HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

March 12, 2021

Arkema

Subject: March 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,

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

7030 Ryburn Drive
Millington, TN 38053
P. 901-873-5300
F. 901-873-5301

Weekly Route Critical Equipment Observations

C Concentrator Vacuum Pump 2130-1
The motor and pump still have the same vibration amplitude of 0.17"/second velocity peak overall. No immediate concerns.

Agitator, Hydrogenator C 7001-01
All vibrations are still under 0.1"/second velocity peak overall. We will continue to monitor normally. No immediate issue.

A/B Concentrator Vacuum Pump 57
The outboard pump bearing overall is 0.262"/sec peak velocity, with a dominant vibration at 16 orders, which is most likely vane pass. We will continue to watch for changes. **Rated a Class I Defect.**

Flash Vacuum Pump 2130-1
All vibrations are below 0.1"/second velocity peak overall. No reportable issues.

Air Compressor C-201
Rotor bar vibrations are above 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 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. We will continue to monitor this unit for changes. **Rated a Class I Defect.**

Air Compressor C-203
Rotor bar vibrations are high for this motor's history. We are still watching compressor vibrations at around 6.9 orders of input shaft speed with multiple harmonics of that fundamental vibration. The vibration peaks were always present; however, they jumped up starting in January. A more precise analysis could be reported if detailed information regarding compressor components could be provided. 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 7 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 for now.**

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 I Defect.**

D Hydrogenator Agitator 9002-10
Highest overall vibration is at 0.27"/sec velocity peak for the gearbox. Vibrations are mostly sub-synchronous in nature. This is lower for this unit. We will watch carefully during the next few surveys. **Rated a Class I Defect.**

Abbreviated Last Measurement Summary
****

Database: Arkema.rbm
Station: PEROXIDE
Route No. 4: ARK WK 2
Report Date: 12-Mar-21 12:53

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump	(12-Mar-21)		
	OVERALL LEVEL	1-20 KHz	
11	.065 In/Sec	.323 G-s	1200.0 RPM
21	.068 In/Sec	.469 G-s	
23	.172 In/Sec	.135 G-s	
71	.114 In/Sec	1.007 G-s	
81	.168 In/Sec	.764 G-s	
83	.090 In/Sec	1.587 G-s	
7000-01 - AGITATOR,HYDROGENATOR C	(12-Mar-21)		
	OVERALL LEVEL	1-20 KHZ	
02	.046 In/Sec	.052 G-s	45.00 RPM
03	.044 In/Sec	.035 G-s	
11	.067 In/Sec	.723 G-s	1400.0 RPM
12	.064 In/Sec	.781 G-s	
13	.067 In/Sec	.247 G-s	
21	.074 In/Sec	.285 G-s	
22	.092 In/Sec	.166 G-s	
23	.061 In/Sec	.296 G-s	
31	.091 In/Sec	.505 G-s	
32	.098 In/Sec	.749 G-s	
33	.049 In/Sec	.220 G-s	

	41	.085 In/Sec	.819 G-s	
	42	.068 In/Sec	.806 G-s	
	51	.073 In/Sec	.523 G-s	375.0 RPM
	53	.095 In/Sec	.352 G-s	
	61	.034 In/Sec	.298 G-s	
	71	.055 In/Sec	.882 G-s	45.00 RPM
	81	.022 In/Sec	.293 G-s	
	83	.047 In/Sec	.384 G-s	

57 - A/B Concentr Vac Pmp-var RPM (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.049 In/Sec	.379 G-s	900.0 RPM
12	.064 In/Sec	.256 G-s	
21	.094 In/Sec	.236 G-s	
23	.064 In/Sec	.167 G-s	
71	.127 In/Sec	.491 G-s	
81	.262 In/Sec	.800 G-s	
83	.082 In/Sec	.908 G-s	

2130-1 - FLASH VAP VAC PUMP-var speed (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.053 In/Sec	.274 G-s	1200.0 RPM
12	.031 In/Sec	.411 G-s	
21	.037 In/Sec	.479 G-s	
22	.044 In/Sec	.215 G-s	
23	.073 In/Sec	.717 G-s	
71	.068 In/Sec	.544 G-s	
72	.076 In/Sec	.711 G-s	
81	.075 In/Sec	.299 G-s	
82	.082 In/Sec	.745 G-s	
83	.048 In/Sec	.673 G-s	

C-203 - C-203 Comp (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.032 In/Sec	1.120 G-s	3588.0 RPM
12	.079 In/Sec	3.064 G-s	
21	.131 In/Sec	5.000 G-s	
22	.135 In/Sec	5.096 G-s	
23	.089 In/Sec	3.196 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.050 In/Sec	1.964 G-s	
72M	.052 In/Sec	2.789 G-s	
73M	.072 In/Sec	2.055 G-s	
81M	.067 In/Sec	3.532 G-s	
82M	.070 In/Sec	2.971 G-s	
71F	.089 In/Sec	2.734 G-s	
72F	.080 In/Sec	2.366 G-s	
73F	.069 In/Sec	3.146 G-s	
81F	.052 In/Sec	1.445 G-s	
82F	.063 In/Sec	1.285 G-s	

C-202 - C-202 Comp (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.043 In/Sec	.717 G-s	3588.0 RPM
12	.115 In/Sec	.323 G-s	
21	.066 In/Sec	1.174 G-s	
22	.106 In/Sec	2.788 G-s	

	23	.076 In/Sec	1.473 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.059 In/Sec	1.201 G-s	
	72M	.059 In/Sec	2.873 G-s	
	73M	.078 In/Sec	1.847 G-s	
	81M	.049 In/Sec	1.806 G-s	
	82M	.062 In/Sec	1.250 G-s	
	71F	.036 In/Sec	2.096 G-s	
	72F	.061 In/Sec	1.720 G-s	
	73F	.049 In/Sec	1.405 G-s	
	81F	.048 In/Sec	1.894 G-s	
	82F	.060 In/Sec	1.208 G-s	
C-201	- C-201 Comp		(12-Mar-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.088 In/Sec	.869 G-s	3588.0 RPM
	12	.089 In/Sec	.909 G-s	
	21	.101 In/Sec	.780 G-s	
	22	.037 In/Sec	.940 G-s	
	23	.105 In/Sec	3.182 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.045 In/Sec	2.010 G-s	
	72M	.059 In/Sec	2.016 G-s	
	73M	.072 In/Sec	2.426 G-s	
	81M	.076 In/Sec	4.131 G-s	
	82M	.060 In/Sec	3.076 G-s	
	71F	.061 In/Sec	2.871 G-s	
	72F	.075 In/Sec	2.245 G-s	
	73F	.041 In/Sec	1.695 G-s	
	81F	.085 In/Sec	3.456 G-s	
	82F	.062 In/Sec	1.540 G-s	
new AC	- INSTRUMENT AIR COMPRESSOR		(12-Mar-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.147 In/Sec	.880 G-s	1780.0 RPM
	12	.108 In/Sec	.966 G-s	
	13	.071 In/Sec	.523 G-s	
	21	.133 In/Sec	1.010 G-s	
	22	.072 In/Sec	.952 G-s	
	23	.041 In/Sec	.651 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71F	.245 In/Sec	9.087 G-s	
	72F	.174 In/Sec	4.602 G-s	
	73F	.170 In/Sec	3.749 G-s	
	81F	.141 In/Sec	3.373 G-s	
	82F	.331 In/Sec	7.329 G-s	
	83F	.185 In/Sec	4.750 G-s	
	71M	.120 In/Sec	3.473 G-s	
	72M	.180 In/Sec	6.610 G-s	
	73M	.125 In/Sec	5.700 G-s	
	81M	.207 In/Sec	6.527 G-s	
	82M	.240 In/Sec	2.035 G-s	
	83M	.192 In/Sec	2.218 G-s	
201-08A	- COMPRESSOR,NASH A 201-08A		(12-Mar-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.089 In/Sec	.078 G-s	506.3 RPM

12	.073 In/Sec	.113 G-s	
13	.169 In/Sec	.218 G-s	
21	.065 In/Sec	.101 G-s	
22	.087 In/Sec	.125 G-s	
23	.122 In/Sec	.104 G-s	
71	.173 In/Sec	1.136 G-s	
72	.261 In/Sec	1.283 G-s	
73	.170 In/Sec	.215 G-s	
81	.174 In/Sec	.371 G-s	
82	.316 In/Sec	.369 G-s	
83	.180 In/Sec	.326 G-s	

202-05 - NASH SEAL LIQUID PUMP-A (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.023 In/Sec	.075 G-s	1800.0 RPM
21	.015 In/Sec	.094 G-s	
23	.017 In/Sec	.070 G-s	
71	.033 In/Sec	.041 G-s	
72	.018 In/Sec	.044 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.091 In/Sec	.064 G-s	1185.0 RPM
21	.069 In/Sec	.078 G-s	
23	.047 In/Sec	.080 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.199 In/Sec	.655 G-s	
31L	.269 In/Sec	.677 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.240 In/Sec	.304 G-s	
51L	.211 In/Sec	.302 G-s	100.0 RPM
52	.259 In/Sec	.284 G-s	
52L	.230 In/Sec	.248 G-s	
53	.113 In/Sec	.553 G-s	
53L	.027 In/Sec	.582 G-s	
61	.154 In/Sec	.129 G-s	
61L	.151 In/Sec	.138 G-s	
81	.036 In/Sec	.031 G-s	
82	.034 In/Sec	.019 G-s	
83	.025 In/Sec	.175 G-s	

9003-01 - D-HYDRO PRIMARY FILT FD PUMP (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.048 In/Sec	.333 G-s	1800.0 RPM
21	.049 In/Sec	.440 G-s	
23	.039 In/Sec	.190 G-s	
71	.115 In/Sec	.261 G-s	
72	.121 In/Sec	.272 G-s	

9001-01 - D-HYDRO SECOND. FILT FD PUMP (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.055 In/Sec	.140 G-s	1800.0 RPM
21	.049 In/Sec	.243 G-s	
23	.037 In/Sec	.085 G-s	
71	.082 In/Sec	.338 G-s	
72	.086 In/Sec	.273 G-s	

192-03 - Two Stage Water Pump A-WEST (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.068 In/Sec	.227 G-s	1765.0 RPM
21	.078 In/Sec	.463 G-s	
23	.059 In/Sec	.347 G-s	
71	.153 In/Sec	.396 G-s	
72	.065 In/Sec	.763 G-s	

191-07 - M MIX BED WATER PUMP 191-07 (12-Mar-21)

	OVERALL LEVEL	1-20 KHz	
11	.080 In/Sec	.992 G-s	3600.0 RPM
21	.064 In/Sec	.610 G-s	
23	.103 In/Sec	.463 G-s	
71	.242 In/Sec	.202 G-s	
72	.171 In/Sec	.248 G-s	

Clarification Of Vibration Units:

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