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June 1, 2021

NUCOR Melt Shop

Subject: May 2021 vibration survey

Below is a summary report for the Melt Shop monthly vibration survey that was performed on 5/26/21. 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.

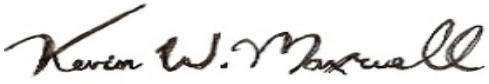
Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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,



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Defects

West Caster Mold Water Pump
High 1 x rpm vibration is present in the motor axial. This indicates angular misalignment. Motor and pump may also have some internal wear. Perform a precision alignment with less than .003" offset and angularity. Ensure there is no soft foot present in the motor. Rated as a **CLASS II** defect.

East Caster Mold Water Pump
Pump is still showing some signs of internal wear. Coupling may also be wearing due to misalignment. Perform a precision alignment with less than .003" offset and angularity. Ensure there is no soft foot present. Rated as a **CLASS II** defect.

West Booster Pump
Pump data shows another increase in non-synchronous vibration at the outboard end of the pump. This is good indication of bearing defects taking place in the pump bearings. Pump will need attention SOON. Rated as a **CLASS III** defect.

West Caster Spray Water Pump
Motor data shows defects are present in the motor bearings. We will monitor this closely. Rated as a **CLASS II** defect for now.

Cooling Tower #2 Supply Pump
Pump was down this survey; however, the following still applies: The pump appears to have cavitation which is causing a high noise floor in the spectrum. This is also making the ODE pump bearing have high acceleration. This could also be a bearing issues, but the noise floor is masking the data somewhat. Pump impeller or other pump internals may also be worn which could be causing this vibration. Pump needs to be inspected as time allows. Rated as a **CLASS II** defect.

Cooling Tower #3 Supply Pump
Pump was down this survey; however, the following still applies: The pump appears to have cavitation which is causing a high noise floor in the spectrum. This is also making the ODE pump bearing have high acceleration. This could also be a bearing issues, but the noise floor is masking the data somewhat. Pump impeller or other pump internals could also be worn which could be causing this vibration. Pump needs to be inspected as time allows. Rated as a **CLASS II** defect.

Cooling Tower #6 Supply Pump
The pump vibration data is still indicating that there is bearing wear, and possibly cavitation in the pump. Inspect ODE pump bearing SOON. Ensure the pump has no inlet restrictions and is operating in the correct part of the curve. Rated as a **CLASS II** defect.

Spray Chamber Exhaust Fan
Motor still has high fan speed vibration. Outboard fan bearing is showing signs of defects/wear. Inspect fan bearings especially the ODE fan bearing for defects and proper lubrication as soon as practical. This unit is very likely operating near a critical speed and is resonant which is likely influencing the high vibration in the motor and fan. We will continue to monitor this closely. Rated as a **CLASS II** defect.

South Caster Oscillator
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 (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.130 In/Sec	.532 G-s
MIH	.121 In/Sec	1.257 G-s
MIA	.218 In/Sec	.881 G-s
PIA	.298 In/Sec	.777 G-s
PIH	.166 In/Sec	1.140 G-s
POH	.146 In/Sec	1.098 G-s
MCMWP - MID CASTER MOLD WATER PUMP (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.095 In/Sec	1.077 G-s
MIH	.096 In/Sec	.577 G-s
MIA	.194 In/Sec	.818 G-s
PIA	.190 In/Sec	1.197 G-s
PIH	.168 In/Sec	.824 G-s
POH	.119 In/Sec	1.004 G-s
WBOSTRP - WEST Booster PUMP (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.080 In/Sec	.188 G-s
MIH	.064 In/Sec	.198 G-s
MIA	.039 In/Sec	.198 G-s
PIA	.129 In/Sec	1.135 G-s
PIH	.108 In/Sec	.790 G-s
POH	.225 In/Sec	2.341 G-s
EBOSTRP - EAST Booster PUMP (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.110 In/Sec	.506 G-s
MIH	.077 In/Sec	.471 G-s
MIA	.039 In/Sec	.175 G-s
PIA	.102 In/Sec	.142 G-s
PIH	.136 In/Sec	.313 G-s
POH	.093 In/Sec	.313 G-s
ECSWP 1LFT - EAST CASTER SPRAY WP 1 LEFT (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.523 In/Sec	.808 G-s
MIH	.302 In/Sec	1.335 G-s
MIA	.156 In/Sec	.779 G-s
MCSWP 2LFT - MID CASTER SPRAY WP 2 LEFT (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.152 In/Sec	.519 G-s
MIH	.100 In/Sec	.851 G-s
MIA	.133 In/Sec	.879 G-s
WCSWP 4RT - WEST CASTER SPRAY WP 4 RIGH (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.247 In/Sec	1.682 G-s
MIH	.177 In/Sec	2.147 G-s
MIA	.112 In/Sec	.729 G-s
MSERVOHYDP - MIDDLE SERVO Hyd PUMP (26-May-21)		
	OVERALL LEVEL	1K-20KHz
MOH	.121 In/Sec	.210 G-s
MIH	.055 In/Sec	.275 G-s
PIV	.101 In/Sec	.906 G-s

WSERVOHYDP - WEST SERVO Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.064 In/Sec	.140 G-s
MIH	.066 In/Sec	.225 G-s
PIV	.104 In/Sec	.678 G-s

SERVOHRECP - SERVO Hyd RECIRC PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.059 In/Sec	.165 G-s
MIH	.045 In/Sec	.374 G-s
PIV	.088 In/Sec	.575 G-s

N2DECKHYDP - North 2ND DECK Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.084 In/Sec	.991 G-s
MIH	.176 In/Sec	1.170 G-s
PIV	.318 In/Sec	1.829 G-s

2DEKRECIP - 2ND DECK L&S Hyd RECIRC PUM (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.088 In/Sec	.899 G-s
MIH	.108 In/Sec	.874 G-s
PIV	.357 In/Sec	2.231 G-s

S2DECKHYDP - SOUTH 2ND DECK Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.055 In/Sec	.635 G-s
MIH	.061 In/Sec	.803 G-s
PIV	.132 In/Sec	1.364 G-s

1SUPLYP - #1 Supply Pump (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.058 In/Sec	.198 G-s
MIH	.067 In/Sec	.158 G-s
MIA	.079 In/Sec	.127 G-s
PIA	.173 In/Sec	.495 G-s
PIH	.190 In/Sec	1.073 G-s
POH	.175 In/Sec	.761 G-s

5SUPLYP - #5 Supply Pump (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.034 In/Sec	.477 G-s
MIH	.056 In/Sec	.583 G-s
MIA	.058 In/Sec	.312 G-s
PIA	.210 In/Sec	1.127 G-s
PIH	.196 In/Sec	.789 G-s
POH	.214 In/Sec	1.040 G-s

6SUPLYP - #6 Supply Pump (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.081 In/Sec	.193 G-s
MIH	.094 In/Sec	.211 G-s
MIA	.103 In/Sec	.137 G-s
PIA	.186 In/Sec	.611 G-s
PIH	.234 In/Sec	1.129 G-s
POH	.237 In/Sec	1.890 G-s

CBRA - CASTER BAGHOUSE REVERSE AIR (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.061 In/Sec	.301 G-s
MIH	.056 In/Sec	.180 G-s
MIA	.028 In/Sec	.190 G-s

CBID - CASTER BAGHOUSE ID FAN (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.051 In/Sec	.052 G-s
MOV	.027 In/Sec	.062 G-s
MIH	.060 In/Sec	.126 G-s
MIV	.052 In/Sec	.184 G-s
MIA	.035 In/Sec	.228 G-s

FIA	.186 In/Sec	.551 G-s
FIH	.122 In/Sec	1.034 G-s
FIV	.088 In/Sec	1.067 G-s
FOH	.131 In/Sec	.659 G-s
FOV	.039 In/Sec	.720 G-s
FOA	.081 In/Sec	.622 G-s

FRAF - Furnace REVERSE AIR Fan (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.040 In/Sec	.244 G-s
MIH	.051 In/Sec	.406 G-s
MIA	.031 In/Sec	.239 G-s
FIA	.058 In/Sec	.386 G-s
FIH	.040 In/Sec	.484 G-s
FOH	.032 In/Sec	.156 G-s

EFBHF - East Furnace Bag House Fan (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.067 In/Sec	.727 G-s
MIH	.072 In/Sec	.830 G-s
MIA	.029 In/Sec	.076 G-s
FIA	.053 In/Sec	.449 G-s
FIH	.087 In/Sec	.576 G-s
FOH	.095 In/Sec	1.231 G-s

WFBHF - WEST Furnace Bag House Fan (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.081 In/Sec	.454 G-s
MIH	.107 In/Sec	.736 G-s
MIA	.090 In/Sec	.616 G-s
FIA	.124 In/Sec	1.263 G-s
FIH	.133 In/Sec	1.572 G-s
FOH	.104 In/Sec	.674 G-s

NCHYDP - North CASTER Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.063 In/Sec	.439 G-s
MIH	.031 In/Sec	.153 G-s
PIH	.051 In/Sec	.021 G-s

MIDCHYDP - MIDDLE CASTER Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.135 In/Sec	.778 G-s
MIH	.089 In/Sec	.471 G-s
PIH	.151 In/Sec	1.341 G-s

SCHYDP - SOUTH CASTER Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.131 In/Sec	1.462 G-s
MIH	.082 In/Sec	.778 G-s
PIH	.281 In/Sec	3.396 G-s

SCEXFAN - SPRAY CHAMBER EXHAUST Fan (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.783 In/Sec	.144 G-s
MIH	.725 In/Sec	.346 G-s
MIA	.570 In/Sec	.210 G-s
FIH	.392 In/Sec	.288 G-s
FOH	.274 In/Sec	.380 G-s

ENARCOHYDP - EAST NARCO Hyd PUMP (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.052 In/Sec	.209 G-s
MIH	.064 In/Sec	.326 G-s
PIV	.217 In/Sec	.529 G-s

NC OCILLA - North Caster Oscillator (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.389 In/Sec	.436 G-s
MIH	.314 In/Sec	.553 G-s

MIA	.171 In/Sec	.328 G-s
GIA	.152 In/Sec	.946 G-s
GIH	.263 In/Sec	.462 G-s
GOH	.234 In/Sec	.903 G-s

MC OCILLA - Middle Caster Oscillator (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.317 In/Sec	.271 G-s
MIH	.316 In/Sec	.273 G-s
MIA	.151 In/Sec	.371 G-s
GIA	.148 In/Sec	.767 G-s
GIH	.232 In/Sec	.630 G-s
GOH	.221 In/Sec	1.393 G-s

SC OCILLA - South Caster Oscillator (26-May-21)

	OVERALL LEVEL	1K-20KHz
MOH	.185 In/Sec	.220 G-s
MIH	.161 In/Sec	.436 G-s
MIA	.166 In/Sec	.265 G-s
GIA	.153 In/Sec	.832 G-s
GIH	.190 In/Sec	.581 G-s
GOH	.174 In/Sec	1.252 G-s

Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK