KAPPA X Case Study

PREVENTING CATASTROPHIC FAILURE AND COSTLY REPLACEMENT AT A POWER PLANT

One of the largest power plants in the United States experienced issues with two out of three recirculating pumps, which are critical for generating power. Despite regular monthly vibration route data collection, the pumps were running louder than normal, indicating a potential problem. To avoid a complete failure that would halt power generation, the plant implemented continuous monitoring using Sensoteq's KAPPA X wireless vibration sensor from LUDECA on one of the recirculation pumps.

CHALLENGES

- Criticality: The recirculating pumps are essential for generating power by providing Delonized Water (DI Water) to produce steam for the steam turbines. A pump failure would result in a complete power outage.
- Cost and Lead Time: Replacing a pump was estimated to cost $120,000 and would take approximately 16 weeks, causing significant financial and operational setbacks for the power plant. The ZLD area at which the pump operates is also critical to clean up the pond water to ensure the site also maintains zero liquid discharge from the facility, thus recycling all water ensuring maximum sustainability of the most precious resource at any power plant especially in the desert, that being water.

The following steps were taken to get the project started:

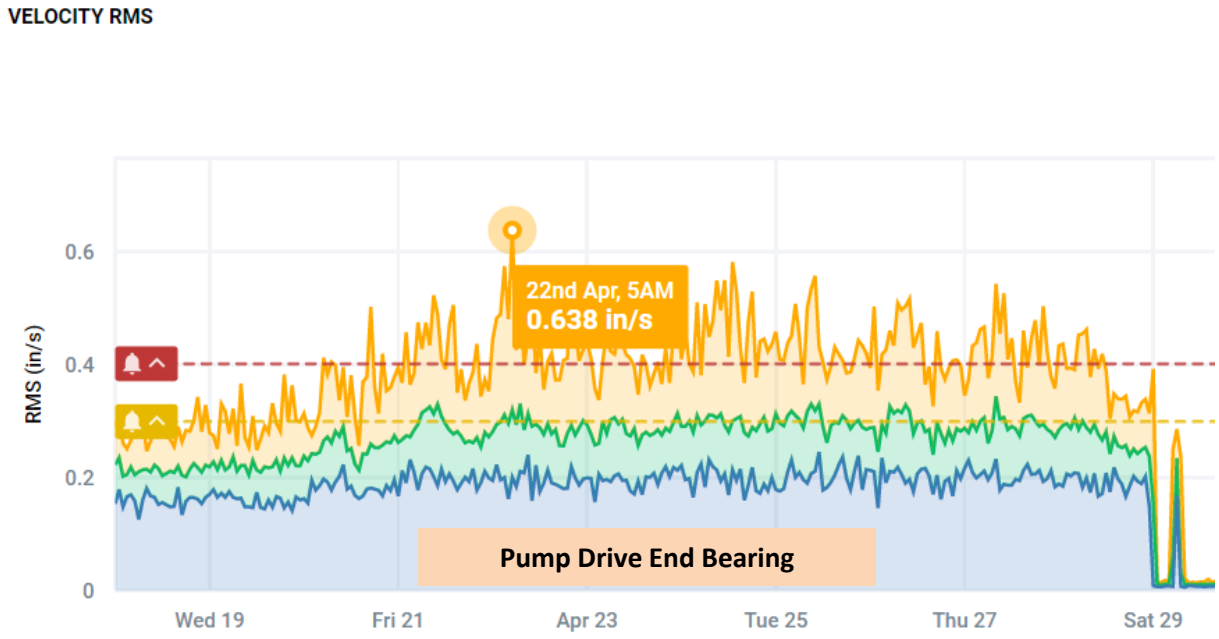
Continuous Monitoring: Two KAPPA X sensors were mounted on the motor bearings, while two sensors were mounted on the pump bearings. The system collected vibration data every minute, providing real-time insights into the pump's condition.

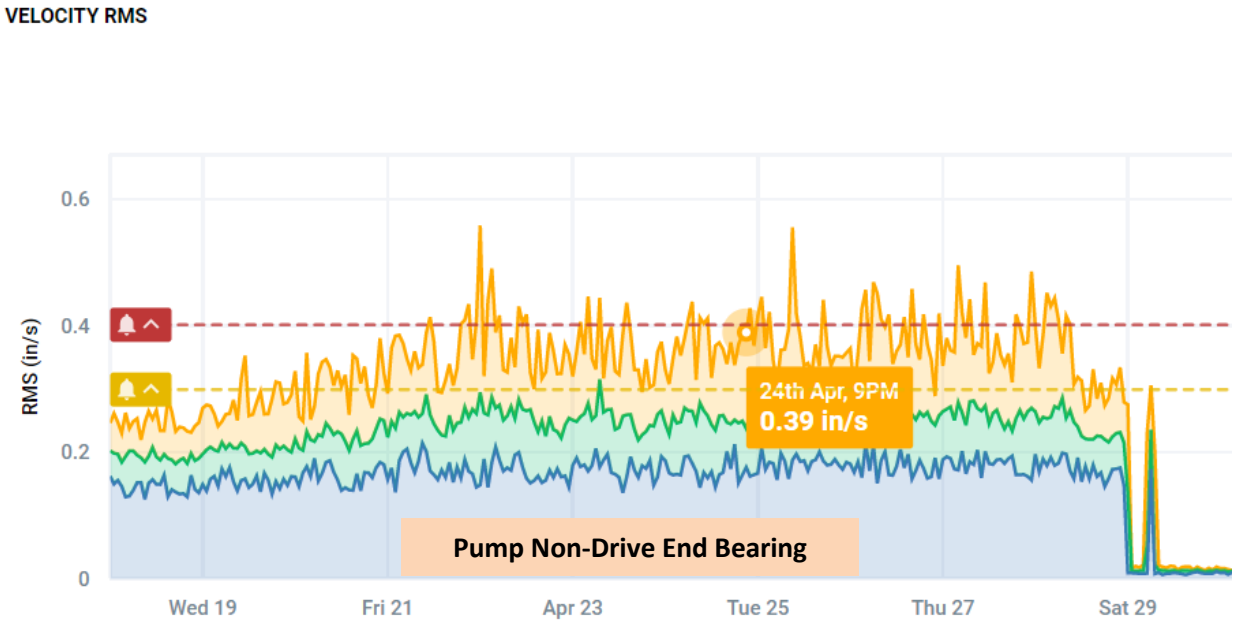
Motor Non Drive End

Pump

Motor Drive End

Data Analysis: After several days of continuous monitoring, the collected vibration data clearly indicated an ongoing issue with the pump. The trend showed that the pump was heading towards a catastrophic failure.





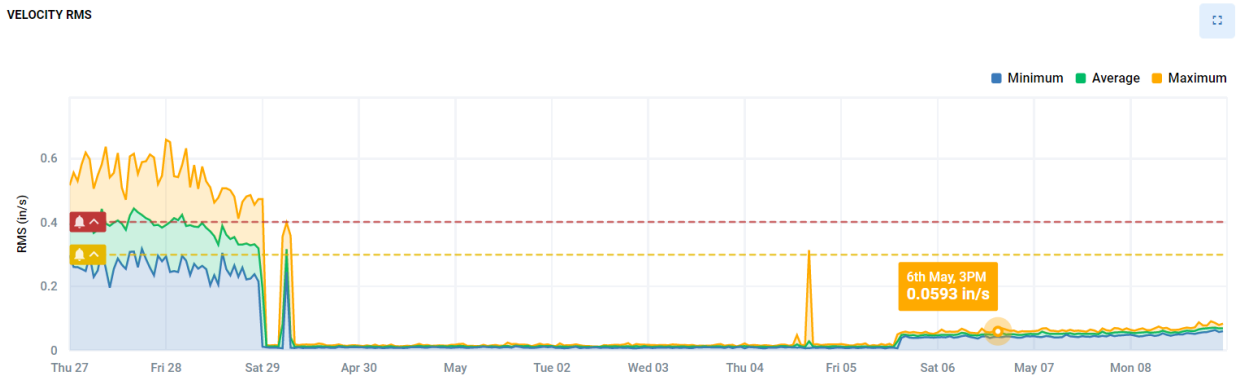
Timely Intervention: The plant personnel decided to bring the motor-pump assembly down for service based on the alarming trend observed in the data. To avoid a complete failure, a certified rotating specialist and contractor, Brian Franks with JetTech Mechanical, was brought in to overhaul the entire pump assembly.

OUTCOME

Power Frame and Pump Wet End Examination: During the overhaul, a careful examination of the pump power frame revealed significant damage. To rectify the issue, the pump power frame and mechanical seal were replaced. The Kappa X data played a critical role as the contractor was able to reuse the existing CD4 wet end of the pump which has a lead time of over 6+ months. If the Power frame would have completely failed the pump impeller would have made contact with the volute and possible stuffing box, rendering it unrepairable and bringing the unit down for an undetermined amount of time until a new wet end could be retained. The data from the Kappa X also revealed that the discharge strainer baskets were completely plugged causing the pump to run at an extreme dead head destroying the thrust bearings in the pump power frame leading to extreme elevated vibration levels on three planes of the triaxial sensor (horizontal, vertical, and axial).

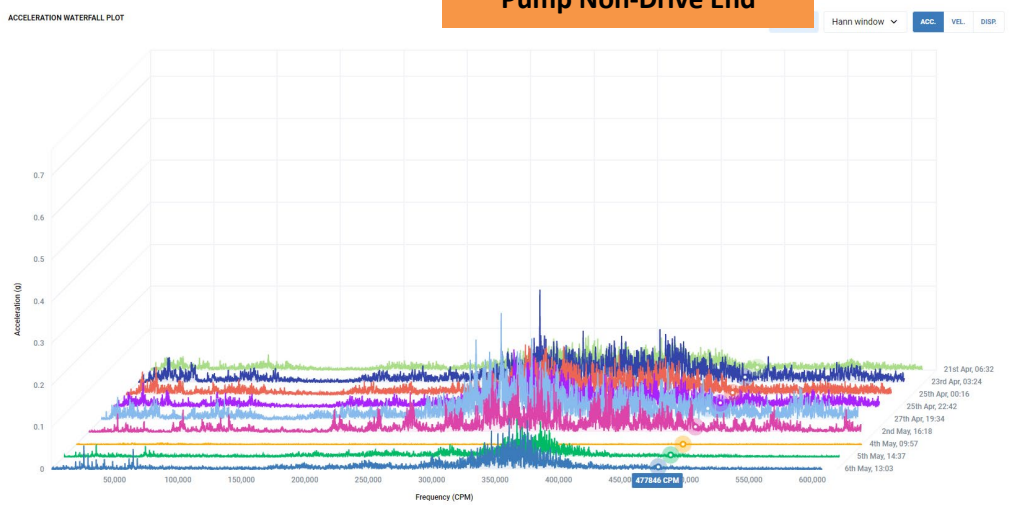
Laser Shaft Alignment and Pipe Strain Measurement: To ensure proper alignment, a precision alignment was performed using the Easy-Laser XT770 shaft alignment system. Additionally, pipe strain was measured and documented using the XT770 EasyTrend.

Improved Performance: After the overhaul and alignment procedures, the pump impeller was re-installed. Upon startup, a noticeable drop in vibration amplitude and improved behavior of the pump were observed.



Pump Drive End

Pump Non-Drive End



Cost Savings and Expansion: The power plant was pleased with the results achieved through continuous monitoring and timely intervention. By avoiding the need to purchase a new pump, estimated at $120,000 with a 6-month lead time, significant cost savings were realized. Impressed by the outcomes, the plant decided to expand the monitoring system by adding additional KAPPA X sensors to their other recirculation pumps and boiler feed water pumps.

Implementing continuous monitoring using the KAPPA X wireless vibration sensor enabled the power plant to detect an impending failure in one of the critical recirculation pumps. Prompt intervention, including an overhaul and alignment, prevented a catastrophic failure, saved significant costs, and minimized downtime. The successful outcome prompted the plant to extend the monitoring system to other essential pumps, further enhancing reliability and maintenance efficiency.