HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

June 8, 2021

Arkema

Subject: June week 1 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 0.163"/second velocity peak overall in the axial measurement. Vibration consists mostly of a 4x RPM component. We suspect either a 4 finger coupling, or process issue associated with impeller pass. **Rated a Class I Defect.**

Agitator, Hydrogenator C 7001-01
Unit was not available at the time of our service.

A/B Concentrator Vacuum Pump 57
The unit vibration overall is 0.26"/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
The pump appeared to be cavitating with the vibration over 0.3"/second velocity peak. This is a large jump in vibration levels for this unit. Check liquid levels as well as operating parameters. **Rated a Class II Defect.**

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. 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 wide noise floor. Overall acceleration is near 8 g's RMS. Spectral comparison between the units does not lead us to any conclusion at this time. 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-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 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 5 and 9 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 0.3"/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 0.2"/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

No immediate issues

Abbreviated Last Measurement Summary
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Database: Arkema.rbm
Station: PEROXIDE
Route No. 3: ARK WK 1
Report Date: 08-Jun-21 12:47

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump (07-Jun-21)			
	OVERALL LEVEL	1-20 KHz	
11	.065 In/Sec	.201 G-s	1200.0 RPM
21	.068 In/Sec	.591 G-s	
23	.163 In/Sec	.141 G-s	
71	.077 In/Sec	1.203 G-s	
81	.144 In/Sec	.522 G-s	
83	.075 In/Sec	.976 G-s	

57 - A/B Concentr Vac Pmp-var RPM (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.070 In/Sec	.239 G-s	900.0 RPM
12	.063 In/Sec	.351 G-s	
21	.095 In/Sec	.172 G-s	
23	.068 In/Sec	.216 G-s	
71	.155 In/Sec	.335 G-s	
81	.257 In/Sec	.619 G-s	
83	.060 In/Sec	.810 G-s	

2130-1 - FLASH VAP VAC PUMP-var speed (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.060 In/Sec	.073 G-s	1200.0 RPM
12	.071 In/Sec	.354 G-s	
21	.071 In/Sec	.318 G-s	
22	.085 In/Sec	.189 G-s	
23	.111 In/Sec	.200 G-s	
71	.287 In/Sec	1.114 G-s	
72	.115 In/Sec	1.115 G-s	
81	.313 In/Sec	1.024 G-s	
82	.144 In/Sec	2.649 G-s	
83	.097 In/Sec	1.644 G-s	

7007-24 - ABC SEC. FILT FEED PMP-SOUTH (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.034 In/Sec	.717 G-s	1800.0 RPM
21	.052 In/Sec	1.881 G-s	
23	.039 In/Sec	.929 G-s	
71	.108 In/Sec	2.125 G-s	
72	.067 In/Sec	2.077 G-s	

9001-2 - MIDDLE OXIDIZER FEED PUMP (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.019 In/Sec	.617 G-s	1800.0 RPM
21	.043 In/Sec	.354 G-s	
23	.032 In/Sec	.291 G-s	
71	.061 In/Sec	.193 G-s	
72	.042 In/Sec	.215 G-s	

7016-11 - WEST OXIDIZER FEED PUMP (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.025 In/Sec	.207 G-s	1800.0 RPM
21	.020 In/Sec	.480 G-s	
23	.023 In/Sec	.759 G-s	
71	.085 In/Sec	.183 G-s	
72	.073 In/Sec	.475 G-s	

234-01 - CHILL WATER PUMP 234-01 (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.042 In/Sec	.848 G-s	1790.0 RPM
21	.043 In/Sec	1.035 G-s	
23	.087 In/Sec		
71	.102 In/Sec	.253 G-s	
72	.096 In/Sec	.217 G-s	

C-203 - C-203 Comp (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.028 In/Sec	.883 G-s	3588.0 RPM
12	.063 In/Sec	2.451 G-s	
21	.031 In/Sec	1.012 G-s	
22	.035 In/Sec	.773 G-s	
23	.066 In/Sec	2.332 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.047 In/Sec	2.027 G-s	
72M	.044 In/Sec	2.202 G-s	
73M	.063 In/Sec	1.911 G-s	
81M	.063 In/Sec	3.027 G-s	
82M	.040 In/Sec	2.327 G-s	
71F	.044 In/Sec	3.989 G-s	
72F	.065 In/Sec	2.351 G-s	
73F	.084 In/Sec	3.849 G-s	
81F	.061 In/Sec	2.360 G-s	
82F	.058 In/Sec	2.147 G-s	

9000-02 - D HYDROGENATOR FD PUMP- EAST (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.049 In/Sec	.395 G-s	1800.0 RPM
21	.053 In/Sec	.401 G-s	
23	.039 In/Sec	.230 G-s	
71	.099 In/Sec	.596 G-s	
72	.079 In/Sec	.530 G-s	

236-04A - HYDROGNTOR PRECOOLER FD PUMP (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.028 In/Sec	.499 G-s	1800.0 RPM
21	.049 In/Sec	.794 G-s	
23	.039 In/Sec	.112 G-s	
71	.102 In/Sec	.443 G-s	
72	.059 In/Sec	.253 G-s	

C-202 - C-202 Comp (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.069 In/Sec	2.408 G-s	3588.0 RPM
12	.101 In/Sec	1.483 G-s	
21	.067 In/Sec	.583 G-s	
22	.081 In/Sec	1.588 G-s	
23	.054 In/Sec	1.059 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.033 In/Sec	.988 G-s	
72M	.051 In/Sec	2.006 G-s	
73M	.071 In/Sec	1.693 G-s	
81M	.044 In/Sec	7.823 G-s	
82M	.050 In/Sec	2.366 G-s	
71F	.033 In/Sec	3.210 G-s	
72F	.064 In/Sec	1.436 G-s	
73F	.073 In/Sec	4.666 G-s	
81F	.043 In/Sec	2.249 G-s	
82F	.047 In/Sec	.756 G-s	

C-201 - C-201 Comp (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.092 In/Sec	.469 G-s	3588.0 RPM
12	.062 In/Sec	1.621 G-s	

21	.088 In/Sec	.328 G-s	
22	.052 In/Sec	.115 G-s	
23	.050 In/Sec	1.341 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.040 In/Sec	2.062 G-s	
72M	.049 In/Sec	1.797 G-s	
73M	.072 In/Sec	2.414 G-s	
81M	.074 In/Sec	3.130 G-s	
82M	.060 In/Sec	2.188 G-s	
71F	.093 In/Sec	3.323 G-s	
72F	.073 In/Sec	2.158 G-s	
73F	.044 In/Sec	.833 G-s	
81F	.086 In/Sec	2.943 G-s	
82F	.057 In/Sec	1.691 G-s	

new AC - INSTRUMENT AIR COMPRESSOR (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.118 In/Sec	.954 G-s	1780.0 RPM
12	.101 In/Sec	.698 G-s	
13	.067 In/Sec	.577 G-s	
21	.124 In/Sec	1.044 G-s	
22	.081 In/Sec	1.066 G-s	
23	.037 In/Sec	.563 G-s	
	OVERALL LEVEL	1-20 KHZ	
71F	.187 In/Sec	7.296 G-s	
72F	.148 In/Sec	3.385 G-s	
73F	.149 In/Sec	2.504 G-s	
81F	.146 In/Sec	2.712 G-s	
82F	.264 In/Sec	7.379 G-s	
83F	.177 In/Sec	3.635 G-s	
71M	.108 In/Sec	4.450 G-s	
72M	.162 In/Sec	9.376 G-s	
73M	.129 In/Sec	4.725 G-s	
81M	.142 In/Sec	3.280 G-s	
82M	.174 In/Sec	2.067 G-s	
83M	.214 In/Sec	7.187 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.082 In/Sec	.105 G-s	506.3 RPM
12	.088 In/Sec	.120 G-s	
13	.151 In/Sec	.139 G-s	
21	.071 In/Sec	.088 G-s	
22	.091 In/Sec	.118 G-s	
23	.143 In/Sec	.076 G-s	
71	.172 In/Sec	.980 G-s	
72	.254 In/Sec	1.057 G-s	
73	.183 In/Sec	.600 G-s	
81	.157 In/Sec	.268 G-s	
82	.315 In/Sec	.400 G-s	
83	.157 In/Sec	.218 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (07-Jun-21)

	OVERALL LEVEL	1-20 KHz	
11	.058 In/Sec	.045 G-s	1185.0 RPM
21	.074 In/Sec	.066 G-s	
23	.037 In/Sec	.065 G-s	

	OVERALL LEVEL	1-20 KHZ	
31	.202 In/Sec	.844 G-s	
31L	.119 In/Sec	.798 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.207 In/Sec	.186 G-s	
51L	.198 In/Sec	.183 G-s	100.0 RPM
52	.194 In/Sec	.377 G-s	
52L	.203 In/Sec	.360 G-s	
53	.141 In/Sec	.475 G-s	
53L	.032 In/Sec	.440 G-s	
61	.136 In/Sec	.148 G-s	
61L	.157 In/Sec	.121 G-s	
81	.047 In/Sec	.044 G-s	
82	.033 In/Sec	.046 G-s	
83	.032 In/Sec	.151 G-s	

Clarification Of Vibration Units:

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