HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

February 17, 2022

Arkema

Subject: February week 2 service report

Critical equipment and monthly equipment with issues are discussed in this report.

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.

This completes our assessment of your equipment for this survey. Thank you for your business and don't hesitate to call if you have any comments or questions.

Sincerely,

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H2O2 Weekly Route Critical Equipment Observations

C Concentrator Vacuum Pump 2130-1
The pump has the highest vibration amplitude of about 0.15"/second velocity peak overall in the outboard horizontal measurement. Vibration still consists of multiple low amplitude shaft speed harmonics with a dominant 4x RPM peak. **Rated a Class I Defect.**

Agitator, Hydrogenator C 7001-01
Data still shows a low amplitude2x and 3x RPM vibration in the motor drive end measurements. This usually indicates some misalignment. Overall velocity is 0.15"/second peak for the motor drive end vertical. Adjust only as time allows. **Rated a Class I Defect.**

A/B Concentrator Vacuum Pump 57
The unit vibration overall is 0.3"/sec peak velocity for the outboard pump bearing and is dominated by a possible vane pass. We will continue to watch for changes. **Rated a Class I Defect.**

Flash Vacuum Pump 2130-1
Data shows all vibrations are under 0.1"/second velocity peak overall. No issues of note.

Air Compressor C-201
Rotor bar vibrations are normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a low noise floor. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. Overall acceleration is 6.8 g's RMS at 1 point. We will continue to monitor this unit closely for changes **Rated a Class I Defect.**

Air Compressor C-202
Rotor bar vibrations are normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a low noise floor. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. Overall acceleration is 4.0 g's RMS at 1 point. We will continue to monitor this unit closely for changes **Rated a Class I Defect.**

Air Compressor C-203
Rotor bar vibrations are normal for this motor's history. The trend clearly shows that the vibrations vary considerably over time. We still believe these motors have possible weak rotor bar end connections that cause the vibrations to fluctuate higher due to loading. There are still blower case vibrations around 2.5-3 KHz with a low noise floor. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. Overall acceleration is 7.3 g's RMS at 1 point. We will continue to monitor this unit closely for changes. **Rated a Class I Defect.**

Instrument Air Compressor
The male and female shaft vibrations still seem to show gear mesh and lobe pass harmonics as well as a beat vibration occasionally. They continue to vary over time. Both shafts have between 4 and 10 g's RMS overall acceleration. The dominant vibration appears to be at near 2500 Hz and is a harmonic. We are still watching this unit closely and will be going forward. Some oil was noted on the unit base. **Rated a Class I Defect.**

Air Compressor NASH A 201-08A
Vibrations are at 0.18"/sec velocity peak for the inboard vertical. The vibration spectrum is still dominated by a 20-order vibration, which is thought to be vane pass. **Rated a Class I Defect.**

D Hydrogenator Agitator 9002
Highest overall vibration is at 0.29"/sec velocity peak for the gearbox output top E/W. Multiple vibrations are at near 10 Hz. They appear to be a resonant, but the one of them could be a gear mesh. The time waveform shows they are most likely periodically beating (going into and out of phase). Ensure all fasteners are at proper torque values and inspect support structures for any signs of stress cracks, broken welds, or metal fatigue. Perform periodic oil analysis on the gearbox for signs of internal wear. **Rated a Class I Defect.**

H2O2 Monthly Route Equipment

M MIX BED WATER PUMP 191-07
The pump 2x and 5x RPM vibrations are dominant. Check the pump operational parameters and shaft alignment as time allows. **Rated a Class I Defect.**

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 4: ARK WK 2
Report Date: 17-Feb-22 12:11

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump (15-Feb-22)			
	OVERALL LEVEL	1-20 KHz	
11	.062 In/Sec	.636 G-s	1200.0 RPM
21	.062 In/Sec	.536 G-s	
23	.139 In/Sec	.158 G-s	
71	.112 In/Sec	.216 G-s	
81	.152 In/Sec	.699 G-s	
83	.087 In/Sec	.962 G-s	
7000-01 - AGITATOR,HYDROGENATOR C (15-Feb-22)			
	OVERALL LEVEL	1-20 KHZ	
02	.049 In/Sec	.0055 G-s	45.00 RPM
03	.042 In/Sec	.086 G-s	
11	.084 In/Sec	.342 G-s	1400.0 RPM
12	.074 In/Sec	.513 G-s	
13	.132 In/Sec	.456 G-s	
21	.087 In/Sec	.631 G-s	
22	.150 In/Sec	.491 G-s	
23	.139 In/Sec	.194 G-s	
31	.067 In/Sec	.277 G-s	
32	.083 In/Sec	.410 G-s	
33	.052 In/Sec	.430 G-s	
41	.039 In/Sec	.248 G-s	
42	.066 In/Sec	.169 G-s	
51	.063 In/Sec	.193 G-s	375.0 RPM
53	.094 In/Sec	.263 G-s	
61	.049 In/Sec	.198 G-s	
71	.021 In/Sec	.169 G-s	45.00 RPM
81	.023 In/Sec	.177 G-s	
83	.048 In/Sec	.371 G-s	
57 - A/B Concentr Vac Pmp-var RPM (15-Feb-22)			
	OVERALL LEVEL	1-20 KHz	
11	.064 In/Sec	.279 G-s	900.0 RPM
12	.084 In/Sec	.158 G-s	
21	.108 In/Sec	.236 G-s	
23	.061 In/Sec	.280 G-s	
71	.113 In/Sec	.726 G-s	
81	.300 In/Sec	1.036 G-s	
83	.053 In/Sec	.757 G-s	
2130-1 - FLASH VAP VAC PUMP-var speed (15-Feb-22)			
	OVERALL LEVEL	1-20 KHz	
11	.039 In/Sec	.287 G-s	1200.0 RPM
12	.033 In/Sec	.235 G-s	

	21	.044 In/Sec	.434 G-s	
	22	.042 In/Sec	.592 G-s	
	23	.047 In/Sec	.109 G-s	
	71	.068 In/Sec	.599 G-s	
	72	.054 In/Sec	.364 G-s	
	81	.072 In/Sec	.517 G-s	
	82	.087 In/Sec	.521 G-s	
	83	.040 In/Sec	.599 G-s	

C-203 - C-203 Comp (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.080 In/Sec	3.112 G-s	3588.0 RPM
12	.032 In/Sec	1.000 G-s	
21	.032 In/Sec	.529 G-s	
22	.033 In/Sec	.150 G-s	
23	.024 In/Sec	.368 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.056 In/Sec	4.494 G-s	
72M	.051 In/Sec	2.421 G-s	
73M	.061 In/Sec	2.257 G-s	
81M	.037 In/Sec	7.189 G-s	
82M	.072 In/Sec	3.631 G-s	
71F	.043 In/Sec	3.453 G-s	
72F	.040 In/Sec	.587 G-s	
73F	.079 In/Sec	7.385 G-s	
81F	.045 In/Sec	6.645 G-s	
82F	.045 In/Sec	1.681 G-s	

C-202 - C-202 Comp (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.073 In/Sec	2.097 G-s	3588.0 RPM
12	.124 In/Sec	.450 G-s	
21	.119 In/Sec	4.152 G-s	
22	.055 In/Sec	.097 G-s	
23	.037 In/Sec	.374 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.031 In/Sec	1.339 G-s	
72M	.047 In/Sec	2.094 G-s	
73M	.090 In/Sec	2.343 G-s	
81M	.047 In/Sec	3.001 G-s	
82M	.070 In/Sec	2.137 G-s	
71F	.032 In/Sec	3.046 G-s	
72F	.054 In/Sec	1.456 G-s	
73F	.069 In/Sec	1.998 G-s	
81F	.043 In/Sec	3.641 G-s	
82F	.051 In/Sec	4.024 G-s	

C-201 - C-201 Comp (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.116 In/Sec	3.174 G-s	3588.0 RPM
12	.153 In/Sec	4.981 G-s	
21	.098 In/Sec	2.041 G-s	
22	.070 In/Sec	2.349 G-s	
23	.061 In/Sec	.270 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.047 In/Sec	3.305 G-s	
72M	.047 In/Sec	2.421 G-s	

73M	.077 In/Sec	2.725 G-s	
81M	.058 In/Sec	2.303 G-s	
82M	.085 In/Sec	3.677 G-s	
71F	.045 In/Sec	5.269 G-s	
72F	.079 In/Sec	3.036 G-s	
73F	.090 In/Sec	6.234 G-s	
81F	.053 In/Sec	6.840 G-s	
82F	.076 In/Sec	3.041 G-s	

new AC - INSTRUMENT AIR COMPRESSOR (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.148 In/Sec	1.093 G-s	1780.0 RPM
12	.101 In/Sec	.639 G-s	
13	.122 In/Sec	.363 G-s	
21	.150 In/Sec	1.560 G-s	
22	.073 In/Sec	.864 G-s	
23	.050 In/Sec	.614 G-s	
	OVERALL LEVEL	1-20 KHZ	
71F	.149 In/Sec	6.553 G-s	
72F	.230 In/Sec	8.401 G-s	
73F	.143 In/Sec	4.359 G-s	
81F	.134 In/Sec	2.455 G-s	
82F	.219 In/Sec	5.103 G-s	
83F	.203 In/Sec	4.739 G-s	
71M	.133 In/Sec	5.577 G-s	
72M	.221 In/Sec	10.24 G-s	
73M	.184 In/Sec	.767 G-s	
81M	.140 In/Sec	6.037 G-s	
82M	.218 In/Sec	7.664 G-s	
83M	.246 In/Sec	5.175 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.055 In/Sec	.219 G-s	506.3 RPM
12	.057 In/Sec	.232 G-s	
13	.088 In/Sec	.116 G-s	
21	.048 In/Sec	.078 G-s	
22	.054 In/Sec	.166 G-s	
23	.118 In/Sec	.163 G-s	
71	.150 In/Sec	.425 G-s	
72	.182 In/Sec	.327 G-s	
73	.142 In/Sec	.270 G-s	
81	.152 In/Sec	.132 G-s	
82	.169 In/Sec	.138 G-s	
83	.100 In/Sec	.082 G-s	

202-05 - NASH SEAL LIQUID PUMP-A (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.016 In/Sec	.140 G-s	1800.0 RPM
21	.021 In/Sec	.196 G-s	
23	.017 In/Sec	.057 G-s	
71	.033 In/Sec	.022 G-s	
72	.024 In/Sec	.021 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.079 In/Sec	.110 G-s	1185.0 RPM

21	.087 In/Sec	.212 G-s	
23	.036 In/Sec	.113 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.180 In/Sec	.688 G-s	
31L	.265 In/Sec	.600 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.246 In/Sec	.265 G-s	
51L	.297 In/Sec	.274 G-s	100.0 RPM
52	.192 In/Sec	.234 G-s	
52L	.183 In/Sec	.222 G-s	
53	.098 In/Sec	.360 G-s	
53L	.032 In/Sec	.338 G-s	
61	.181 In/Sec	.226 G-s	
61L	.159 In/Sec	.208 G-s	
81	.035 In/Sec	.033 G-s	
82	.034 In/Sec	.029 G-s	
83	.021 In/Sec	.054 G-s	

9003-01 - D-HYDRO PRIMARY FILT FD PUMP (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.051 In/Sec	.306 G-s	1800.0 RPM
21	.039 In/Sec	.629 G-s	
23	.033 In/Sec	.460 G-s	
71	.074 In/Sec	.253 G-s	
72	.089 In/Sec	.272 G-s	

9003-02 - D-HYDRO RECYCLE PUMP (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.061 In/Sec	.342 G-s	1800.0 RPM

9001-01 - D-HYDRO SECOND. FILT FD PUMP (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.044 In/Sec	.196 G-s	1800.0 RPM
21	.044 In/Sec	.223 G-s	
23	.048 In/Sec	.158 G-s	
71	.065 In/Sec	.302 G-s	
72	.036 In/Sec	.253 G-s	

192-03 - Two Stage Water Pump A-WEST (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.059 In/Sec	.260 G-s	1765.0 RPM
21	.086 In/Sec	.274 G-s	
23	.056 In/Sec	.144 G-s	
71	.135 In/Sec	.489 G-s	
72	.065 In/Sec	.723 G-s	

191-07 - M MIX BED WATER PUMP 191-07 (15-Feb-22)

	OVERALL LEVEL	1-20 KHz	
11	.069 In/Sec	.284 G-s	3600.0 RPM
21	.059 In/Sec	.345 G-s	
23	.054 In/Sec	.337 G-s	
71	.280 In/Sec	.188 G-s	
72	.185 In/Sec	.208 G-s	

Clarification Of Vibration Units:

Acc --> G-s PK

Vel --> In/Sec PK