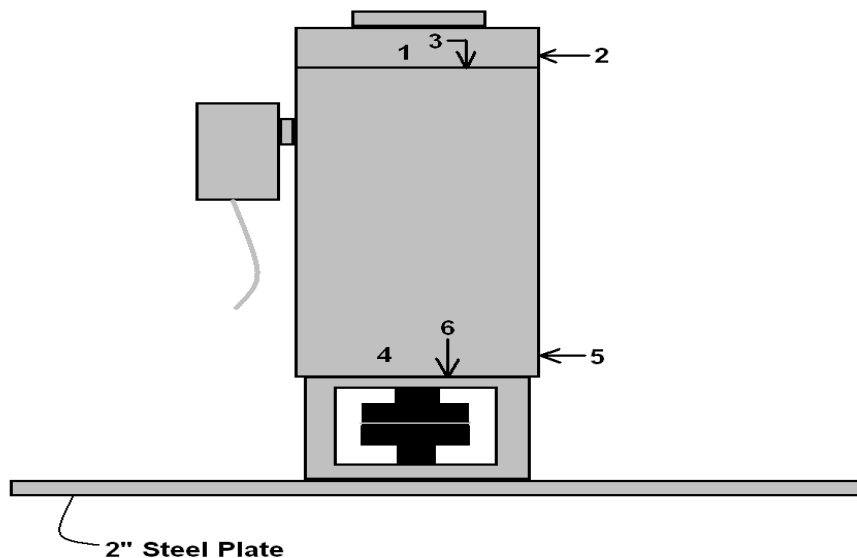


MachineryWatch.Com, Inc. Case History

Machine:	Vertical Pump Motor
Industry & Location:	Water Treatment Plant, Virginia
Equipment:	Long Drive Shaft, Centrifugal Pump, Wound Rotor Variable Speed Motor, 6'4" above base, Motor Speed = 540 RPM
Instrumentation:	MAARS Model 5000, accelerometers
Condition:	Looseness induced Resonance at 1X RPM
Indication:	Excessive Vibration (Shaking) at 1X RPM, resonance verified with transient capture, coast-down and impact tests
Corrective Action:	Tightened Motor Hold Down Bolts 1/16 to 1/4 turn
Results:	Vibration reduced at 1X RPM by approximately 67%. To further reduce levels the speed of the pump was going to be slightly reduced to provide further separation of the natural frequency and the running speed.

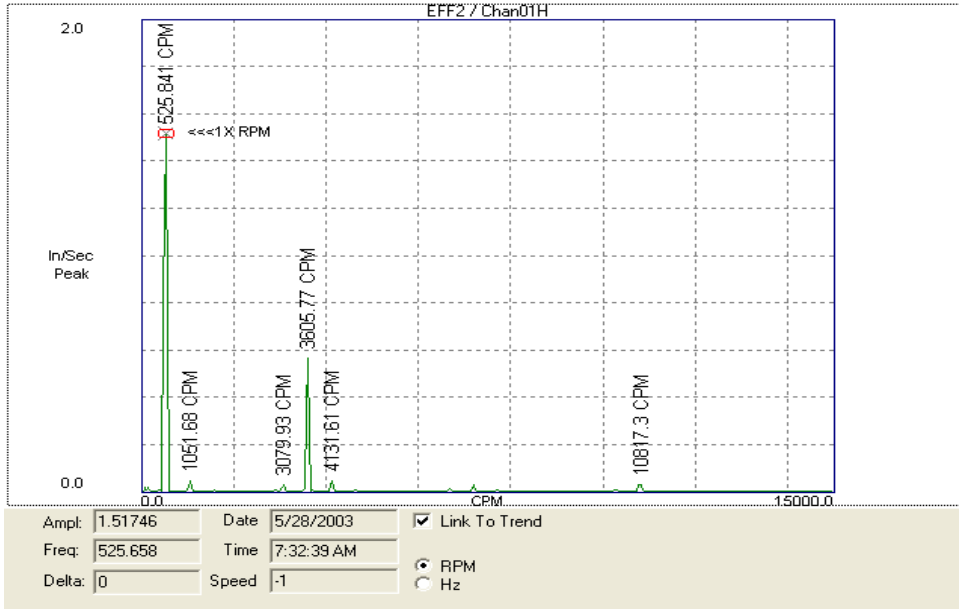
The subject pump motor had been recently overhauled by a local shop. When the site personnel reinstalled the motor there was excessive vibration felt and viewed. The repair shop and facility requested an analysis be performed to determine the source of the vibration.



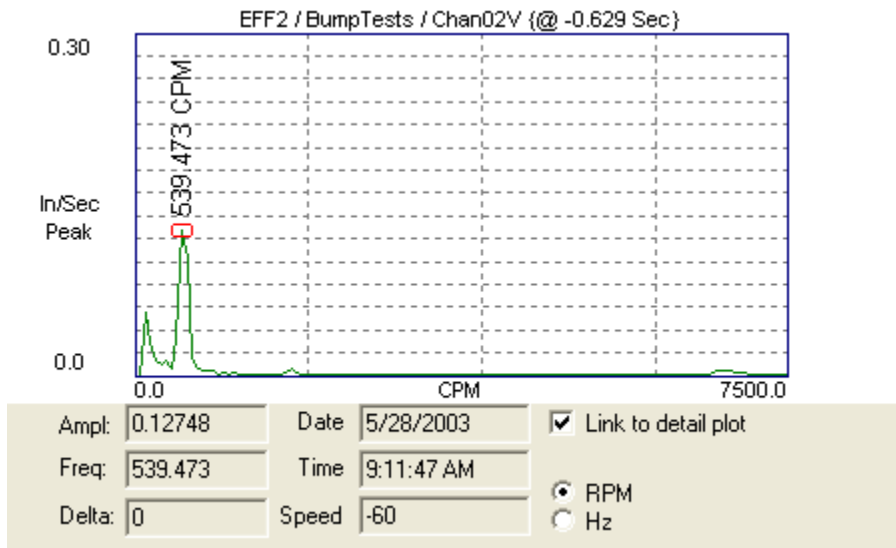
The vibration tests that showed the vibrations were highest at the top of the motor and very directional. These are characteristics of vertical pump resonances. The spectral data also showed a clear large amplitude peak at 3600 CPM (60 Hz), which is also typical for these motors. Both impact tests and

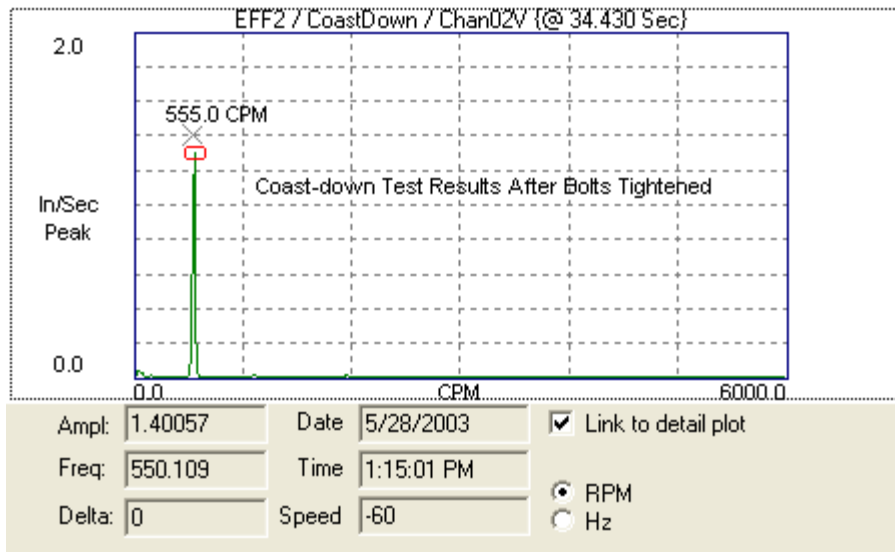
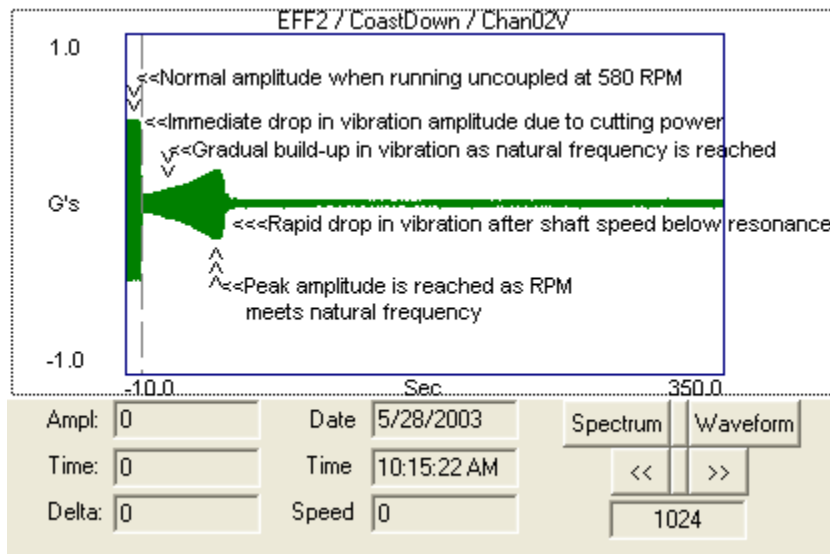
uncoupled coast down tests were used to verify the natural frequency.

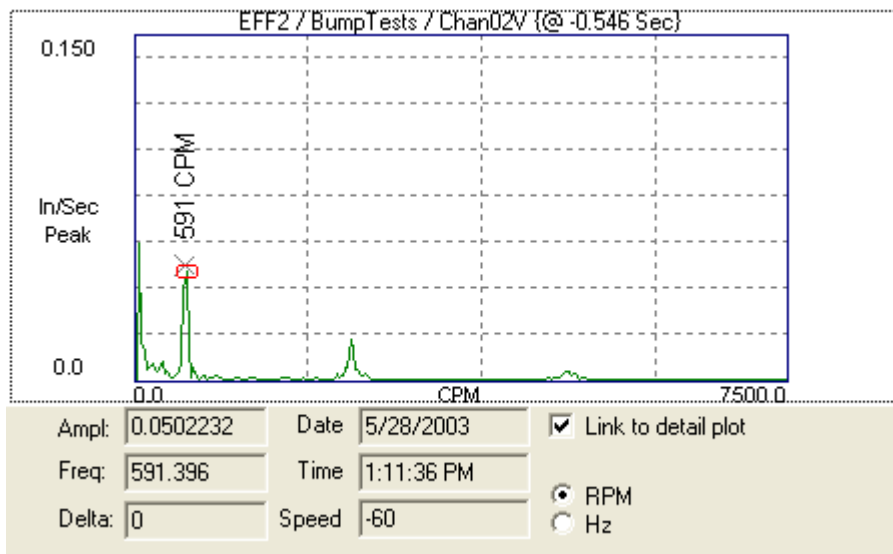
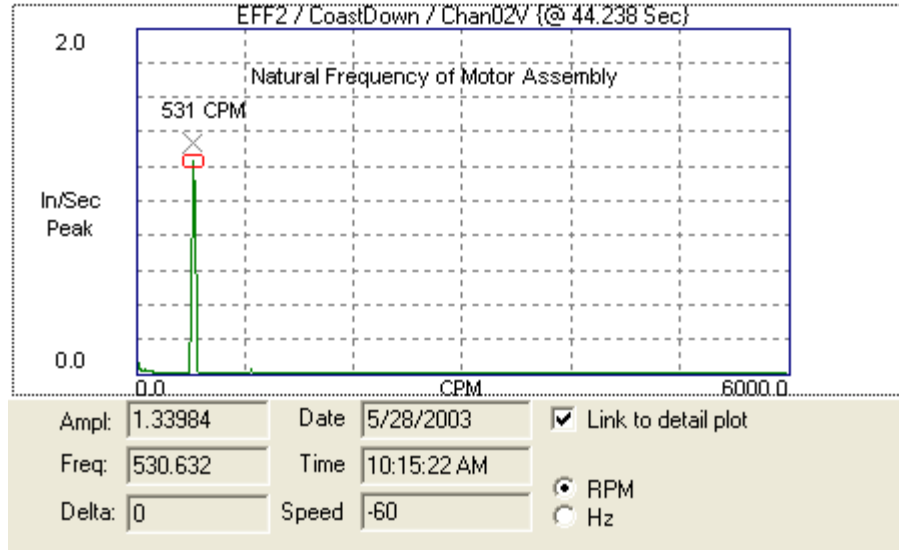
The table shows the data before and after tightening the base bolts and also compares the levels to those found on an adjacent identical pump.



More bump tests were done after the bolts were tightened and the results are shown in the spectra above via the higher response frequency (591 CPM vs 539 CPM). Another proof of the shifted natural frequency is shown below in the coast-down waveform captured before tightening the bolts. The highest amplitude spectra captured during this and the coast-down captured after the bolts were tightened follow the displayed waveform. The spectra showing the higher frequency peak was captured after the bolts were tightened.







<i>Measurement Position</i>	<i>EFF#2 As Found</i>	<i>EFF#2 Tightened Bolts</i>	<i>EFF#1 As Found</i>
1	1.63	0.313	0.279
2	0.870	0.069	0.080
3	0.200	0.023	0.100
4	0.650	0.064	0.063
5	0.130	0.036	0.078
6	0.190	0.087	0.072