HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

February 15, 2021

Arkema

Subject: February week 2 vibration 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
Vibrations appear to be slightly elevated this survey. Motor inboard axial is at 0.184"/sec velocity peak. No actions required just yet.

Agitator, Hydrogenator C 7001-01
The highest motor overall vibration is at 0.141"/sec velocity peak for the inboard vertical. We will continue to monitor normally. Gearbox looks good. No immediate issue.

A/B Concentrator Vacuum Pump 57
The outboard pump bearing overall is 0.264"/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
Stairs were ice covered and not safe to access.

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 for changes. **Rated a Class I Defect**.

Air Compressor C-202
Rotor bar vibrations are again high 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 II Defect.**

Air Compressor C-203
We are watching an increase in a compressor vibration 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. We will continue to monitor this unit for changes. **Rated a Class II 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 0.280"/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 0.273"/sec velocity peak for the gearbox. Vibrations are mostly sub-synchronous in nature. This is about average for this unit. We will watch carefully during the next few surveys. No immediate concern.

Abbreviated Last Measurement Summary
****

Database: Arkema.rbm
Station: PEROXIDE
Route No. 4: ARK WK 2
Report Date: 15-Feb-21 12:02

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump	(12-Feb-21)		
	OVERALL LEVEL	1-20 KHz	
11	.054 In/Sec	.491 G-s	1200.0 RPM
21	.068 In/Sec	.523 G-s	
23	.184 In/Sec	.156 G-s	
71	.124 In/Sec	.999 G-s	
81	.158 In/Sec	.696 G-s	
83	.073 In/Sec	1.720 G-s	
7000-01 - AGITATOR,HYDROGENATOR C	(12-Feb-21)		
	OVERALL LEVEL	1-20 KHZ	
02	.047 In/Sec	.036 G-s	45.00 RPM
03	.055 In/Sec	.053 G-s	
11	.068 In/Sec	.274 G-s	1400.0 RPM
12	.084 In/Sec	.882 G-s	
13	.112 In/Sec	.237 G-s	
21	.086 In/Sec	.301 G-s	
22	.141 In/Sec	.103 G-s	
23	.133 In/Sec	.633 G-s	
31	.107 In/Sec	1.257 G-s	

	32	.090 In/Sec	.785 G-s	
	33	.046 In/Sec	.310 G-s	
	41	.092 In/Sec	1.147 G-s	
	42	.084 In/Sec	1.127 G-s	
	51	.071 In/Sec	.468 G-s	375.0 RPM
	53	.066 In/Sec	.436 G-s	
	61	.036 In/Sec	.540 G-s	
	71	.057 In/Sec	.965 G-s	45.00 RPM
	81	.020 In/Sec	.337 G-s	
	83	.059 In/Sec	.355 G-s	

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

	OVERALL LEVEL	1-20 KHz	
11	.062 In/Sec	.225 G-s	900.0 RPM
12	.052 In/Sec	.270 G-s	
21	.080 In/Sec	.288 G-s	
23	.054 In/Sec	.167 G-s	
71	.119 In/Sec	.796 G-s	
81	.264 In/Sec	.581 G-s	
83	.040 In/Sec	.881 G-s	

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

	OVERALL LEVEL	1-20 KHz	
11	.075 In/Sec	2.820 G-s	3588.0 RPM
12	.062 In/Sec	2.815 G-s	
21	.068 In/Sec	2.524 G-s	
22	.062 In/Sec	2.386 G-s	
23	.042 In/Sec	1.605 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.046 In/Sec	1.903 G-s	
72M	.047 In/Sec	1.344 G-s	
73M	.060 In/Sec	5.891 G-s	
81M	.076 In/Sec	3.382 G-s	
82M	.078 In/Sec	2.374 G-s	
71F	.066 In/Sec	2.911 G-s	
72F	.068 In/Sec	2.232 G-s	
73F	.121 In/Sec	6.750 G-s	
81F	.070 In/Sec	2.396 G-s	
82F	.062 In/Sec	1.425 G-s	

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

	OVERALL LEVEL	1-20 KHz	
11	.098 In/Sec	2.986 G-s	3588.0 RPM
12	.118 In/Sec	.376 G-s	
21	.131 In/Sec	3.746 G-s	
22	.385 In/Sec	13.13 G-s	
23	.177 In/Sec	6.006 G-s	
	OVERALL LEVEL	1-20 KHZ	
71M	.040 In/Sec	.910 G-s	
72M	.056 In/Sec	2.157 G-s	
73M	.079 In/Sec	2.466 G-s	
81M	.049 In/Sec	3.976 G-s	
82M	.078 In/Sec	3.803 G-s	
71F	.053 In/Sec	2.470 G-s	
72F	.059 In/Sec	1.353 G-s	
73F	.051 In/Sec	1.537 G-s	
81F	.063 In/Sec	3.356 G-s	

	82F	.070 In/Sec	2.502 G-s	
C-201	- C-201 Comp		(12-Feb-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.087 In/Sec	1.463 G-s	3588.0 RPM
	12	.092 In/Sec	1.245 G-s	
	21	.094 In/Sec	2.111 G-s	
	22	.054 In/Sec	.846 G-s	
	23	.162 In/Sec	6.392 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71M	.064 In/Sec	3.018 G-s	
	72M	.060 In/Sec	2.009 G-s	
	73M	.097 In/Sec	3.278 G-s	
	81M	.121 In/Sec	6.253 G-s	
	82M	.073 In/Sec	2.564 G-s	
	71F	.069 In/Sec	4.131 G-s	
	72F	.060 In/Sec	1.527 G-s	
	73F	.069 In/Sec	3.082 G-s	
	81F	.071 In/Sec	2.467 G-s	
	82F	.070 In/Sec	1.930 G-s	
new AC	- INSTRUMENT AIR COMPRESSOR		(12-Feb-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.136 In/Sec	1.635 G-s	1780.0 RPM
	12	.113 In/Sec	.915 G-s	
	13	.061 In/Sec	.384 G-s	
	21	.139 In/Sec	1.228 G-s	
	22	.080 In/Sec	.936 G-s	
	23	.054 In/Sec	.568 G-s	
		OVERALL LEVEL	1-20 KHZ	
	71F	.217 In/Sec	5.762 G-s	
	72F	.154 In/Sec	2.347 G-s	
	73F	.236 In/Sec	7.274 G-s	
	81F	.147 In/Sec	3.555 G-s	
	82F	.255 In/Sec	7.727 G-s	
	83F	.259 In/Sec	8.192 G-s	
	71M	.137 In/Sec	5.099 G-s	
	72M	.206 In/Sec	7.239 G-s	
	73M	.153 In/Sec	5.133 G-s	
	81M	.227 In/Sec	7.024 G-s	
	82M	.279 In/Sec	2.987 G-s	
	83M	.163 In/Sec	2.435 G-s	
201-08A	- COMPRESSOR,NASH A 201-08A		(12-Feb-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.063 In/Sec	.089 G-s	506.3 RPM
	12	.073 In/Sec	.160 G-s	
	13	.137 In/Sec	.122 G-s	
	21	.062 In/Sec	.104 G-s	
	22	.099 In/Sec	.161 G-s	
	23	.134 In/Sec	.124 G-s	
	71	.141 In/Sec	1.174 G-s	
	72	.238 In/Sec	.998 G-s	
	73	.139 In/Sec	.297 G-s	
	81	.160 In/Sec	.294 G-s	
	82	.280 In/Sec	.215 G-s	
	83	.151 In/Sec	.146 G-s	

202-05	- NASH SEAL LIQUID PUMP-A		(12-Feb-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.033 In/Sec	.123 G-s	1800.0 RPM
	21	.031 In/Sec	.074 G-s	
	23	.046 In/Sec	.136 G-s	
	71	.032 In/Sec	.042 G-s	
	72	.024 In/Sec	.035 G-s	
9002-10	- D-HYDROGENATOR AGITATOR		(12-Feb-21)	
		OVERALL LEVEL	1-20 KHz	
	11	.124 In/Sec	.145 G-s	1185.0 RPM
	21	.076 In/Sec	.130 G-s	
	23	.089 In/Sec	.119 G-s	
		OVERALL LEVEL	1-20 KHZ	
	31	.200 In/Sec	.617 G-s	
	31L	.191 In/Sec	.645 G-s	
		OVERALL LEVEL	1-20 KHz	
	51	.093 In/Sec	.312 G-s	
	51L	.113 In/Sec	.294 G-s	100.0 RPM
	52	.273 In/Sec	.377 G-s	
	52L	.250 In/Sec	.377 G-s	
	53	.097 In/Sec	.837 G-s	
	53L	.025 In/Sec	.799 G-s	
	61	.070 In/Sec	.139 G-s	
	61L	.083 In/Sec	.134 G-s	
	81	.037 In/Sec	.020 G-s	
	82	.036 In/Sec	.018 G-s	
	83	.024 In/Sec	.158 G-s	

Clarification Of Vibration Units:

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