

CASE STUDY



IVC
TECHNOLOGIES



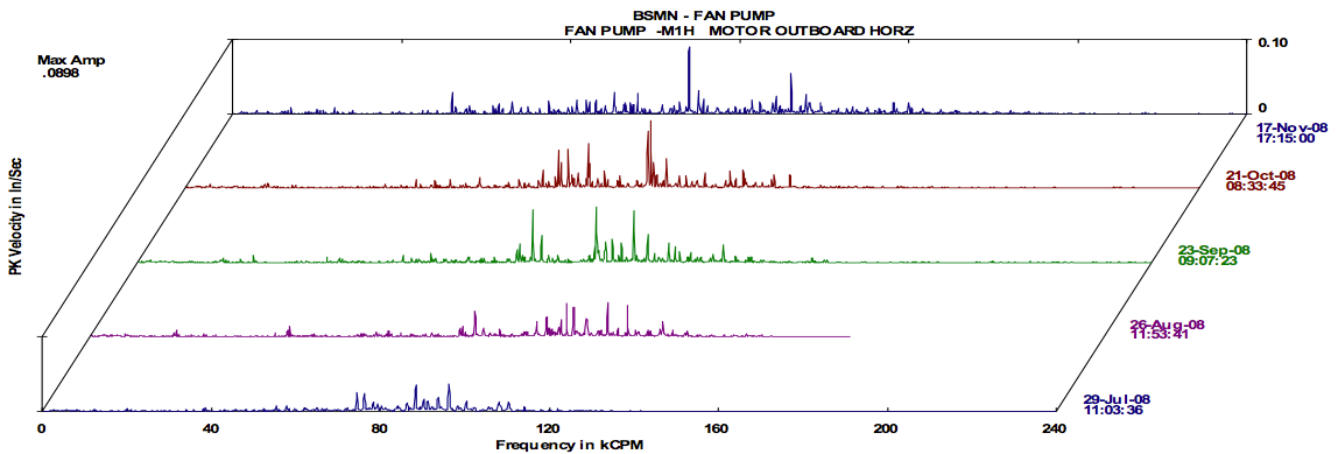
Title: Fluting Case Study: Variable Frequency Drive on Motor

Industry: Paper | Machine: Paper Machine – Fan Pump | Technology: Vibration Analysis

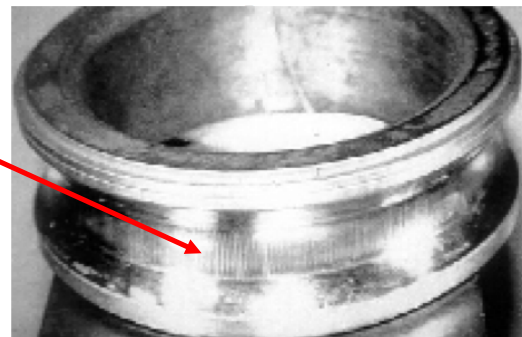
Purpose: This case study highlights the use of a variable frequency drive on a motor and the collateral damage created by continued shaft current discharge on motor bearings.

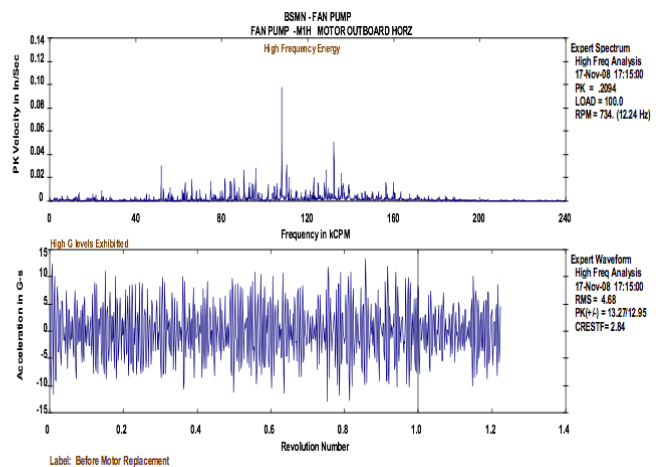
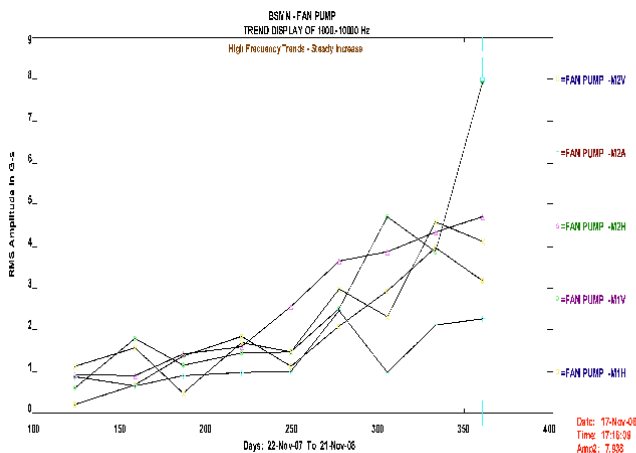
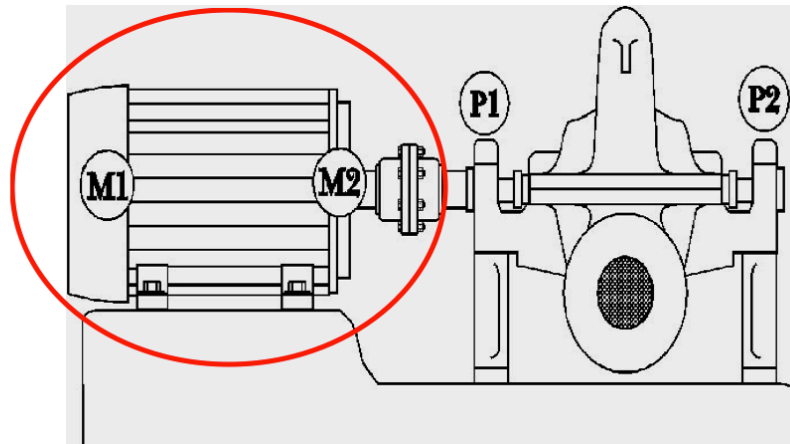
Overview: The fan pump is the center of the paper mill approach system and serves to mix the pulp stock with processed white water. The fan pump delivers this mixture to the head box, and ultimately, onto the wire of the Fourdrinier. The fan pump is typically the largest pump in the paper machine system, and the demands made on it are critical to the paper making process. Flow rate and pressure must be stable, without pulsations or surges. Fan pumps must also be able to vary the flow over the entire range of paper machine operation. The use of a variable-frequency drive (VFD) on the fan pump eliminates the need for throttling or recirculation. A VFD allows the pump to operate more efficiently. One of the drawbacks of VFD use is that under certain circumstances, a motor shaft electrical current can discharge through the bearing(s), potentially creating pitting and fusion craters in the race wall and ball bearings. If this continues, the bearings can become so severely pitted that fluting, excessive noise, and failure occur.

Findings: Over the course of a few months, we watched the progressing of motor bearing faults on the fan pump caused by ‘fluting.’ The progression is best seen in the acquired high-frequency spectral data plot diagram below.



Here is a visual example of inner race etching caused by shaft current discharged through the bearing.





Analysis: The spectral data shows high-frequency energy seen as a 'haystack' out past 80 Kcpm associated with high Gs in the time-waveform. The historical trend of the high-frequency band is at a steady incline indicating that the condition is worsening. Electrical potential or "charge" builds up on the shaft and discharges through the bearing(s). This is known as 'fluting' due to the excessive noise associated with this problem.

Recommendation: It is recommended to have both motor bearing replaced. At the time of the bearing replacement, install a shaft grounding device to eliminate the "fluting" from reoccurring. (The motor was swapped with a spare rebuilt motor with the shaft grounding rings installed at the motor shop shortly after this collection).

About IVC Technologies

IVC Technologies is dedicated to helping our customers achieve optimal efficiencies through condition-based monitoring (CBM) utilizing our highly experienced and certified CBM analysts, cutting-edge PdM technologies, and equipment with unsurpassed analytic capabilities. Our Advanced Testing Group (ATG) is comprised of the foremost leading experts in the diagnosis of the most complex problems plaguing industry today.

