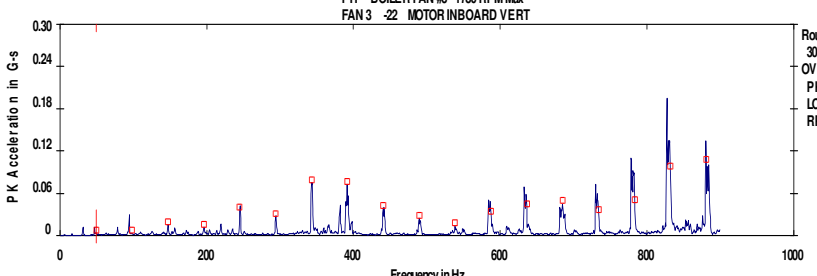
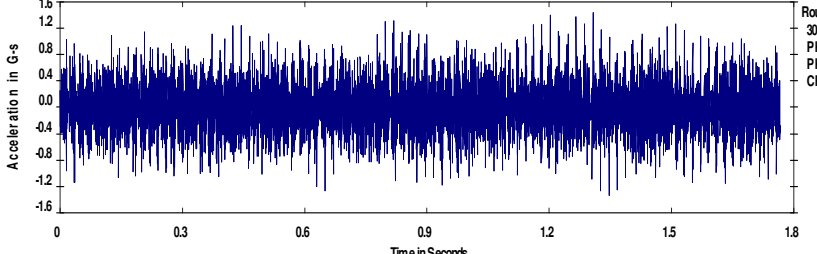
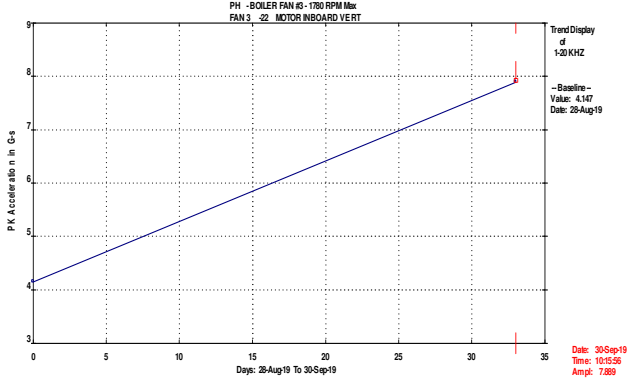




Client	Blues City Brewery	Survey Date	9-3-19
Location	Memphis, TN	Report Date	9-3-19
Machine	Boiler 3 Fan Motor	QMS No.	140748
Component	Bearings	Analyst	DWS

Defect Rating for this machine	<b>CLASS II</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> Defect (s) present that may cause failure in short term (less than 2 mos.). Should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

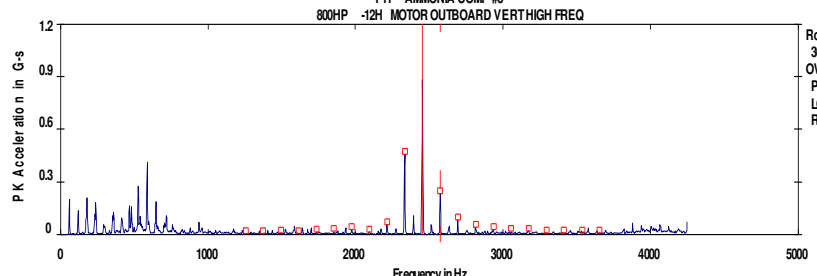
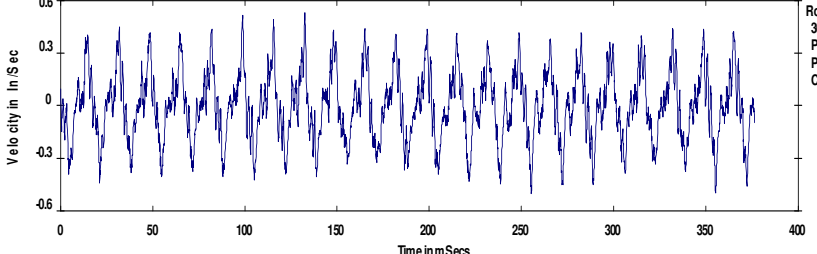
Vibration Data	Analysis
<p>PH - BOILER FAN #3 - 1780 RPM Max FAN 3 -22 MOTOR INBOARD VERT</p>  <p>Route Spectrum 30-Sep-19 10:15:50 OVERALL= .0739 V-DG PK = .5774 LOAD = 100.0 RPM = 939. (15.65 Hz)</p>  <p>Route Waveform 30-Sep-19 10:15:50 PK = .6179 PK(u)=1.44/1.34 CRESTF=3.30</p> <p>Freq: 48.94 Ord: 3.127 Spec: .00406</p>	<p>Non synchronous peaks marked in the spectrum. Impacting in the time domain.</p>

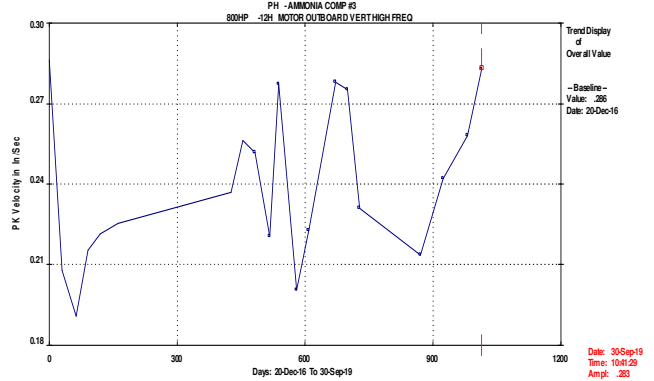
Discussion / Repair recommendations	Trend Data
<p>Possible bearing defect frequencies in the motor; which look to be from fluting. Increase in the acceleration trend. Expect to change out the bearings in the future. <b>Rated a Class II Defect.</b></p>	 <p>Trend Display of 1-20 KHZ</p> <p>Baseline Value: 4.147 Date: 28-Aug-19</p> <p>Date: 30-Sep-19 Time: 10:15:50 Ampl: 7.889</p>



Client	Blues City Brewery	Survey Date	9-3-19
Location	Memphis, TN	Report Date	9-3-19
Machine	Ammonia Compressor 3	QMS No.	140748
Component	Bearings/Bars	Analyst	DWS

Defect Rating for this machine	<b>CLASS II</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> Defect (s) present that may cause failure in short term (less than 2 mos.). Should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

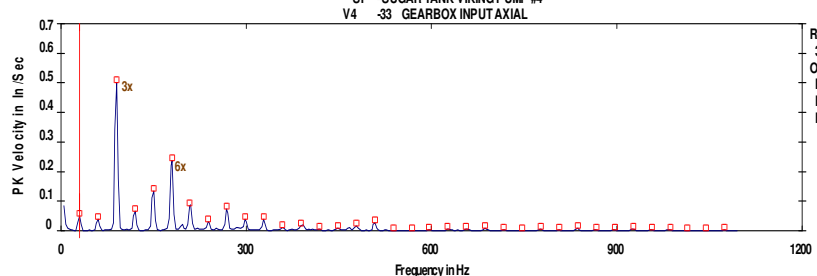
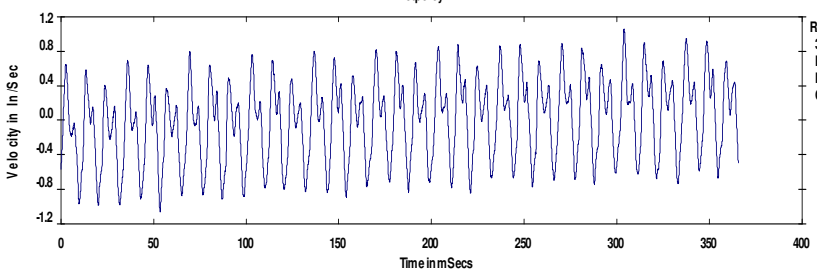
Vibration Data	Analysis
<p>PH - AMMONIA COMP #3 800HP -12H MOTOR OUTBOARD VERTHIGH FREQ</p>  <p>Route Spectrum 30-Sep-19 10:41:31 OVERALL= 2827 V-DG PK = 1.43 LOAD = 100.0 RPM = 3591. (59.85 Hz)</p>  <p>Route Waveform 30-Sep-19 10:41:31 PK = .2755 PK(+) = 5290/5035 CREST= 2.72</p> <p>Freq: 2574.4 Ord: 43.01 Spec: .232 Dirq: 119.99</p>	<p>Synchronous peak with 2x line frequency sidebands, and multiple shaft speed harmonics in the acceleration spectrum of the motor outboard bearing.</p>

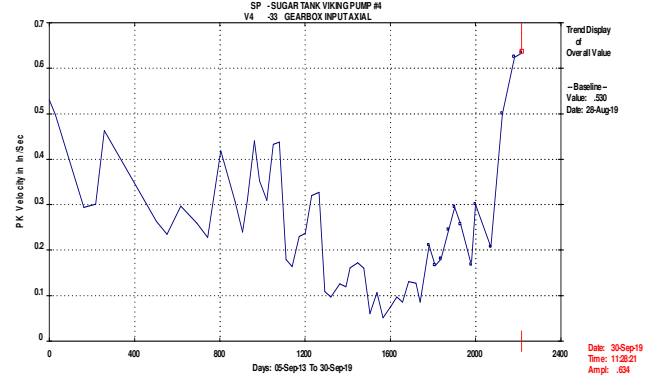
Discussion / Repair recommendations	Trend Data
<p>The motor is still be suffering from two issues. Plot data shows high frequency vibration peaks with 2 times line frequency sidebands. This is called a rotor bar issue. Some of the bars have weak or cracked connections. As time progresses the vibrations usually tend to rise; ultimately, the bars will become loose and start to cause vibrations at shaft speed then with side bands. This motor also seems to have looseness, or excessive clearance in or around the bearings. Check the bearing clearances if possible for now. <b>Rated a Class II Defect.</b></p>	 <p>Trend Display Overall Value Baseline Value: .286 Date: 20-Dec-16</p> <p>Date: 30-Sep-19 Time: 10:41:29 Ampl: .283</p>



Client	Blues City Brewery	Survey Date	9-3-19
Location	Memphis, TN	Report Date	9-3-19
Machine	Sugar Tank 4 Pump	QMS No.	140748
Component	Coupling/Alignment	Analyst	DWS

Defect Rating for this machine	<b>CLASS III</b>
Defect Rating System	
<b>Class I:</b> Defect is present, but effect on reliability is not clear; no immediate action is required. Continue normal monitoring.	<b>Class III:</b> Defect (s) present that may cause failure in short term (less than 2 mos.). Should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.
<b>Class II:</b> Defect (s) present that may cause problem in long term (2-6 mos.). Repair during normal maintenance scheduling. Continue to monitor.	<b>Class IV:</b> Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. <b>Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs.</b>

Vibration Data	Analysis
<p>SP - SUGAR TANK VIKING PUMP #4 V4 -33 GEARBOX INPUT AXIAL</p>  <p>Route Spectrum 30-Sep-19 11:28:17 OVERALL= .6338 V-DG PK = .6320 LOAD = 100.0 RPM = 1792 (29.87 Hz)</p>  <p>Route Waveform 30-Sep-19 11:28:17 PK = .6525 PK(+-) = 1.06/1.06 CRESTF= 2.30</p> <p>Freq: 29.87 Ord: 1.000 Spec: .05026 Dir: .207</p>	<p>A dominant 3x RPM vibration is a good indicator of a coupling issue, especially if it is equipped with a love joy type.</p>

Discussion / Repair recommendations	Trend Data
<p>The dominant 3x RPM vibration as well as the stepped time waveform are good indicators of a coupling and or alignment issue. The increase in vibrations require action. Inspect the unit soon. Replace worn or damaged components and re-align the shafts on the whole drivetrain. <b>Rated a Class III Defect.</b></p>	 <p>Trend Display Overall Value - Baseline - Value: .530 Date: 28-Aug-19</p> <p>Date: 30-Sep-19 Time: 11:28:21 Ampl: .634</p>