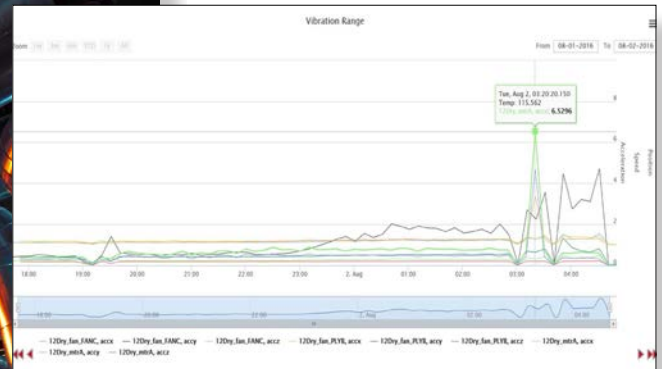


24/7 Remote Condition Monitoring in Remote Location Provides Early Detection, Prevents Catastrophic Failure

Economical remote monitoring enabled paper manufacturer to monitor a critical asset in a remote location and prevent downtime when an auto-lubrication system failed





By Abhishek Jadhav, Senior Mechanical Engineer, Category II Vibration Analyst

Dynapar OnSite™ Makes Hard-to-Reach Assets Easy to Monitor

Economical remote monitoring enabled paper manufacturer to monitor a critical asset in a remote location and prevent downtime when an auto-lubrication system failed

The drying step in paper manufacturing is an essential part of the process. Here, water is removed from the paper sheet through a combination of heat and pressure from steam-heated rolls. Exhaust fans, typically mounted on the roof of the factory, are required to remove water vapor evaporated from the paper sheet, and control temperature, humidity and air flow around the sheet. Although these fans, and the motors that drive them, are not considered high value, they are critical assets. If the exhaust fans shut down, so does the line.

For one manufacturer of food-grade paper goods, repeated failures of the exhaust-fan bearings resulted in significant lost production. Normally, the primary paper line and the exhaust fans run 24/7, with the exception of quarterly scheduled maintenance. Because stopping the primary line shuts down the subsidiary converting lines it feeds, downtime on the exhaust fan is tantamount to shutting down entire sections of the factory. The company had to find a solution. It turned to online condition monitoring.

The exhaust fans are driven by an AC induction motors with belt drives. Two taper-lock bearings (inboard and outboard) support the shaft. The fans act as overhung loads, which means that the bearing closest to the rotor of the motor (inboard) carries more load than the other bearing (outboard).



Figure 1: Exhaust fans located in a utility room on the roof where conditions included 70° C temperatures in the summer and snow and ice in the winter

The motors were rated for 100,000 hour lifetimes (11+ years) but had previously failed after less than a year of operation. The cause was catastrophic failure of an inboard bearing. The stresses from that failure split the motor shaft torsionally. Given the location and size of the motor, repair required removing the motor from the roof by crane. The process took days and cost hundreds of thousands of dollars in lost productivity and cost of repairs.

The Challenge

Although quarterly maintenance was still several months away, the maintenance staff wanted to monitor the bearing frequently in order to receive warnings of impending failure to prevent another catastrophic failure. This was not practical, however, for multiple reasons:

First, readings needed to take place at frequent intervals but the location of the assets was difficult and time-consuming to access. Second, the conditions would not permit readings to be taken often by maintenance technicians. The fans are located in a rooftop room where temperatures can be as high as 70°C. Particularly in summer, conditions ranged from uncomfortable to unsafe, even with the door open. Meanwhile in winter, ice and snow made it impossible for vibration techs to safely access the assets to take readings.

The service techs needed a way to gather data remotely. They chose the [Dynapar OnSite™ condition monitoring system](#)

The Solution

The OnSite condition monitoring system was installed to monitor the motor and fan inboard and outboard bearings. It was configured to take temperature and vibration readings at intervals of XX minutes. The OnSite system captured data automatically and transmitted it via Wi-Fi. As a result, the service techs could gather the information they needed for analysis without putting themselves at risk.



Figure 3: The Dynapar OnSite™ system shown with sensors mounted to both the inboard and outboard pillow-block bearing housings.

The Results

Once the OnSite system was installed, the manufacturer's 3rd party condition monitoring partner kept a close eye on the condition of the machine. Although the overall vibration energy did not change much, the OnSite system sensors installed on the fan bearing housings caught a change in temperature and alarmed the 3rd party.

During normal operation, the bearing housings are heated to 70 °C. Instead, the reading captured by the OnSite sensor showed a temperature of 123°C. When the condition monitoring partner asked the maintenance group to investigate, the team discovered that the bearing lubrication machine was down. Early detection and enabled them to repair the problem before it triggered catastrophic failure in the bearing.

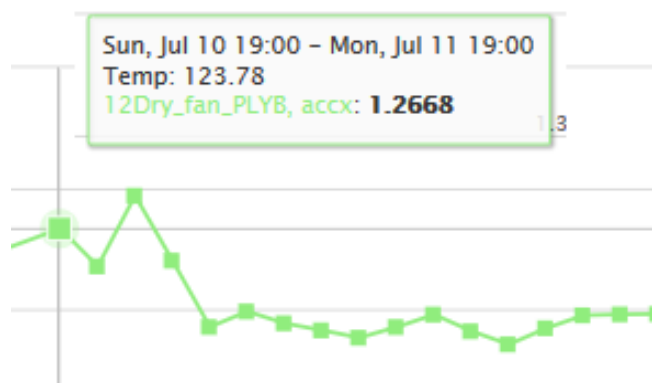


Figure 4: Temperature data from the OnSite system shows a reading of 123°C or more

After the auto-lubrication system was replaced, the OnSite system monitored another temperature increase accompanied by severe vibration readings. The condition monitoring partner also alerted the maintenance group to the issue and they discovered the motor fan had also failed due to high temperature. A crew was able to replace the fan immediately before any permanent damage to the motor occurred.

[Learn more about condition monitoring and analyzing data in this video](#)

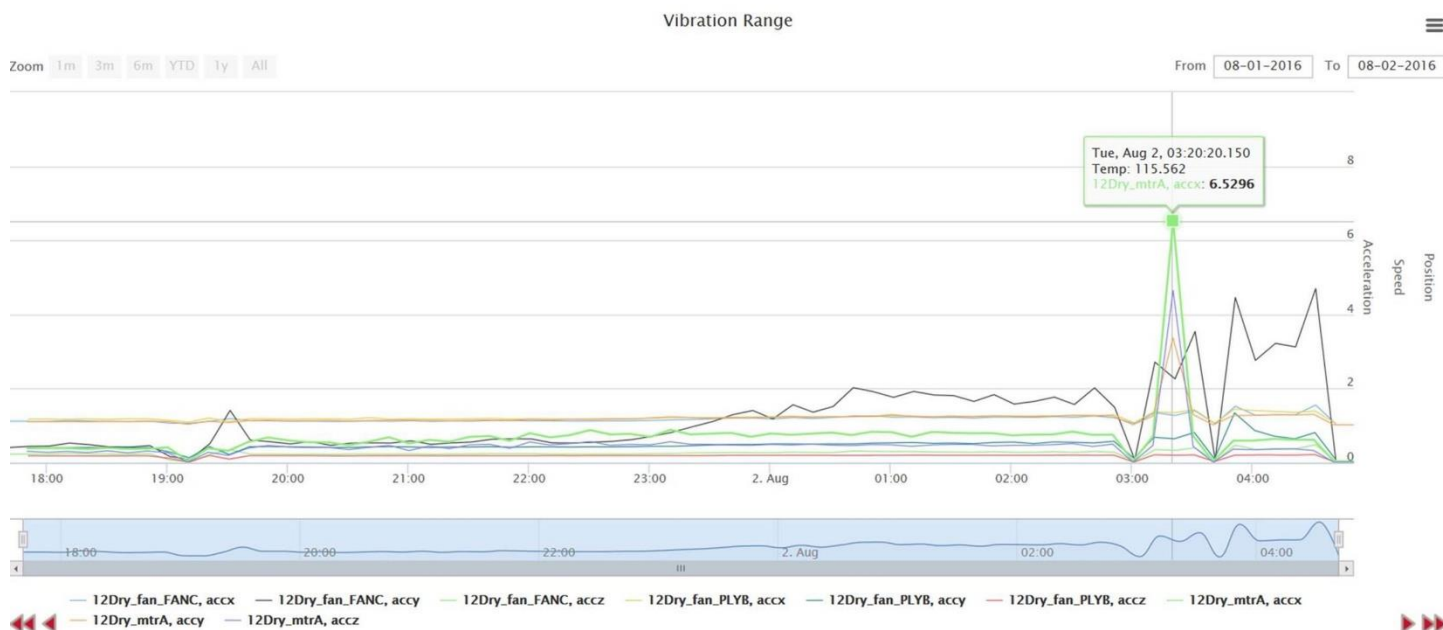


Figure 5: A peak in both vibration and temperature can be seen in data from the OnSite system when the motor fan failed.

Together with the 3rd party condition monitoring partner, the Dynapar OnSite™ system allowed the mill to be situationally aware of conditions inside the remote fan room at all times. The team was only deployed to the remote location when an event occurred, avoiding unnecessary work in extreme temperatures. Thanks to the OnSite system, the motor has now been running longer than the previous unit that catastrophically failed.

Discover what the Dynapar OnSite™ Condition Monitoring System can do for you. Request more information about the OnSite system today at www.dynapar.com/onsite.

Dynapar is an industry leading supplier of motion feedback and condition monitoring solutions offering a broad range of encoders and resolvers for motion control and 24/7 remote condition monitoring systems with cloud based analytics tools. Dynapar was founded in Gurnee, Illinois in 1955 and has been expanded through acquisitions and partnerships to include Dynapar™, Hengstler™, NorthStar™, Harowe™, and Encoder Technology brand product lines. For over 60 years, Dynapar has provided innovative, customized system solutions for virtually any heavy-duty, industrial, servo, or light-duty application.