White Paper
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Machinery Health

Tissue Machine Bearing Failure and PeakVue Problem Resolution

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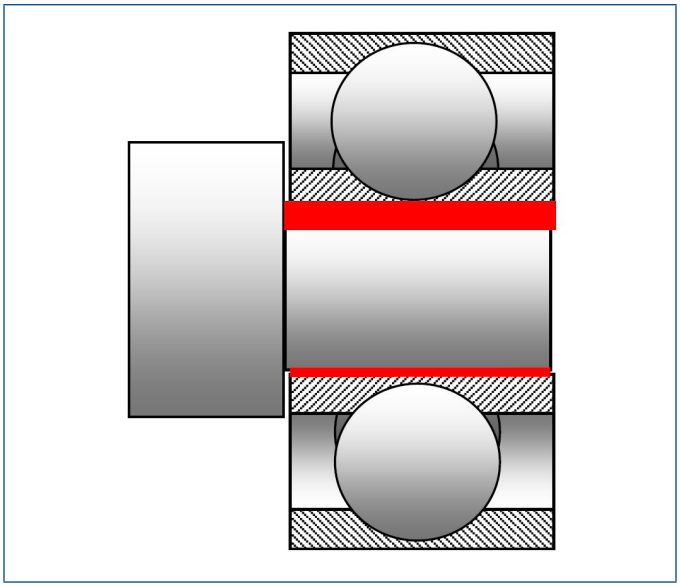
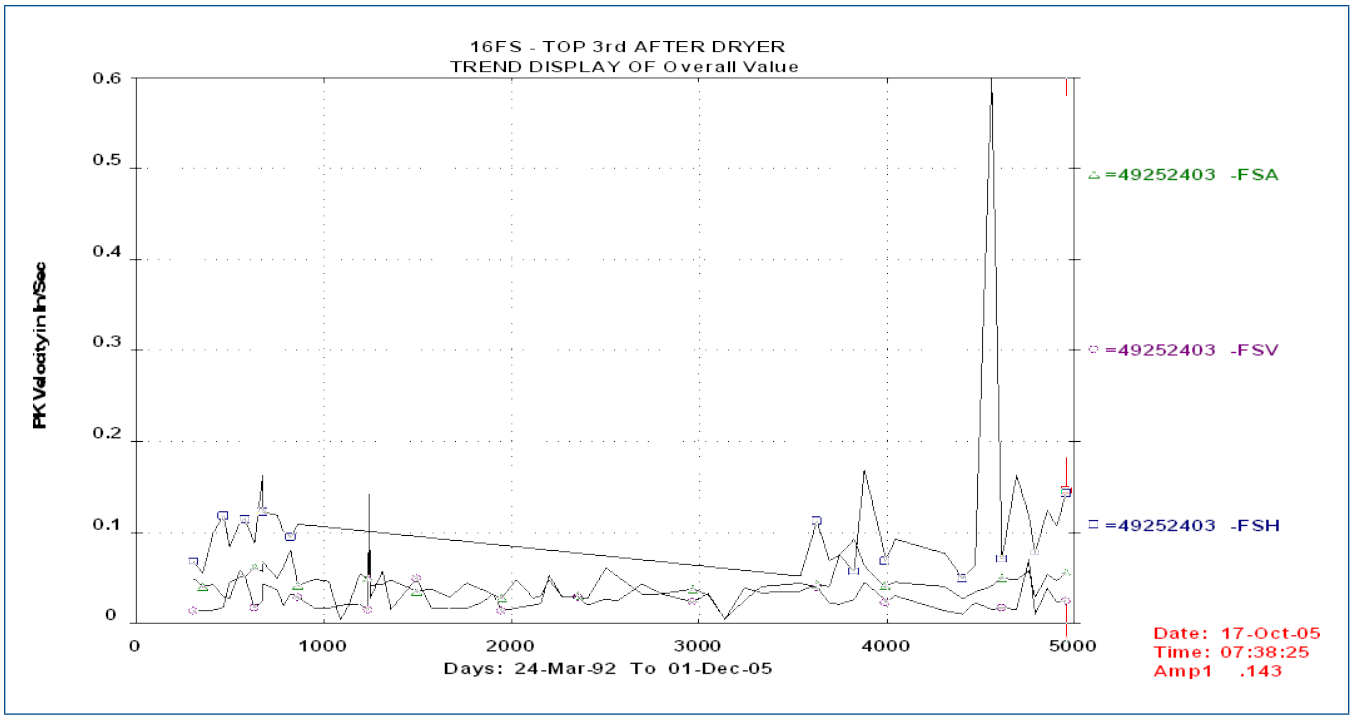
Introduction

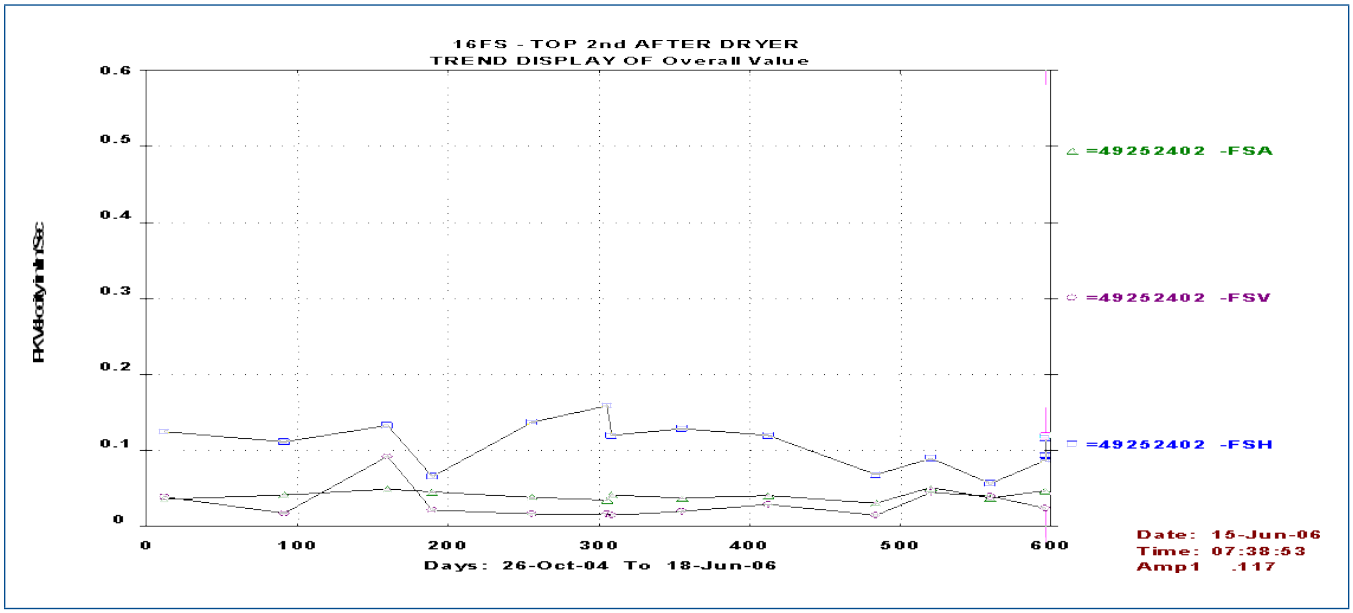
On November 23, 2005, the 16 Tissue Machine After-dryer T3 tending-side bearing had a significant failure. The bearing failed after an audible noise and high temperature was noted on the bearing housing. Upon inspection of the front side bearing, a 1/8” drop in the bearing position was observed; the inner race and the retaining ring were not found in their correct positions. Two of the three lock down bolts were missing with one bolt sheared off, resulting in bearing and journal damage. The other missing bolt disintegrated, its debris is believed to have plugged the oil return line. The last bolt was in position, partially holding the retaining ring. Oil flowing into the bearing housing indicated that the bearing had lubrication before failure. Six of the eight front-side After-dryer bearings were inspected during this repair, and nothing was found out-of-standard.



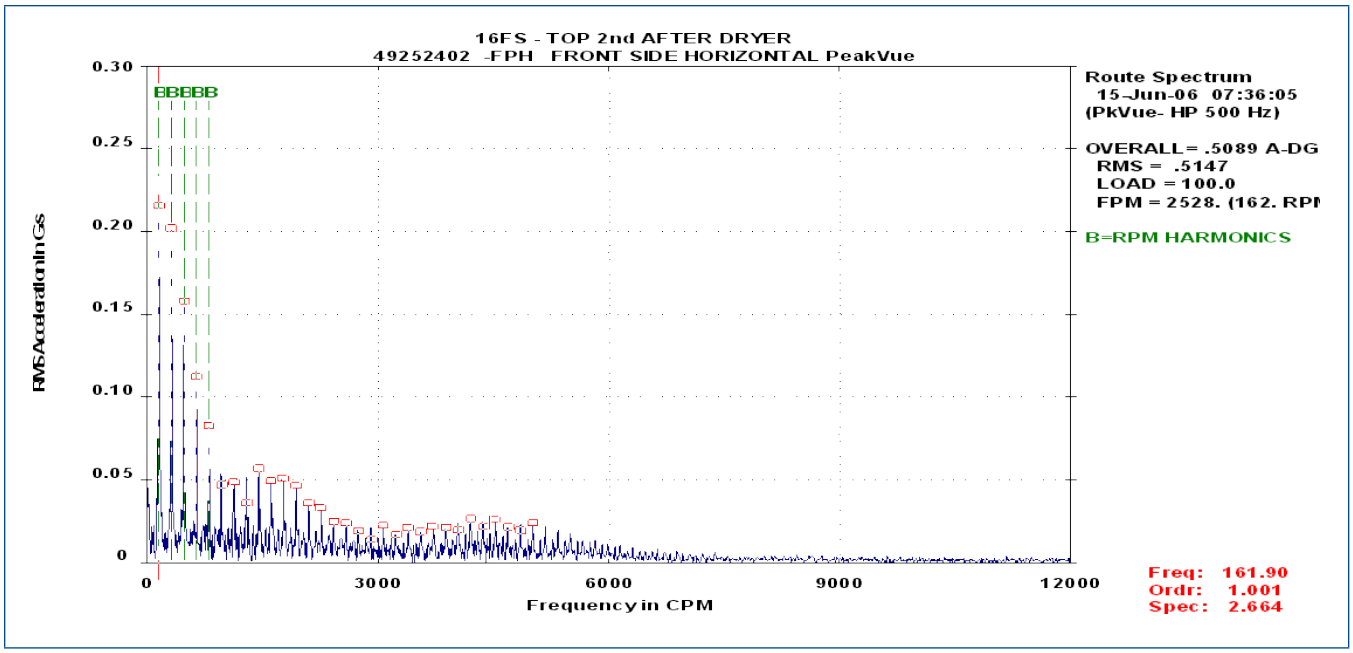
Aside from a minor increase in the axial amplitude, the vibration data from October 17th did not show any signs of defect prior to the bearing failure. As a result of the audible noise emanating from the bearing, an inspection was recommended. Shortly after these readings, the T3 bearing failed before a shutdown inspection could be performed. After this failure, PeakVue monitoring was added to the route for all tissue machine rolls.



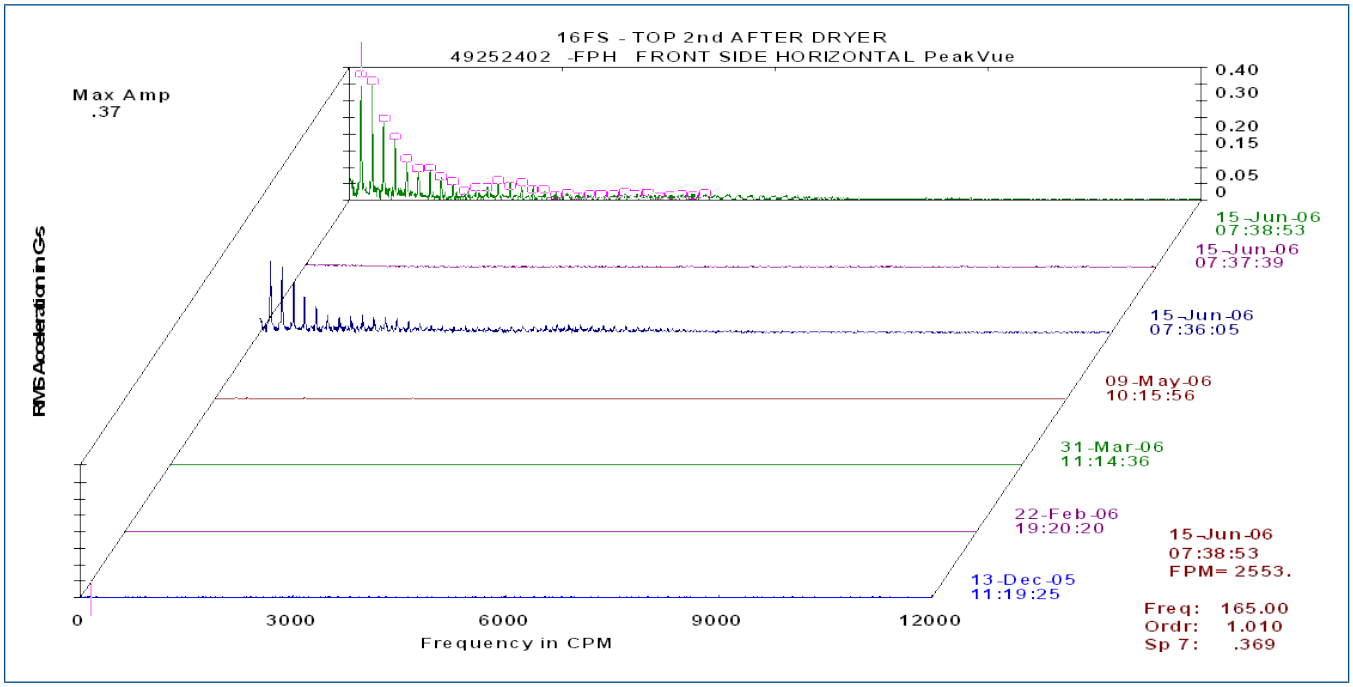
On June 15, 2006, vibration analysis was requested on the 16TM T2 After-dryer tending-side bearing. This was on the same After-dryer section of the tissue machine as the previous failure. An intermittent audible noise was emanating from the F/S T2 bearing. Vibration data was collected on the bearing along with PeakVue readings. Horizontal, vertical and axial vibration amplitudes were low, below 0.12 ips on the bearing housing readings.



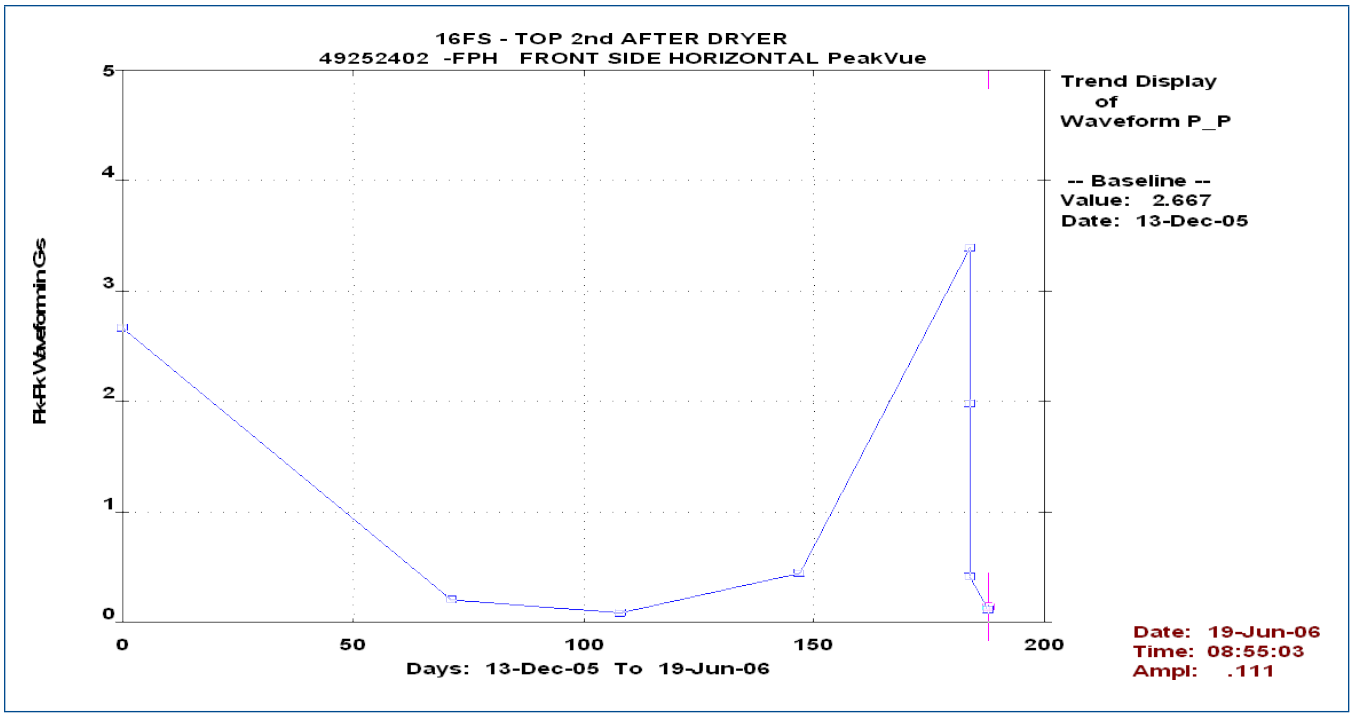
PeakVue data contained multiples of TS, and the overall PeakVue value increased when the audible noise was louder.



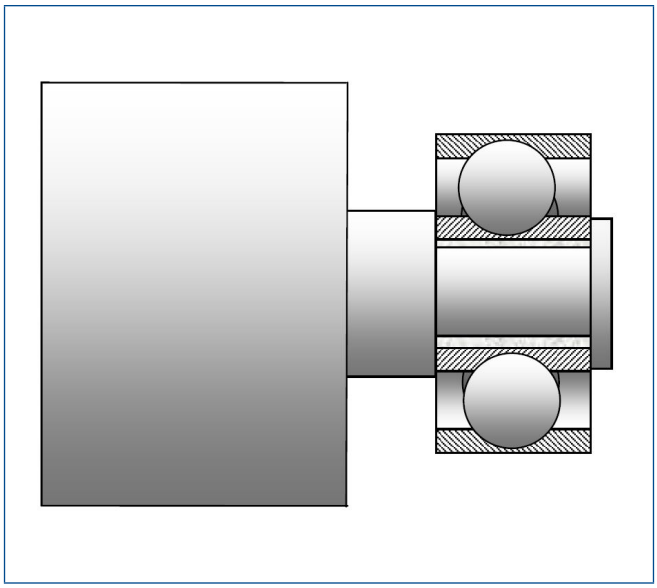
Three PeakVue readings were collected at that time, which are displayed in the waterfall plot below. The middle June 15th reading was taken when the audible noise decreased. An analysis of the collected data was performed and a report generated. Recommendations were made to increase monitoring of the bearing PeakVue and temperature values until maintenance could be performed. An inspection of the bearing for looseness or wear was also recommended at the next opportunity.



Because of production requirements, the bearing was flooded with oil to maintain TM operation. Readings on June 19, 2006 found that the audible noise and PeakVue values decreased. The problem still exists but was masked by excessive bearing oil. Recommendations to inspect the bearing and perform monitoring until maintenance was possible were reiterated.



A TM shutdown was scheduled for June 20th and an inspection of the After-dryer T2 Roll bearing was performed at that time. The inner race was found to be loose on the shaft. Measurements on the journal found it to be severely worn where the bearing inner race was spinning on the shaft. A compression fit is used on this configuration to hold the inner race in-place on the roll journal. The journal was machined and a sleeve was installed along with a new bearing.



Vibration amplitudes and PeakVue values have remained low after maintenance repairs to the T2 and T3 bearings. The application of PeakVue when audible noise is present on a machine can help to diagnose a fault. As seen in this paper, multiple PeakVue measurements should be collected and readings timed for the highest amplitudes of audible noise when the sound is intermittent. Utilizing the 2130 Analyzer notes option during data collection can assist in the analysis process to correlate changes in PeakVue amplitude with audible noise changes.

Multiples of turning speed is typically indicative of looseness in vibration readings. The multiples of turning speed in the PeakVue data reached 3.4 G's p-p when the audible noise was at its highest value. This may have been from load variations on the bearing. Although PeakVue amplitudes were low, severe damage was found during the maintenance inspection. When multiples of turning speed is indicated in PeakVue measurements, maintenance inspection of the bearing should be considered to avoid failure of the machine component.

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