HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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September 27, 2023

Seth McMillan
Lanxess
Memphis, TN

Seth,

The following is a summary of findings from the September 2023 quarterly vibration survey at your facility. Please let us know if there are any questions or comments.

QualiTest® uses a four-step rating system for defects.

Class I: Defect is present, but effect on reliability is not clear; no immediate action is required. Continue to normally monitor.

Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

Class III; Defect (s) present that may cause failure in short term (less than 2 months). This should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.

Class IV; Defect (s) present that makes continued reliability unpredictable, and possibility of secondary damage is high. Repairs should be made ASAP. An unscheduled shutdown should be considered for repairs

Machine Summary Table

Date Collected												
Month	5	8	1	9								
Day	3	18	10	22								
Year	22	22	23	23								
Item	Condition											
Refrigeration Compressor A												
Refrigeration Compressor B			NR	NR								
East Cooling Tower Pump				NR								
Middle Cooling Tower Pump	NR		NR									
West Cooling Tower Pump		NR										
West Neutralization Pump	NR	NR	NR	NR								
East Neutralization Pump												
KOH Feed Pump												
Peroxide Feed Pump												
Crystallizer Recirc Pump												
Slurry Transfer Pump												
Quench Tank Pump												
Centrifuge Feed Pump												
Caro's Acid Pump												
Scrubber Circulation Pump												
Dust Collector Blower	NA											
Quench Tank Blower												
Vent Scrubber Blower	NA											
Hold Tank Agitator	NA											
Crystallizer Agitator	NA											
Pre-Crusher	NA											
Grinder	NA											
Brine Tank Pump	NR	NR	NR									
Two Stage Water Pump												

Abbreviated Last Measurement Summary

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Database: oxone.rbm
Station: MEMPHIS OXONE
Route No. 1: LANXESS

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
REFGCOMPA - REFRIGERATION COMPRESSOR A (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
MOH	.070 In/Sec	.517 G-s
MOV	.051 In/Sec	.122 G-s
MOA	.015 In/Sec	.082 G-s
MIH	.054 In/Sec	.234 G-s
MIV	.026 In/Sec	.039 G-s
MIA	.032 In/Sec	.050 G-s
C1H	.043 In/Sec	.323 G-s
C1V	.033 In/Sec	.169 G-s
C1A	.062 In/Sec	.188 G-s
C2H	.037 In/Sec	.251 G-s
C2V	.387 In/Sec	.124 G-s
C2A	.086 In/Sec	.158 G-s
C3H	.072 In/Sec	.606 G-s
C3V	.181 In/Sec	.366 G-s
C3A	.193 In/Sec	.158 G-s
C4H	.052 In/Sec	1.527 G-s
C4V	.098 In/Sec	.267 G-s
C4A	.155 In/Sec	.252 G-s
P3	.368 In/Sec	.853 G-s
P4	.041 In/Sec	1.064 G-s
P5	.035 In/Sec	.172 G-s
P6	.220 In/Sec	.347 G-s
P9	.615 In/Sec	.145 G-s
P10	1.508 In/Sec	.107 G-s
7371-03 - MIDDLE COOLING TOWER PUMP (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
11	.269 In/Sec	1.354 G-s
12	.197 In/Sec	1.545 G-s
13	.208 In/Sec	3.194 G-s
14	.202 In/Sec	2.805 G-s
7371-05 - WEST COOLING TOWER PUMP (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
11	.058 In/Sec	1.450 G-s
12	.046 In/Sec	1.177 G-s
13	.058 In/Sec	3.208 G-s
14	.050 In/Sec	2.022 G-s
X2 - EAST NEUTRALIZATION PUMP (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
11	.160 In/Sec	.873 G-s
12	.140 In/Sec	.886 G-s
362-13 - KOH FEED PUMP (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
11	.060 In/Sec	1.034 G-s
21	.055 In/Sec	.726 G-s
23	.060 In/Sec	.199 G-s
71	.102 In/Sec	1.212 G-s
72	.119 In/Sec	1.322 G-s
357-13 - PEROXIDE FEED PUMP (22-Sep-23)		
	OVERALL LEVEL	1-20 kHZ
11	.023 In/Sec	.087 G-s

	21	.022 In/Sec	.095 G-s
	23	.034 In/Sec	.037 G-s
	71	.060 In/Sec	.140 G-s
	72	.070 In/Sec	.039 G-s

363-06 - CRYSTALLIZER RECIRC PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.013 In/Sec	.240 G-s
21	.017 In/Sec	.545 G-s
23	.013 In/Sec	.118 G-s
71	.026 In/Sec	.077 G-s
72	.025 In/Sec	.052 G-s
81	.024 In/Sec	.073 G-s

363-07A - SLURRY TRANSFER PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.061 In/Sec	.207 G-s
21	.087 In/Sec	.115 G-s
23	.039 In/Sec	.043 G-s
71	.054 In/Sec	.270 G-s
72	.068 In/Sec	.043 G-s

106-01 - PUMP,#2 QUENCH TANK (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.060 In/Sec	1.108 G-s
21	.047 In/Sec	.653 G-s
23	.154 In/Sec	.085 G-s
71	.831 In/Sec	.807 G-s
72	.448 In/Sec	.553 G-s

363-13 - CENTRIFUGE FEED PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.203 In/Sec	.353 G-s
21	.100 In/Sec	.655 G-s
23	.153 In/Sec	.138 G-s
71	.244 In/Sec	.255 G-s
72	.297 In/Sec	.134 G-s

360-05 - CARO'S ACID PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.074 In/Sec	.699 G-s
21	.070 In/Sec	.558 G-s
23	.069 In/Sec	.164 G-s
71	.121 In/Sec	.269 G-s
72	.118 In/Sec	.079 G-s

366-41 - SCRUBBER CIRCULATION PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.166 In/Sec	3.987 G-s
21	.196 In/Sec	4.228 G-s
23	.208 In/Sec	1.558 G-s
71	.188 In/Sec	.822 G-s
81	.268 In/Sec	.402 G-s

DC BLOWER - BLOWER, DUST COLLECTOR (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.123 In/Sec	1.652 G-s
12	.101 In/Sec	.284 G-s
13	.099 In/Sec	.182 G-s
21	.108 In/Sec	1.180 G-s
22	.108 In/Sec	.276 G-s
23	.106 In/Sec	.283 G-s
71	.150 In/Sec	3.718 G-s
81	.254 In/Sec	4.908 G-s

106-08 - BLOWER, QUENCH TANK (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.528 In/Sec	1.073 G-s
12	.935 In/Sec	.374 G-s
13	.467 In/Sec	.248 G-s

	21	.276 In/Sec	1.350 G-s
	22	.926 In/Sec	.246 G-s
	23	.738 In/Sec	.130 G-s
	71	.355 In/Sec	2.890 G-s
	81	.490 In/Sec	1.103 G-s

VNTSCRBBLW - BLOWER, VENT SCRUBBER (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.119 In/Sec	1.322 G-s
12	.388 In/Sec	.489 G-s
13	.121 In/Sec	.262 G-s
21	.102 In/Sec	1.328 G-s
22	.567 In/Sec	.318 G-s
23	.126 In/Sec	.563 G-s
71	.198 In/Sec	.656 G-s
81	.145 In/Sec	1.052 G-s

363-18 - AGITATOR, HOLD TANK (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.124 In/Sec	.547 G-s
21	.126 In/Sec	1.147 G-s
23	.163 In/Sec	.103 G-s
31	.103 In/Sec	1.461 G-s
32	.075 In/Sec	.386 G-s

363-03 - AGITATOR,OXONE CRYSTALLIZER (22-Sep-23)

	OVERALL LEVEL	1K-20K HZ
UBH	.042 In/Sec	.034 G-s
LBH	.056 In/Sec	.062 G-s
GOH	.106 In/Sec	1.051 G-s
	OVERALL LEVEL	1-20 kHZ
GIH	.120 In/Sec	1.314 G-s
21	.210 In/Sec	.309 G-s
11	.199 In/Sec	.342 G-s

7368-03 - PRECRUSHER OXONE (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
23	1.027 In/Sec	.064 G-s
11	.416 In/Sec	.321 G-s
21	.328 In/Sec	.649 G-s
22	.818 In/Sec	.094 G-s
71	.341 In/Sec	2.936 G-s
81	.676 In/Sec	1.245 G-s

370-03 - GRINDER,OXONE (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.169 In/Sec	.298 G-s
71	.279 In/Sec	3.276 G-s

110-04 - BRINE TANK PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.141 In/Sec	.360 G-s
21	.091 In/Sec	.714 G-s
23	.189 In/Sec	.216 G-s
71	.116 In/Sec	.317 G-s
72	.161 In/Sec	.120 G-s

2STAGEWTR - TWO STAGE WATER PUMP (22-Sep-23)

	OVERALL LEVEL	1-20 kHZ
11	.054 In/Sec	.643 G-s
21	.061 In/Sec	.526 G-s
23	.059 In/Sec	.096 G-s
71	.113 In/Sec	.960 G-s
72	.072 In/Sec	.396 G-s

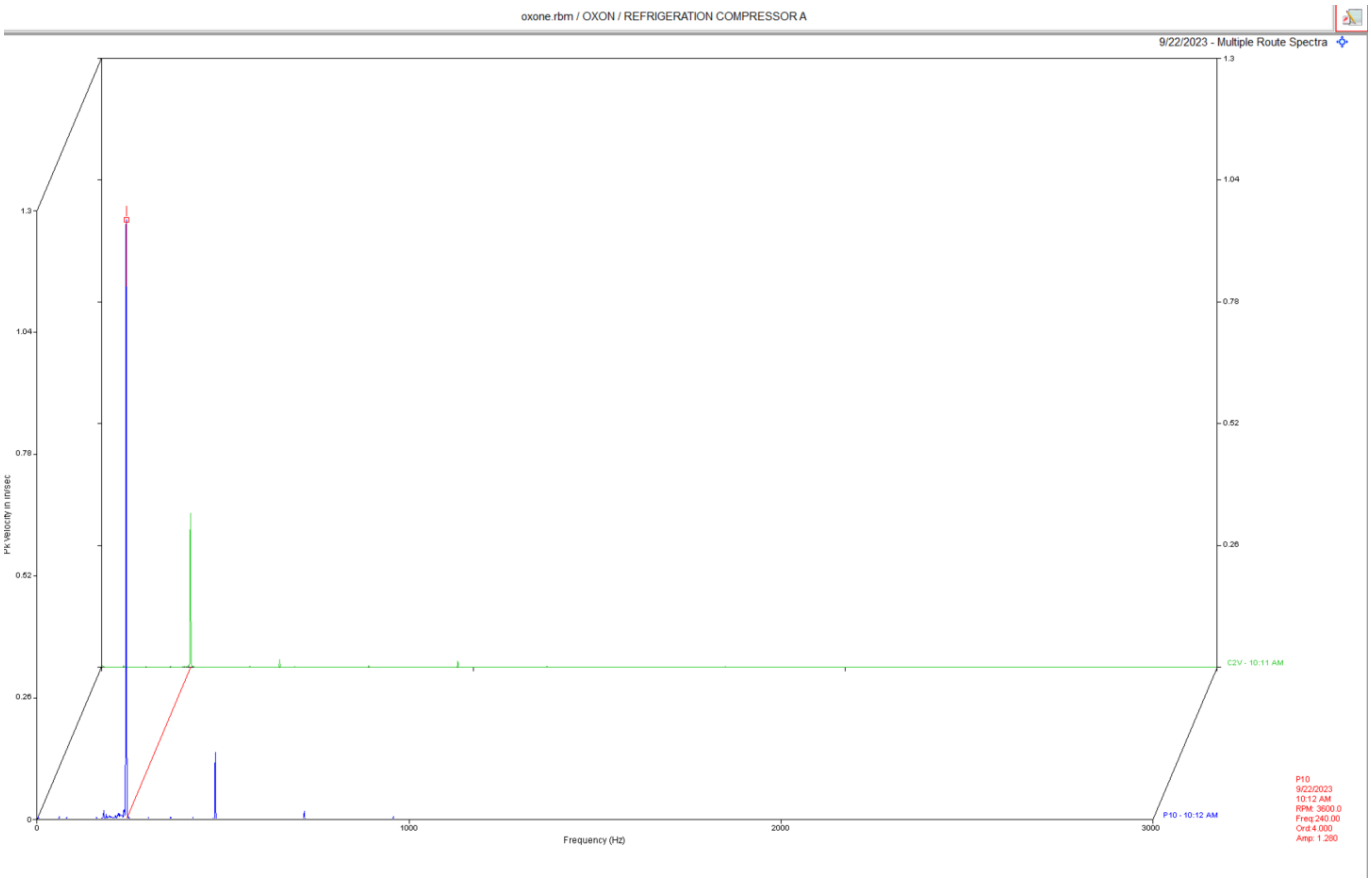
Clarification Of Vibration Units:

Acc --> G-s PK

Vel --> In/Sec PK

Vibration Analysis

Refrigeration Compressor A CLASS I



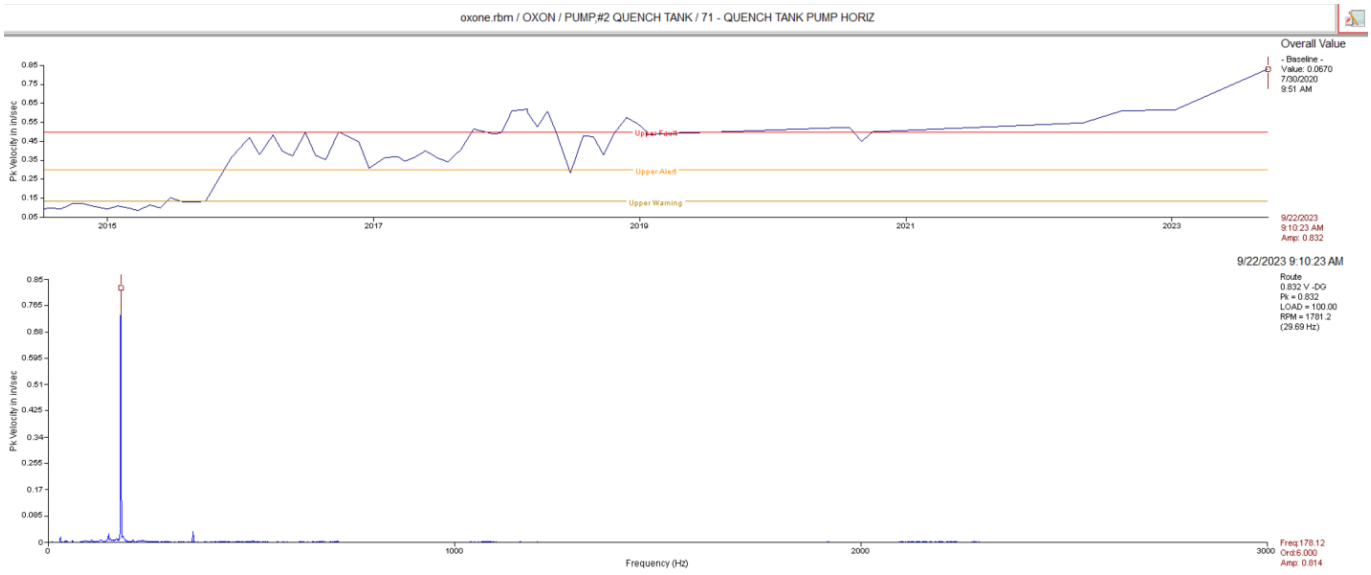
Observation:

The two spectrums above are the compressor input outboard vertical(C2V) and the inlet piping at the elbow in the vertical direction(P10). Both spectrums shows a peak at 240 HZ which is 4 x rpm. P10 shows a peak amplitude of 1.3 ips while C2V shows peak amplitude to be .328 ips.

Recommendation:

The 4 x rpm vibration that can be seen in the outboard end of the compressor in the vertical direction appears to be excited by the very high vibration in the inlet piping of the compressor. The piping vibration is over 1 ips and is highest in the vertical direction. It is unclear if this is a resonance in the piping or if the vibration is being influenced by some type of flow turbulence. Further investigations are recommended to determine the source of the 240 HZ. vibration in the inlet piping.

Quench Tank Pump CLASS II



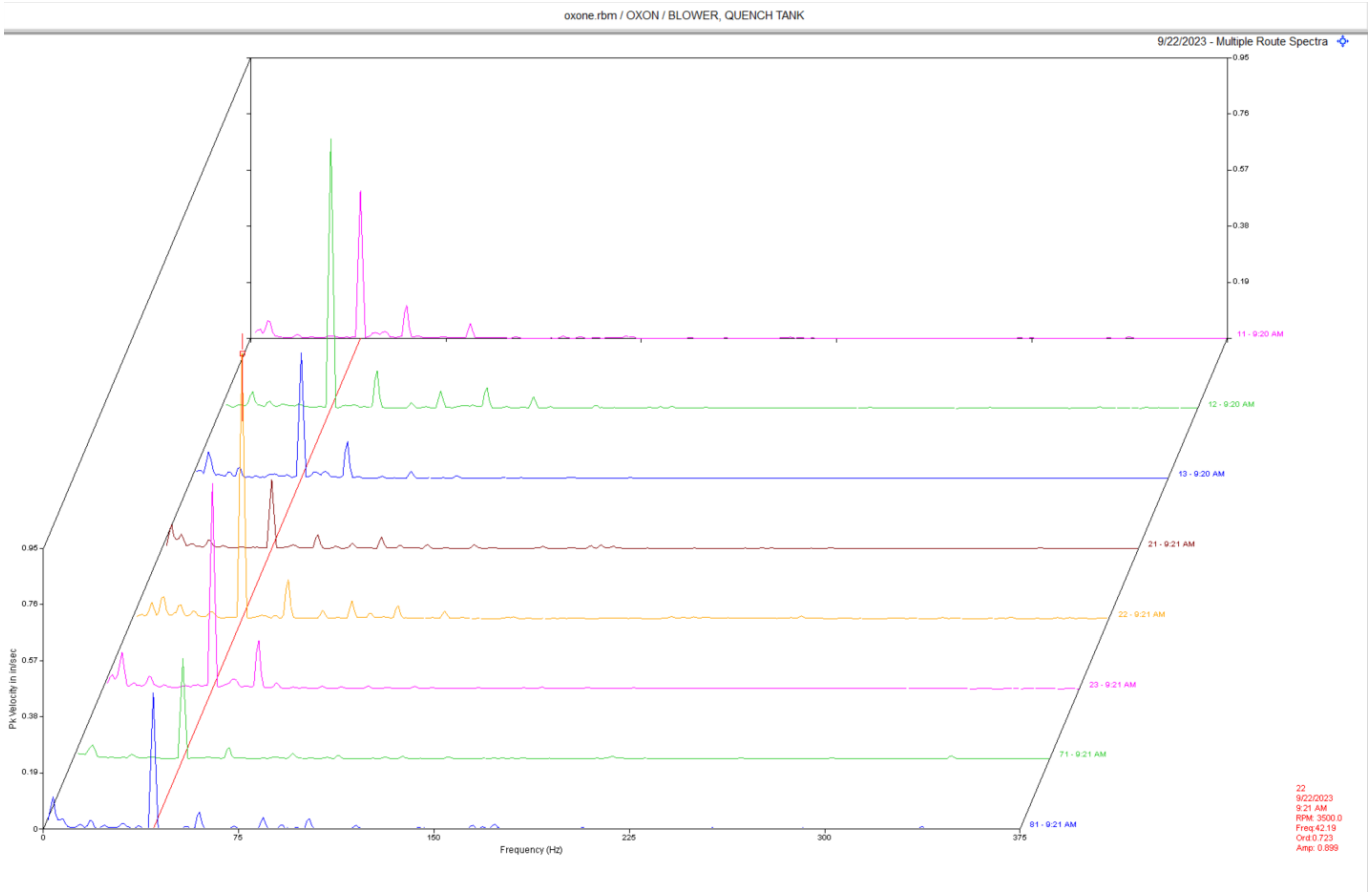
Observation:

Pump horizontal data shows a dominant vibration at 6 x rpm. Trend data shows an increase in overall vibration.

Recommendation:

If impeller has 6 vanes, then this vibration is pump vane pass and may be caused by internal pump/impeller issue or pump flow issue. Ensure pump is operating within the proper flow parameters and inspect pump as scheduling allows.

Quench Tank Blower **CLASS II**



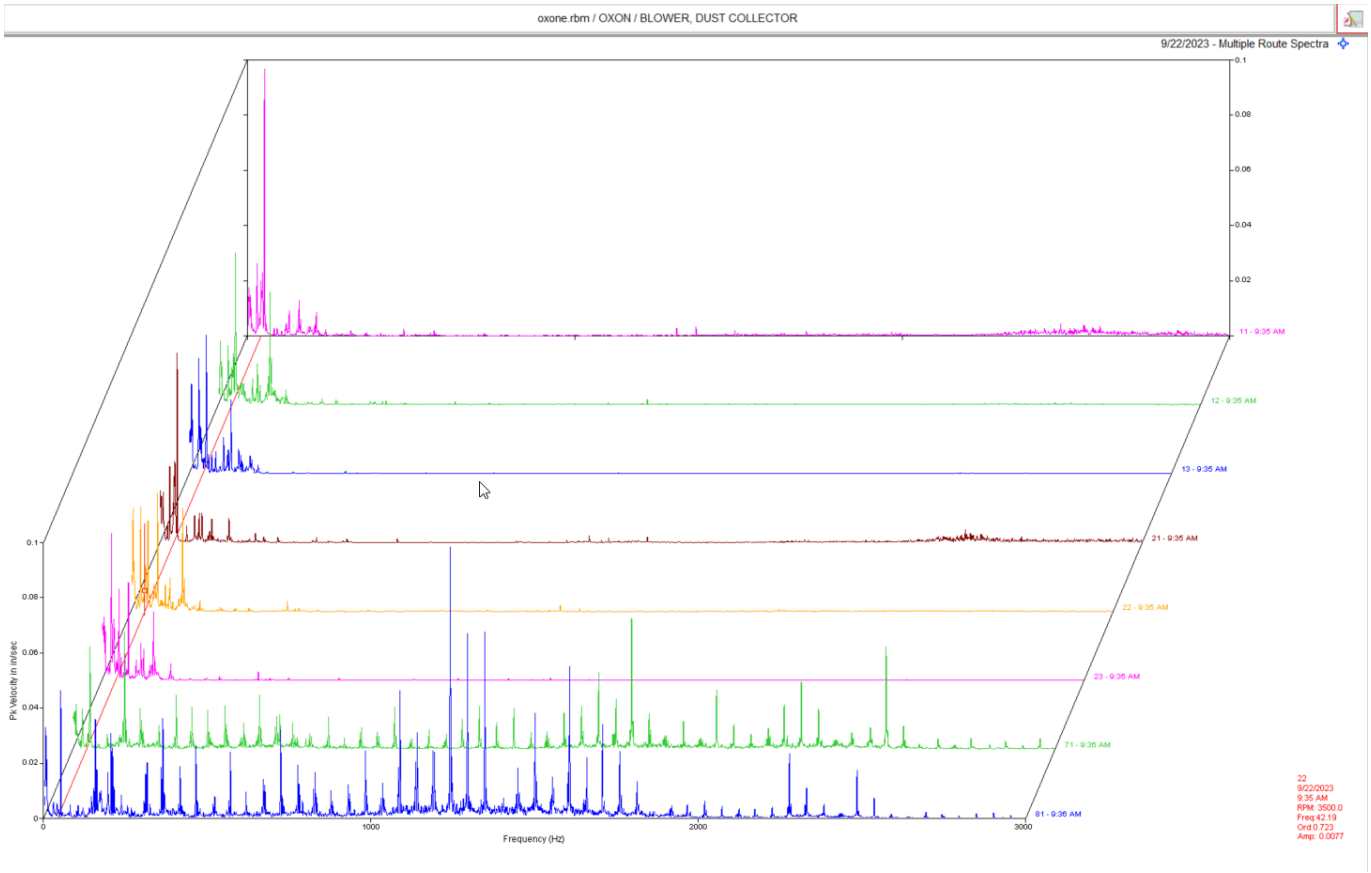
Observation:

Multipoint spectra shows a high vibration throughout the blower and motor. This peak appears to be 1 x blower rpm.

Recommendation:

Data suggests imbalance of the blower or possible sheave issue. Inspect blower wheel for build up and or damage. Ensure sheaves are in good shape and properly aligned. Ensure belts are also in good shape.

Dust Collector Blower CLASS III



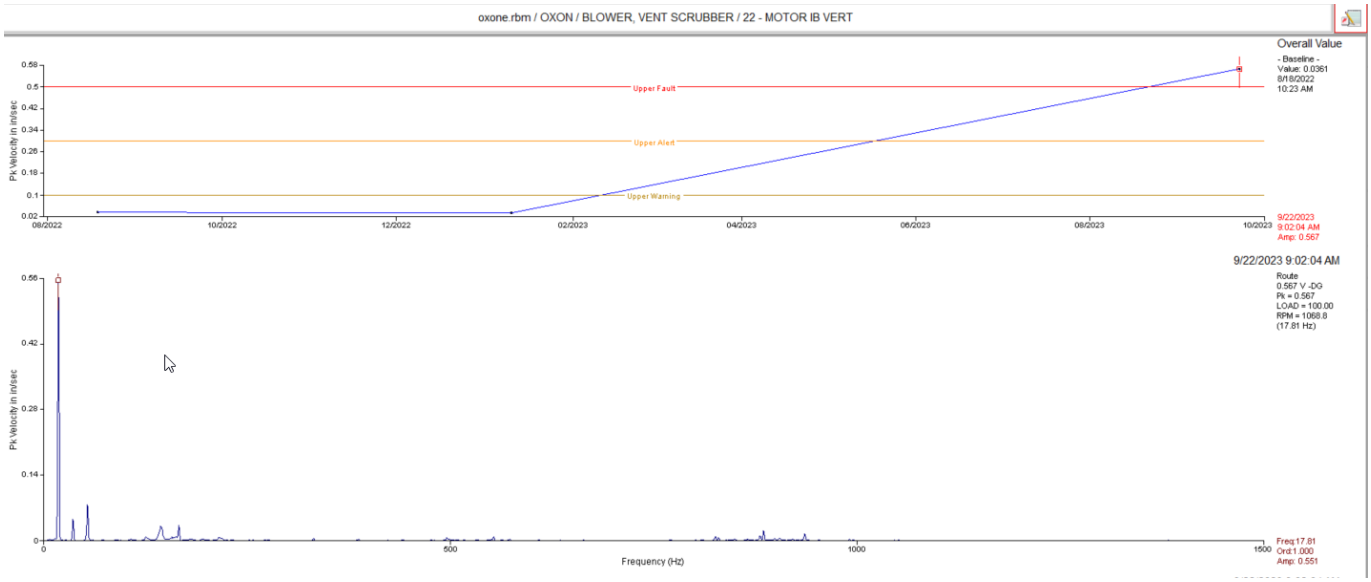
Observation:

Multipoint spectra show excessive vibration in the blower bearings. Peaks are mostly non-synchronous which indicate bearing defects.

Recommendation:

Data indicates defects/wear in the blower bearings. They are very noisy as well and will need attention very soon.

Vent Scrubber Blower CLASS II



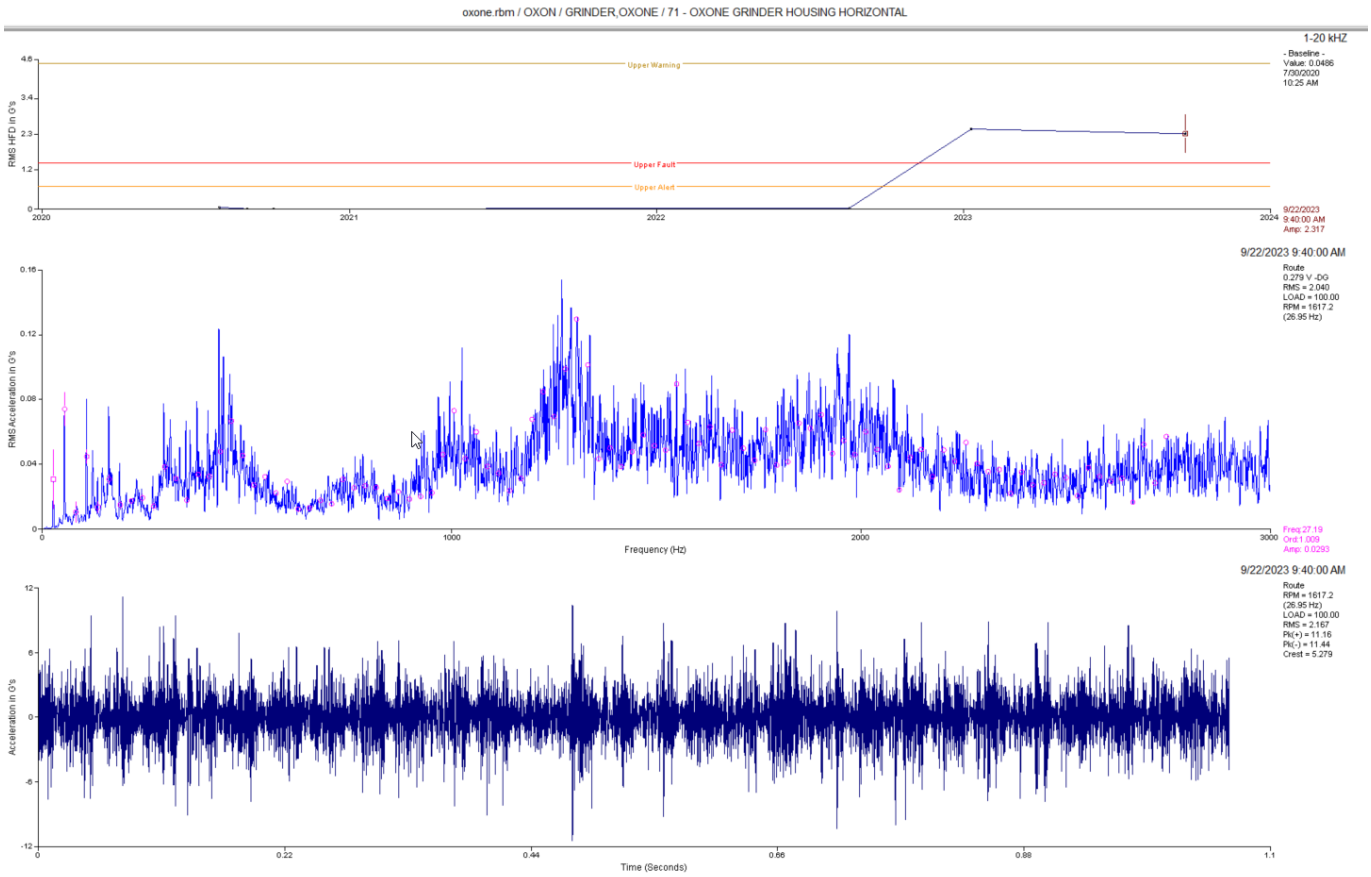
Observation:

Spectral data above is the motor drive end vertical. There appears to be a decent increase in 1 x rpm vibration in the motor and blower according to trend data above.

Recommendation:

Data indicates possible imbalance of the blower wheel. It is recommended to inspect the blower wheel for build up soon.

Grinder **CLASS III**



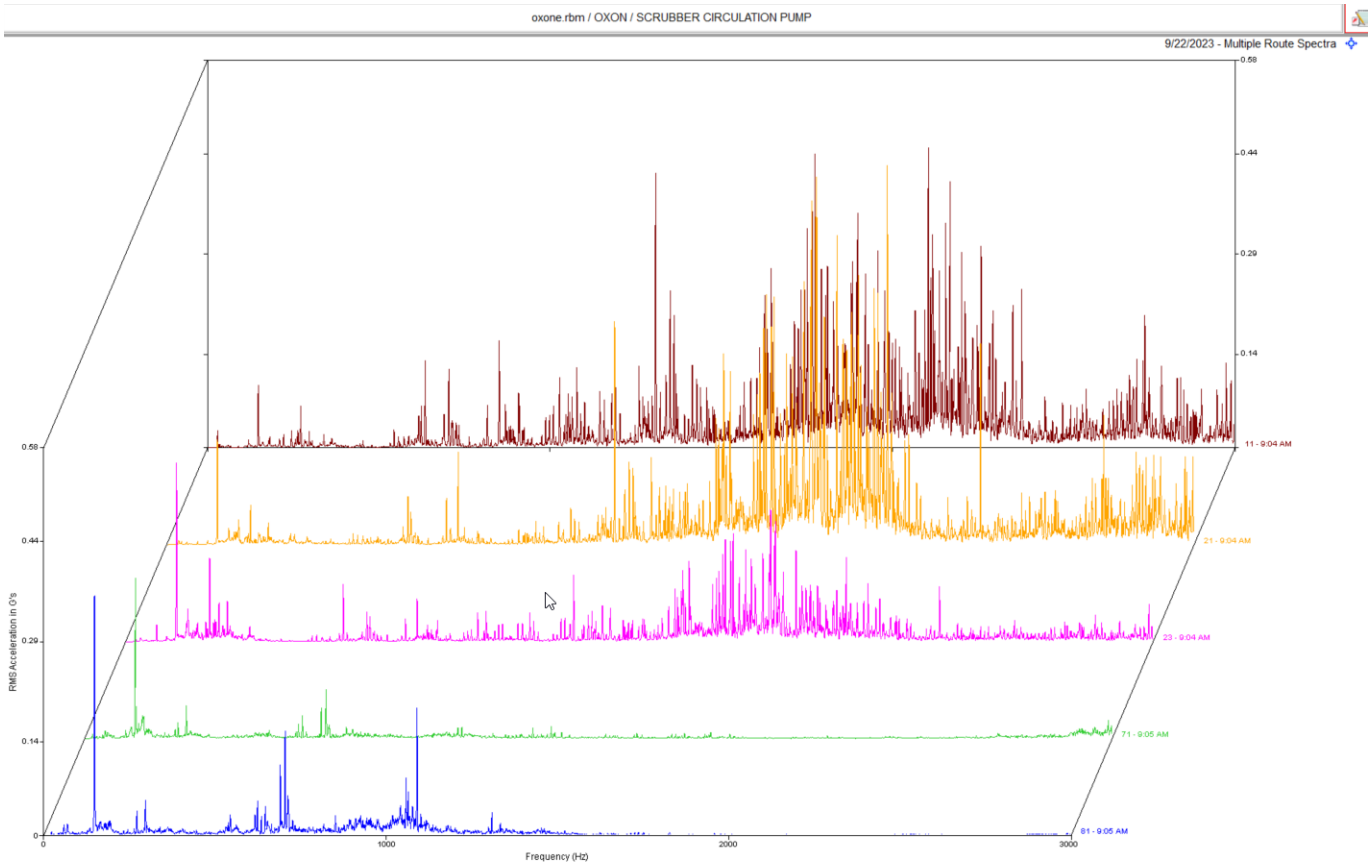
Observation:

Data above is the outboard grinder bearing. Waveform shows impacting while spectral data shows a large noise floor throughout the spectrum. Trend data shows an increase in high frequency amplitude.

Recommendation:

Data indicates likely bearing wear of the grinder bearings. The grinder bearings will need attention soon.

Scrubber Circulation Pump CLASS III



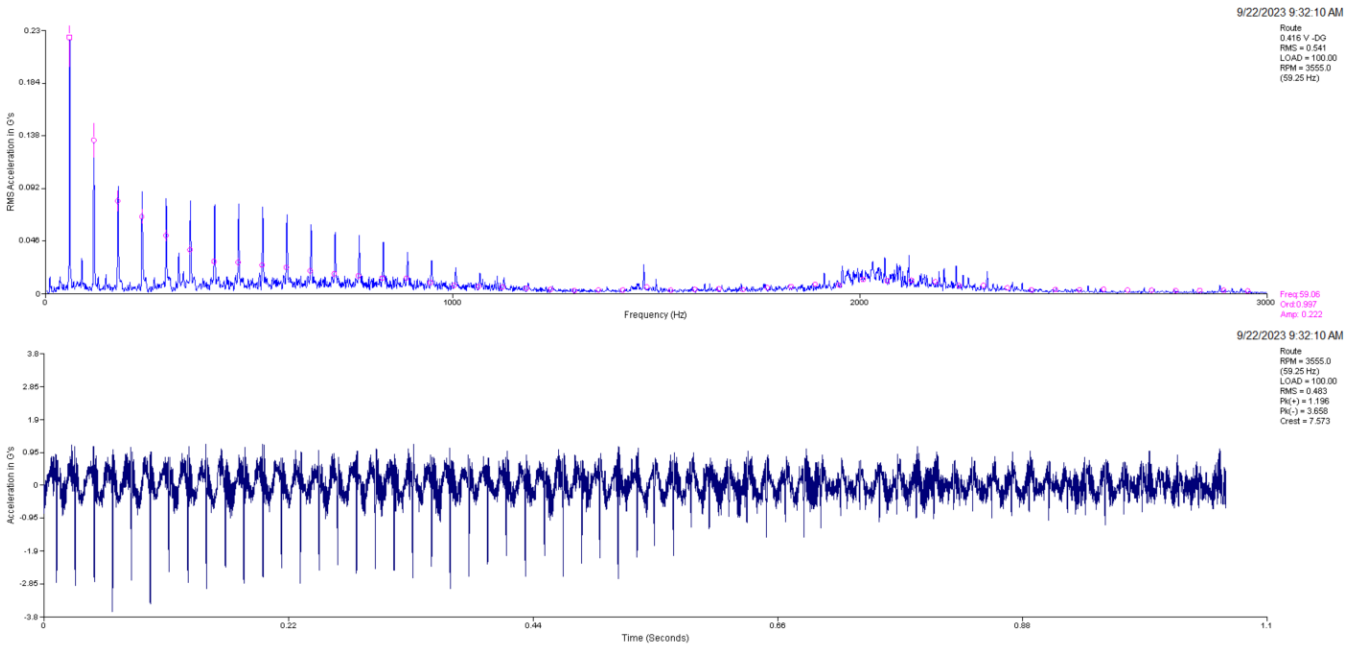
Observation:

Multi-point spectral waterfall shows high amplitude acceleration and non-synchronous peaks in motor spectra.

Recommendation:

Motor bearings are showing signs of defect/wear. We are monitoring this closely. Motor should to be replaced at next major down time.

Pre-Crusher **CLASS III**



Observation:.
Data shown is the motor outboard horizontal. Data shows quite a bit of rpm harmonics with a directional waveform.

Recommendation:
Data suggests looseness or a rub. Motor and base/structure should be inspected for looseness, crack, etc. Inspect sheaves also.

As always, it has been a pleasure to serve the Lanxess Oxone Memphis Plant. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

ISO Certified Vibration Analyst, Category III

HI-SPEED INDUSTRIAL SERVICE

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