the defective motor.

Bearing Defect	Typical Overall	Life Expectation
New Bearing	3.8mm/s	100%
Stage 1	3.8mm/s	<20%
Stage 2	3.8mm/s	<10%
Stage 3	4.0mm/s	<5%
Stage 4	4.5mm/s	<1%
Failure	>11mm/s	0%

Takeaways

By installing i-ALERT and establishing an immediate baseline of the pump’s status, the user was able to easily detect changes early in the process. This allowed them ample time to plan the pump shut-down and motor replacement, saving both unplanned downtime and a potential catastrophic machine failure.

In this particular case, where the pump approached “Extreme Motor Bearing Wear” only five days after an early stage diagnosis, the user likely wouldn’t have discovered the issue until it was too late. However, with i-ALERT’s continuous online monitoring, they were able to locate, track and resolve the problem with peace of mind.

i-ALERT – protect your facility, protect your business.

Key Highlights

Detecting Stage 2 bearing defects: i-ALERT’s incredibly accurate and sensitive 1,100 hertz sensor can detect subtle changes in vibration, even up to Stage 2 bearing defects

Preventing unplanned downtime: by avoiding pump failure, i-ALERT saved the refinery nearly \$2,000/minute of tripped system