7030 Ryburn Dr. Millington, TN Phone: (901) 873-5300 Fax: (901) 873-5301 www.gohispeed.com

November 13, 2023

NUCOR Melt Shop

Subject: October 2023 vibration survey

Below is a summary report for the Melt Shop monthly vibration survey that was performed on 11/10/23. 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.

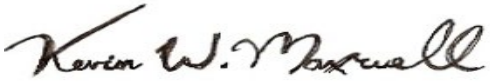
Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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

Cell: 901-486-4565

Email: kwilliam@gohispeed.com

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.

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 was down this survey; however, the following still applies: The hyd. Pump has had a significant increase in vibration. Data shows vibration to be 1 x rpm with overall amplitude over 1.4 ips. Check coupling and ensure pump is operating properly. Rated a **CLASS III** defect.

North 2nd Deck Hyd. Pump
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.

Cooling Tower Pump #5
Data still shows high 1 x rpm axial vibration in the pump. Pump impeller/shaft could be out of balance or bent. Pump could also have cocked bearing or some other internal misalignment. Inspect as time 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 SOON. 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 still shows some impacting. It is recommended to inspect gear couplings as time allows. We are monitoring this closely. Rated as a **CLASS II** defect.

Furnace Reverse Air Fan
The impacting vibration in fan bearings was higher in amplitude this survey. The fan shaft also appears to have visible movement especially at the outboard (ODE) fan bearing. It is recommended to perform a lift check of the fan shaft as scheduling allows. Ensure fan and inner cone are not making contact. We will continue to monitor this issue closely. Rated as a **CLASS II** defect.

West Furnace Baghouse Fan
It appears that the drive motor has been changed since last survey. New data shows an increase in 2 x rpm vibration. 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.

North 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

****

Database: nucorja9.rbm
Station: Melt Shop
Route No. 1: MELT SHOP

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
WCMWP - WEST CASTER MOLD WATER PUMP (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.049 In/Sec	.246 G-s
MIH	.054 In/Sec	.555 G-s
MIA	.085 In/Sec	.263 G-s
PIA	.134 In/Sec	.467 G-s
PIH	.083 In/Sec	.847 G-s
POH	.122 In/Sec	.651 G-s
ECMWP - EAST CASTER MOLD WATER PUMP (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.051 In/Sec	.485 G-s
MIH	.039 In/Sec	.758 G-s
MIA	.168 In/Sec	.534 G-s
PIA	.197 In/Sec	4.113 G-s
PIH	.102 In/Sec	2.051 G-s
POH	.187 In/Sec	2.443 G-s
WBOSTRP - WEST Booster PUMP (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.070 In/Sec	.289 G-s
MIH	.070 In/Sec	.350 G-s
MIA	.035 In/Sec	.229 G-s
PIA	.128 In/Sec	2.356 G-s
PIH	.119 In/Sec	1.360 G-s
POH	.182 In/Sec	2.437 G-s
EBOSTRP - EAST Booster PUMP (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.089 In/Sec	.213 G-s
MIH	.078 In/Sec	.457 G-s
MIA	.077 In/Sec	.211 G-s
ECSWP 1LFT - EAST CASTER SPRAY WP 1 LEFT (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.135 In/Sec	.186 G-s
MIH	.060 In/Sec	.726 G-s
MIA	.092 In/Sec	.054 G-s
MCSWP 2LFT - MID CASTER SPRAY WP 2 LEFT (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.108 In/Sec	.430 G-s
MIH	.095 In/Sec	.365 G-s
MIA	.138 In/Sec	.188 G-s
MCSWP 3RT - MID CASTER SPRAY WP 3 RIGHT (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.190 In/Sec	.555 G-s
MIH	.132 In/Sec	1.771 G-s
MIA	.115 In/Sec	.394 G-s
ESERVOHYDP - EAST SERVO Hyd PUMP (10-Nov-23)		
	OVERALL LEVEL	1K-20KHz
MOH	.040 In/Sec	.362 G-s
MIH	.069 In/Sec	.521 G-s
PIV	.274 In/Sec	1.631 G-s

WSERVOHYDP - WEST SERVO Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.139 In/Sec	.566 G-s
MIH	.129 In/Sec	.871 G-s
PIV	.291 In/Sec	1.365 G-s

SERVOHRECP - SERVO Hyd RECIRC PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.149 In/Sec	.809 G-s
MIH	.135 In/Sec	1.071 G-s
PIV	.188 In/Sec	2.190 G-s

N2DECKHYDP - North 2ND DECK Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.108 In/Sec	1.289 G-s
MIH	.086 In/Sec	2.067 G-s
PIV	.176 In/Sec	13.11 G-s

2DEKRECIP - 2ND DECK L&S Hyd RECIRC PUM (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.110 In/Sec	1.007 G-s
MIH	.074 In/Sec	2.163 G-s
PIV	.217 In/Sec	5.774 G-s

S2DECKHYDP - SOUTH 2ND DECK Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.148 In/Sec	.689 G-s
MIH	.176 In/Sec	1.036 G-s
PIV	.384 In/Sec	6.709 G-s

1SUPLYP - #1 Supply Pump (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.060 In/Sec	.266 G-s
MIH	.087 In/Sec	.255 G-s
MIA	.090 In/Sec	.192 G-s
PIA	.402 In/Sec	.914 G-s
PIH	.252 In/Sec	.565 G-s
POH	.227 In/Sec	.526 G-s

2SUPLYP - #2 Supply Pump (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.054 In/Sec	.518 G-s
MIH	.051 In/Sec	.628 G-s
MIA	.093 In/Sec	.379 G-s
PIA	.183 In/Sec	1.083 G-s
PIH	.242 In/Sec	1.067 G-s
POH	.226 In/Sec	2.005 G-s

3SUPLYP - #3 Supply Pump (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.054 In/Sec	1.491 G-s
MIH	.061 In/Sec	1.193 G-s
MIA	.066 In/Sec	1.000 G-s
PIA	.135 In/Sec	.821 G-s
PIH	.130 In/Sec	.553 G-s
POH	.172 In/Sec	2.224 G-s

5SUPLYP - #5 Supply Pump (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.046 In/Sec	.908 G-s
MIH	.063 In/Sec	.647 G-s
MIA	.096 In/Sec	.452 G-s
PIA	.419 In/Sec	2.928 G-s
PIH	.242 In/Sec	1.397 G-s
POH	.321 In/Sec	.785 G-s

6SUPLYP - #6 Supply Pump (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.108 In/Sec	.417 G-s
MIH	.119 In/Sec	.231 G-s

	MIA	.141 In/Sec	.283 G-s
	PIA	.166 In/Sec	.858 G-s
	PIH	.209 In/Sec	.543 G-s
	POH	.248 In/Sec	.907 G-s

CBRA - CASTER BAGHOUSE REVERSE AIR (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.032 In/Sec	.175 G-s
MIH	.031 In/Sec	.182 G-s
MIA	.020 In/Sec	.169 G-s
FIH	.060 In/Sec	.079 G-s
FOH	.104 In/Sec	.032 G-s

CBID - CASTER BAGHOUSE ID FAN (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.057 In/Sec	.072 G-s
MOV	.039 In/Sec	.164 G-s
MIH	.070 In/Sec	.118 G-s
MIV	.058 In/Sec	.293 G-s
MIA	.035 In/Sec	.155 G-s
FIA	.141 In/Sec	1.522 G-s
FIH	.115 In/Sec	2.526 G-s
FIV	.090 In/Sec	2.577 G-s
FOH	.161 In/Sec	1.398 G-s
FOV	.031 In/Sec	1.881 G-s
FOA	.126 In/Sec	2.622 G-s

FRAF - Furnace REVERSE AIR Fan (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.103 In/Sec	.263 G-s
MIH	.121 In/Sec	.639 G-s
MIA	.047 In/Sec	.281 G-s
FIA	.065 In/Sec	.526 G-s
FIH	.152 In/Sec	1.033 G-s
FOH	.107 In/Sec	1.069 G-s
FOV	.060 In/Sec	.899 G-s
FIV	.062 In/Sec	.787 G-s

EFBHF - East Furnace Bag House Fan (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.073 In/Sec	.453 G-s
FOH	.055 In/Sec	3.046 G-s

WFBHF - WEST Furnace Bag House Fan (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.152 In/Sec	.942 G-s
MIH	.200 In/Sec	.433 G-s
MIA	.108 In/Sec	.542 G-s
FIA	.081 In/Sec	1.758 G-s
FIH	.111 In/Sec	2.415 G-s
FOH	.110 In/Sec	1.625 G-s

NCHYDP - North CASTER Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.108 In/Sec	.747 G-s
MIH	.092 In/Sec	1.104 G-s
PIH	.307 In/Sec	2.137 G-s

MIDCHYDP - MIDDLE CASTER Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.120 In/Sec	.563 G-s
MIH	.058 In/Sec	.394 G-s
PIH	.273 In/Sec	1.041 G-s

SCEXFAN - SPRAY CHAMBER EXHAUST Fan (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.320 In/Sec	.579 G-s
MIH	.330 In/Sec	.515 G-s
MIA	.094 In/Sec	.121 G-s
FIH	.238 In/Sec	.251 G-s

	FOH	.243 In/Sec	.867 G-s

ENARCOHYDP - EAST NARCO Hyd PUMP (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.060 In/Sec	.471 G-s
MIH	.050 In/Sec	.259 G-s
PIV	.103 In/Sec	1.423 G-s

NC OCILLA - North Caster Oscillator (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.114 In/Sec	.311 G-s
MIH	.087 In/Sec	.942 G-s
MIA	.087 In/Sec	.233 G-s
GIA	.095 In/Sec	.081 G-s
GIH	.087 In/Sec	.743 G-s
GOH	.092 In/Sec	.852 G-s

MC OCILLA - Middle Caster Oscillator (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.223 In/Sec	.351 G-s
MIH	.148 In/Sec	.087 G-s
MIA	.081 In/Sec	.142 G-s
GIA	.066 In/Sec	.532 G-s
GIH	.091 In/Sec	.648 G-s
GOH	.088 In/Sec	.514 G-s

SC OCILLA - South Caster Oscillator (10-Nov-23)

	OVERALL LEVEL	1K-20KHz
MOH	.055 In/Sec	.237 G-s
MIH	.034 In/Sec	.130 G-s
MIA	.034 In/Sec	.110 G-s
GIA	.023 In/Sec	.109 G-s
GIH	.032 In/Sec	.146 G-s
GOH	.028 In/Sec	.078 G-s

Clarification Of Vibration Units:

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