HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

July 20, 2021

Arkema

Subject: July 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 0.17"/second velocity peak overall in the outboard horizontal measurement. Vibration still consists of multiple low amplitude shaft speed harmonics with a dominant 4x RPM component we suspect is impeller pass. **Rated a Class I Defect.**

Agitator, Hydrogenator C 7001-01
Data shows all vibrations are under 0.1"/second velocity peak overall. No issues of note.

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 16 order vibration which we believe to be 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 wide noise floor. Overall acceleration is 5 g's RMS at 1 point. Synchronous and non-synchronous harmonic vibration peaks are evident in the data. All 3 compressors have the same non-synchronous peaks but vary in amplitude. We will continue to monitor this unit closely for changes. **Rated a Class I Defect.**

Air Compressor C-202
Rotor bar vibrations are low 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 wide noise floor. Overall acceleration is 3 g's RMS at 1 point. **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 2.5-3.5 KHz with a wide noise floor. Marked vibrations appear to be non-synchronous, but harmonic in nature. Overall acceleration has dropped to 5.5 g's RMS at the compressor output shaft axial. **Rated a Class II Defect for now**. Please provide more specific details about the internals if possible.

Instrument Air Compressor
The male and female shaft vibrations still seem to show gear mesh and harmonics as well as a beat vibration occasionally. They continue to vary over time. Both shafts have between 7 and 11 g's RMS overall in the data. The dominant vibration appears to be the second gear mesh harmonic at near 2500 Hz. We are still watching this unit closely and will be going forward. **Rated a Class I Defect.**

Air Compressor NASH A 201-08A
Highest vibration is still in the pump itself at 0.32"/sec velocity peak for the outboard vertical. The vibration spectrum is still dominated by a 20-order vibration, which is thought to be vane pass. **Rated a Class II Defect.**

D Hydrogenator Agitator 9002
Highest overall vibration is at 0.29"/sec velocity peak for the gearbox output top horizontal. Vibrations are sub-synchronous to motor speed at about 9 Hz and a 14 order peak and harmonic. The 9 Hz peak appears to be a resonance, and the amplitude changes over time, but does not seem to be periodic. The others are most likely the number of pinion teeth (14 teeth and the input gear mesh) and the first harmonic of gear mesh. Ensure all fasteners are at proper torque values and inspect support structures for any signs of stress cracks, broken welds, or metal fatigue. **Rated a Class I Defect now.**

H2 Monthly Route Equipment

No Issues.

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                    Abbreviated Last Measurement Summary
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                Database:  Arkema.rbm
                Station:   PEROXIDE
                Route No.  4:  ARK WK 2
                Report Date:  21-Jul-21   12:28

MEASUREMENT POINT     OVERALL LEVEL       HFD / VHFD      MACHINE SPEED
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2130-1old  - C Concentrator Vacuum Pump    (19-Jul-21)
                      OVERALL LEVEL     1-20 KHz
       11               .073 In/Sec       .312 G-s        1200.0 RPM
       21               .071 In/Sec       .369 G-s
       23               .160 In/Sec       .155 G-s
       71               .127 In/Sec       .778 G-s
       81               .171 In/Sec       .661 G-s
       83               .091 In/Sec      1.186 G-s

7000-01    - AGITATOR,HYDROGENATOR C       (19-Jul-21)
                      OVERALL LEVEL     1-20 KHZ
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02	.032 In/Sec	.074 G-s	45.00 RPM
03	.044 In/Sec	.047 G-s	
11	.069 In/Sec	.708 G-s	1400.0 RPM
12	.082 In/Sec	.728 G-s	
13	.068 In/Sec	.198 G-s	
21	.083 In/Sec	.235 G-s	
22	.097 In/Sec	.132 G-s	
23	.079 In/Sec	.486 G-s	
31	.071 In/Sec	.376 G-s	
32	.068 In/Sec	.357 G-s	
33	.072 In/Sec	.210 G-s	
41	.074 In/Sec	.537 G-s	
42	.070 In/Sec	.538 G-s	
51	.067 In/Sec	.297 G-s	375.0 RPM
53	.079 In/Sec	.227 G-s	
61	.028 In/Sec	.226 G-s	
71	.059 In/Sec	.289 G-s	45.00 RPM
81	.030 In/Sec	.153 G-s	
83	.044 In/Sec	.233 G-s	

57 - A/B Concentr Vac Pmp-var RPM (19-Jul-21)

	OVERALL LEVEL	1-20 KHz	
11	.060 In/Sec	.301 G-s	900.0 RPM
12	.079 In/Sec	.419 G-s	
21	.071 In/Sec	.218 G-s	
23	.062 In/Sec	.202 G-s	
71	.146 In/Sec	.732 G-s	
81	.322 In/Sec	1.080 G-s	
83	.041 In/Sec	.732 G-s	

2130-1 - FLASH VAP VAC PUMP-var speed (19-Jul-21)

	OVERALL LEVEL	1-20 KHz	
11	.035 In/Sec	.278 G-s	1200.0 RPM
12	.034 In/Sec	.531 G-s	
21	.042 In/Sec	.881 G-s	
22	.038 In/Sec	.541 G-s	
23	.048 In/Sec	1.323 G-s	
71	.064 In/Sec	.340 G-s	
72	.082 In/Sec	.385 G-s	
81	.077 In/Sec	.307 G-s	
82	.082 In/Sec	.738 G-s	
83	.041 In/Sec	.560 G-s	

C-203 - C-203 Comp (19-Jul-21)

	OVERALL LEVEL	1-20 KHz	
11	.040 In/Sec	1.312 G-s	3588.0 RPM
12	.076 In/Sec	2.942 G-s	
21	.017 In/Sec	.258 G-s	
22	.042 In/Sec	1.350 G-s	
23	.030 In/Sec	1.064 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.038 In/Sec	1.506 G-s	
72M	.031 In/Sec	1.202 G-s	
73M	.061 In/Sec	.827 G-s	
81M	.050 In/Sec	2.682 G-s	
82M	.053 In/Sec	5.024 G-s	
71F	.048 In/Sec	2.482 G-s	

	72F	.061 In/Sec	1.512 G-s	
	73F	.046 In/Sec	1.212 G-s	
	81F	.050 In/Sec	3.995 G-s	
	82F	.057 In/Sec	1.779 G-s	
C-202	- C-202 Comp		(19-Jul-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.052 In/Sec	1.521 G-s	3588.0 RPM
	12	.122 In/Sec	.710 G-s	
	21	.065 In/Sec	.310 G-s	
	22	.091 In/Sec	1.765 G-s	
	23	.053 In/Sec	.980 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.032 In/Sec	1.291 G-s	
	72M	.045 In/Sec	2.790 G-s	
	73M	.062 In/Sec	2.754 G-s	
	81M	.051 In/Sec	2.371 G-s	
	82M	.056 In/Sec	3.185 G-s	
	71F	.035 In/Sec	1.872 G-s	
	72F	.063 In/Sec	2.019 G-s	
	73F	.039 In/Sec	1.943 G-s	
	81F	.045 In/Sec	1.579 G-s	
	82F	.049 In/Sec	1.305 G-s	
C-201	- C-201 Comp		(19-Jul-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.085 In/Sec	.194 G-s	3588.0 RPM
	12	.064 In/Sec	1.541 G-s	
	21	.088 In/Sec	.231 G-s	
	22	.055 In/Sec	1.507 G-s	
	23	.054 In/Sec	.139 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.044 In/Sec	2.637 G-s	
	72M	.046 In/Sec	1.704 G-s	
	73M	.066 In/Sec	1.361 G-s	
	81M	.075 In/Sec	3.438 G-s	
	82M	.044 In/Sec	5.487 G-s	
	71F	.042 In/Sec	3.595 G-s	
	72F	.057 In/Sec	1.891 G-s	
	73F	.059 In/Sec	2.048 G-s	
	81F	.066 In/Sec	2.657 G-s	
	82F	.044 In/Sec	1.245 G-s	
new AC	- INSTRUMENT AIR COMPRESSOR		(19-Jul-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.113 In/Sec	.906 G-s	1780.0 RPM
	12	.104 In/Sec	.642 G-s	
	13	.053 In/Sec	.531 G-s	
	21	.106 In/Sec	1.192 G-s	
	22	.079 In/Sec	.979 G-s	
	23	.042 In/Sec	.884 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71F	.205 In/Sec	8.122 G-s	
	72F	.159 In/Sec	3.284 G-s	
	73F	.166 In/Sec	2.586 G-s	
	81F	.142 In/Sec	2.849 G-s	
	82F	.469 In/Sec	11.46 G-s	

83F	.177 In/Sec	4.091 G-s	
71M	.126 In/Sec	5.486 G-s	
72M	.137 In/Sec	4.614 G-s	
73M	.102 In/Sec	5.045 G-s	
81M	.155 In/Sec	2.887 G-s	
82M	.263 In/Sec	7.454 G-s	
83M	.195 In/Sec	2.625 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (19-Jul-21)

	OVERALL LEVEL	1-20 KHz	
11	.090 In/Sec	.082 G-s	506.3 RPM
12	.095 In/Sec	.101 G-s	
13	.162 In/Sec	.062 G-s	
21	.084 In/Sec	.084 G-s	
22	.093 In/Sec	.071 G-s	
23	.178 In/Sec	.060 G-s	
71	.157 In/Sec	1.319 G-s	
72	.244 In/Sec	1.121 G-s	
73	.169 In/Sec	.473 G-s	
81	.198 In/Sec	.257 G-s	
82	.314 In/Sec	.493 G-s	
83	.181 In/Sec	.266 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (19-Jul-21)

	OVERALL LEVEL	1-20 KHz	
11	.075 In/Sec	.072 G-s	1185.0 RPM
21	.069 In/Sec	.077 G-s	
23	.039 In/Sec	.056 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.177 In/Sec	.615 G-s	
31L	.146 In/Sec	.758 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.157 In/Sec	.276 G-s	
51L	.158 In/Sec	.348 G-s	100.0 RPM
52	.287 In/Sec	.288 G-s	
52L	.187 In/Sec	.313 G-s	
53	.114 In/Sec	.354 G-s	
53L	.024 In/Sec	.342 G-s	
61	.120 In/Sec	.121 G-s	
61L	.125 In/Sec	.098 G-s	
81	.031 In/Sec	.034 G-s	
82	.037 In/Sec	.055 G-s	
83	.022 In/Sec	.146 G-s	

Clarification Of Vibration Units:

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