



Failure Prevention Associates
2800 E. Broadway Street, C-252
Pearland, TX 77581

voice (408) 891-5830
fax (888) 219-4715
email: info@failureprevention.net

Asset Management, Vibration Analysis, Ultrasound Detection, Thermal Imaging, Lubrication Condition Monitoring, Electric Motor Testing, Vibration Sensors

Vibration Analysis fixes Unbalanced Motor

A power generation plant in TX was experiencing repeated shutdowns from high vibration alarms. The vibration data on the fan pointed to unbalance as the problem.

Plant staff attempted to balance the 18-foot diameter fan rotor. No changes were achieved.

We learned the fan had been out of service for several years due to the high vibration trips. Auxiliary fans have been used to allow production to continue. While the balancing job looked good, no changes meant we needed to look elsewhere. The staff related that full capacity power generation was not being achieved using these alternative methods.



The fan has sleeve bearings. So it must be run on a turning gear to protect the bearings and the shaft when not running. The power company is burning extra power to keep this asset “available” without receiving any production value from it.

The vibration levels from the fan and motor bearings showed highest on the motor and not the fan bearings. Checking the phase angles, revealed 180-degree phase difference between the drive end and non-drive end motor bearings. Misalignment, unbalance and soft foot are two of the most common conditions that would produce such a condition.

Soft foot is a condition where one or more of the machine feet do not sit flush with the surface they sit upon. When torquing down the hold down bolts, a soft foot condition can warp the frame of the asset. This causes the machine to vibrate excessively and lead to premature component failure. Soft foot in a motor will cause excessive vibration.

Each motor foot hold down nut was loosened; the movement of the foot was measured by a dial indicator. Three (3) of the four feet moved 3 one-thousandths of an inch. The right rear foot was found to move ten (10) one-thousandths. A significant difference. Shims were placed under the foot to resolve the 10 mil deficit.

The motor was energized and run for 45 minutes. Pre-and post-mitigation vibration signatures were obtained. The graph below illustrates the dramatic 700% loss of vibration energy due removal of the soft foot condition.

Cost of electricity to run turning gear motor - \$12.47 per day = \$4,551.55. We were unable to obtain data on efficiency losses and lost gigawatt hours.

