HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

June 8, 2021

Arkema

Subject: June week 2 service report

Most of the machines surveyed were found to be in good condition except for the following:

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 motor has the highest vibration amplitude of about 0.167"/second velocity peak overall in the axial measurement. Vibration consists mostly of a 4x RPM component. **Rated a Class I Defect.**

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

A/B Concentrator Vacuum Pump 57
Data shows all vibrations under 0.11"/second velocity peak overall. No issues of note.

Flash Vacuum Pump 2130-1
Data shows all vibrations 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 over 8 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 II Defect due to the recent increase in acceleration in the compressor section.**

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. **Rated a Class I Defect**.

Air Compressor C-203
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. **Rated a Class I Defect**.

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 0.33"/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 0.25"/sec velocity peak for the gearbox top output horizontal. Vibrations are mostly sub-synchronous to motor speed and consist of multiple peaks near to 11 Hz. It appears to be a resonance, and the amplitude changes over time, but does not seem to be periodic. This is near the maximum amplitude we have seen for this measurement. 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.

H2O2 Monthly Route Equipment

191-07 Middle Mix Bed Water Pump
Data continues to show a dominant 5x RPM vibration in the pump. We suspect wear in the pump impeller, or a process or flow issue. **Rated a Class II Defect.**

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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:  14-Jun-21   11:12

MEASUREMENT POINT     OVERALL LEVEL       HFD / VHFD      MACHINE SPEED
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2130-1old  - C Concentrator Vacuum Pump    (14-Jun-21)
                      OVERALL LEVEL     1-20 KHz
       11               .073 In/Sec       .335 G-s        1200.0 RPM
       21               .073 In/Sec       .362 G-s
       23               .167 In/Sec       .146 G-s
       71               .102 In/Sec       .744 G-s
       81               .159 In/Sec       .571 G-s
       83               .075 In/Sec      1.236 G-s

7000-01    - AGITATOR,HYDROGENATOR C       (14-Jun-21)
                      OVERALL LEVEL     1-20 KHZ
       02               .043 In/Sec       .019 G-s         45.00 RPM
       03               .049 In/Sec       .025 G-s
       11               .069 In/Sec       .614 G-s        1400.0 RPM
       12               .068 In/Sec       .703 G-s
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	13	.091 In/Sec	.201 G-s	
	21	.084 In/Sec	.191 G-s	
	22	.098 In/Sec	.225 G-s	
	23	.074 In/Sec	.459 G-s	
	31	.073 In/Sec	.324 G-s	
	32	.063 In/Sec	.437 G-s	
	33	.041 In/Sec	.196 G-s	
	41	.068 In/Sec	.436 G-s	
	42	.070 In/Sec	.502 G-s	
	51	.071 In/Sec	.375 G-s	375.0 RPM
	53	.084 In/Sec	.271 G-s	
	61	.036 In/Sec	.258 G-s	
	71	.056 In/Sec	.405 G-s	45.00 RPM
	81	.021 In/Sec	.211 G-s	
	83	.047 In/Sec	.214 G-s	

57 - A/B Concentr Vac Pmp-var RPM (14-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.088 In/Sec	.406 G-s	900.0 RPM
12	.080 In/Sec	.568 G-s	
21	.077 In/Sec	.286 G-s	
23	.049 In/Sec	.543 G-s	
71	.114 In/Sec	.278 G-s	
81	.114 In/Sec	1.244 G-s	
83	.042 In/Sec	.867 G-s	

2130-1 - FLASH VAP VAC PUMP-var speed (14-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.043 In/Sec	.115 G-s	1200.0 RPM
12	.035 In/Sec	.293 G-s	
21	.048 In/Sec	.478 G-s	
22	.041 In/Sec	.180 G-s	
23	.052 In/Sec	.297 G-s	
71	.063 In/Sec	.492 G-s	
72	.069 In/Sec	.502 G-s	
81	.076 In/Sec	.919 G-s	
82	.073 In/Sec	.687 G-s	
83	.042 In/Sec	1.094 G-s	

C-203 - C-203 Comp (14-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.028 In/Sec	.873 G-s	3588.0 RPM
12	.030 In/Sec	.126 G-s	
21	.018 In/Sec	.215 G-s	
22	.053 In/Sec	1.758 G-s	
23	.022 In/Sec	.745 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.042 In/Sec	1.414 G-s	
72M	.040 In/Sec	1.916 G-s	
73M	.061 In/Sec	2.464 G-s	
81M	.057 In/Sec	3.073 G-s	
82M	.046 In/Sec	3.669 G-s	
71F	.055 In/Sec	1.830 G-s	
72F	.053 In/Sec	1.059 G-s	
73F	.078 In/Sec	3.902 G-s	
81F	.053 In/Sec	1.687 G-s	
82F	.057 In/Sec	1.565 G-s	

C-202	- C-202 Comp		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.055 In/Sec	1.572 G-s	3588.0 RPM
	12	.104 In/Sec	.457 G-s	
	21	.064 In/Sec	.336 G-s	
	22	.085 In/Sec	.217 G-s	
	23	.054 In/Sec	1.112 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.033 In/Sec	2.306 G-s	
	72M	.046 In/Sec	1.578 G-s	
	73M	.063 In/Sec	1.617 G-s	
	81M	.043 In/Sec	2.071 G-s	
	82M	.058 In/Sec	3.269 G-s	
	71F	.034 In/Sec	2.115 G-s	
	72F	.060 In/Sec	1.827 G-s	
	73F	.040 In/Sec	1.633 G-s	
	81F	.035 In/Sec	1.547 G-s	
	82F	.051 In/Sec	1.090 G-s	
C-201	- C-201 Comp		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.093 In/Sec	.924 G-s	3588.0 RPM
	12	.102 In/Sec	2.516 G-s	
	21	.088 In/Sec	.754 G-s	
	22	.084 In/Sec	3.381 G-s	
	23	.096 In/Sec	3.191 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.044 In/Sec	2.579 G-s	
	72M	.052 In/Sec	2.034 G-s	
	73M	.066 In/Sec	2.960 G-s	
	81M	.078 In/Sec	8.593 G-s	
	82M	.051 In/Sec	3.606 G-s	
	71F	.037 In/Sec	2.220 G-s	
	72F	.065 In/Sec	2.353 G-s	
	73F	.051 In/Sec	1.954 G-s	
	81F	.065 In/Sec	2.499 G-s	
	82F	.044 In/Sec	1.142 G-s	
new AC	- INSTRUMENT AIR COMPRESSOR		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.122 In/Sec	.852 G-s	1780.0 RPM
	12	.098 In/Sec	.611 G-s	
	13	.057 In/Sec	.462 G-s	
	21	.124 In/Sec	1.472 G-s	
	22	.083 In/Sec	.465 G-s	
	23	.055 In/Sec	.375 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71F	.212 In/Sec	7.584 G-s	
	72F	.194 In/Sec	8.666 G-s	
	73F	.150 In/Sec	2.931 G-s	
	81F	.134 In/Sec	2.987 G-s	
	82F	.258 In/Sec	7.492 G-s	
	83F	.187 In/Sec	4.434 G-s	
	71M	.148 In/Sec	7.261 G-s	
	72M	.212 In/Sec	10.26 G-s	
	73M	.111 In/Sec	2.996 G-s	

	81M	.176 In/Sec	5.146 G-s	
	82M	.300 In/Sec	11.24 G-s	
	83M	.192 In/Sec	2.492 G-s	
201-08A	- COMPRESSOR,NASH A 201-08A		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.079 In/Sec	.118 G-s	506.3 RPM
	12	.080 In/Sec	.171 G-s	
	13	.165 In/Sec	.091 G-s	
	21	.067 In/Sec	.080 G-s	
	22	.107 In/Sec	.084 G-s	
	23	.126 In/Sec	.095 G-s	
	71	.153 In/Sec	1.362 G-s	
	72	.254 In/Sec	1.140 G-s	
	73	.177 In/Sec	.131 G-s	
	81	.161 In/Sec	.239 G-s	
	82	.328 In/Sec	.281 G-s	
	83	.173 In/Sec	.379 G-s	
202-05	- NASH SEAL LIQUID PUMP-A		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.021 In/Sec	.138 G-s	1800.0 RPM
	21	.015 In/Sec	.127 G-s	
	23	.019 In/Sec	.114 G-s	
	71	.035 In/Sec	.054 G-s	
	72	.015 In/Sec	.048 G-s	
9002-10	- D-HYDROGENATOR AGITATOR		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.072 In/Sec	.113 G-s	1185.0 RPM
	21	.065 In/Sec	.170 G-s	
	23	.043 In/Sec	.056 G-s	
		OVERALL LEVEL	1-20 KHZ	
	31	.164 In/Sec	.768 G-s	
	31L	.210 In/Sec	.824 G-s	
		OVERALL LEVEL	1-20 KHz	
	51	.160 In/Sec	.286 G-s	
	51L	.185 In/Sec	.206 G-s	100.0 RPM
	52	.248 In/Sec	.358 G-s	
	52L	.178 In/Sec	.347 G-s	
	53	.110 In/Sec	.453 G-s	
	53L	.022 In/Sec	.420 G-s	
	61	.114 In/Sec	.129 G-s	
	61L	.148 In/Sec	.135 G-s	
	81	.035 In/Sec	.031 G-s	
	82	.030 In/Sec	.241 G-s	
	83	.024 In/Sec	.122 G-s	
9003-01	- D-HYDRO PRIMARY FILT FD PUMP		(14-Jun-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.036 In/Sec	.258 G-s	1800.0 RPM
	21	.054 In/Sec	.446 G-s	
	23	.044 In/Sec	.318 G-s	
	71	.088 In/Sec	.172 G-s	
	72	.121 In/Sec	.197 G-s	
9001-01	- D-HYDRO SECOND. FILT FD PUMP		(14-Jun-21)	

		OVERALL LEVEL	1-20 KHz	
	11	.049 In/Sec	.233 G-s	1800.0 RPM
	21	.052 In/Sec	.369 G-s	
	23	.036 In/Sec	.148 G-s	
	71	.083 In/Sec	.240 G-s	
	72	.080 In/Sec	.245 G-s	

192-03 - Two Stage Water Pump A-WEST (14-Jun-21)

		OVERALL LEVEL	1-20 KHz	
	11	.068 In/Sec	.138 G-s	1765.0 RPM
	21	.070 In/Sec	.756 G-s	
	23	.053 In/Sec	.260 G-s	
	71	.121 In/Sec	.516 G-s	
	72	.064 In/Sec	.508 G-s	

191-07 - M MIX BED WATER PUMP 191-07 (14-Jun-21)

		OVERALL LEVEL	1-20 KHz	
	11	.076 In/Sec	.261 G-s	3600.0 RPM
	21	.072 In/Sec	1.150 G-s	
	23	.101 In/Sec	.844 G-s	
	71	.342 In/Sec	.210 G-s	
	72	.199 In/Sec	.242 G-s	

Clarification Of Vibration Units:

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