

April 24, 2020

Plaskolite

Subject: April vibration report

Most of the machines surveyed were found to be in good condition, with 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 Specialist

Hi-Speed Industrial Service
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Data

Four of the route machines had vibrations just below or above the 0.25"/sec Velocity peak threshold. Please find the vibration summary below:

Hot Water Pumps 2, 3 and 5 have overall vibrations above the threshold limit at 0.43", 0.78" and 0.65"/sec velocity peak respectfully. The amplitudes vary over time. The vibrations generally consist of a dominant resonant peak, shaft fundamental and a secondary resonant peak. Peaks were found between 18 and 30 Hz. Possible root causes include imbalance, structural, resonance or flow issues in the pups or piping. Check pump parameters for running in the curve. Are all valves set correctly? Trim balancing and/or pump impeller inspection should be considered next. **Rated a Class II Defect.**

The Middle Syrup Cooling Pump Gearbox is still vibrating at what appears to be vane pass at neat 35 Hz. There is a fundamental vibration at input speed with a few harmonics. There also seems to be a gear mesh component at around 416 Hz with sidebands of input speed (20 Hz). The vibration amplitude has not changed much. The gearbox is in distress. Be prepared to change in the future. We will keep a close eye on it going forward. **Rated a Class II Defect.**

Please note the following:

The Fast Cooling Upper and Lower Motor bearings have elevated acceleration at near or above 2g's peak in the drive end bearings. The motors were spinning slowly. We suspect the bearings are fluted from shaft currents. **Rated a Class I Defect.**

The tower roof fans on the vibration route could use some modifications. The return air fan (RAF-100) guards need to be modified so better data can be acquired directly from the motor and fan bearing housings. Currently it is fully enclosed. The flare blower mounted on the platform above should have a remote accelerometer installed for data collection so as to prevent analyst from getting stung by wasps during climbing and data collection.

Overall vibration follow:

Abbreviated Last Measurement Summary

Database: mmaold.rbm
Station: PLASKOLITE MEMPHIS
Route No. 3: PLASKOLITE NEW
Report Date: 24-Apr-20 08:43

| MEASUREMENT POINT ----- | OVERALL LEVEL ----- | HFD / VHFD ----- |
|-------------------------------------|------------------------|---------------------|
| 5285-09 - FAN, COOLING TWR WEST | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| W1 - CELL FRAME -WEST END N-S DIR | .012 In/Sec | .043 G-s |
| W2 - CELL FRAME -WEST END E-W DIR | .025 In/Sec | .021 G-s |
| 5285-11 - FAN, COOLING TWR MIDDLE | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| M1 - CELL FRAME -MIDDLE N-S DIR | .0074 In/Sec | .034 G-s |
| M2 - CELL FRAME -MIDDLE E-W DIR | .0090 In/Sec | .060 G-s |
| 5285-12 - FAN, COOLING TWR EAST | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| E1 - CELL FRAME -EAST END E-W DIR | .0050 In/Sec | .0052 G-s |
| | OVERALL LEVEL | HFD (>5 kHz) |
| E2 - CELL FRAME -EAST END N-S DIR | .0063 In/Sec | .0010 G-s |
| 5285-21 - RETURN AIR FAN 100 AREA | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| 71 - FAN INBD (ON FRAME UNDER BRG) | .019 In/Sec | .0034 G-s |
| 81 - FAN OUTBD (ON FRAME UNDER BRG) | .011 In/Sec | .0033 G-s |
| S1100 - FLARE BLOWER | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| 11 - MOTOR FLARE STACK END HORIZ | .017 In/Sec | .012 G-s |
| 12 - MOTOR FLARE STACK END VERT | .017 In/Sec | .013 G-s |
| 13 - MOTOR FLARE STACK END AXIAL | .017 In/Sec | .013 G-s |
| 5214-04 - EAST SYRUP COOL PUMP | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| 11 - MOTOR OUTBOARD HORIZONTAL | .027 In/Sec | .094 G-s |
| 21 - MOTOR INBOARD HORIZONTAL | .028 In/Sec | .125 G-s |
| 23 - MOTOR INBOARD AXIAL | .020 In/Sec | .107 G-s |
| 31 - GEARBOX INPUT HORIZONTAL | .077 In/Sec | |
| 61 - GEARBOX OUTPUT SHAFT HORIZ | .081 In/Sec | |
| 71 - PUMP COUPLING END HORIZ | .065 In/Sec | .218 G-s |
| 81 - PUMPIMPELLER END HORIZ | .038 In/Sec | .351 G-s |
| 5214-03 - MIDDLE SYRUP COOL PUMP | (23-Apr-20) | |
| | OVERALL LEVEL | 1-20 KHz |
| 11 - MOTOR OUTBOARD HORIZONTAL | .056 In/Sec | .091 G-s |
| 21 - MOTOR INBOARD HORIZONTAL | .052 In/Sec | .111 G-s |
| 23 - MOTOR INBOARD AXIAL | .088 In/Sec | .107 G-s |
| 31 - GEARBOX INPUT HORIZONTAL | .402 In/Sec | |
| 61 - GEARBOX OUTPUT SHAFT HORIZ | .268 In/Sec | |
| 71 - PUMP COUPLING END HORIZ | .098 In/Sec | .167 G-s |

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| 81 | - PUMP IMPELLER END HORIZ | .065 In/Sec | .033 G-s |
| 5214-01 - WEST SYRUP COOL PUMP (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - MOTOR OUTBOARD HORIZONTAL | .062 In/Sec | .104 G-s |
| 21 | - MOTOR INBOARD HORIZONTAL | .068 In/Sec | .109 G-s |
| 23 | - MOTOR INBOARD AXIAL | .077 In/Sec | .045 G-s |
| 31 | - GEARBOX INPUT HORIZONTAL | .111 In/Sec | |
| 61 | - GEARBOX OUTPUT HORIZ | .160 In/Sec | |
| 71 | - PUMP CPLG END HORIZ | .116 In/Sec | .209 G-s |
| 81 | - PUMP IMPELLER END HORIZ | .151 In/Sec | .057 G-s |
| 5282-03 - PUMP #2 HOT WATER 5282-03 (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - #2 Hot Water Pump Mtr Top N-S | .434 In/Sec | .392 G-s |
| 12 | - #2 Hot Water Pump Mtr Top E-W | .384 In/Sec | .395 G-s |
| 5282-04 - PUMP #3 HOT WATER 5282-04 (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - #3 Hot Water Pump Mtr Top N-S | .469 In/Sec | .331 G-s |
| 12 | - #3 Hot Water Pump Mtr Top E-W | .775 In/Sec | .394 G-s |
| 5282-06 - PUMP #5 HOT WATER 5282-06 (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - #5 Hot Water Pump Mtr Top N-S | .654 In/Sec | .609 G-s |
| 12 | - #5 Hot Water Pump Mtr Top E-W | .438 In/Sec | .787 G-s |
| 5283-01 - BLOWER, EDGE WATER REMOVAL (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - MOTOR OUTBOARD HORIZONTAL | .141 In/Sec | .103 G-s |
| 21 | - MOTOR INBOARD HORIZONTAL | .109 In/Sec | .084 G-s |
| 23 | - MOTOR AXIAL | .068 In/Sec | .132 G-s |
| 71 | - BLOWER COUPLING END HORIZONTAL | .042 In/Sec | .466 G-s |
| 81 | - BLOWER WHEEL END HORIZONTAL | .106 In/Sec | .662 G-s |
| 5281-12 - BLOWER,SLOW COOLING (UPPER) (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - MOTOR OUTBD HORIZ | .035 In/Sec | .434 G-s |
| 21 | - MOTOR INBD HORIZ | .042 In/Sec | 1.334 G-s |
| 23 | - MOTOR INBD AXIAL | .044 In/Sec | 1.160 G-s |
| 71 | - FAN INBD (ON PILLOWBLOCK FOOT) | .041 In/Sec | .043 G-s |
| 81 | - FAN OUTBD (ON PILLOWBLOCK FOOT) | .038 In/Sec | .166 G-s |
| 5281-13 - BLOWER,SLOW COOLING (LOWER) (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - MOTOR OUTBD HORIZ | .131 In/Sec | .677 G-s |
| 21 | - MOTOR INBD HORIZ | .142 In/Sec | .996 G-s |
| 21H | - MOTOR INBD HORIZ | .138 In/Sec | |
| 23 | - MOTOR INBD AXIAL | .088 In/Sec | .912 G-s |
| 71 | - FAN INBD (ON PILLOWBLOCK FOOT) | .041 In/Sec | .131 G-s |
| 81 | - FAN OUTBD (ON PILLOWBLOCK FOOT) | .026 In/Sec | .151 G-s |
| 5281-14 - BLOWER,RAPID COOLING (UPPER) (23-Apr-20) | | | |
| | OVERALL LEVEL | | 1-20 KHz |
| 11 | - MOTOR OUTBD HORIZ | .059 In/Sec | 1.021 G-s |
| 21 | - MOTOR INBD HORIZ | .102 In/Sec | 2.738 G-s |
| 23 | - MOTOR INBD AXIAL | .050 In/Sec | .381 G-s |

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| 71 | - FAN INBD (ON PILLOWBLOCK FOOT) | .031 In/Sec | .234 G-s |
| 81 | - FAN OUTBD (ON PILLOWBLOCK FOOT) | .023 In/Sec | .235 G-s |

5281-08 - BLOWER, RAPID COOLING (LOWER) (23-Apr-20)

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| | OVERALL LEVEL | 1-20 KHz |
| 11 | - MOTOR OUTBD HORIZ | .037 In/Sec .781 G-s |
| 21 | - MOTOR INBD HORIZ | .092 In/Sec 1.865 G-s |
| 23 | - MOTOR INBD AXIAL | .046 In/Sec .822 G-s |
| 71 | - FAN INBD (ON PILLOWBLOCK FOOT) | .021 In/Sec .203 G-s |
| 81 | - FAN OUTBD (ON PILLOWBLOCK FOOT) | .017 In/Sec .203 G-s |

5281-10 - 200 BELT DRIVE, POLYMERIZER (23-Apr-20)

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| | OVERALL LEVEL | 1-20 KHz |
| 11 | - MOTOR OUTBOARD HORIZ | .027 In/Sec .289 G-s |
| 21 | - MOTOR INBD HORIZ | .034 In/Sec .556 G-s |
| 33 | - GEARBOX INPUT AXIAL | .0079 In/Sec .038 G-s |
| 31 | - GEARBOX INPUT HORIZ | .011 In/Sec .148 G-s |
| 61 | - GEARBOX OUTPUT HORIZ | .0050 In/Sec .051 G-s |
| 71 | - INBOARD PILLOWBLOCK | .0045 In/Sec .0020 G-s |
| 81 | - OUTBOARD PILLOWBLOCK | .0057 In/Sec .0016 G-s |

Clarification Of Vibration Units:

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