HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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April 30, 2024

Seth McMillan
Lanxess
Memphis, TN

Seth,

The following is a summary of findings from the April 2024 quarterly vibration survey at your facility. ***Note that the pre-crusher bearings could not be checked because of the guards in place. Guards need to be modified to allow for sensor placement on crusher bearings.*** 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

Hi-Speed **Industrial Service** tests and inspects industrial machinery and equipment and makes recommendations concerning maintenance and repairs based on its experience in the field of industrial repair and maintenance. The information contained herein is provided as an opinion only, not as a guaranty or warranty of the matters discussed herein.

Machine Summary Table

Date Collected												
Month	5	8	1	9	11	4						
Day	3	18	10	22	16	22						
Year	22	22	23	23	23	24						
Item	Condition											
Refrigeration Compressor A						NR						
Refrigeration Compressor B			NR	NR	NR	NR						
East Cooling Tower Pump				NR	NR							
Middle Cooling Tower Pump	NR		NR			NR						
West Cooling Tower Pump		NR										
West Neutralization Pump	NR	NR	NR	NR	NR							
East Neutralization Pump						NR						
KOH Feed Pump												
Peroxide Feed Pump						NR						
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					NR						
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

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD

7371-07 - EAST COOLING TOWER PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.202 In/Sec	.821 G-s
12	.079 In/Sec	2.068 G-s
13	.159 In/Sec	.882 G-s
14	.052 In/Sec	.889 G-s

7371-05 - WEST COOLING TOWER PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.074 In/Sec	1.276 G-s
12	.113 In/Sec	1.076 G-s
13	.064 In/Sec	2.091 G-s
14	.090 In/Sec	1.635 G-s

X1 - WEST NEUTRALIZATION PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.111 In/Sec	1.007 G-s
12	.086 In/Sec	.555 G-s

362-13 - KOH FEED PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.081 In/Sec	.772 G-s
21	.074 In/Sec	.773 G-s
23	.048 In/Sec	.131 G-s
71	.160 In/Sec	1.736 G-s
72	.157 In/Sec	.683 G-s

363-06 - CRYSTALLIZER RECIRC PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.019 In/Sec	.237 G-s
21	.019 In/Sec	.539 G-s
23	.019 In/Sec	.070 G-s
71	.047 In/Sec	.070 G-s
72	.038 In/Sec	.019 G-s
81	.039 In/Sec	.066 G-s

363-07A - SLURRY TRANSFER PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.097 In/Sec	.897 G-s
21	.072 In/Sec	1.482 G-s
23	.057 In/Sec	.338 G-s
71	.085 In/Sec	.251 G-s
72	.067 In/Sec	.083 G-s

106-01 - PUMP,#2 QUENCH TANK (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.053 In/Sec	.830 G-s
21	.053 In/Sec	.512 G-s
23	.144 In/Sec	.172 G-s
71	.563 In/Sec	1.135 G-s
72	.088 In/Sec	.359 G-s

363-13 - CENTRIFUGE FEED PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.080 In/Sec	.359 G-s
21	.070 In/Sec	.923 G-s
23	.099 In/Sec	.127 G-s
71	.069 In/Sec	.452 G-s
72	.108 In/Sec	.196 G-s

360-05 - CARO'S ACID PUMP (22-Apr-24)

		OVERALL LEVEL	1-20 kHZ
	11	.058 In/Sec	.494 G-s
	21	.064 In/Sec	.594 G-s
	23	.058 In/Sec	.081 G-s
	71	.120 In/Sec	.188 G-s
	72	.142 In/Sec	.082 G-s

363-18 - AGITATOR, HOLD TANK (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.121 In/Sec	.812 G-s
21	.116 In/Sec	.813 G-s
23	.119 In/Sec	.099 G-s
31	.113 In/Sec	1.251 G-s
32	.060 In/Sec	.566 G-s

106-08 - BLOWER, QUENCH TANK (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.454 In/Sec	.465 G-s
12	.816 In/Sec	.197 G-s
13	.423 In/Sec	.074 G-s
21	.138 In/Sec	.882 G-s
22	.865 In/Sec	.196 G-s
23	.394 In/Sec	.176 G-s
71	.327 In/Sec	2.388 G-s
81	.481 In/Sec	.969 G-s

DC BLOWER - BLOWER, DUST COLLECTOR (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.083 In/Sec	1.457 G-s
12	.068 In/Sec	.673 G-s
13	.111 In/Sec	.333 G-s
21	.097 In/Sec	1.448 G-s
22	.096 In/Sec	.333 G-s
23	.106 In/Sec	.386 G-s
71	.099 In/Sec	1.894 G-s
81	.136 In/Sec	2.591 G-s

VNTSCRBBLW - BLOWER, VENT SCRUBBER (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.126 In/Sec	1.486 G-s
12	.093 In/Sec	.629 G-s
13	.049 In/Sec	.392 G-s
21	.045 In/Sec	1.973 G-s
22	.150 In/Sec	.328 G-s
23	.040 In/Sec	.528 G-s
71	.086 In/Sec	1.044 G-s
81	.063 In/Sec	1.072 G-s

370-03 - GRINDER,OXONE (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.031 In/Sec	.209 G-s
71	.050 In/Sec	1.046 G-s

366-41 - SCRUBBER CIRCULATION PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.218 In/Sec	3.730 G-s
21	.183 In/Sec	3.338 G-s
23	.152 In/Sec	.972 G-s
71	.214 In/Sec	.898 G-s
81	.270 In/Sec	.250 G-s

7368-03 - PRECRUSHER OXONE (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
23	.086 In/Sec	.052 G-s
11	.111 In/Sec	.193 G-s
21	.134 In/Sec	.574 G-s
22	.100 In/Sec	.102 G-s
81	.083 In/Sec	.304 G-s

110-04 - BRINE TANK PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.092 In/Sec	.534 G-s
21	.075 In/Sec	.963 G-s
23	.084 In/Sec	.253 G-s
71	.106 In/Sec	.378 G-s
72	.174 In/Sec	.101 G-s

2STAGEWTR - TWO STAGE WATER PUMP (22-Apr-24)

	OVERALL LEVEL	1-20 kHZ
11	.064 In/Sec	.379 G-s
21	.066 In/Sec	.579 G-s
23	.082 In/Sec	.095 G-s
71	.148 In/Sec	1.360 G-s
72	.122 In/Sec	.534 G-s

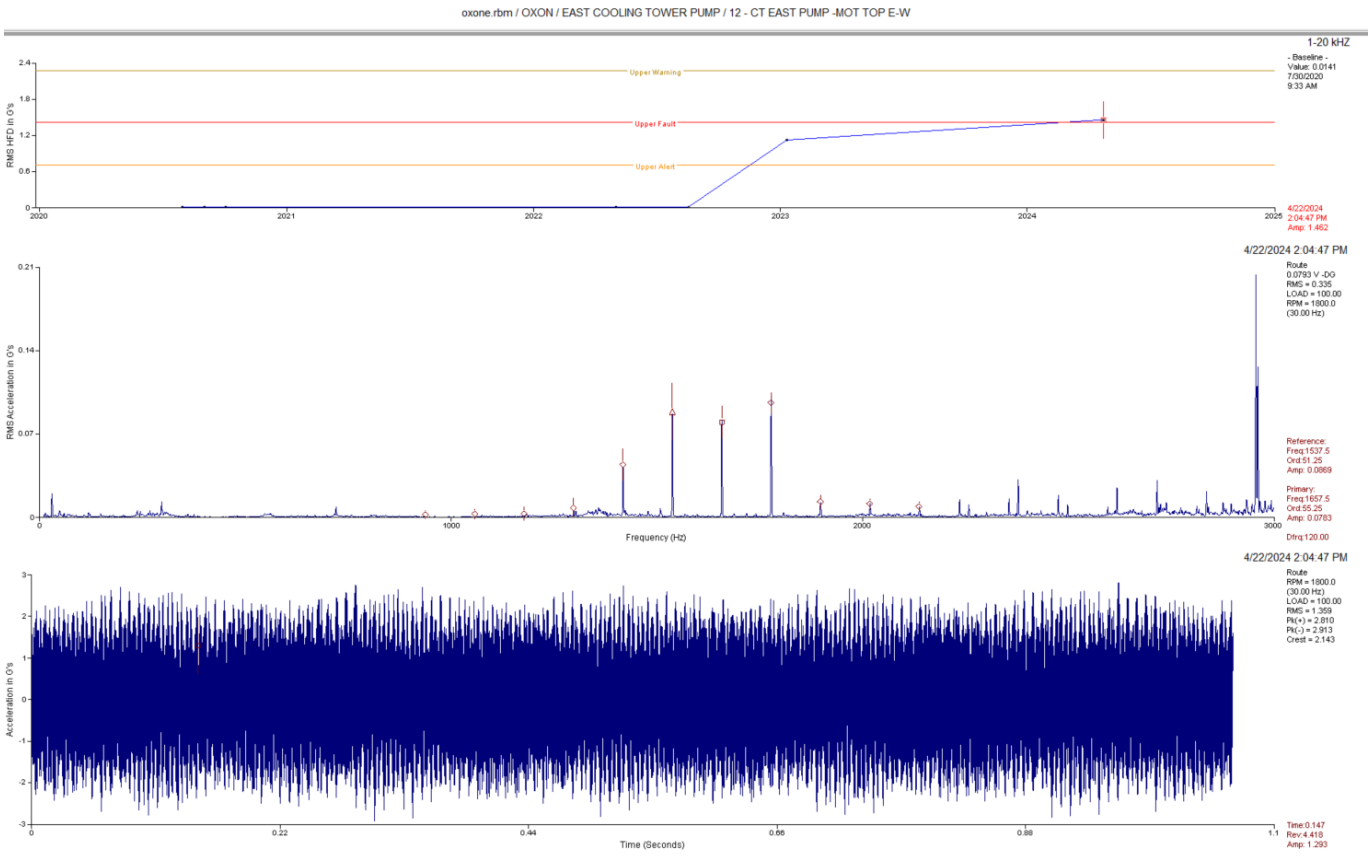
Clarification Of Vibration Units:

Acc --> G-s PK

Vel --> In/Sec PK

Vibration Analysis

East Cooling Tower Pump MOTOR CLASS I



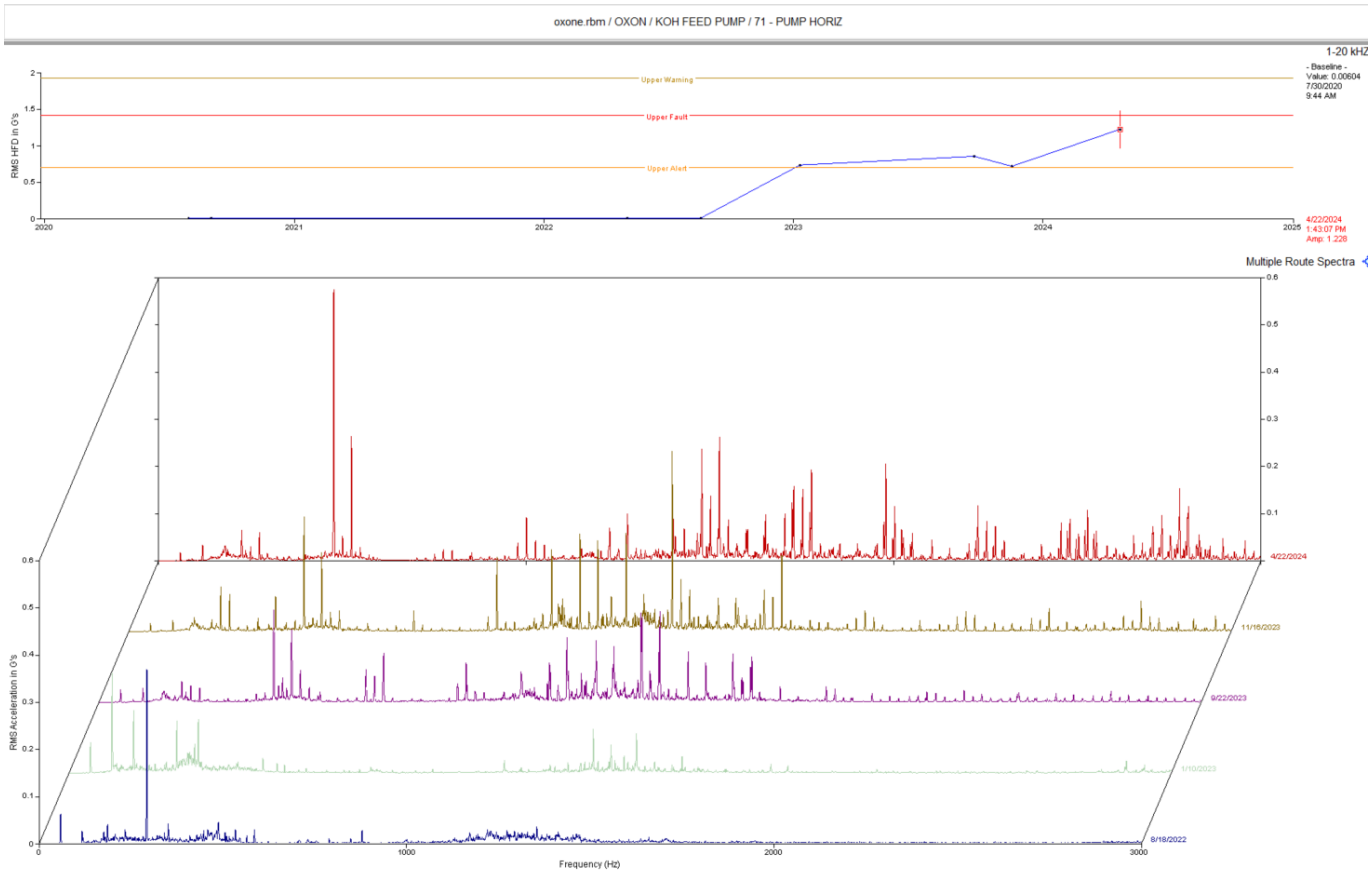
Observation:

Motor data shows a peak with 120 HZ. sidebands.

Recommendation:

Motor data shows an increase in high frequency amplitude. Motor also has a slightly high 1 x rpm vibration. The 120 HZ. sidebands are electrical related as well. Motor may have an air gap issue or rotor issue. We will continue to monitor this closely.

KOH Feed Pump CLASS II



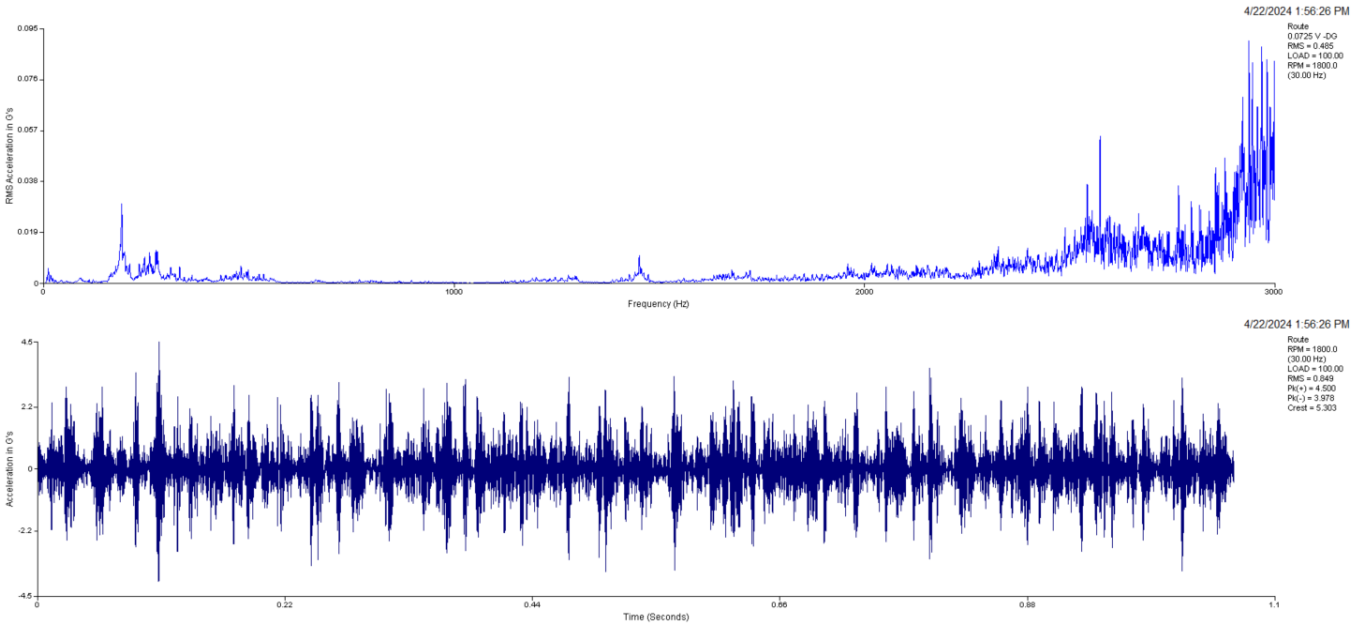
Observation:

Multi-spectral waterfall of the pump shows steady increase of non-synchronous peaks. Trend also shows an increase in high frequency amplitude in G's.

Recommendation:

Pump data shows some signs of bearing degradation. Pump will likely need attention in the next few months.

Slurry Transfer Pump MOTOR CLASS II



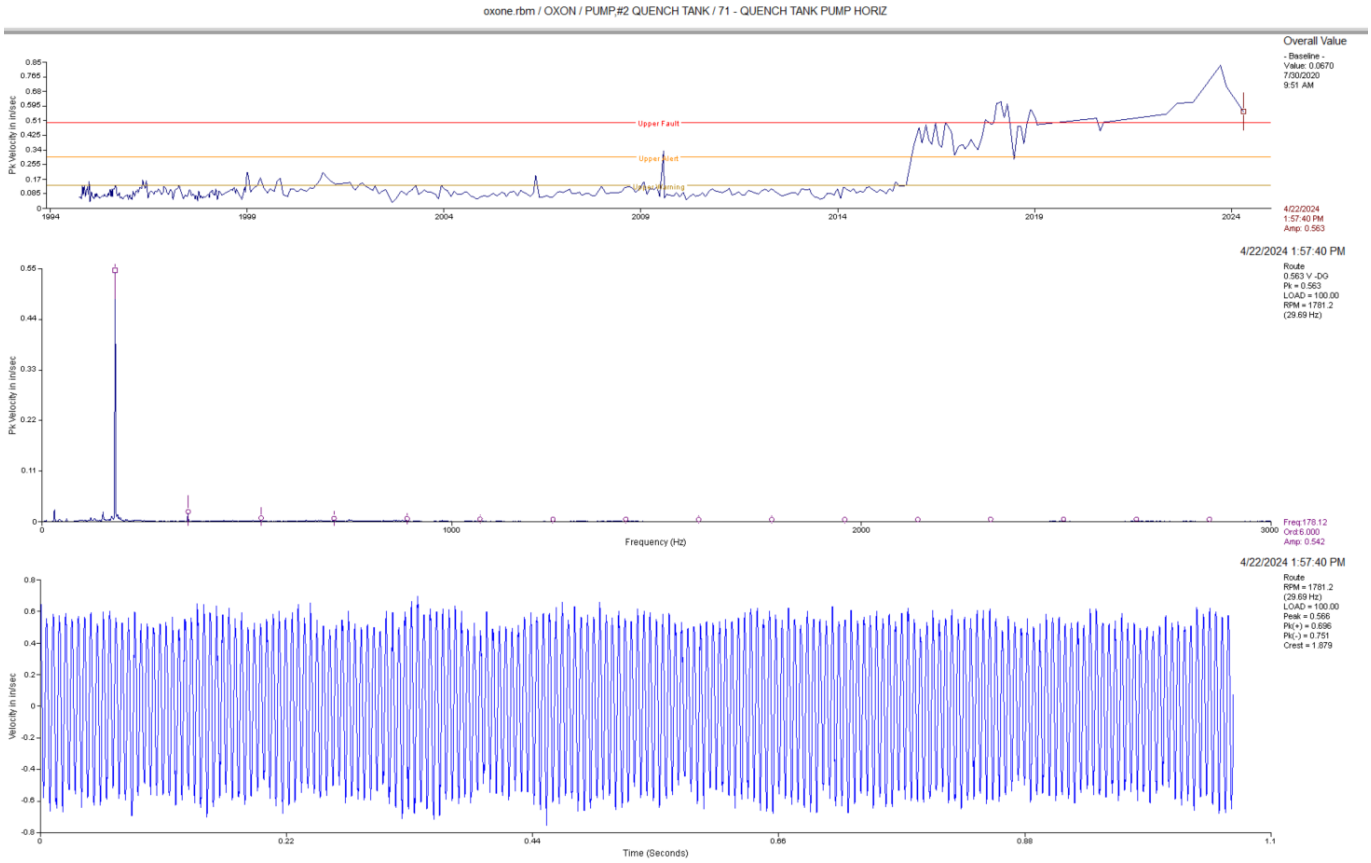
Observation:

Motor inboard data shows high frequency non-synchronous vibration with high amplitude. Waveform shows impacting with amplitude of 8 g's peak to peak.

Recommendation:

Even though amplitudes are lower this survey, the motor data suggests defects of the motor bearings. Motor will likely need attention in the next few months.

Quench Tank Pump CLASS II



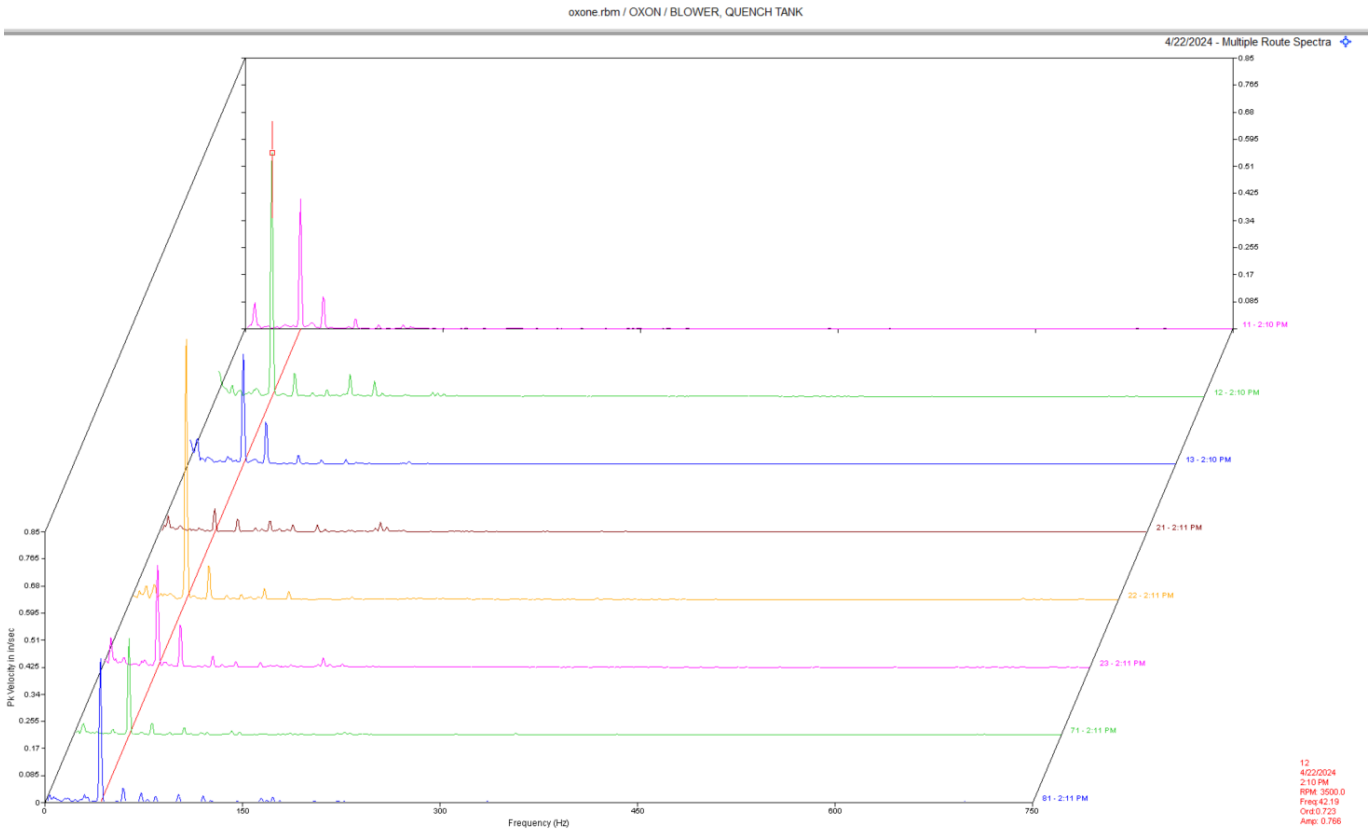
Observation:

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/impeller as scheduling allows.

Quench Tank Blower CLASS II



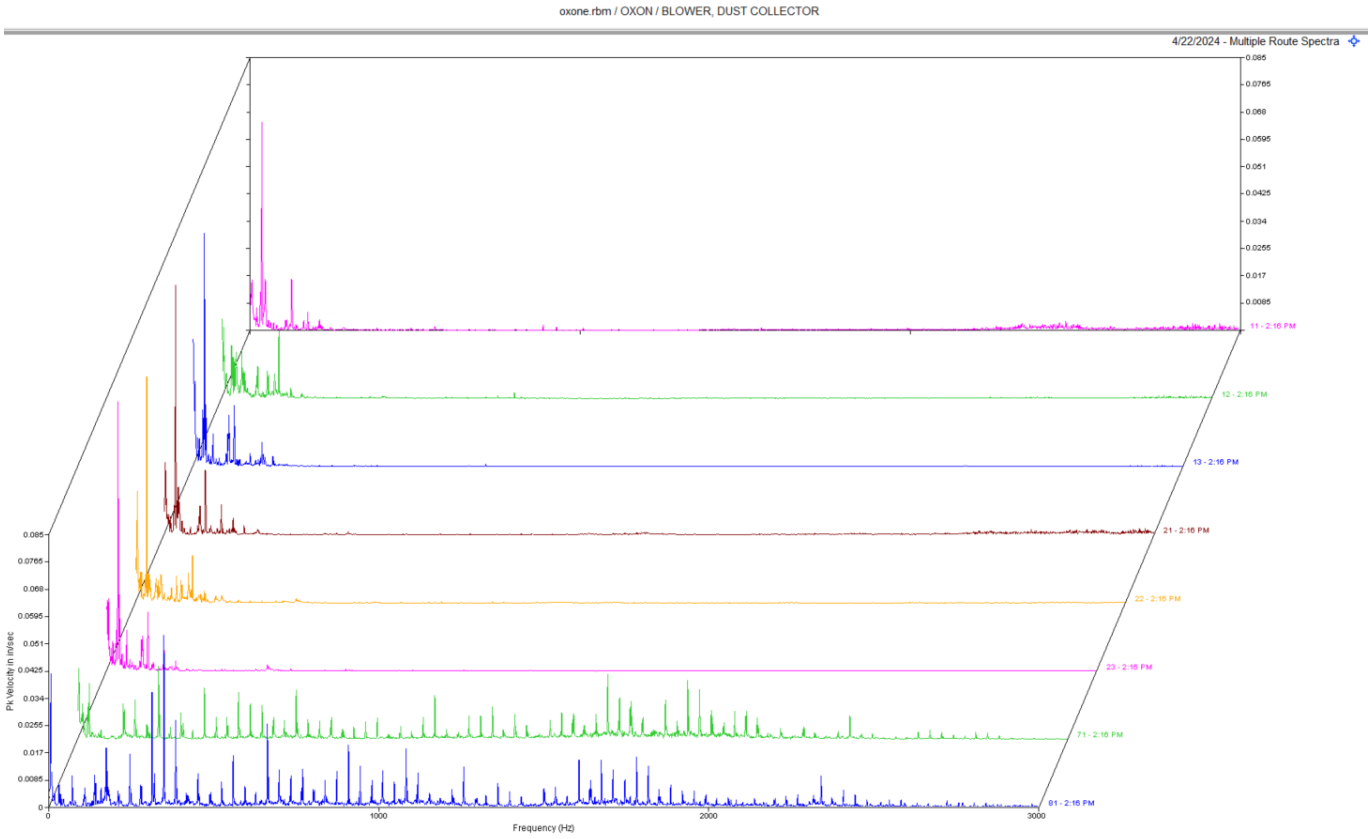
Observation:

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



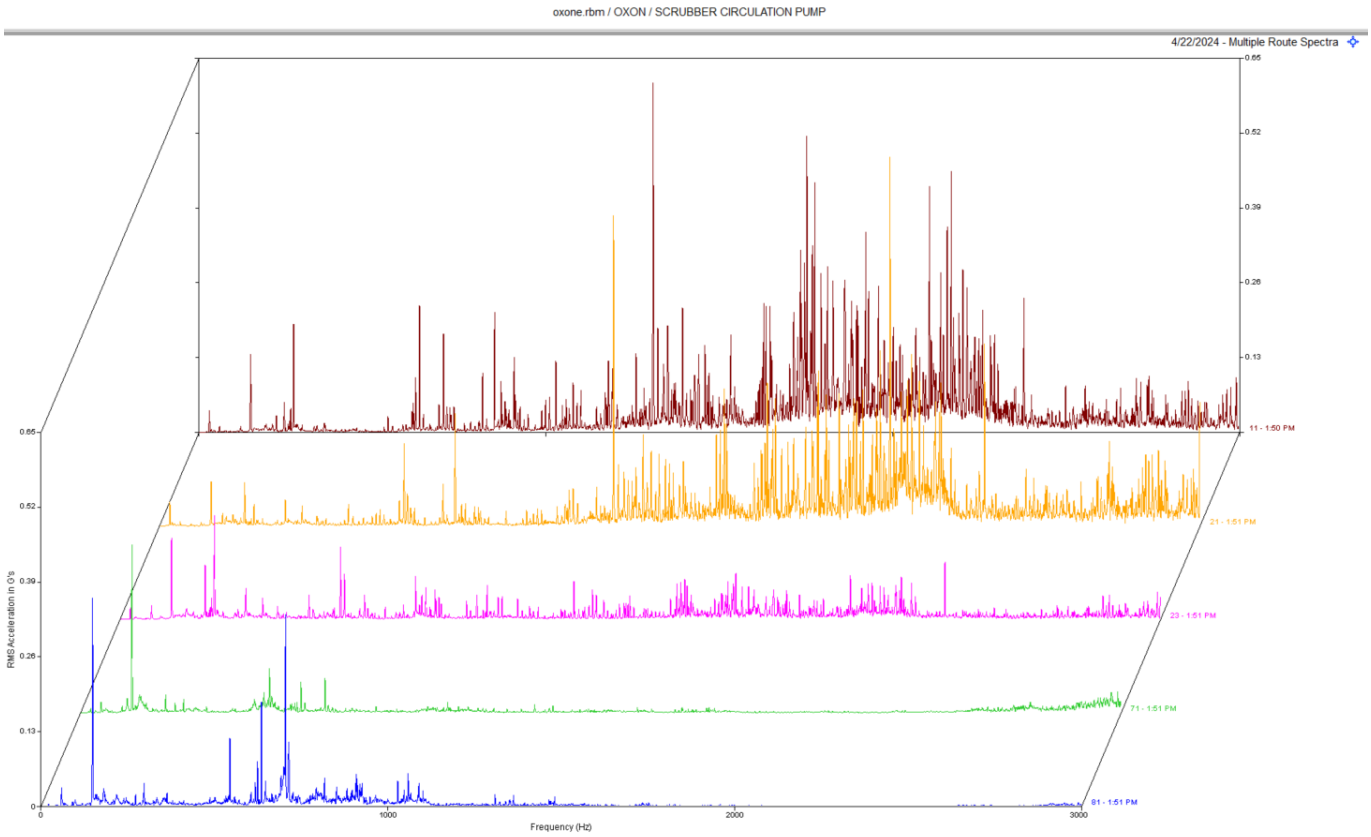
Observation:

Multipoint spectra of the motor and blower shows excessive vibration in the blower bearings. Peaks in blower spectra are mostly synchronous which indicate excessive blower shaft and or bearing fit wear.

Recommendation:

Data indicates defects/wear in the blower bearings and or blower shaft. The blower is very noisy as well and will need attention very soon.

Scrubber Circulation Pump CLASS III



Observation:

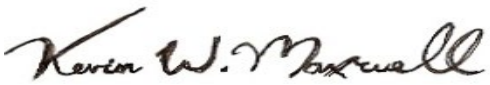
Multi-point spectral waterfall shows high amplitude acceleration and non-synchronous peaks in motor spectra.

Recommendation:

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

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

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