HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

April 12, 2021

Arkema

Subject: April 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,

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 has the highest vibration amplitude of about 0.170"/second velocity peak overall in the axial measurement. No immediate concerns.

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

A/B Concentrator Vacuum Pump 57
The pump bearing overall is 0.1"/sec peak velocity or less. We will continue to watch for changes. No immediate concerns.

Flash Vacuum Pump 2130-1
All vibrations are below 0.102"/second velocity peak overall. No reportable issues.

Air Compressor C-201
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, however, there has been a jump in the 1-20 KHz acceleration trend for the female shaft outboard which we believe could be a cause for concern. Currently we take spectral data that does not show much change, so the change must be higher in frequency. We recommend performing an oil analysis as soon as possible on the compressor. Check the onboard monitoring of the unit. We will continue to monitor this unit closely for changes. **Rated a Class II Defect**.

Air Compressor C-202
Rotor bar vibrations are very 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-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 6 and 8 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 0.344"/sec velocity peak for the outboard vertical and has dropped slightly. 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. Vibrations are mostly sub-synchronous to motor speed. This is still lower amplitude for this unit. **Rated a Class I Defect.**

H2O2 Monthly Route Equipment

No current issues

70% Pumps Bi-annual

0041 Vacuum Receiver Pump East
Possible early distress in the outboard pump bearing, although vacuum pumps do generate cavitation, which generates similar frequencies. **Rated a Class I Defect.**

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 3: ARK WK 1
Report Date: 12-Apr-21 15:16

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.079 In/Sec	.403 G-s	1200.0 RPM
21	.078 In/Sec	.428 G-s	
23	.170 In/Sec	.166 G-s	
71	.115 In/Sec	.666 G-s	
81	.171 In/Sec	.831 G-s	
83	.104 In/Sec	1.571 G-s	
7000-01 - AGITATOR,HYDROGENATOR C (08-Apr-21)			
	OVERALL LEVEL	1-20 KHZ	
02	.049 In/Sec	.015 G-s	45.00 RPM
03	.053 In/Sec	.023 G-s	
11	.077 In/Sec	.654 G-s	1400.0 RPM
12	.076 In/Sec	.742 G-s	
13	.072 In/Sec	.128 G-s	
21	.092 In/Sec	.248 G-s	
22	.099 In/Sec	.109 G-s	
23	.078 In/Sec	.651 G-s	
31	.082 In/Sec	.445 G-s	
32	.065 In/Sec	.507 G-s	
33	.059 In/Sec	.242 G-s	
41	.090 In/Sec	.641 G-s	
42	.066 In/Sec	.582 G-s	
51	.079 In/Sec	.337 G-s	375.0 RPM
53	.086 In/Sec	.272 G-s	
61	.039 In/Sec	.209 G-s	
71	.067 In/Sec	.472 G-s	45.00 RPM
81	.022 In/Sec	.205 G-s	
83	.052 In/Sec	.283 G-s	
57 - A/B Concentr Vac Pmp-var RPM (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.058 In/Sec	.183 G-s	900.0 RPM
12	.065 In/Sec	.223 G-s	
21	.068 In/Sec	.169 G-s	
23	.062 In/Sec	.160 G-s	
71	.080 In/Sec	.396 G-s	
81	.073 In/Sec	.309 G-s	
83	.042 In/Sec	.422 G-s	
2130-1 - FLASH VAP VAC PUMP-var speed (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.101 In/Sec	.119 G-s	1200.0 RPM
12	.034 In/Sec	.630 G-s	

21	.034 In/Sec	.776 G-s		
22	.044 In/Sec	.192 G-s		
23	.054 In/Sec	.936 G-s		
71	.070 In/Sec	.301 G-s		
72	.078 In/Sec	.593 G-s		
81	.079 In/Sec	.364 G-s		
82	.076 In/Sec	.565 G-s		
83	.041 In/Sec	.458 G-s		

236-06 - HYDRO FD PUMP N 236-06 -2FLR (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.091 In/Sec	.068 G-s	3600.0 RPM
21	.067 In/Sec	.198 G-s	

2130-6 - ABC SEC FILT FEED PUMP-NORTH (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.062 In/Sec	.222 G-s	1800.0 RPM
21	.073 In/Sec	.324 G-s	
23	.040 In/Sec	.227 G-s	
71	.150 In/Sec	.807 G-s	
72	.112 In/Sec	.775 G-s	

9001-1 - EAST OXIDIZER FEED PUMP (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.106 In/Sec	.065 G-s	1800.0 RPM
21	.059 In/Sec	.137 G-s	
23	.065 In/Sec	.189 G-s	
71	.136 In/Sec	.632 G-s	
72	.079 In/Sec	.287 G-s	

9001-2 - MIDDLE OXIDIZER FEED PUMP (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.026 In/Sec	.730 G-s	1800.0 RPM
21	.037 In/Sec	.616 G-s	
23	.044 In/Sec	.394 G-s	
71	.083 In/Sec	.228 G-s	
72	.063 In/Sec	.422 G-s	

7016-11 - WEST OXIDIZER FEED PUMP (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.021 In/Sec	.334 G-s	1800.0 RPM
21	.021 In/Sec	.781 G-s	
23	.022 In/Sec	.329 G-s	
71	.085 In/Sec	.431 G-s	
72	.060 In/Sec	.437 G-s	

234-01 - CHILL WATER PUMP 234-01 (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.058 In/Sec	.880 G-s	1790.0 RPM
21	.045 In/Sec	1.073 G-s	
23	.150 In/Sec		
71	.070 In/Sec	.364 G-s	
72	.059 In/Sec	.207 G-s	

C-203 - C-203 Comp (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.048 In/Sec	1.738 G-s	3588.0 RPM

12	.034 In/Sec	.670 G-s	
21	.024 In/Sec	.709 G-s	
22	.031 In/Sec	.842 G-s	
23	.045 In/Sec	1.332 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.037 In/Sec	1.071 G-s	
72M	.040 In/Sec	1.321 G-s	
73M	.050 In/Sec	1.375 G-s	
81M	.041 In/Sec	1.706 G-s	
82M	.064 In/Sec	3.121 G-s	
71F	.037 In/Sec	3.325 G-s	
72F	.056 In/Sec	1.155 G-s	
73F	.052 In/Sec	2.407 G-s	
81F	.041 In/Sec	1.129 G-s	
82F	.050 In/Sec	1.275 G-s	

9000-02 - D HYDROGENATOR FD PUMP- EAST (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.024 In/Sec	.363 G-s	1800.0 RPM
21	.050 In/Sec	.258 G-s	
23	.049 In/Sec	.255 G-s	
71	.095 In/Sec	.442 G-s	
72	.070 In/Sec	.289 G-s	

236-04A - HYDROGNTOR PRECOOLER FD PUMP (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.036 In/Sec	.490 G-s	1800.0 RPM
21	.063 In/Sec	.622 G-s	
23	.050 In/Sec	.236 G-s	
71	.121 In/Sec	.297 G-s	
72	.067 In/Sec	.255 G-s	

C-202 - C-202 Comp (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.106 In/Sec	4.072 G-s	3588.0 RPM
12	.112 In/Sec	.354 G-s	
21	.065 In/Sec	.356 G-s	
22	.108 In/Sec	2.482 G-s	
23	.054 In/Sec	1.442 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.042 In/Sec	1.655 G-s	
72M	.057 In/Sec	2.212 G-s	
73M	.069 In/Sec	2.259 G-s	
81M	.043 In/Sec	1.457 G-s	
82M	.054 In/Sec	4.498 G-s	
71F	.047 In/Sec	2.198 G-s	
72F	.068 In/Sec	2.215 G-s	
73F	.042 In/Sec	1.704 G-s	
81F	.035 In/Sec	2.811 G-s	
82F	.059 In/Sec	1.665 G-s	

C-201 - C-201 Comp (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.115 In/Sec	2.687 G-s	3588.0 RPM
12	.089 In/Sec	1.102 G-s	
21	.091 In/Sec	1.108 G-s	
22	.047 In/Sec	1.038 G-s	

23	.056 In/Sec	1.049 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.043 In/Sec	2.210 G-s	
72M	.053 In/Sec	3.555 G-s	
73M	.068 In/Sec	2.017 G-s	
81M	.086 In/Sec	4.259 G-s	
82M	.051 In/Sec	1.790 G-s	
71F	.070 In/Sec	2.348 G-s	
72F	.034 In/Sec	.639 G-s	
73F	.048 In/Sec	1.700 G-s	
81F	.044 In/Sec	9.179 G-s	
82F	.047 In/Sec	1.232 G-s	

new AC - INSTRUMENT AIR COMPRESSOR (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.107 In/Sec	.760 G-s	1780.0 RPM
12	.118 In/Sec	.858 G-s	
13	.056 In/Sec	.432 G-s	
21	.210 In/Sec	.511 G-s	
22	.111 In/Sec	.443 G-s	
23	.051 In/Sec	.484 G-s	
	OVERALL LEVEL	1-20 KHZ	
71F	.170 In/Sec	6.857 G-s	
72F	.150 In/Sec	2.217 G-s	
73F	.167 In/Sec	4.486 G-s	
81F	.145 In/Sec	2.701 G-s	
82F	.252 In/Sec	5.744 G-s	
83F	.182 In/Sec	2.748 G-s	
71M	.093 In/Sec	3.551 G-s	
72M	.148 In/Sec	7.916 G-s	
73M	.143 In/Sec	5.293 G-s	
81M	.197 In/Sec	5.334 G-s	
82M	.264 In/Sec	7.948 G-s	
83M	.201 In/Sec	3.727 G-s	

201-08A - COMPRESSOR,NASH A 201-08A (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.090 In/Sec	.088 G-s	506.3 RPM
12	.075 In/Sec	.118 G-s	
13	.177 In/Sec	.125 G-s	
21	.087 In/Sec	.113 G-s	
22	.114 In/Sec	.101 G-s	
23	.158 In/Sec	.084 G-s	
71	.178 In/Sec	1.081 G-s	
72	.272 In/Sec	1.137 G-s	
73	.168 In/Sec	.436 G-s	
81	.195 In/Sec	.319 G-s	
82	.344 In/Sec	.255 G-s	
83	.180 In/Sec	.417 G-s	

9002-10 - D-HYDROGENATOR AGITATOR (08-Apr-21)

	OVERALL LEVEL	1-20 KHz	
11	.066 In/Sec	.077 G-s	1185.0 RPM
21	.072 In/Sec	.075 G-s	
23	.044 In/Sec	.064 G-s	
	OVERALL LEVEL	1-20 KHZ	
31	.150 In/Sec	.704 G-s	

31L	.232 In/Sec	.840 G-s	
	OVERALL LEVEL	1-20 KHz	
51	.240 In/Sec	.290 G-s	
51L	.220 In/Sec	.273 G-s	100.0 RPM
52	.224 In/Sec	.276 G-s	
52L	.250 In/Sec	.251 G-s	
53	.148 In/Sec	.386 G-s	
53L	.038 In/Sec	.350 G-s	
61	.181 In/Sec	.117 G-s	
61L	.186 In/Sec	.110 G-s	
81	.033 In/Sec	.024 G-s	
82	.034 In/Sec	.020 G-s	
83	.032 In/Sec	.137 G-s	

Clarification Of Vibration Units:
Acc --> G-s PK
Vel --> In/Sec PK

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE 70% H202 PUMPS
Route No. 1: 70% PUMPS
Report Date: 12-Apr-21 15:16

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
27415 - B TANK CAR LOAD PUMP (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.241 In/Sec	.330 G-s	1750.0 RPM
21	.256 In/Sec	.176 G-s	
23	.136 In/Sec	.168 G-s	
71	.158 In/Sec	.664 G-s	
72	.135 In/Sec	.773 G-s	
0041 - VAC RECEIVR PUMP EAST -Durco (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.253 In/Sec	.287 G-s	1750.0 RPM
21	.187 In/Sec	.154 G-s	
23	.084 In/Sec	.162 G-s	
71	.060 In/Sec	1.235 G-s	
72	.056 In/Sec	1.843 G-s	
0042 - VAC RECEIVR PUMP WEST -Durco (08-Apr-21)			
	OVERALL LEVEL	1-20 KHz	
11	.079 In/Sec	.419 G-s	3550.0 RPM
21	.061 In/Sec	.359 G-s	
23	.081 In/Sec	.140 G-s	
71	.078 In/Sec	1.603 G-s	
72	.068 In/Sec	.964 G-s	

Clarification Of Vibration Units:
Acc --> G-s PK
Vel --> In/Sec PK