HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

January 20, 2021

Arkema

Subject: December 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,

David W. Shook
Senior Reliability Specialists
Hi-Speed Industrial Service
dshook@gohispeed.com

H2O2 Weekly Route Critical Equipment Observations

C Concentrator Vacuum Pump 2130-1
The motor has the highest vibration amplitude of about 0.21"/second velocity peak overall in the inboard axial 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. Adjust only as time allows. **Rated a Class I Defect.**

A/B Concentrator Vacuum Pump 57
The unit vibration overall is 0.32"/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 4.8 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 6.2 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 8.9 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 5 and 11 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 0.17"/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 0.27"/sec velocity peak for the gearbox output top E/W. Dominant vibrations are at about 10.5 Hx and 14 orders of the input speed. 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

No immediate concerns at this time.

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 4: ARK WK 2
Report Date: 20-Jan-22 07:15

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump (18-Jan-22)			
	OVERALL LEVEL	1-20 KHz	
11	.055 In/Sec	.334 G-s	1200.0 RPM
21	.065 In/Sec	.464 G-s	
23	.210 In/Sec	.157 G-s	
71	.159 In/Sec	.827 G-s	
81	.162 In/Sec	.677 G-s	
83	.082 In/Sec	1.456 G-s	
7000-01 - AGITATOR,HYDROGENATOR C (18-Jan-22)			
	OVERALL LEVEL	1-20 KHZ	
02	.043 In/Sec	.109 G-s	45.00 RPM
03	.048 In/Sec	.058 G-s	
11	.070 In/Sec	.592 G-s	1400.0 RPM
12	.086 In/Sec	.816 G-s	
13	.090 In/Sec	.225 G-s	
21	.100 In/Sec	.186 G-s	
22	.136 In/Sec	.089 G-s	
23	.104 In/Sec	.921 G-s	
31	.068 In/Sec	.370 G-s	
32	.070 In/Sec	.455 G-s	
33	.045 In/Sec	.189 G-s	
41	.065 In/Sec	.423 G-s	
42	.065 In/Sec	.541 G-s	
51	.066 In/Sec	.188 G-s	375.0 RPM
53	.086 In/Sec	.203 G-s	
61	.036 In/Sec	.118 G-s	
71	.065 In/Sec	.237 G-s	45.00 RPM
81	.023 In/Sec	.174 G-s	
83	.065 In/Sec	.203 G-s	
57 - A/B Concentr Vac Pmp-var RPM (18-Jan-22)			
	OVERALL LEVEL	1-20 KHz	
11	.053 In/Sec	.465 G-s	900.0 RPM
12	.075 In/Sec	.272 G-s	
21	.055 In/Sec	.088 G-s	
23	.053 In/Sec	.226 G-s	
71	.109 In/Sec	.463 G-s	
81	.320 In/Sec	.962 G-s	
83	.048 In/Sec	.900 G-s	
2130-1 - FLASH VAP VAC PUMP-var speed (18-Jan-22)			
	OVERALL LEVEL	1-20 KHz	
11	.048 In/Sec	.169 G-s	1200.0 RPM
12	.035 In/Sec	.562 G-s	

	21	.052 In/Sec	.543 G-s	
	22	.041 In/Sec	.417 G-s	
	23	.053 In/Sec	1.199 G-s	
	71	.058 In/Sec	.550 G-s	
	72	.064 In/Sec	.559 G-s	
	81	.067 In/Sec	.472 G-s	
	82	.088 In/Sec	.600 G-s	
	83	.036 In/Sec	.659 G-s	
C-203	- C-203 Comp		(18-Jan-22)	
		OVERALL LEVEL	1-20 KHz	
	11	.060 In/Sec	2.353 G-s	3588.0 RPM
	12	.037 In/Sec	.672 G-s	
	21	.022 In/Sec	.430 G-s	
	22	.033 In/Sec	.680 G-s	
	23	.039 In/Sec	1.424 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.045 In/Sec	2.369 G-s	
	72M	.030 In/Sec	.601 G-s	
	73M	.057 In/Sec	8.894 G-s	
	81M	.053 In/Sec	2.352 G-s	
	82M	.069 In/Sec	5.142 G-s	
	71F	.055 In/Sec	1.762 G-s	
	72F	.051 In/Sec	1.638 G-s	
	73F	.084 In/Sec	3.118 G-s	
	81F	.064 In/Sec	3.360 G-s	
	82F	.047 In/Sec	2.022 G-s	
C-202	- C-202 Comp		(18-Jan-22)	
		OVERALL LEVEL	1-20 KHz	
	11	.069 In/Sec	2.408 G-s	3588.0 RPM
	12	.120 In/Sec	1.336 G-s	
	21	.066 In/Sec	.848 G-s	
	22	.100 In/Sec	2.617 G-s	
	23	.045 In/Sec	1.303 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.041 In/Sec	1.757 G-s	
	72M	.048 In/Sec	1.209 G-s	
	73M	.079 In/Sec	2.245 G-s	
	81M	.067 In/Sec	4.439 G-s	
	82M	.064 In/Sec	3.286 G-s	
	71F	.030 In/Sec	6.249 G-s	
	72F	.054 In/Sec	.616 G-s	
	73F	.038 In/Sec	1.127 G-s	
	81F	.042 In/Sec	3.941 G-s	
	82F	.051 In/Sec	1.040 G-s	
C-201	- C-201 Comp		(18-Jan-22)	
		OVERALL LEVEL	1-20 KHz	
	11	.108 In/Sec	2.145 G-s	3588.0 RPM
	12	.086 In/Sec	.552 G-s	
	21	.091 In/Sec	.887 G-s	
	22	.043 In/Sec	.071 G-s	
	23	.089 In/Sec	3.045 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.051 In/Sec	1.449 G-s	
	72M	.057 In/Sec	2.356 G-s	

73M	.070 In/Sec	1.284 G-s	
81M	.095 In/Sec	4.830 G-s	
82M	.060 In/Sec	2.672 G-s	
71F	.050 In/Sec	2.159 G-s	
72F	.068 In/Sec	2.462 G-s	
73F	.089 In/Sec	3.516 G-s	
81F	.059 In/Sec	2.804 G-s	
82F	.040 In/Sec	.706 G-s	

new AC - INSTRUMENT AIR COMPRESSOR (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.127 In/Sec	.822 G-s	1780.0 RPM
12	.108 In/Sec	.747 G-s	
13	.045 In/Sec	.332 G-s	
21	.130 In/Sec	1.063 G-s	
22	.091 In/Sec	.575 G-s	
23	.057 In/Sec	.511 G-s	
	OVERALL LEVEL	1-20 KHZ	
71F	.186 In/Sec	7.804 G-s	
72F	.150 In/Sec	3.140 G-s	
73F	.160 In/Sec	4.636 G-s	
81F	.129 In/Sec	2.779 G-s	
82F	.262 In/Sec	7.137 G-s	
83F	.173 In/Sec	3.431 G-s	
71M	.107 In/Sec	5.337 G-s	
72M	.240 In/Sec	11.51 G-s	
73M	.113 In/Sec	5.649 G-s	
81M	.167 In/Sec	5.767 G-s	
82M	.192 In/Sec	2.466 G-s	
83M	.165 In/Sec	2.719 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.066 In/Sec	.114 G-s	506.3 RPM
12	.059 In/Sec	.132 G-s	
13	.088 In/Sec	.084 G-s	
21	.059 In/Sec	.092 G-s	
22	.064 In/Sec	.146 G-s	
23	.145 In/Sec	.082 G-s	
71	.131 In/Sec	.358 G-s	
72	.152 In/Sec	.400 G-s	
73	.092 In/Sec	.143 G-s	
81	.106 In/Sec	.110 G-s	
82	.169 In/Sec	.044 G-s	
83	.112 In/Sec	.155 G-s	

202-05 - NASH SEAL LIQUID PUMP-A (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.017 In/Sec	.113 G-s	1800.0 RPM
21	.025 In/Sec	.079 G-s	
23	.021 In/Sec	.082 G-s	
71	.029 In/Sec	.060 G-s	
72	.016 In/Sec	.040 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.091 In/Sec	.061 G-s	1185.0 RPM

21	.074 In/Sec	.077 G-s	
23	.062 In/Sec	.104 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.171 In/Sec	.499 G-s	
31L	.160 In/Sec	.589 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.180 In/Sec	.214 G-s	
51L	.269 In/Sec	.193 G-s	100.0 RPM
52	.155 In/Sec	.203 G-s	
52L	.246 In/Sec	.183 G-s	
53	.107 In/Sec	.465 G-s	
53L	.035 In/Sec	.430 G-s	
61	.154 In/Sec	.123 G-s	
61L	.168 In/Sec	.111 G-s	
81	.033 In/Sec	.032 G-s	
82	.039 In/Sec	.022 G-s	
83	.020 In/Sec	.047 G-s	

9003-01 - D-HYDRO PRIMARY FILT FD PUMP (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.049 In/Sec	.045 G-s	1800.0 RPM
21	.041 In/Sec	.351 G-s	
23	.049 In/Sec	.857 G-s	
71	.078 In/Sec	.183 G-s	
72	.146 In/Sec	.195 G-s	

9001-01 - D-HYDRO SECOND. FILT FD PUMP (18-Jan-22)

	OVERALL LEVEL	1-20 KHz	
11	.050 In/Sec	.503 G-s	1800.0 RPM
21	.040 In/Sec	.355 G-s	
23	.030 In/Sec	.244 G-s	
71	.067 In/Sec	.285 G-s	
72	.056 In/Sec	.258 G-s	

Clarification Of Vibration Units:

Acc	-->	G-s	PK
Vel	-->	In/Sec	PK