HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

7030 Ryburn Dr. Millington, TN Phone: (901) 873-5300 Fax: (901) 873-5301 www.gohispeed.com

December 1, 2023

Shawna Guffey
Arkema
Memphis, TN

The following is a summary of findings from the November 2023 H2O2 WEEK 4 and H2 MONTHLY vibration surveys that were performed on November 22, 2023.

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.

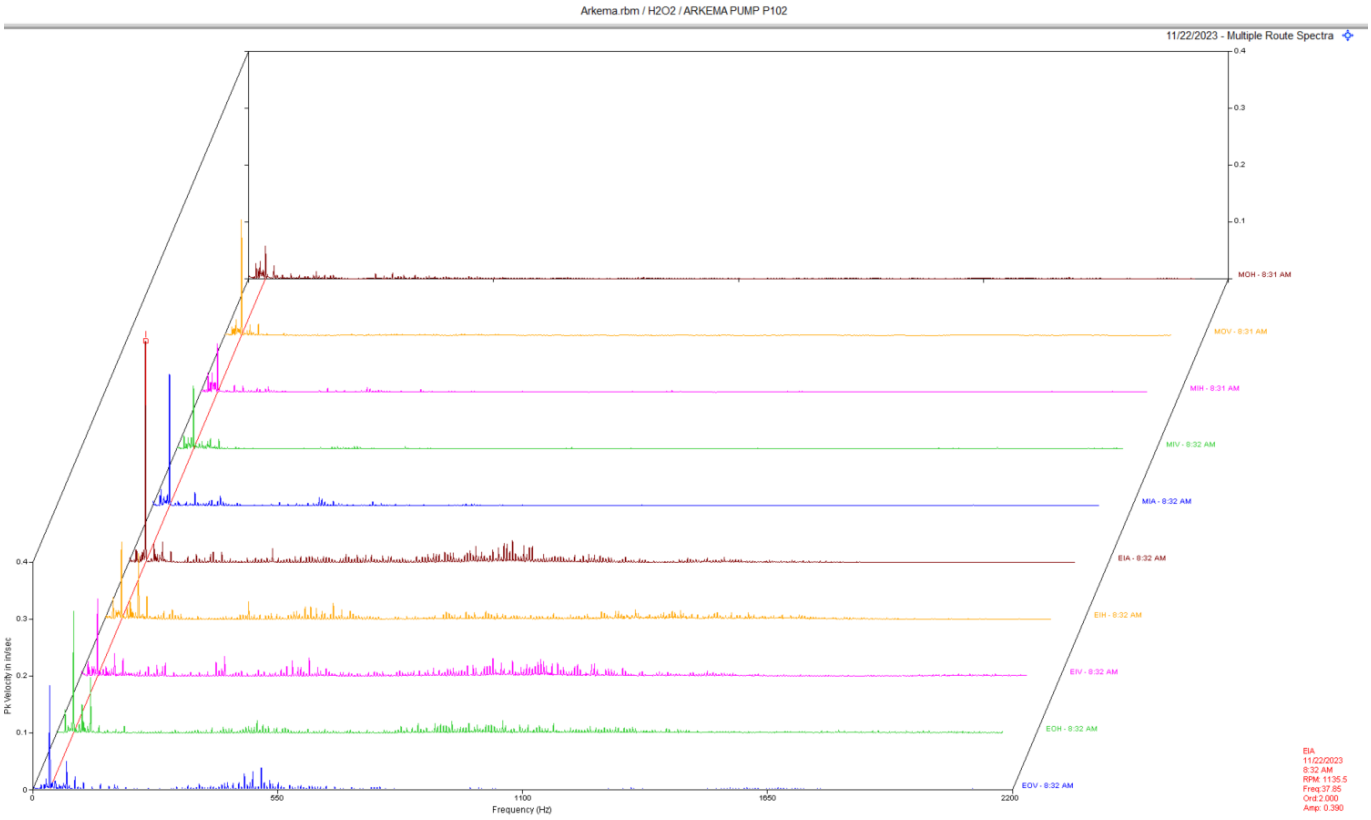
CLASS III; Defect (s) present that may cause failure in short term (less than 2 months). This should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.

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

Defect Summary

WEEK 4 H2O2 Plant

Pump 102 P102 CLASS I



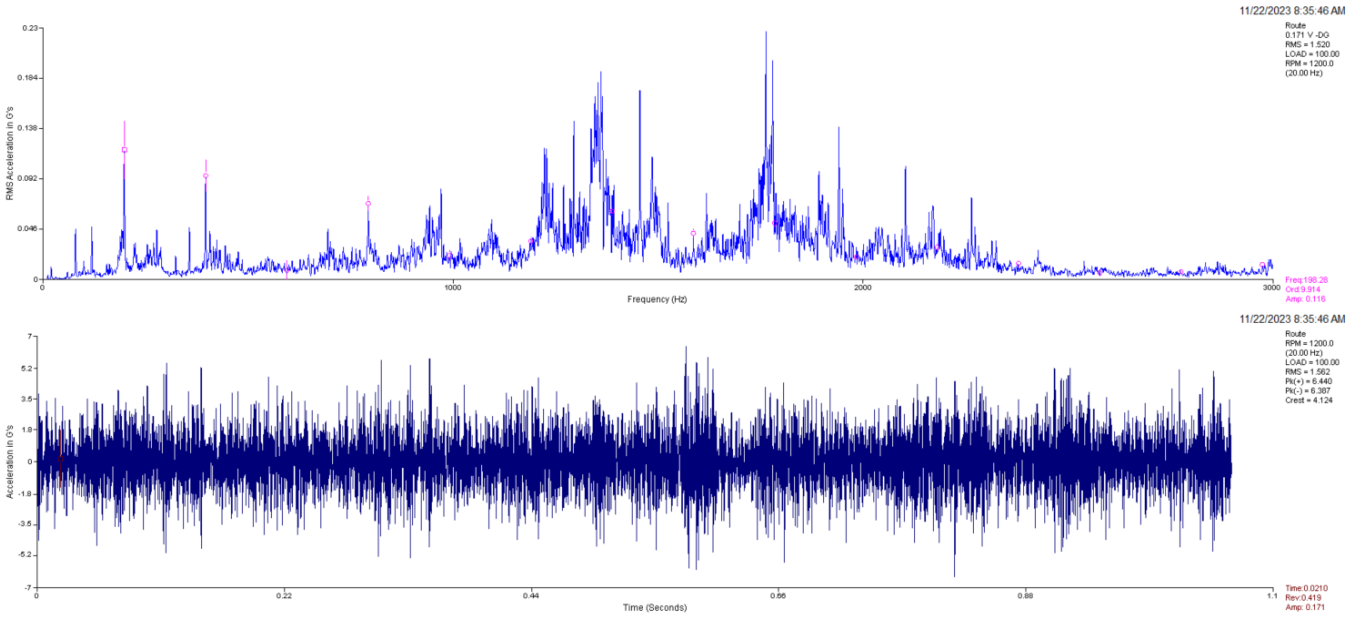
Observation:

Data above is a multipoint spectral waterfall. Pump data shows a 2 x rpm peak with multiple pump rpm harmonics throughout the pump spectra.

Recommendation:

The pump appears to have possible internal wear beginning to occur. The higher vibration in the axial direction may indicate excessive axial clearances. We are monitoring this very closely.

C Concentrator Vacuum Pump CLASS I



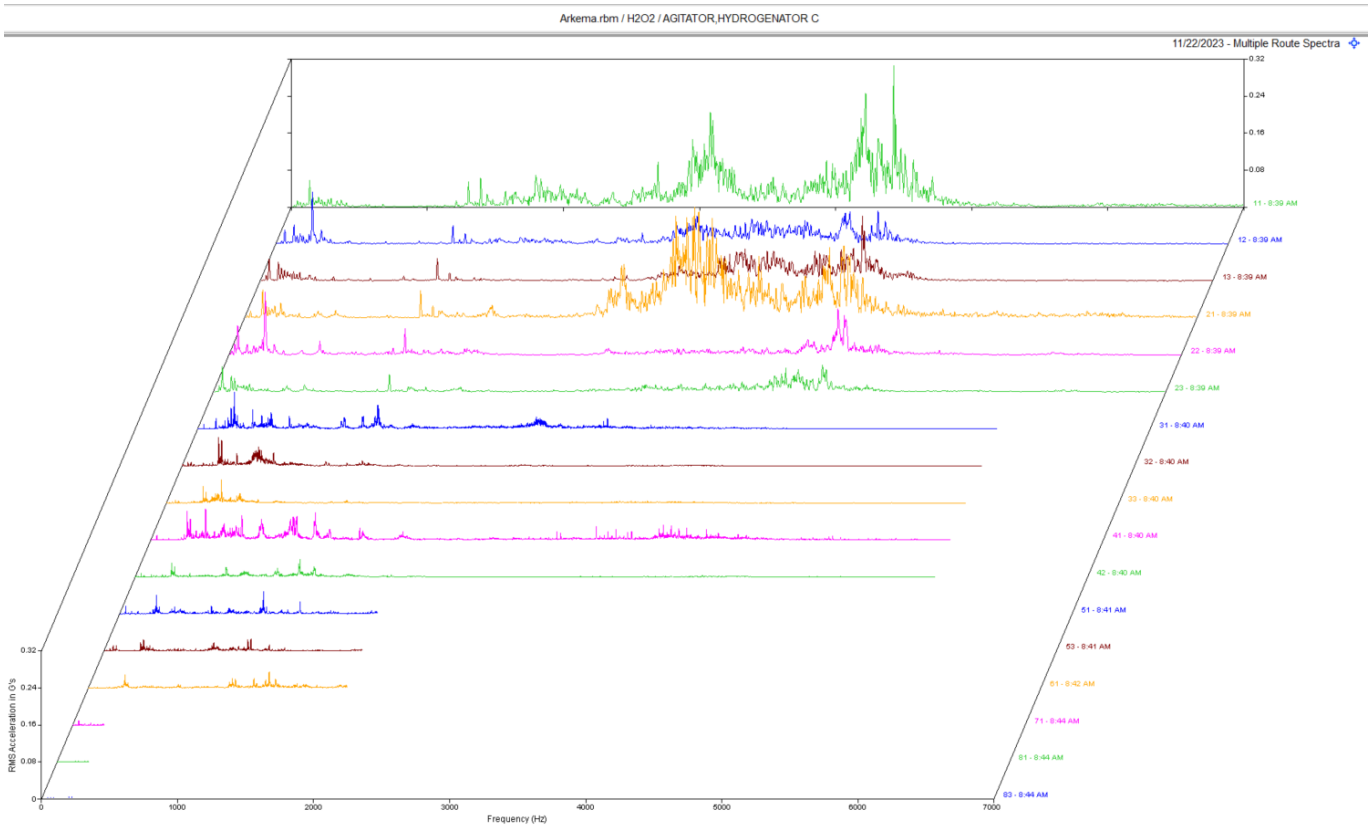
Observation:

Data above is the pump drive end horizontal. The small peaks in mid to high range of the spectrum are non-synchronous peaks and are very likely bearing defect frequencies.

Recommendation:

The pump appears to have early to mid-stage bearing defects/wear. We are monitoring this issue closely.

Agitator, Hydrogenator C CLASS I



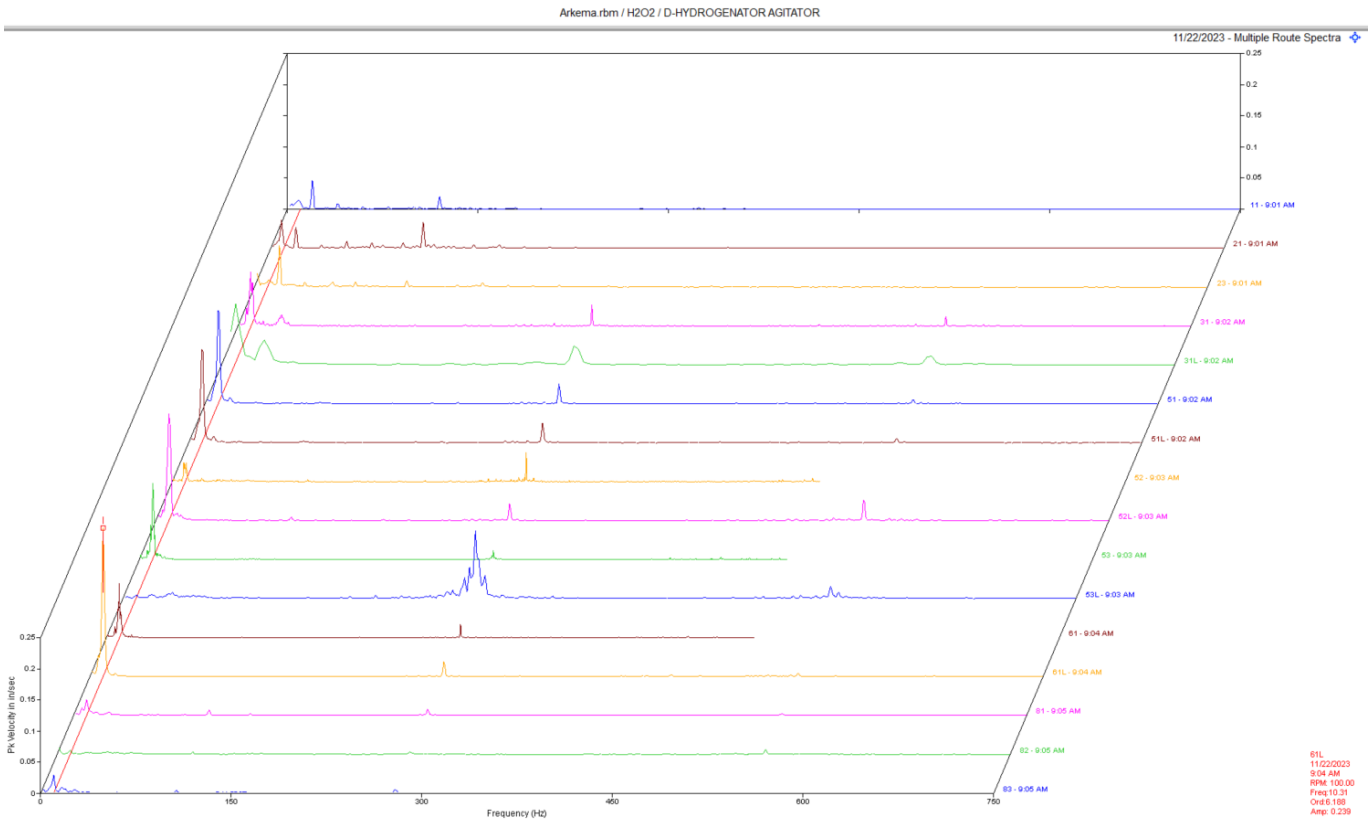
Observation:

Data above is a multipoint spectral waterfall. Data still shows some noise floor in the motor data. Data points labeled 11-23.

Recommendation:

Motor data still suggests a possible issue in the motor. May be rolling element defects in bearings. This issue appears to be minor at this time and we are monitoring this closely.

D Hydrogenator Agitator CLASS I



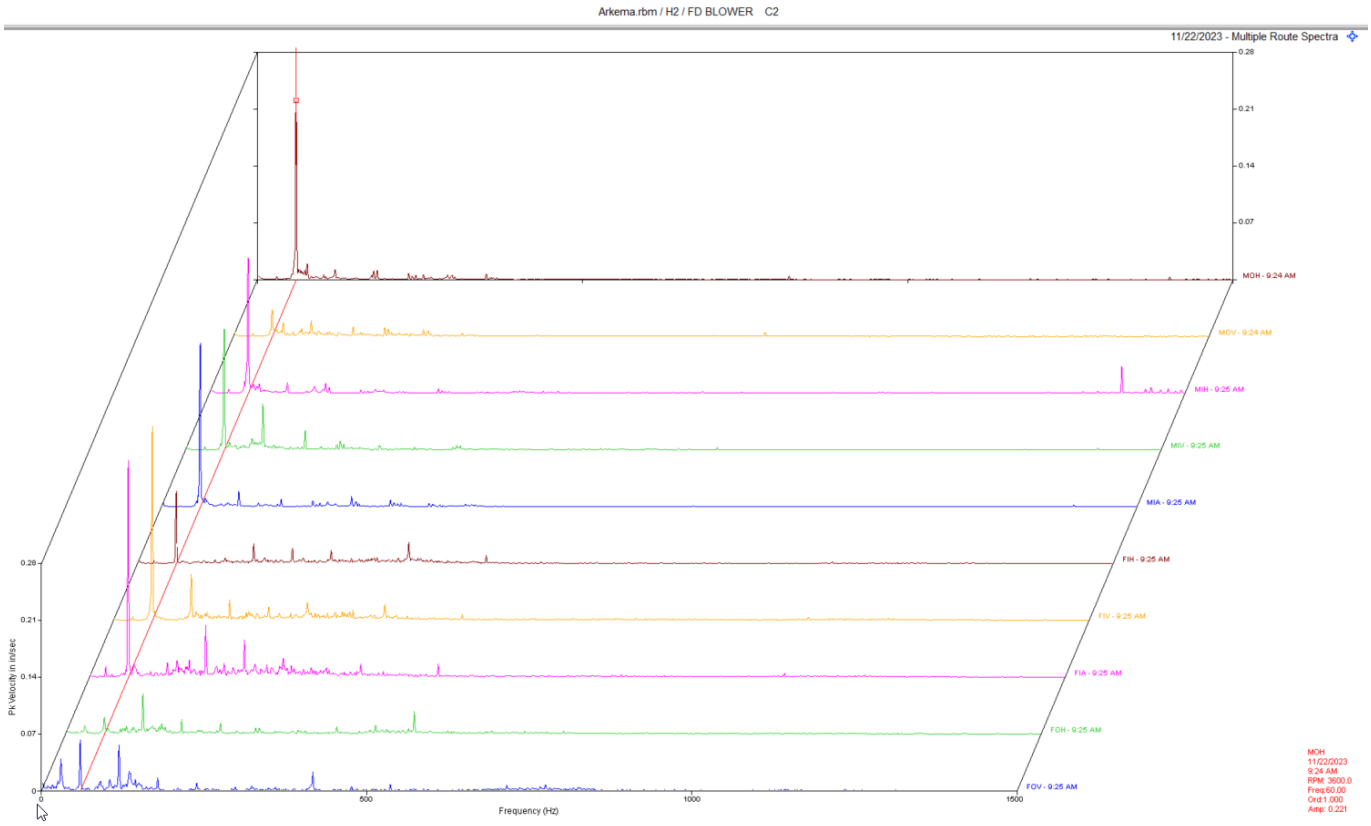
Observation:

Data above is a multi-point spectra of the motor and gear drive. There is quite a bit of low frequency vibration in the gear drive. Spectral and waveform data shows a dominant low frequency vibration that is likely a harmonic of output speed of the gearbox. Gearbox does appear to have visible torsional movement. There is also some gear mesh harmonics on the output axial that have increased in amplitude.

Recommendation:

Data shows a decrease in amplitude throughout gear drive. This will be downgraded to a CLASS I defect. We still recommend to ensure output shaft does not excessive shaft defection. Check coupling hubs and shaft for run out using a dial indicator. Will continue to monitor closely.

FD Blower CLASS I



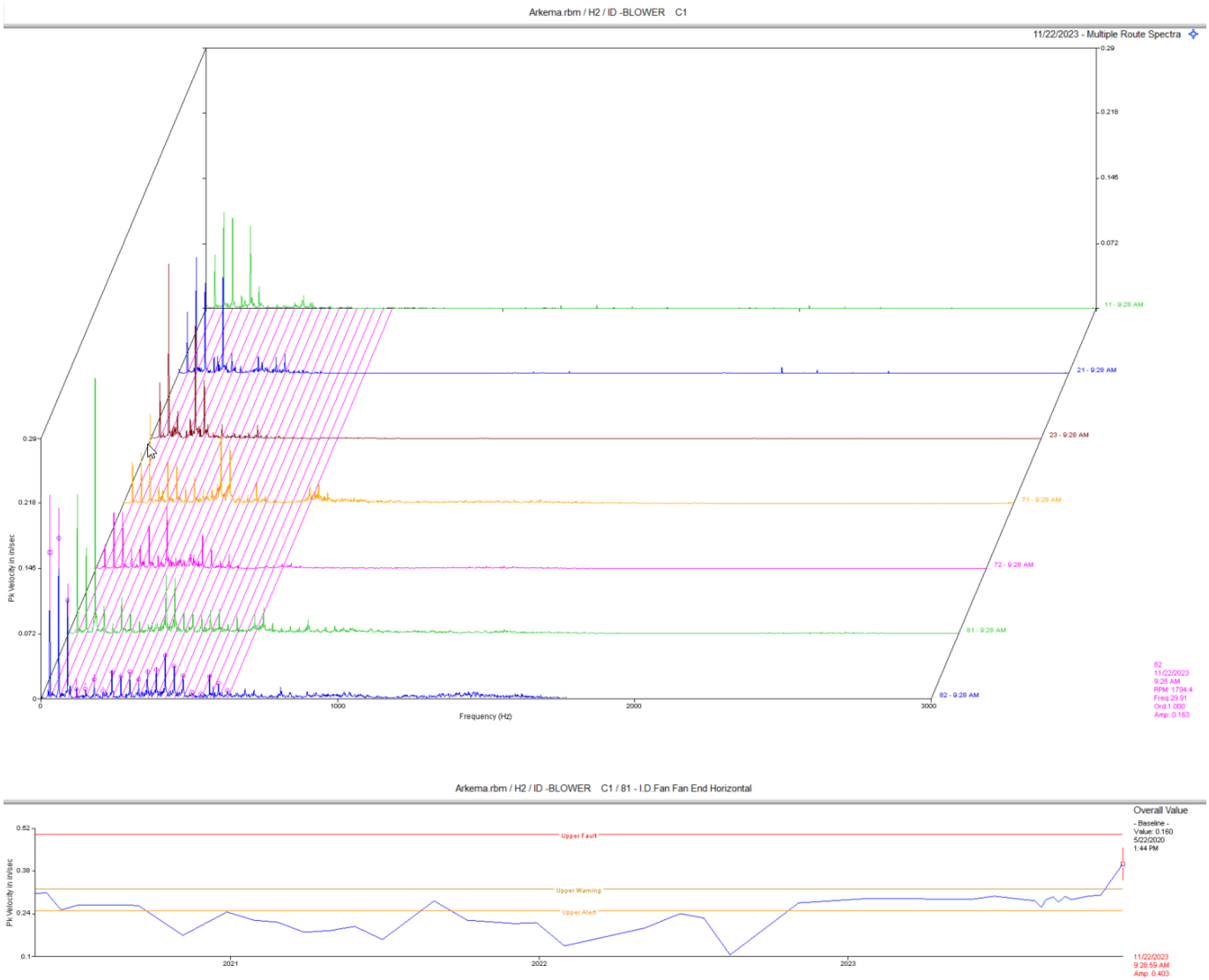
Observation:

Data above shows a high 1 x rpm vibration in the motor and fan. This may be due to the coupling type. TB Woods couplings are not a good coupling for high speed applications. We recommend looking into changing the coupling type to a Rexnord Omega Coupling. This coupling has a much higher rpm rating. TB Woods couplings for this size coupling have a max rpm of 3600 rpm. Omega couplings this size have a speed rating of 6600 rpm.

Recommendation:

We recommend looking into changing coupling type. Also the fan bearing clearances should be inspected during next available time.

ID Fan CLASS II



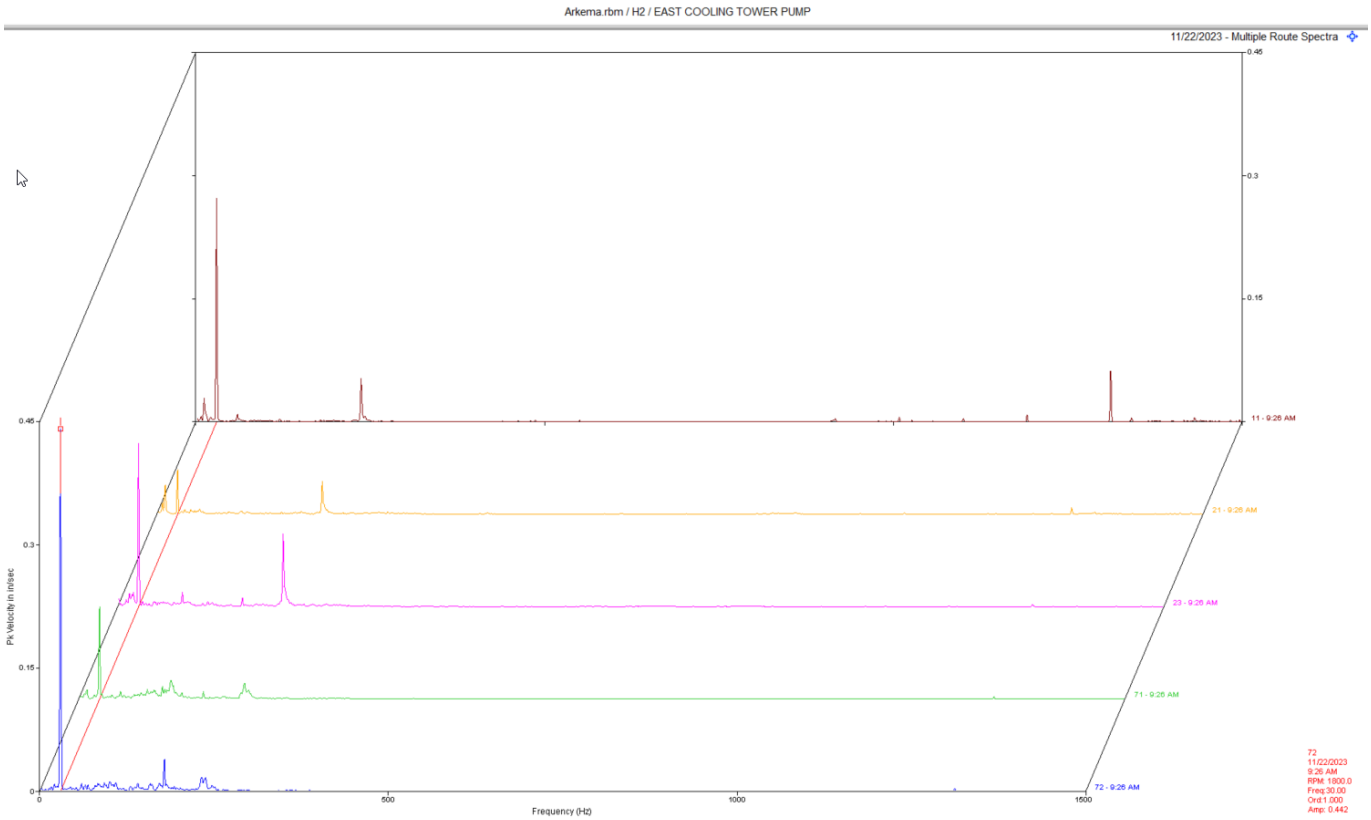
Observation:

Multi-point spectra of the motor and fan shows several rpm harmonics in the fan data. Motor also has some 1-6 x rpm peaks present. Trend data shows an increase in amplitude at ODE fan bearing.

Recommendation:

The fan bearing data indicates mechanical looseness in the fan bearings particularly the ODE fan bearing. This is also where the most fan shaft wear is at which is likely the cause of the high vibration. The fan shaft will likely need attention in the near future if vibration keeps increasing.

East and West Cooling Tower Pumps CLASS II



Observation:

Data above is the East Pump. Data shows a high vibration at 1 x rpm in motor and pump.
All three pumps have similar vibration and similar issues.

Recommendation:

Cooling tower motors/pumps have base issues. They were not installed correctly. Bases need to be leveled and fastened properly to the concrete. There should not be gaps between the base frame and the concrete pad. The bases also need to epoxy grouted. Because the bases are not installed correctly, there is excessive vibration, especially in the motor/pump verticals. Ensure bases are leveled, fastened properly, and grouted in as soon as time allows.

Abbreviated Last Measurement Summary

****

Database: Arkema.rbm
Station: PEROXIDE
Route No. 4: ARK WK4

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
P102 - ARKEMA PUMP P102	(22-Nov-23)	
	OVERALL LEVEL	1K-20KHz
MOH	.092 In/Sec	.484 G-s
MOV	.222 In/Sec	.429 G-s
MIH	.117 In/Sec	.657 G-s
MIV	.135 In/Sec	.540 G-s
MIA	.255 In/Sec	.237 G-s
EIA	.454 In/Sec	.722 G-s
EIH	.263 In/Sec	3.408 G-s
EIV	.245 In/Sec	.846 G-s
EOH	.294 In/Sec	2.607 G-s
EOV	.231 In/Sec	.777 G-s
2130-1old - C Concentrator Vacuum Pump	(22-Nov-23)	
	OVERALL LEVEL	1-20 KHz
11	.066 In/Sec	.424 G-s
21	.058 In/Sec	.552 G-s
23	.117 In/Sec	.130 G-s
71	.171 In/Sec	1.747 G-s
81	.199 In/Sec	.574 G-s
83	.170 In/Sec	.834 G-s
7000-01 - AGITATOR,HYDROGENATOR C	(22-Nov-23)	
	OVERALL LEVEL	1-20 KHZ
02	.042 In/Sec	.023 G-s
03	.043 In/Sec	.015 G-s
11	.069 In/Sec	1.828 G-s
12	.079 In/Sec	.739 G-s
13	.088 In/Sec	.791 G-s
21	.080 In/Sec	1.893 G-s
22	.130 In/Sec	.415 G-s
23	.092 In/Sec	.324 G-s
31	.070 In/Sec	.334 G-s
32	.087 In/Sec	.105 G-s
33	.081 In/Sec	.075 G-s
41	.076 In/Sec	.415 G-s
42	.049 In/Sec	.183 G-s
51	.044 In/Sec	.187 G-s
53	.037 In/Sec	.058 G-s
61	.027 In/Sec	.329 G-s
71	.042 In/Sec	.261 G-s
81	.018 In/Sec	.272 G-s
83	.028 In/Sec	.097 G-s
57 - A/B Concentr Vac Pmp-var RPM	(22-Nov-23)	
	OVERALL LEVEL	1-20 KHz
11	.048 In/Sec	.380 G-s
12	.060 In/Sec	.136 G-s
21	.083 In/Sec	.370 G-s
23	.065 In/Sec	.175 G-s
71	.118 In/Sec	.571 G-s
81	.311 In/Sec	.452 G-s
83	.092 In/Sec	.630 G-s
2130-1 - FLASH VAP VAC PUMP-var speed	(22-Nov-23)	
	OVERALL LEVEL	1-20 KHz
11	.050 In/Sec	.284 G-s
12	.034 In/Sec	.130 G-s
21	.058 In/Sec	1.192 G-s
22	.043 In/Sec	.212 G-s

	23	.055 In/Sec	.180 G-s
	71	.079 In/Sec	.822 G-s
	72	.072 In/Sec	.324 G-s
	81	.083 In/Sec	1.695 G-s
	82	.080 In/Sec	.811 G-s
	83	.046 In/Sec	.500 G-s

C-203	- C-203 Comp		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.136 In/Sec	5.675 G-s
	12	.028 In/Sec	.731 G-s
	21	.051 In/Sec	1.988 G-s
	22	.032 In/Sec	.336 G-s
	23	.026 In/Sec	.315 G-s
		OVERALL LEVEL	1-20 KHZ
	71M	.071 In/Sec	4.096 G-s
	72M	.057 In/Sec	1.024 G-s
	73M	.073 In/Sec	1.530 G-s
	81M	.059 In/Sec	14.29 G-s
	82M	.051 In/Sec	1.835 G-s
	71F	.048 In/Sec	2.744 G-s
	72F	.056 In/Sec	1.314 G-s
	73F	.043 In/Sec	1.124 G-s
	81F	.043 In/Sec	3.368 G-s
	82F	.049 In/Sec	1.107 G-s

C-202	- C-202 Comp		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.254 In/Sec	10.78 G-s
	12	.152 In/Sec	2.666 G-s
	21	.082 In/Sec	1.626 G-s
	22	.053 In/Sec	.379 G-s
	23	.050 In/Sec	.346 G-s
		OVERALL LEVEL	1-20 KHZ
	71M	.061 In/Sec	3.786 G-s
	72M	.054 In/Sec	1.056 G-s
	73M	.085 In/Sec	1.053 G-s
	81M	.054 In/Sec	7.892 G-s
	82M	.057 In/Sec	2.130 G-s
	71F	.037 In/Sec	14.05 G-s
	72F	.069 In/Sec	1.594 G-s
	73F	.038 In/Sec	3.463 G-s
	81F	.041 In/Sec	3.949 G-s
	82F	.052 In/Sec	1.532 G-s

C-201	- C-201 Comp		(16-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.149 In/Sec	5.225 G-s
	12	.059 In/Sec	1.768 G-s
	21	.110 In/Sec	1.596 G-s
	22	.034 In/Sec	.229 G-s
	23	.061 In/Sec	.136 G-s
		OVERALL LEVEL	1-20 KHZ
	71M	.061 In/Sec	3.255 G-s
	72M	.046 In/Sec	.978 G-s
	73M	.070 In/Sec	1.124 G-s
	81M	.042 In/Sec	6.333 G-s
	82M	.028 In/Sec	.937 G-s
	71F	.040 In/Sec	5.412 G-s
	72F	.059 In/Sec	1.264 G-s
	73F	.037 In/Sec	1.250 G-s
	81F	.038 In/Sec	5.846 G-s
	82F	.059 In/Sec	1.467 G-s

new AC	- INSTRUMENT AIR COMPRESSOR		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.104 In/Sec	1.054 G-s
	12	.101 In/Sec	.670 G-s
	13	.059 In/Sec	.225 G-s
	21	.087 In/Sec	1.804 G-s

	22	.079 In/Sec	.639 G-s
	23	.037 In/Sec	.325 G-s
		OVERALL LEVEL	1-20 KHZ
	71M	.137 In/Sec	10.72 G-s
	72M	.129 In/Sec	3.776 G-s
	73M	.218 In/Sec	2.319 G-s
	81M	.120 In/Sec	4.117 G-s
	82M	.110 In/Sec	1.449 G-s
	83M	.198 In/Sec	2.747 G-s
	71F	.143 In/Sec	6.031 G-s
	72F	.080 In/Sec	1.618 G-s
	73F	.154 In/Sec	1.444 G-s
	81F	.178 In/Sec	8.330 G-s
	82F	.241 In/Sec	1.075 G-s
	83F	.242 In/Sec	1.784 G-s
201-08A	- COMPRESSOR,NASH A 201-08A		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.058 In/Sec	.179 G-s
	12	.072 In/Sec	.212 G-s
	13	.122 In/Sec	.045 G-s
202-05	- NASH SEAL LIQUID PUMP-A		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.019 In/Sec	.206 G-s
	21	.021 In/Sec	.451 G-s
	23	.018 In/Sec	.103 G-s
	71	.025 In/Sec	.043 G-s
	72	.020 In/Sec	.016 G-s
9002-10	- D-HYDROGENATOR AGITATOR		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.062 In/Sec	.230 G-s
	21	.081 In/Sec	.190 G-s
	23	.082 In/Sec	.057 G-s
		OVERALL LEVEL	1-20 KHZ
	31	.160 In/Sec	.538 G-s
	31L	.123 In/Sec	.573 G-s
		OVERALL LEVEL	1-20 KHz
	51	.199 In/Sec	.233 G-s
	51L	.199 In/Sec	.233 G-s
	52	.085 In/Sec	.157 G-s
	52L	.237 In/Sec	.414 G-s
	53	.210 In/Sec	.200 G-s
	53L	.186 In/Sec	.278 G-s
	61	.133 In/Sec	.197 G-s
	61L	.275 In/Sec	.197 G-s
	81	.041 In/Sec	.043 G-s
	82	.025 In/Sec	.046 G-s
	83	.045 In/Sec	.0078 G-s

Station: HYDROGEN
Route No. 1: H2 MONTHLY

MEASUREMENT POINT		OVERALL LEVEL	HFD / VHFD
P2B	- PUMP MEA CIRC EAST P2B		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.041 In/Sec	.399 G-s
	21	.033 In/Sec	.329 G-s
	23	.034 In/Sec	.140 G-s
	71	.175 In/Sec	2.548 G-s
	72	.123 In/Sec	1.256 G-s
P1B	- PUMP BFW EAST P1B		(22-Nov-23)
		OVERALL LEVEL	1-20 KHz
	11	.083 In/Sec	.415 G-s
	21	.069 In/Sec	.926 G-s

	23	.051 In/Sec	.189 G-s
	71	.121 In/Sec	.502 G-s
	72	.098 In/Sec	.467 G-s
	81	.084 In/Sec	.940 G-s
	82	.089 In/Sec	.636 G-s
	83	.049 In/Sec	.643 G-s

C2 - FD BLOWER C2 (22-Nov-23)

	OVERALL LEVEL	1-20 KHz
MOH	.262 In/Sec	1.468 G-s
MOV	.071 In/Sec	.278 G-s
MIH	.211 In/Sec	1.227 G-s
MIV	.196 In/Sec	.156 G-s
MIA	.236 In/Sec	.155 G-s
FIH	.128 In/Sec	1.627 G-s
FIV	.295 In/Sec	.546 G-s
FIA	.341 In/Sec	.626 G-s
FOH	.102 In/Sec	.652 G-s
FOV	.140 In/Sec	.417 G-s

C1 - ID -BLOWER C1 (22-Nov-23)

	OVERALL LEVEL	1-20 KHz
11	.207 In/Sec	.334 G-s
21	.236 In/Sec	.458 G-s
23	.280 In/Sec	.098 G-s
71	.229 In/Sec	1.673 G-s
72	.170 In/Sec	.729 G-s
81	.403 In/Sec	2.951 G-s
82	.343 In/Sec	1.709 G-s

CTPE - EAST COOLING TOWER PUMP (22-Nov-23)

	OVERALL LEVEL	1-20 KHz
11	.301 In/Sec	1.914 G-s
21	.102 In/Sec	1.718 G-s
23	.237 In/Sec	.873 G-s
71	.143 In/Sec	.826 G-s
72	.463 In/Sec	.173 G-s

CTPW - WEST COOLING TOWER PUMP (22-Nov-23)

	OVERALL LEVEL	1-20 KHz
11	.178 In/Sec	1.085 G-s
21	.113 In/Sec	3.462 G-s
23	.188 In/Sec	1.095 G-s
71	.273 In/Sec	1.773 G-s
72	.146 In/Sec	.243 G-s

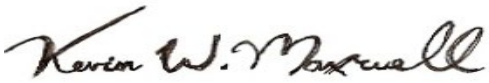
Clarification Of Vibration Units:

Acc --> G-s PK

Vel --> In/Sec PK

As always, it has been a pleasure to serve Arkema. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

Cell: 901-486-4565
Email: kwilliam@gohispeed.com