

December 1, 2020

LANXESS

Subject: November vibration service

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Most of the machines surveyed were found to be in good condition with the exception of 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**  
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## **Reportable equipment**

### **CT Hot well East Pump**

This unit still has a 1x vibration that is near 0.5 in/sec peak velocity. The vibration is somewhat directional which us to believe there is also resonance here. Ensure that all fasteners are secured properly and inspect the coupling for any wear. Trim balancing can be effective. Rated as a **CLASS II** defect for now.

### **Quench Tank Pump**

The pump vibration at 6x RPM has increased to over 0.6"/sec velocity peak in the spectrum of the pump input horizontal. We suspect the pump has 6 blades/vanes and is not running as designed and is out of the operational curve. Please check all design parameters vs flow and pressure readings. Rated as a **CLASS II** defect at this time.

### **Quench Tank Blower**

The fan bearings and motor verticals still have elevated vibration levels. This is more than likely due to a fan imbalance. Ensure that all foot bolts are torqued and preform a field balance as time allows. Rated as a **CLASS II** defect for now.

### **#1 & #2 Bird Centrifuges**

These units are mounted on the same skid and spin at nearly the same speed which leads to the creation of a "Beat" vibration with a frequency equal to the inverse of the delta between the two shaft speeds in Hz when the fundamental vibration are of consequence. Ensure all foot bolts are torqued. More than likely, the issue is process related imbalance, both bird centrifuge units have high vibrations of the same type at near 0.8"/sec velocity peak in the spectrum. Rated as a **CLASS II** defect.

### **Precrusher**

Unit vibrations are dominated by 59 Hz peaks and up to 2"/sec velocity peak as measured in the time waveform. Inspect the unit for shaft issues such as eccentricity and imbalance. Check all fasteners.

**Rated a Class III Defect.**

### **Bucket Elevator for the Precrusher**

The Unit appears to be in sad shape. Vibration data seemed to indicate a broken gear or tooth in the gearbox causing a large periodic vibration with a ring down. The gearbox needs to be changed as soon as possible. Visual observations also seemed to show the outboard bearing to shaft fit was so worn, that the two were rotating at different speeds. We expect the elevator drive shaft and both supporting bearings will need to be replaced. Excess grease covered the area, so this observation needs to be confirmed by a thorough mechanical inspection. **Rated a Class IV Defect.**

### Oxone Packaging Elevator

Overall vibrations are at 0.63"/sec velocity peak. The vibration appears to be periodic. Please inspect the drive train and components for wear and alignment. **Rated a Class II Defect.**

### Oxone Blender

Overall vibrations are above 0.63"/sec velocity peak for most points. Inspect the unit for defects such as loose or missing fasteners, bent shafts or eccentric hubs, worn drive components, or poor shaft alignment. Check for gearbox wear with backlash check and have oil samples checked for wear particles and other indicators of faults. **Rated a Class II Defect.**

### Oxone Brine Circulator Pump.

This unit has a what looks to be a shaft speed vibration at 59.66 Hz that is dominant in the motor. We suspect an alignment or coupling issue. Check all fasteners also. Inspect soon. **Rated a Class II Defect.**

#### Abbreviated Last Measurement Summary \*\*\*\*\*

Database: oxone.rbm  
Station: LANXESS  
Route No. 1: LANXESS  
Report Date: 01-Dec-20 12:29

MEASUREMENT POINT -----	OVERALL LEVEL -----	HFD / VHFD -----
7371-07 - PUMP,CT HOTWELL (EAST PUMP)	(30-Nov-20)	
	OVERALL LEVEL	
11 - CT EAST PUMP - MOTOR TOP N-S	.488 In/Sec	
12 - CT EAST PUMP -MOT TOP E-W	.165 In/Sec	
7371-05 - PUMP,CT COLDWELL (WEST PUMP)	(30-Nov-20)	
	OVERALL LEVEL	
11 - CT WEST PUMP - MOTOR TOP N-S	.064 In/Sec	
12 - CT WEST PUMP - MOTOR TOP E-W	.037 In/Sec	
362-13 - KOH RECIRC PUMP	(30-Nov-20)	
	OVERALL LEVEL	
11 - MOTOR OUTBOARD HORIZ	.138 In/Sec	
21 - MOTOR INBOARD HORIZ	.128 In/Sec	
23 - MOTOR INBOARD AXIAL	.118 In/Sec	
71 - PUMP HORIZ	.339 In/Sec	
72 - PUMP VERT	.186 In/Sec	
357-13 - PUMP,H2O2 FEED TO OX REACTOR	(30-Nov-20)	

		OVERALL LEVEL
11	- H2O2 FEED MTR OUTBD HORIZONTAL	.072 In/Sec
21	- H2O2 FEED MTR INBD HORIZONTAL	.066 In/Sec
23	- H2O2 FEED MTR INBD AXIAL	.046 In/Sec
71	- H2O2 FEED PUMP HORIZONTAL	.125 In/Sec
72	- H2O2 FEED PUMP VERTICAL	.068 In/Sec
363-06	- PUMP,OXONE CRYST CIRC	(30-Nov-20)
		OVERALL LEVEL
11	- OXONE CRYST CIRC PUMP MOTOR OBH	.015 In/Sec
21	- OXONE CRYST CIRC PUMP MOTOR IBH	.014 In/Sec
23	- OXONE CRYST CIRC PUMP MOTOR AXIA	.017 In/Sec
71	- OXONE CRYST CIRC PUMP INDB HOR	.025 In/Sec
72	- OXONE CRYST CIRC PUMP VERTICAL	.018 In/Sec
81	- OXONE CRYST CIRC PUMP OUTBD HOR	.033 In/Sec
DEL -SL	- DELUMPER @ SLURRY TRANS PUMP	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OB HOR	.172 In/Sec
21	- MOTOR IB HOR	.137 In/Sec
22	- MOTOR IB VERT	.151 In/Sec
23	- MOTOR IB AXIAL	.106 In/Sec
71	- IB BEARING HOR	.087 In/Sec
81	- OB BEARING HOR	.088 In/Sec
DEL- HT	- DELUMPER @ HOLD TANK (WALL)	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OB HOR	.079 In/Sec
21	- MOTOR IB HOR	.133 In/Sec
22	- MOTOR IB VERT	.127 In/Sec
23	- MOTOR IB AXIAL	.102 In/Sec
71	- IB BEARING HOR	.139 In/Sec
81	- OB BEARING HOR	.118 In/Sec
363-07A	- OXONE CRYST. SLURRY XFER PMP	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD HORIZ	.096 In/Sec
21	- MOTOR INBOARD HORIZ	.060 In/Sec
23	- MOTOR INBOARD AXIAL	.073 In/Sec
71	- PUMP HORIZ	.084 In/Sec
72	- PUMP VERT	.112 In/Sec
106-01	- PUMP,#2 QUENCH TANK	(30-Nov-20)
		OVERALL LEVEL
11	- #2 QUENCH TK PMP OUTBD HOR.	.034 In/Sec
21	- #2 QUENCH TANK PUMP INBD HOR.	.047 In/Sec
23	- #2 QUENCH TANK PUMP INBD AXIAL	.074 In/Sec
71	- QUENCH TANK PUMP HORIZ	.645 In/Sec
72	- QUENCH TANK PUMP VERTICAL	.070 In/Sec
360-05	- PUMP,CARO'S ACID CIRC.	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBD HORIZONTAL	.154 In/Sec
21	- MOTOR INBD HORIZONTAL	.112 In/Sec
23	- MOTOR INBD AXIAL	.135 In/Sec
71	- PUMP HORIZONTAL	.094 In/Sec
72	- CARO'S ACID PUMP VERTICAL	.069 In/Sec

363-18	- AGITATOR, HOLD TANK	(30-Nov-20)	
		OVERALL LEVEL	
11	- MOTOR OB HOR	.127 In/Sec	
21	- MOTOR IB HOR	.140 In/Sec	
23	- MOTOR OB AXIAL	.134 In/Sec	
31	- GEARBOX HOR	.099 In/Sec	
32	- GEARBOX VERT	.057 In/Sec	
363-03	- AGITATOR,OXONE CRYSTALLIZER	(30-Nov-20)	
		OVERALL LEVEL	1K-20K HZ
UBH	- AGIT ANGLE DRIVE UPPER BRG HOR	.063 In/Sec	.0020 G-s
LBH	- AGIT ANGLE DRIVE LOWER BRG HOR	.063 In/Sec	.0015 G-s
GOH	- GEARBOX OUTPUT HOR	.087 In/Sec	.097 G-s
GIH	- GEARBOX INPUT SHAFT HOR	.086 In/Sec	
21	- MOTOR INBOARD HORIZ	.106 In/Sec	
11	- MOTOR OUTBOARD HORIZ	.100 In/Sec	
106-08	- BLOWER, QUENCH TANK	(30-Nov-20)	
		OVERALL LEVEL	
11	- MOTOR OUTBOARD HOR	.168 In/Sec	
12	- MOTOR OUTBOARD VERT	.376 In/Sec	
13	- MOTOR OUTBOARD AXIAL-NEW POINT	.186 In/Sec	
21	- MOTOR IB HOR	.165 In/Sec	
22	- MOTOR IB VERT	.322 In/Sec	
23	- MOTOR INBOARD AXIAL-NEW POINT	.201 In/Sec	
71	- BLOWER OUTBOARD FRAME	.439 In/Sec	
81	- BLOWER INBOARD FRAME	.288 In/Sec	
18-372-05	- OXONE BLENDER	(30-Nov-20)	
		OVERALL LEVEL	
11	- MOTOR OUTBOARD HORIZONTAL	.643 In/Sec	
12	- MOTOR OUTBOARD VERTICAL	.609 In/Sec	
22	- MOTOR INBOARD VERTICAL	.665 In/Sec	
21	- MOTOR INBOARD HORIZONTAL	.629 In/Sec	
23	- MOTOR INBOARD AXIAL	.676 In/Sec	
GIH	- GRBX INBOARD HORIZONTAL	.622 In/Sec	
GOH	- GRBX OUTBOARD HORIZONTAL	.660 In/Sec	
SH	- SPLITTER HORIZONTAL	.257 In/Sec	
SV	- SPLITTER VERTICAL	.333 In/Sec	
364-09	- #1 BIRD CENTRIFUGE 364-09	(30-Nov-20)	
		OVERALL LEVEL	
11	- BIRD CENTRIFUGE MOTOR OUTBD HOR	.256 In/Sec	
21	- BIRD CENTRIFUGE MOTOR INBD HOR	.362 In/Sec	
23	- BIRD CENTRIFUGE MOTOR INBD Axial	.458 In/Sec	
71	- BIRD CENTRIFUGE INBOARD HORIZONT	.724 In/Sec	
71L	- CENT. INBOARD HORIZONT - LOW FQ	.738 In/Sec	
73	- BIRD CENT. INBOARD AXIAL	.212 In/Sec	
81	- BIRD CENTRIFUGE OUTBD HORIZONTAL	.285 In/Sec	
81L	- CENT OUTBOARD HORIZONT-LOW FQ	.207 In/Sec	
364-10	- #2 BIRD CENTRIFUGE	(30-Nov-20)	
		OVERALL LEVEL	
11	- #2 BIRD CENT. MOTOR OUTBD HOR	.190 In/Sec	
21	- #2 BIRD CENT.MOTOR INBD HOR	.166 In/Sec	
23	- BIRD CENTRIFUGE MOTOR INBD Axial	.191 In/Sec	

71	- #2 BIRD CENT. INBOARD HORIZONTAL	.988 In/Sec
71L	- CENT. INBOARD HORIZONTAL - LOW FQ	.968 In/Sec
81	- #2 BIRD CENT. OUTBD HORIZONTAL	.372 In/Sec
81L	- CENT OUTBOARD HORIZONTAL-LOW FQ	.369 In/Sec
370-03	- GRINDER, OXONE	(30-Nov-20)
		OVERALL LEVEL
11	- OXONE GRINDER MOTOR OBH	.071 In/Sec
71	- OXONE GRINDER HOUSING HORIZONTAL	.050 In/Sec
366-12	- BLOWER DRYER EXHAUST 366-12	(30-Nov-20)
		OVERALL LEVEL
11	- DRYER EXHAUST BLWR MTR OB HOR	.149 In/Sec
12	- DRYER EXHAUST BLWR MTR OB VERT	.147 In/Sec
21	- DRYER EXHAUST BLWR MTR IB HOR	.142 In/Sec
22	- DRYER EXHAUST BLWR MTR IB VERT	.159 In/Sec
23	- DRYER EXHAUST BLWR MTR IB AXIAL	.175 In/Sec
71	- DRY EXH. BLWR-SHEAVE END BRG HOR	.207 In/Sec
81	- DRY EXH BLWR-WHEEL END BRG HOR	.355 In/Sec
366-41	- VENT SCRUBBER CIRC - PUMP	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD HORIZ	.121 In/Sec
21	- MOTOR INBOARD HORIZ	.085 In/Sec
23	- MOTOR INBOARD AXIAL	.082 In/Sec
71	- PUMP HORIZ	.199 In/Sec
81	- PUMP VERT	.323 In/Sec
369-09	- SCREENER, OXONE	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD HORIZ	.534 In/Sec
11L	- MOTOR OUTBOARD HORIZ-LOW FREQ	6.491 In/Sec
21	- MOTOR INBOARD HORIZ	.382 In/Sec
23	- MOTOR INBOARD AXIAL	.246 In/Sec
31	- GEARBOX HOUSING -E-W DIRECTION	.189 In/Sec
368-02	- COOLER, OXONE	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD HORIZ	1.632 In/Sec
21	- MOTOR INBOARD HORIZ	1.372 In/Sec
23	- MOTOR INBOARD AXIAL	.397 In/Sec
31	- GEARBOX HOUSING -E-W DIR	.098 In/Sec
373-33	- OXONE PACKER ELEVATOR	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD END HORIZ	.265 In/Sec
21	- MOTOR DRIVE END- HORIZ	.394 In/Sec
23	- MOTOR DRIVE END- AXIAL	.631 In/Sec
51000868	- BKT ELEVATOR-above precrushr	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD END HORIZ	.569 In/Sec
12	- MOTOR OUTBOARD END VERT	1.868 In/Sec
13	- MOTOR OUTBOARD END AXIAL	.878 In/Sec
21	- MOTOR DRIVE END- HORIZ	.562 In/Sec
22	- MOTOR DRIVE END- VERT	1.942 In/Sec
23	- MOTOR DRIVE END- AXIAL	.920 In/Sec

31	- GEARBOX INPUT HORIZ	.548 In/Sec
32	- GEARBOX INPUT VERT	.592 In/Sec
33	- GEARBOX INPUT AXIAL	.675 In/Sec

7368-03	- PRECRUSHER OXONE	(30-Nov-20)
		OVERALL LEVEL
23	- MOTOR IB AXIAL	1.142 In/Sec
11	- MOTOR OB HOR	.598 In/Sec
21	- MOTOR IB HOR	.360 In/Sec
22	- MOTOR IB VERT	1.469 In/Sec
71	- IB BEARING HOR	.386 In/Sec
81	- OB BEARING HOR	.595 In/Sec

110-04	- OXONE BRINE CIRC PUMP	(30-Nov-20)
		OVERALL LEVEL
11	- MOTOR OUTBOARD HORIZ	.485 In/Sec
21	- MOTOR INBOARD HORIZ	.293 In/Sec
23	- MOTOR INBOARD AXIAL	.277 In/Sec
71	- PUMP HORIZ	.166 In/Sec
72	- PUMP VERT	.339 In/Sec

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Clarification Of Vibration Units:

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