HI-SPEED INDUSTRIAL SERVICE

MILLINGTON, TN

February 28, 2020

ARKEMA

Subject: February week 4 vibration service report

Weekly Equipment

C Concentrator Vacuum Pump 2130-1
The motor axial vibration has dropped, but the pump axial is up. Vibration is below 0.2"/sec velocity though. No action is required.

Agitator, Hydrogenator C 7001-01
No legitimate vibrations were found to be above 0.146"/sec velocity peak overall for the gearbox output axial. Spectrum appears normal for unit. No action required.

A/B Concentrator Vacuum Pump 57
Overall vibrations have dropped for the outboard pump bearing and is at 0.288"/sec velocity peak, at what looks to be mostly vane pass. We must note; however, that the vibration changes constantly as the vacuum breaks, so the overall reading and the data could change significantly during a short period of time. No immediate action is required at this time. **Rated a Class I Defect**.

Flash Vacuum Pump 2130-1
Vibrations appear to be normal this survey. No actions required.

Air Compressor C-201
Rotor bar vibrations are below 1 g RMS. 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. We will continue to monitor this unit for changes No actions required.

Air Compressor C-202
Rotor bar vibrations are at 1 g RMS. The trend clearly shows that the vibrations vary considerably over time. No actions required.

Air Compressor C-203
Rotor bar vibrations are at 4.4 g's RMS. 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. No actions required.

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Instrument Air Compressor new

Oil loss could still be an issue. A device mounted to the west side of the unit was still emitting vapors. Vibration appeared to be about normal at under 0.3"/sec velocity peak. **Rated a Class I Defect.**

Air Compressor NASH A 201-08A
Vibrations are still down in the motor after the foot bolts were tightened. We recommend a complete cleaning and republication of all the foot bolts for the motor and vacuum pump. Pump vibrations are mixed. Check the pump bearing large flange bolts also. Check both shafts for excessive clearance with a lift check and finish with a shaft alignment. The pump is at 0.3"/sec velocity, so the unit is still **Rated a Class II Defect.**

D Hydrogenator Agitator 9002-10
Vibration data shows a slight change in vibrations this survey. Highest amplitude is still at 0.259"/sec velocity peak for the gearbox top E/W measurement. **Still rated a Class I Defect.**

Monthly Equipment

Middle Mix Bed Water Pump 191-07
The unit still shows possible vane pass vibration. Pump could be worn and could be running outside the optimal operating point. **Rated A Class I Defect.**

South Cooling Tower South Fan
Overall vibrations are around 0.4"/sec velocity peak and are highest axially for the motor and gearbox. Inspect the unit drivetrain and fasteners. **Rated a Class II Defect.**

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 Specialist
dshook@gohispeed.com
Hi-Speed **Industrial Service**

Abbreviated Last Measurement Summary

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Database: Arkema.rbm
Station: PEROXIDE
Route No. 6: ARKEMA WK 3-4
Report Date: 28-Feb-20 12:50

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD	MACHINE SPEED
2130-1old - C Concentrator Vacuum Pump	(25-Feb-20)		
	OVERALL LEVEL		
11	.054 In/Sec		1200.0 RPM
21	.066 In/Sec		
23	.119 In/Sec		
71	.111 In/Sec		
81	.190 In/Sec		
83	.094 In/Sec		
7000-01 - AGITATOR,HYDROGENATOR C	(25-Feb-20)		
	OVERALL LEVEL		
01	.041 In/Sec		1800.0 RPM
02	.039 In/Sec		
03	.047 In/Sec		
11	.045 In/Sec		
12	.049 In/Sec		
13	.048 In/Sec		
21	.048 In/Sec		
22	.049 In/Sec		
23	.055 In/Sec		
31	.077 In/Sec		
32	.074 In/Sec		
33	.055 In/Sec		
41	.055 In/Sec		
42	.044 In/Sec		
53	.146 In/Sec		
53L	.146 In/Sec		
57 - A/B Concentr Vac Pmp-var RPM	(25-Feb-20)		
	OVERALL LEVEL		
11	.061 In/Sec		900.0 RPM
12	.049 In/Sec		
21	.076 In/Sec		
23	.062 In/Sec		
71	.130 In/Sec		
81	.288 In/Sec		
83	.058 In/Sec		
2130-1 - FLASH VAP VAC PUMP-var speed	(25-Feb-20)		
	OVERALL LEVEL		
11	.063 In/Sec		1200.0 RPM
12	.036 In/Sec		
21	.041 In/Sec		
22	.046 In/Sec		
23	.053 In/Sec		

	71	.068 In/Sec		
	72	.073 In/Sec		
	81	.080 In/Sec		
	82	.100 In/Sec		
	83	.043 In/Sec		

C-203 - C-203 Comp (25-Feb-20)

	OVERALL LEVEL	1-20 KHz	
11	.030 In/Sec	.617 G-s	3588.0 RPM
12	.125 In/Sec	4.424 G-s	
21	.040 In/Sec	1.338 G-s	
22	.026 In/Sec	.098 G-s	
23	.050 In/Sec	.657 G-s	
71M	.040 In/Sec		
72M	.054 In/Sec		
73M	.069 In/Sec		
81M	.080 In/Sec		
82M	.067 In/Sec		
71F	.051 In/Sec		
72F	.054 In/Sec		
73F	.092 In/Sec		
81F	.053 In/Sec		
82F	.057 In/Sec		

C-202 - C-202 Comp (25-Feb-20)

	OVERALL LEVEL	1-20 KHz	
11	.069 In/Sec	.737 G-s	3588.0 RPM
12	.117 In/Sec	.444 G-s	
21	.061 In/Sec	.534 G-s	
22	.056 In/Sec	.332 G-s	
23	.048 In/Sec	.567 G-s	
71M	.053 In/Sec		
72M	.048 In/Sec		
73M	.091 In/Sec		
81M	.052 In/Sec		
82M	.062 In/Sec		
71F	.039 In/Sec		
72F	.059 In/Sec		
73F	.066 In/Sec		
81F	.052 In/Sec		
82F	.052 In/Sec		

C-201 - C-201 Comp (25-Feb-20)

	OVERALL LEVEL	1-20 KHz	
11	.081 In/Sec	.572 G-s	3588.0 RPM
12	.094 In/Sec	1.237 G-s	
21	.098 In/Sec	.810 G-s	
22	.051 In/Sec	.675 G-s	
23	.082 In/Sec	.423 G-s	
71M	.050 In/Sec		
72M	.032 In/Sec		
73M	.078 In/Sec		
81M	.062 In/Sec		
82M	.059 In/Sec		
71F	.055 In/Sec		
72F	.053 In/Sec		
73F	.061 In/Sec		

	81F	.079 In/Sec		
	82F	.059 In/Sec		
new AC	- INSTRUMENT AIR COMPRESSOR	(25-Feb-20)		
		OVERALL LEVEL	1-20 KHz	
	11	.164 In/Sec	1.108 G-s	1780.0 RPM
	12	.113 In/Sec	.836 G-s	
	13	.057 In/Sec	.464 G-s	
	21	.207 In/Sec	1.540 G-s	
	22	.070 In/Sec	.841 G-s	
	23	.069 In/Sec	.675 G-s	
	71M	.210 In/Sec		
	72M	.141 In/Sec		
	73M	.155 In/Sec		
	81M	.164 In/Sec		
	82M	.229 In/Sec		
	83M	.267 In/Sec		
	71F	.191 In/Sec		
	72F	.151 In/Sec		
	73F	.220 In/Sec		
	81F	.155 In/Sec		
	82F	.298 In/Sec		
	83F	.209 In/Sec		
201-08A	- COMPRESSOR,NASH A 201-08A	(25-Feb-20)		
		OVERALL LEVEL		
	11	.066 In/Sec		506.3 RPM
	12	.078 In/Sec		
	13	.155 In/Sec		
	21	.105 In/Sec		
	22	.130 In/Sec		
	23	.163 In/Sec		
	71	.177 In/Sec		
	72	.271 In/Sec		
	73	.213 In/Sec		
	81	.169 In/Sec		
	82	.288 In/Sec		
	83	.150 In/Sec		
202-05	- NASH SEAL LIQUID PUMP-A	(25-Feb-20)		
		OVERALL LEVEL		
	11	.042 In/Sec		1800.0 RPM
	21	.036 In/Sec		
	23	.018 In/Sec		
	71	.050 In/Sec		
	72	.024 In/Sec		
9002-10	- D-HYDROGENATOR AGITATOR	(25-Feb-20)		
		OVERALL LEVEL		
	11	.071 In/Sec		1185.0 RPM
	21	.069 In/Sec		
	23	.058 In/Sec		
	31	.253 In/Sec		
	31L	.205 In/Sec		
	51	.259 In/Sec		
	51L	.213 In/Sec		
	52	.188 In/Sec		

52L	.242 In/Sec		
53	.169 In/Sec		
61	.132 In/Sec		
61L	.167 In/Sec		
81	.038 In/Sec		
82	.038 In/Sec		
83	.041 In/Sec		

9001-01 - D-HYDRO SECOND. FILT FD PUMP (25-Feb-20)

	OVERALL LEVEL	
11	.062 In/Sec	1800.0 RPM
21	.055 In/Sec	
23	.039 In/Sec	
71	.090 In/Sec	
72	.060 In/Sec	

192-03 - Two Stage Water Pump A-WEST (25-Feb-20)

	OVERALL LEVEL	
11	.062 In/Sec	1765.0 RPM
21	.098 In/Sec	
23	.040 In/Sec	
71	.102 In/Sec	
72	.060 In/Sec	

191-07 - M MIX BED WATER PUMP 191-07 (25-Feb-20)

	OVERALL LEVEL	
11	.148 In/Sec	3600.0 RPM
21	.178 In/Sec	
23	.074 In/Sec	
71	.308 In/Sec	
72	.157 In/Sec	

NTC-SF - N CT-SOUTH FAN, N TWR (25-Feb-20)

	OVERALL LEVEL	
1	.082 In/Sec	1780.0 RPM
2	.061 In/Sec	
3	.103 In/Sec	
4	.089 In/Sec	
5	.0034 In/Sec	
6	.113 In/Sec	
6L	.110 In/Sec	

NCT - NF - N CT -NORTH FAN, N TWR (25-Feb-20)

	OVERALL LEVEL	
7	.144 In/Sec	1780.0 RPM
8	.082 In/Sec	
9	.100 In/Sec	
10	.135 In/Sec	
11	.131 In/Sec	
12	.105 In/Sec	

530-02 - PUMP,N.COOLING TWR,MIDDLE (25-Feb-20)

	OVERALL LEVEL	
11	.100 In/Sec	1780.0 RPM
12	.142 In/Sec	

530-03 - PUMP,N.COOLING TWR,SOUTH (25-Feb-20)

		OVERALL LEVEL	
	11	.131 In/Sec	1780.0 RPM
	12	.154 In/Sec	
548-7	- IRON-FREE H2O BOOSTER PUMP	(25-Feb-20)	
		OVERALL LEVEL	
	11	.044 In/Sec	1800.0 RPM
	21	.050 In/Sec	
	23	.050 In/Sec	
	71	.149 In/Sec	
	72	.059 In/Sec	
STC-NF	- S CT - NORTH FAN, S TWR	(25-Feb-20)	
		OVERALL LEVEL	
	1	.305 In/Sec	1780.0 RPM
	2	.237 In/Sec	
	3	.150 In/Sec	
	4	.162 In/Sec	
	6	.181 In/Sec	
STC-MF	- S CT - MID FAN, S TWR	(25-Feb-20)	
		OVERALL LEVEL	
	1	.293 In/Sec	1780.0 RPM
	2	.257 In/Sec	
	3	.141 In/Sec	
	4	.143 In/Sec	
	5	.102 In/Sec	
	6	.105 In/Sec	
STC-SF	- S CT - SOUTH FAN, S TWR	(25-Feb-20)	
		OVERALL LEVEL	
	1	.311 In/Sec	1780.0 RPM
	2	.315 In/Sec	
	3	.340 In/Sec	
	4	.210 In/Sec	
	5	.295 In/Sec	
	6	.393 In/Sec	
SCT-1	- SOUTH CT PUMP - EAST	(25-Feb-20)	
		OVERALL LEVEL	
	21	.046 In/Sec	1800.0 RPM
	23	.053 In/Sec	
	71	.126 In/Sec	
	72	.079 In/Sec	
SCT-2	- SOUTH CT PUMP - MID	(25-Feb-20)	
		OVERALL LEVEL	
	11	.034 In/Sec	1800.0 RPM
	21	.044 In/Sec	
	23	.064 In/Sec	
	71	.146 In/Sec	
	72	.142 In/Sec	
SCT-3	- SOUTH CT PUMP - WEST	(25-Feb-20)	
		OVERALL LEVEL	
	11	.055 In/Sec	1800.0 RPM
	21	.051 In/Sec	

23	.099	In/Sec
71	.209	In/Sec
72	.213	In/Sec

Clarification Of Vibration Units:

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