HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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July 26th, 2023

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Arkema
Memphis, TN

The following is a summary of findings from the July 2023 WEEK 3 vibration survey at the H2O2 Plant that was performed on July 21st, 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.

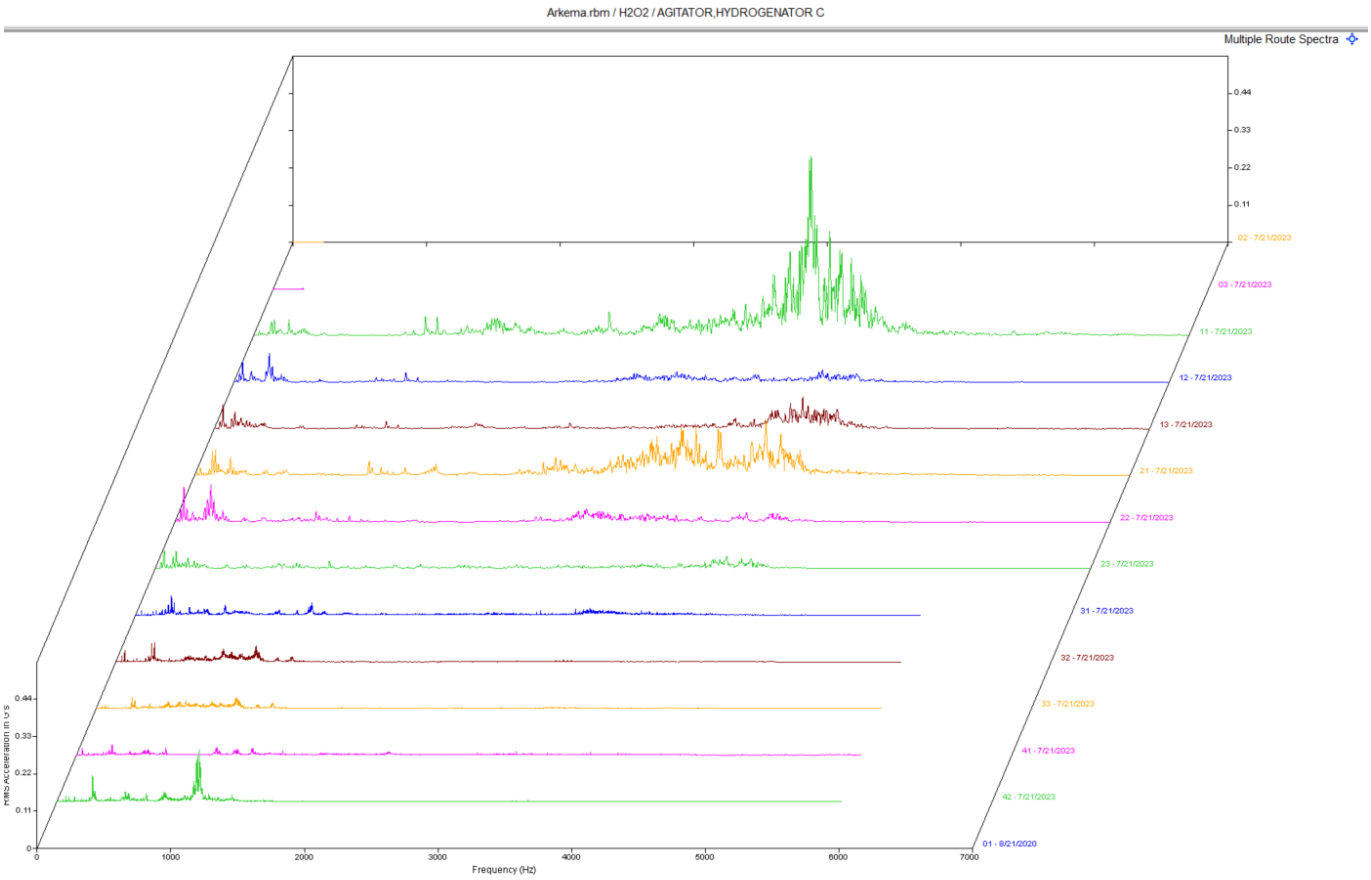
CLASS III; Defect (s) present that may cause failure in short term (less than 2 months). This should be addressed as soon as practical, with a high maintenance priority. Increase monitoring frequency.

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 2 H2O2 Plant

Agitator, Hydrogenator C CLASS I



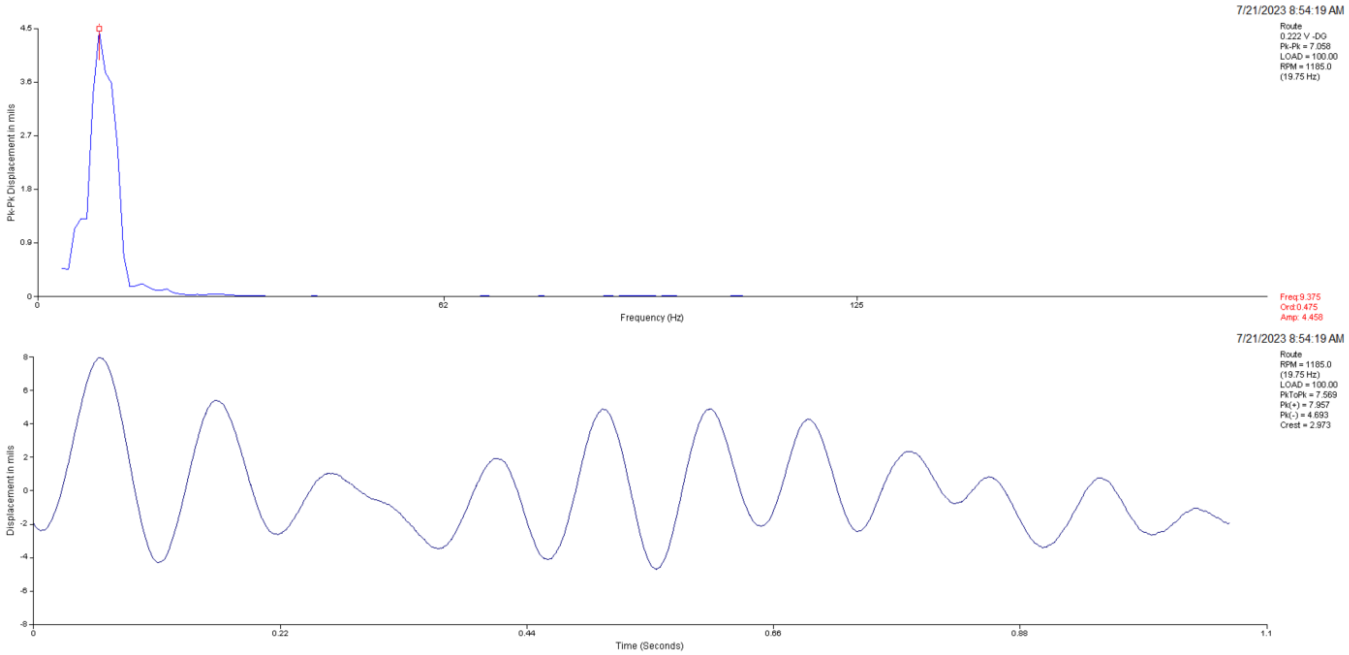
Observation:

Data above is a multipoint spectral waterfall. Data does show 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 II



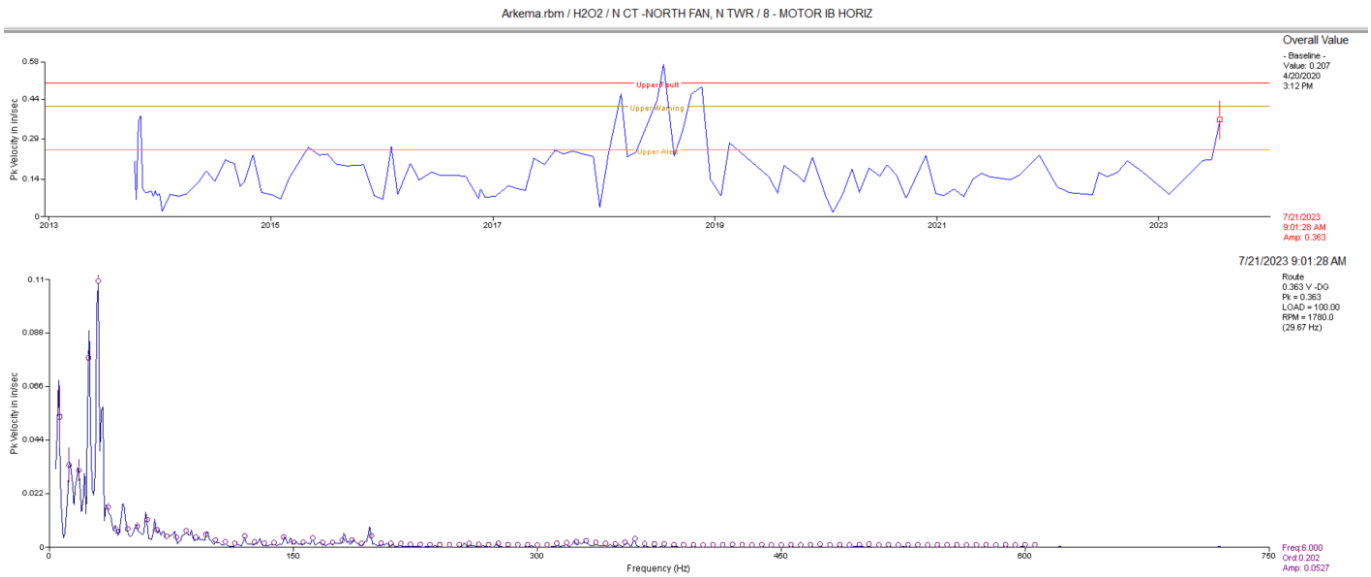
Observation:

Data above is output top radial direction (East-West). Displacement amplitudes are somewhat high. Waveform shows an amplitude of around 8 mil peak-peak. 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. The gear mesh vibration previously seen in the data appears to be lower this survey.

Recommendation:

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.

North Fan@North CT Tower CLASS II



Observation:

Motor inboard has sub-synchronous vibrations. Trend data shows overall amplitude to the highest in several years.

Recommendation:

Check drive train components such belts, couplings, etc. for wear.

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 3: ARK WK 3

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
2130-1old - C Concentrator Vacuum Pump	(21-Jul-23)	
	OVERALL LEVEL	1-20 KHz
11	.083 In/Sec	.392 G-s
21	.089 In/Sec	.612 G-s
23	.119 In/Sec	.282 G-s
71	.149 In/Sec	2.249 G-s
81	.193 In/Sec	.625 G-s
83	.187 In/Sec	1.135 G-s
7000-01 - AGITATOR,HYDROGENATOR C	(21-Jul-23)	
	OVERALL LEVEL	1-20 KHZ
02	.046 In/Sec	.025 G-s
03	.049 In/Sec	.012 G-s
11	.080 In/Sec	2.489 G-s
12	.122 In/Sec	.383 G-s
13	.124 In/Sec	.590 G-s
21	.100 In/Sec	1.092 G-s
22	.202 In/Sec	.332 G-s
23	.106 In/Sec	.249 G-s
31	.072 In/Sec	.460 G-s
32	.096 In/Sec	.159 G-s
33	.048 In/Sec	.138 G-s
41	.062 In/Sec	.247 G-s
42	.092 In/Sec	.472 G-s
51	.070 In/Sec	.281 G-s
53	.065 In/Sec	.123 G-s
61	.033 In/Sec	.265 G-s
71	.045 In/Sec	.243 G-s
81	.026 In/Sec	.446 G-s
83	.062 In/Sec	.262 G-s
57 - A/B Concentr Vac Pmp-var RPM	(21-Jul-23)	
	OVERALL LEVEL	1-20 KHz
11	.045 In/Sec	.277 G-s
12	.049 In/Sec	.130 G-s
21	.080 In/Sec	.520 G-s
23	.059 In/Sec	.112 G-s
71	.127 In/Sec	.447 G-s
81	.299 In/Sec	.534 G-s
83	.106 In/Sec	.204 G-s
2130-1 - FLASH VAP VAC PUMP-var speed	(21-Jul-23)	
	OVERALL LEVEL	1-20 KHz
11	.054 In/Sec	.490 G-s
12	.100 In/Sec	.123 G-s
21	.060 In/Sec	.884 G-s
22	.080 In/Sec	.178 G-s
23	.059 In/Sec	.206 G-s
71	.286 In/Sec	.799 G-s
72	.126 In/Sec	.747 G-s
81	.151 In/Sec	1.217 G-s
82	.192 In/Sec	.864 G-s
83	.113 In/Sec	.695 G-s
C-203 - C-203 Comp	(21-Jul-23)	
	OVERALL LEVEL	1-20 KHz
11	.047 In/Sec	3.361 G-s
12	.037 In/Sec	1.080 G-s
21	.072 In/Sec	3.138 G-s

	22	.032 In/Sec	.455 G-s
	23	.018 In/Sec	.404 G-s
		OVERALL LEVEL	1-20 KHZ
	71M	.061 In/Sec	3.590 G-s
	72M	.046 In/Sec	1.114 G-s
	73M	.080 In/Sec	1.083 G-s
	81M	.042 In/Sec	13.72 G-s
	82M	.038 In/Sec	1.523 G-s
	71F	.040 In/Sec	3.236 G-s
	72F	.054 In/Sec	.666 G-s
	73F	.039 In/Sec	.809 G-s
	81F	.045 In/Sec	7.455 G-s
	82F	.035 In/Sec	1.195 G-s

C-202 - C-202 Comp (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.048 In/Sec	1.555 G-s
12	.144 In/Sec	1.107 G-s
21	.069 In/Sec	.670 G-s
22	.063 In/Sec	.128 G-s
23	.051 In/Sec	.058 G-s
	OVERALL LEVEL	1-20 KHZ
71M	.049 In/Sec	4.344 G-s
72M	.063 In/Sec	.915 G-s
73M	.066 In/Sec	.861 G-s
81M	.056 In/Sec	11.36 G-s
82M	.047 In/Sec	1.150 G-s
71F	.039 In/Sec	4.212 G-s
72F	.082 In/Sec	1.954 G-s
73F	.037 In/Sec	1.709 G-s
81F	.073 In/Sec	17.93 G-s
82F	.062 In/Sec	3.089 G-s

new AC - INSTRUMENT AIR COMPRESSOR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.088 In/Sec	1.008 G-s
12	.115 In/Sec	1.504 G-s
13	.048 In/Sec	.199 G-s
21	.072 In/Sec	1.218 G-s
22	.084 In/Sec	1.240 G-s
23	.038 In/Sec	.640 G-s
	OVERALL LEVEL	1-20 KHZ
71F	.079 In/Sec	6.817 G-s
72F	.096 In/Sec	2.150 G-s
73F	.051 In/Sec	1.831 G-s
81F	.099 In/Sec	3.725 G-s
82F	.442 In/Sec	.897 G-s
83F	.127 In/Sec	1.026 G-s
71M	.133 In/Sec	10.24 G-s
72M	.261 In/Sec	1.589 G-s
73M	.113 In/Sec	1.577 G-s
81M	.087 In/Sec	11.76 G-s
82M	.118 In/Sec	1.949 G-s
83M	.098 In/Sec	2.110 G-s

9002-10 - D-HYDROGENATOR AGITATOR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.065 In/Sec	.197 G-s
21	.094 In/Sec	.450 G-s
23	.079 In/Sec	.103 G-s
	OVERALL LEVEL	1-20 KHZ
31	.212 In/Sec	.720 G-s
31L	.139 In/Sec	.746 G-s
	OVERALL LEVEL	1-20 KHz
51	.222 In/Sec	.368 G-s
51L	.222 In/Sec	.368 G-s
52	.076 In/Sec	.471 G-s
52L	.169 In/Sec	.549 G-s
53	.236 In/Sec	.169 G-s
53L	.072 In/Sec	.528 G-s

	61	.137 In/Sec	.282 G-s
	61L	.166 In/Sec	.282 G-s
	81	.036 In/Sec	.026 G-s
	82	.030 In/Sec	.084 G-s
	83	.034 In/Sec	.023 G-s

NTC-SF - N CT-SOUTH FAN, N TWR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
1	.375 In/Sec	.504 G-s
2	.189 In/Sec	.525 G-s
3	.186 In/Sec	.537 G-s
	OVERALL LEVEL	1-20 KHZ
4	.198 In/Sec	.392 G-s
5	.0061 In/Sec	.0013 G-s
6	.260 In/Sec	.430 G-s

NCT - NF - N CT -NORTH FAN, N TWR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
7	.278 In/Sec	.429 G-s
8	.363 In/Sec	.372 G-s
9	.243 In/Sec	.343 G-s
	OVERALL LEVEL	1-20 KHZ
10	.163 In/Sec	.331 G-s
11	.189 In/Sec	.301 G-s
12	.152 In/Sec	.358 G-s

530-01 - PUMP,N.COOLING TWR,NORTH (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.272 In/Sec	1.115 G-s
12	.184 In/Sec	.608 G-s

530-02 - PUMP,N.COOLING TWR,MIDDLE (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.102 In/Sec	1.278 G-s
12	.161 In/Sec	1.353 G-s

548-7 - IRON-FREE H2O BOOSTER PUMP (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
11	.024 In/Sec	.358 G-s
21	.030 In/Sec	1.046 G-s
23	.045 In/Sec	.550 G-s
71	.038 In/Sec	.122 G-s
72	.034 In/Sec	.129 G-s

STC-NF - S CT - NORTH FAN, S TWR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
1	.269 In/Sec	.827 G-s
2	.240 In/Sec	.251 G-s
3	.137 In/Sec	.166 G-s
	OVERALL LEVEL	1-20 KHZ
4	.120 In/Sec	.388 G-s
5	.132 In/Sec	.507 G-s

STC-MF - S CT - MID FAN, S TWR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
1	.253 In/Sec	.520 G-s
2	.208 In/Sec	.196 G-s
3	.137 In/Sec	.087 G-s
	OVERALL LEVEL	1-20 KHZ
4	.111 In/Sec	.301 G-s
5	.108 In/Sec	.432 G-s
6	.115 In/Sec	.549 G-s

STC-SF - S CT - SOUTH FAN, S TWR (21-Jul-23)

	OVERALL LEVEL	1-20 KHz
1	.138 In/Sec	.351 G-s
2	.234 In/Sec	.247 G-s
3	.186 In/Sec	.102 G-s
	OVERALL LEVEL	1-20 KHZ
4	.135 In/Sec	.477 G-s

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            5                        .084 In/Sec        .449 G-s
            6                        .388 In/Sec        .612 G-s

      SCT-1      - SOUTH CT PUMP - EAST          (21-Jul-23)
                                   OVERALL LEVEL      1-20 KHz
            11                      .045 In/Sec       1.254 G-s
            21                      .069 In/Sec       1.755 G-s
            23                      .088 In/Sec       1.105 G-s
            71                      .151 In/Sec       1.132 G-s
            72                      .119 In/Sec       1.054 G-s

      SCT-2      - SOUTH CT PUMP - MID           (21-Jul-23)
                                   OVERALL LEVEL      1-20 KHz
            11                      .081 In/Sec       2.833 G-s
            21                      .052 In/Sec       1.308 G-s
            23                      .118 In/Sec        .769 G-s
            71                      .132 In/Sec       1.237 G-s
            72                      .104 In/Sec       1.280 G-s

      SCT-3      - SOUTH CT PUMP - WEST          (21-Jul-23)
                                   OVERALL LEVEL      1-20 KHz
            11                      .067 In/Sec       1.621 G-s
            21                      .057 In/Sec        .756 G-s
            23                      .108 In/Sec        .759 G-s
            71                      .157 In/Sec        .872 G-s
            72                      .189 In/Sec       1.314 G-s

-------------------------------------------------------------------------------
   Clarification Of Vibration Units:
      Acc       -->  G-s       PK
      Vel       -->  In/Sec    PK
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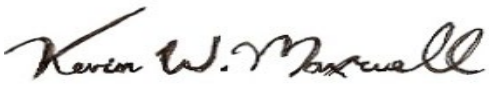
As always, it has been a pleasure to serve Arkema. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

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