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May 15, 2024

NUCOR Melt Shop

Subject: May 2024 vibration survey

Below is a summary report for the Melt Shop monthly vibration survey that was performed on 5/14/24. 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

As always, it has been a pleasure to serve NUCOR Steel Flowood-Jackson, MS. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

ISO Certified Vibration Analyst, Category III

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Defects

Middle Caster Mold Water Pump

Pump was down this survey; however, the following still applies: Vibration data shows issues in the pump. Data suggests looseness/wear of the pump bearings/fits. Impeller and other pump internals may also have wear. The pump will likely need attention soon. Rated as a **CLASS II** defect.

East Servo Hyd. Pump

Pump vibration data shows quite a bit of hydraulic vane pass frequency and rpm sidebands surrounding these peaks. This is usually due to pump wear but may also be influenced by excessive loading and unloading of the pump. For now, ensure pump has proper flows and is operating properly. Rated as a **CLASS II** defect.

West Servo Hyd. Pump

Pump vibration data shows some hydraulic vane pass frequency and rpm sidebands around these peaks. This is usually due to pump wear but may also be influenced by excessive loading and unloading of the pump. For now, ensure pump has proper flows and is operating properly. Rated as a **CLASS II** defect.

Servo Hyd. Recirc. Pump

The pump still has higher than average vibration. Spectral data shows harmonics of hydraulic vane frequency. This may be due to internal pump wear and or flow issue. Rated as a **CLASS II** defect.

Middle 2nd Deck Hyd. Pump

Pump skid was down this survey; however, the following likely still applies: Overall amplitude is slightly lower but still high. The presence of vane harmonics and high acceleration amplitude in the pump suggests a flow issue. Ensure pump is operating at normal flow. Unit still has a high 1 x rpm vibration. Rated a **CLASS II** defect.

South 2nd Deck Hyd. Pump

Pump skid was down this survey; however, the following likely still applies: Spectral data of the pump shows harmonics of hydraulic vane frequency. This may be due to internal pump wear and or flow issue. Rated as a **CLASS II** defect.

Cooling Tower #4 Supply Pump

Pump data shows some signs of bearing defects/wear in the ODE pump bearing. Inspect pump as scheduling allows. Rated as a **CLASS III** defect.

Cooling Tower #5 Supply Pump

Pump has some increased 1 x rpm axial vibration. For now, it is recommended to inspect couplings, alignment, and all pump fasteners as scheduling allows. Rated as a **CLASS II** defect.

Cooling Tower #6 Supply Pump

The pump vibration data still indicates that there is bearing wear, and possibly cavitation in the pump. Inspect ODE pump bearing. Ensure the pump has no inlet restrictions and is operating in the correct part of the curve. Impeller may have excessive wear. Rated as a **CLASS II** defect.

Caster ID Baghouse Fan

Motor and fan inboard vertical data are still showing some impacting in the time waveform. It is recommended to inspect gear couplings especially the fan end coupling as time allows. We will continue to monitor this closely. Rated as a **CLASS II** defect.

West Furnace Baghouse Fan

Data still shows a 2 x rpm vibration in the motor. This usually is an indication of an alignment and or coupling issue. Vibration is not at an alarm level yet, so this is a **CLASS I** defect.

Spray Chamber Exhaust Fan

Motor and fan both have increased vibration this survey. Belts could be slipping which is allowing the motor to operate at speeds near a resonance which causing high 1 x fan rpm vibration in the unit. High 1 x rpm vibration could also be structural. Inspect all motor base mounts/fasteners. Inspect fan for build-up and inspect belt tension soon. Rated as a **CLASS III** defect.

North Caster Oscillator

Oscillators were down during this survey; however, the following likely still applies: This unit has visible axial movement of the input of the gear drive. You can see the movement at the coupling gap. Data of the gear drive does show some gear noise and this unit seems to be knocking worse than the other two drives. Inspect unit as scheduling allows. Rated as a **CLASS II** defect.

Abbreviated Last Measurement Summary
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Database: nucorja9.rbm
Station: Melt Shop

MEASUREMENT POINT		OVERALL LEVEL	HFD / VHFD
WCMWP	- WEST CASTER MOLD WATER PUMP	(14-May-24)	
		OVERALL LEVEL	1K-20KHz
MOH		.045 In/Sec	.122 G-s
MIH		.066 In/Sec	.189 G-s
MIA		.072 In/Sec	.121 G-s
PIA		.199 In/Sec	.595 G-s
PIH		.149 In/Sec	.501 G-s
POH		.140 In/Sec	.415 G-s
ECMWP	- EAST CASTER MOLD WATER PUMP	(14-May-24)	
		OVERALL LEVEL	1K-20KHz
MOH		.151 In/Sec	.251 G-s
MIH		.110 In/Sec	.256 G-s
MIA		.154 In/Sec	.224 G-s
PIA		.254 In/Sec	1.575 G-s
PIH		.133 In/Sec	1.832 G-s
POH		.150 In/Sec	1.715 G-s
WBOSTRP	- WEST Booster PUMP	(14-May-24)	
		OVERALL LEVEL	1K-20KHz
MOH		.043 In/Sec	.299 G-s
MIH		.047 In/Sec	.340 G-s
MIA		.038 In/Sec	.147 G-s
PIA		.115 In/Sec	.812 G-s
PIH		.113 In/Sec	.670 G-s
POH		.198 In/Sec	2.192 G-s
ECSWP 1LFT	- EAST CASTER SPRAY WP 1 LEFT	(14-May-24)	
		OVERALL LEVEL	1K-20KHz
MOH		.106 In/Sec	.206 G-s
MIH		.084 In/Sec	.171 G-s
MIA		.083 In/Sec	.134 G-s

MCSWP 3RT - MID CASTER SPRAY WP 3 RIGHT (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.210 In/Sec	.613 G-s
MIH	.106 In/Sec	.748 G-s
MIA	.130 In/Sec	.547 G-s

WCSWP 4RT - WEST CASTER SPRAY WP 4 RIGH (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.201 In/Sec	.312 G-s
MIH	.126 In/Sec	.499 G-s
MIA	.120 In/Sec	.431 G-s

ESERVOHYDP - EAST SERVO Hyd PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.064 In/Sec	.344 G-s
MIH	.087 In/Sec	.516 G-s
PIV	.208 In/Sec	2.483 G-s

WSERVOHYDP - WEST SERVO Hyd PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.183 In/Sec	.272 G-s
MIH	.111 In/Sec	.300 G-s
PIV	.185 In/Sec	1.705 G-s

SERVOHRECP - SERVO Hyd RECIRC PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.170 In/Sec	.422 G-s
MIH	.160 In/Sec	1.940 G-s
PIV	.301 In/Sec	2.559 G-s

1SUPLYP - #1 Supply Pump (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.061 In/Sec	.182 G-s
MIH	.085 In/Sec	.154 G-s
MIA	.102 In/Sec	.103 G-s
PIA	.392 In/Sec	.058 G-s
PIH	.288 In/Sec	.341 G-s
POH	.193 In/Sec	.450 G-s

2SUPLYP - #2 Supply Pump (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.058 In/Sec	.475 G-s
MIH	.057 In/Sec	.372 G-s
MIA	.081 In/Sec	.098 G-s
PIA	.197 In/Sec	.401 G-s
PIH	.197 In/Sec	.487 G-s
POH	.285 In/Sec	1.791 G-s

4SUPLYP - #4 Supply Pump (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.063 In/Sec	.975 G-s
MIH	.068 In/Sec	1.028 G-s
MIA	.063 In/Sec	.290 G-s
PIA	.185 In/Sec	.563 G-s
PIH	.168 In/Sec	.679 G-s
POH	.296 In/Sec	2.743 G-s

5SUPLYP - #5 Supply Pump (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.046 In/Sec	.642 G-s
MIH	.054 In/Sec	.642 G-s
MIA	.070 In/Sec	.324 G-s
PIA	.621 In/Sec	.580 G-s
PIH	.311 In/Sec	.807 G-s

6SUPLYP - #6 Supply Pump (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.068 In/Sec	.163 G-s
MIH	.083 In/Sec	.177 G-s
MIA	.094 In/Sec	.242 G-s

PIA	.182 In/Sec	.130 G-s
PIH	.178 In/Sec	.461 G-s
POH	.221 In/Sec	1.423 G-s

CBRA - CASTER BAGHOUSE REVERSE AIR (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.044 In/Sec	.090 G-s
MIH	.058 In/Sec	.128 G-s
MIA	.042 In/Sec	.130 G-s
FIH	.040 In/Sec	.377 G-s
FOH	.080 In/Sec	.215 G-s

CBID - CASTER BAGHOUSE ID FAN (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.035 In/Sec	.069 G-s
MOV	.030 In/Sec	.111 G-s
MIH	.053 In/Sec	.131 G-s
MIV	.071 In/Sec	.430 G-s
MIA	.031 In/Sec	.130 G-s
FIA	.079 In/Sec	.710 G-s
FIH	.096 In/Sec	1.426 G-s
FIV	.088 In/Sec	.676 G-s
FOH	.048 In/Sec	.203 G-s
FOV	.026 In/Sec	.154 G-s
FOA	.049 In/Sec	.110 G-s

FRAF - Furnace REVERSE AIR Fan (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.032 In/Sec	.222 G-s
MIH	.033 In/Sec	.596 G-s
MIA	.029 In/Sec	.612 G-s
FIA	.054 In/Sec	.651 G-s
FIH	.026 In/Sec	.405 G-s
FOH	.020 In/Sec	.532 G-s
FOV	.023 In/Sec	.368 G-s

EFBHF - East Furnace Bag House Fan (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.052 In/Sec	.673 G-s
MIH	.063 In/Sec	.575 G-s
MIA	.027 In/Sec	.176 G-s
FIA	.087 In/Sec	1.138 G-s
FIH	.098 In/Sec	1.023 G-s
FOH	.093 In/Sec	.498 G-s

WFBHF - WEST Furnace Bag House Fan (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.140 In/Sec	.244 G-s
MIH	.178 In/Sec	.329 G-s
MIA	.059 In/Sec	.395 G-s
FIA	.110 In/Sec	1.183 G-s
FIH	.128 In/Sec	1.394 G-s
FOH	.090 In/Sec	.747 G-s

NCHYDP - North CASTER Hyd PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.046 In/Sec	.246 G-s
MIH	.053 In/Sec	.659 G-s
PIH	.100 In/Sec	.565 G-s

SCHYDP - SOUTH CASTER Hyd PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.114 In/Sec	.224 G-s
MIH	.079 In/Sec	.334 G-s
PIH	.148 In/Sec	.641 G-s

SCEXFAN - SPRAY CHAMBER EXHAUST Fan (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	1.188 In/Sec	.429 G-s
MIH	1.258 In/Sec	.352 G-s

MIA	.353 In/Sec	.176 G-s
FIH	.640 In/Sec	.175 G-s
FOH	.339 In/Sec	.485 G-s

ENARCOHYDP - EAST NARCO Hyd PUMP (14-May-24)

	OVERALL LEVEL	1K-20KHz
MOH	.088 In/Sec	.072 G-s
MIH	.080 In/Sec	.112 G-s
PIV	.079 In/Sec	.139 G-s

Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK