



**QualiTest® Diagnostics**

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July 29, 2024

NUCOR Melt Shop

Subject: July 2024 vibration survey

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Below is a summary report for the Melt Shop monthly vibration survey that was performed on 7/25/24. 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

**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.

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 was down this survey; however, the following still applies:*** 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 is still showing some hydraulic vane pass frequency with rpm sidebands. 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.

### **Middle 2<sup>nd</sup> Deck Hyd. Pump**

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 as a **CLASS II** defect.

### **South 2<sup>nd</sup> Deck Hyd. Pump**

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 was down this survey; however, the following likely still applies:*** 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 was down this survey; however, the following likely still applies:*** 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.

### Abbreviated Last Measurement Summary

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Database: nucorja9.rbm

Station: Melt Shop

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
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WCMWP - WEST CASTER MOLD WATER PUMP (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.112 In/Sec	.081 G-s
MIH	.094 In/Sec	.265 G-s
MIA	.100 In/Sec	.190 G-s
PIA	.152 In/Sec	.396 G-s
PIH	.116 In/Sec	.665 G-s
POH	.137 In/Sec	.629 G-s
ECMWP - EAST CASTER MOLD WATER PUMP (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.097 In/Sec	.316 G-s
MIH	.130 In/Sec	.286 G-s
MIA	.086 In/Sec	.298 G-s
PIA	.185 In/Sec	1.257 G-s
PIH	.148 In/Sec	1.649 G-s
POH	.160 In/Sec	1.799 G-s
WBOSTRP - WEST Booster PUMP (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.060 In/Sec	.747 G-s
MIH	.035 In/Sec	.221 G-s
MIA	.042 In/Sec	.116 G-s
PIA	.098 In/Sec	.697 G-s
PIH	.125 In/Sec	.964 G-s
POH	.174 In/Sec	1.749 G-s
ECSWP 1LFT - EAST CASTER SPRAY WP 1 LEFT (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.168 In/Sec	.237 G-s
MIH	.090 In/Sec	.271 G-s
MIA	.115 In/Sec	.105 G-s
MCSWP 2LFT - MID CASTER SPRAY WP 2 LEFT (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.163 In/Sec	.591 G-s
MIH	.107 In/Sec	.422 G-s
MIA	.108 In/Sec	.305 G-s
MCSWP 3RT - MID CASTER SPRAY WP 3 RIGHT (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.150 In/Sec	.263 G-s
MIH	.091 In/Sec	.532 G-s
MIA	.099 In/Sec	.262 G-s
MSERVOHYDP - MIDDLE SERVO Hyd PUMP (25-Jul-24)		
OVERALL LEVEL	1K-20KHz	
MOH	.150 In/Sec	.172 G-s

MIH	.076 In/Sec	.211 G-s
PIV	.168 In/Sec	1.119 G-s
WSERVOHYDP - WEST SERVO Hyd PUMP (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.075 In/Sec	.472 G-s
MIH	.096 In/Sec	.578 G-s
PIV	.200 In/Sec	1.734 G-s
SERVOHRECP - SERVO Hyd RECIRC PUMP (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.107 In/Sec	.048 G-s
MIH	.087 In/Sec	.457 G-s
PIV	.139 In/Sec	.542 G-s
N2DECKHYDP - North 2ND DECK Hyd PUMP (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.059 In/Sec	.375 G-s
MIH	.097 In/Sec	.660 G-s
PIV	.193 In/Sec	2.370 G-s
2DEKRECIP - 2ND DECK L&S Hyd RECIRC PUM (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.113 In/Sec	.423 G-s
MIH	.132 In/Sec	.336 G-s
PIV	.261 In/Sec	1.970 G-s
S2DECKHYDP - SOUTH 2ND DECK Hyd PUMP (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.267 In/Sec	.530 G-s
MIH	.167 In/Sec	.570 G-s
PIV	.630 In/Sec	1.657 G-s
1SUPLYP - #1 Supply Pump (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.069 In/Sec	.178 G-s
MIH	.097 In/Sec	.132 G-s
MIA	.111 In/Sec	.104 G-s
PIA	.358 In/Sec	.489 G-s
PIH	.260 In/Sec	.271 G-s
POH	.171 In/Sec	.528 G-s
2SUPLYP - #2 Supply Pump (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.068 In/Sec	.861 G-s
MIH	.075 In/Sec	.757 G-s
MIA	.077 In/Sec	.288 G-s
PIA	.278 In/Sec	.405 G-s
PIH	.252 In/Sec	.533 G-s
POH	.249 In/Sec	1.639 G-s
3SUPLYP - #3 Supply Pump (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.078 In/Sec	1.300 G-s
MIH	.079 In/Sec	1.107 G-s
MIA	.059 In/Sec	.423 G-s
PIA	.180 In/Sec	.276 G-s
PIH	.128 In/Sec	.297 G-s
POH	.188 In/Sec	1.298 G-s
6SUPLYP - #6 Supply Pump (25-Jul-24)		
	OVERALL LEVEL	1K-20KHz
MOH	.044 In/Sec	.187 G-s
MIH	.057 In/Sec	.184 G-s
MIA	.064 In/Sec	.120 G-s
PIA	.142 In/Sec	.531 G-s
PIH	.153 In/Sec	.589 G-s
POH	.202 In/Sec	1.355 G-s
CBRA - CASTER BAGHOUSE REVERSE AIR (25-Jul-24)		

		OVERALL LEVEL	1K-20KHz
MOH		.041 In/Sec	.172 G-s
MIH		.051 In/Sec	.113 G-s
MIA		.035 In/Sec	.085 G-s
FIH		.045 In/Sec	.263 G-s
FOH		.104 In/Sec	.254 G-s
CBID	- CASTER BAGHOUSE ID FAN	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.067 In/Sec	.078 G-s
MOV		.034 In/Sec	.076 G-s
MIH		.050 In/Sec	.149 G-s
MIV		.071 In/Sec	.209 G-s
MIA		.034 In/Sec	.167 G-s
FIA		.111 In/Sec	.444 G-s
FIH		.105 In/Sec	1.210 G-s
FIV		.107 In/Sec	1.103 G-s
FOH		.059 In/Sec	.209 G-s
FOV		.024 In/Sec	.149 G-s
FOA		.029 In/Sec	.070 G-s
FRAF	- Furnace REVERSE AIR Fan	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.053 In/Sec	.264 G-s
MIH		.050 In/Sec	.665 G-s
MIA		.052 In/Sec	.772 G-s
FIA		.103 In/Sec	.261 G-s
FIH		.063 In/Sec	.440 G-s
FOH		.041 In/Sec	.252 G-s
EFBHF	- East Furnace Bag House Fan	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.065 In/Sec	.702 G-s
MIH		.059 In/Sec	.677 G-s
MIA		.059 In/Sec	.921 G-s
FIA		.070 In/Sec	.553 G-s
FIH		.094 In/Sec	1.012 G-s
FOH		.091 In/Sec	1.062 G-s
WFBHF	- WEST Furnace Bag House Fan	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.086 In/Sec	.200 G-s
MIH		.113 In/Sec	.364 G-s
MIA		.039 In/Sec	.280 G-s
FIA		.089 In/Sec	.583 G-s
FIH		.121 In/Sec	1.000 G-s
FOH		.094 In/Sec	1.199 G-s
MIDCHYDP	- MIDDLE CASTER Hyd PUMP	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.056 In/Sec	.381 G-s
MIH		.052 In/Sec	.583 G-s
PIH		.137 In/Sec	.912 G-s
SCHYDP	- SOUTH CASTER Hyd PUMP	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.149 In/Sec	.296 G-s
MIH		.105 In/Sec	.367 G-s
PIH		.138 In/Sec	.662 G-s
SCEXFAN	- SPRAY CHAMBER EXHAUST Fan	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	
MOH		.474 In/Sec	.221 G-s
MIH		.562 In/Sec	.105 G-s
MIA		.302 In/Sec	.257 G-s
FIH		.677 In/Sec	.099 G-s
FOH		.430 In/Sec	.329 G-s
ENARCOHYDP	- EAST NARCO Hyd PUMP	(25-Jul-24)	
	OVERALL LEVEL	1K-20KHz	

MOH	.075 In/Sec	.017 G-s
MIH	.059 In/Sec	.064 G-s
PIV	.142 In/Sec	.102 G-s

NC OCILLA - North Caster Oscillator (25-Jul-24)

OVERALL LEVEL 1K-20KHz

MOH	.154 In/Sec	.363 G-s
MIH	.100 In/Sec	.087 G-s
MIA	.101 In/Sec	.305 G-s
GIA	.075 In/Sec	.050 G-s
GIH	.090 In/Sec	.093 G-s
GOH	.091 In/Sec	.238 G-s

MC OCILLA - Middle Caster Oscillator (25-Jul-24)

OVERALL LEVEL 1K-20KHz

MOH	.335 In/Sec	.337 G-s
MIH	.208 In/Sec	.162 G-s
MIA	.106 In/Sec	.087 G-s
GIA	.076 In/Sec	.012 G-s
GIH	.097 In/Sec	.184 G-s
GOH	.106 In/Sec	.167 G-s

SC OCILLA - South Caster Oscillator (25-Jul-24)

OVERALL LEVEL 1K-20KHz

MOH	.060 In/Sec	.097 G-s
MIH	.045 In/Sec	.061 G-s
MIA	.027 In/Sec	.025 G-s
GIA	.042 In/Sec	.069 G-s
GIH	.036 In/Sec	.089 G-s
GOH	.033 In/Sec	.059 G-s

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Clarification Of Vibration Units:

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