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September 5, 2024

Nucor Roll Mill
Jackson-Flowood, MS

Subject: August vibration survey

Below is a summary report for the monthly Roll Mill vibration survey that was performed on 8/29/24. Most of the machines surveyed were found to be in good condition except for the following.

HI-SPEED 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 NUCOR Steel Flowood, MS. If there are any comments or questions, do not hesitate to contact us.

Sincerely,

Kevin W. Maxwell

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Defects

Roll Stand 1A
Planetary gearbox still has some vibration and noise floor that comes and goes in spectral data at the input end of the gearbox. The amplitudes and gear mesh frequencies in spectral data may be influenced some due to load and speed; however, they may also indicate low level internal wear or defects in internal components. We are continuing to monitor this closely. Rated as a **CLASS I** defect.

Roll Stand 1
Drive motor continues to have elevated DE axial vibration associated with line frequency 60 Hz and 360 HZ. (6 x line freq.). The amplitudes tend to go up and down depending on motor load and speed. This may be an SCR issue. It is recommended to inspect drive components for issues. Rated as a **CLASS II** defect.

Roll Stand 2
Drive motor has elevated vibrations associated with 360 hz. The 360 hz. peak in the spectrum has rpm sidebands. This may be an issue with the armature. For now, check comm and brushes. Also, inboard gearbox (Int.) is showing some gear mesh vibration with sidebands of input rpm. This issue appears to come and go based on load and speed. This type of vibration is an indication of heavy tooth load or possible gear wear. Rated as a **CLASS II** defect for now.

Roll Stand 6
A dominant gear mesh vibration is sometimes present towards the output of the gearbox. The up and down amplitude of this peak is likely due to changes in tooth load and speed. This vibration was higher this month, with amplitude showing an increase from .142 ips in July to .813 in August. We will continue to monitor this very closely. This is rated as a **CLASS I** defect.

Roll Stand 7
Gearbox vibration was lower in amplitude this survey. Vibration data shows dominant gear mesh harmonics on outboard end of the gear casing. The up and down amplitude of this peak from month to month is likely due to changes in tooth load and machine speed. We suspect this to be possibly due to a resonant gear mesh frequency vibration and we will continue to monitor this very closely. Rated as a **CLASS I** defect.

Roll Stand 8
Cooling fan motor has some elevated vibration at 10 Hz. This is likely a resonant frequency of the frame that the fan motor is mounted to. Rated as a **CLASS I** defect.

Roll Stand 12
Drive motor spectral data is showing some non-synchronous peaks that may be associated with bearing race defects. Typically, this issue is caused by fluting of the bearing races. This is low level at this time, and we are monitoring this closely. Rated as a **CLASS I** defect.

Roll Stand 13
Cooling fan motor has extreme amount of vibration. Overall amplitude at the ODE of the cooling fan motor was over 2.6 ips-pk during our test on 8/29. Data shows dominant 1 x rpm vibration. Inspect fan and all fasteners/structure ASAP. Rated as a **CLASS IV** defect.

Roll Stand 16
Cooling fan motor has elevated vibration at the ODE. Last month's amplitude was .12 ips-pk while amplitude this survey was .693 ips-pk. Inspect the cooling fan structure, fasteners, and fan wheel as scheduling allows. Rated as a **CLASS II** defect.

Furnace Cooling Tower Drive South

Motor data shows axial and radial vibration that appears to be occurring at or near 1 x motor rpm and may indicate a structural issue such as loose fasteners, weak flexible motor base. This could also be caused by a resonance or air flow turbulence in this unit. We will continue to monitor this issue closely. Rated as a **CLASS II** defect.

Abbreviated Last Measurement Summary
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Database: nucorja9.rbm
Station: Roll Mill Rolls

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
STD1A - Stand 1A	(29-Aug-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.076 In/Sec	.0067 G-s
MIH	.026 In/Sec	.071 G-s
MIA	.071 In/Sec	.097 G-s
COH	.119 In/Sec	.167 G-s
GIA	.051 In/Sec	.035 G-s
GIH	.087 In/Sec	.460 G-s
GI2	.075 In/Sec	.057 G-s
GI3	.063 In/Sec	.096 G-s
GI4	.054 In/Sec	.265 G-s
GI5	.038 In/Sec	.184 G-s
GI6	.028 In/Sec	.071 G-s
GOH	.026 In/Sec	.045 G-s
STD2A - Stand 2A	(29-Aug-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.070 In/Sec	.013 G-s
MIH	.054 In/Sec	.054 G-s
MIA	.062 In/Sec	.039 G-s
COH	.218 In/Sec	.076 G-s
STD1 - Stand 1	(29-Aug-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.099 In/Sec	.077 G-s
MIH	.099 In/Sec	.055 G-s
MIA	.453 In/Sec	.242 G-s
GIA	.032 In/Sec	.028 G-s
GIH	.070 In/Sec	.027 G-s
COH	.068 In/Sec	.023 G-s
STD2 - Stand 2	(29-Aug-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.141 In/Sec	.072 G-s
MIH	.124 In/Sec	.041 G-s
MIA	.610 In/Sec	.984 G-s
GIA	.100 In/Sec	.146 G-s
GIH	.071 In/Sec	.070 G-s
COH	.299 In/Sec	.045 G-s
STD3 - Stand 3	(29-Aug-24)	
	OVERALL LEVEL	1K-20KHz
MOH	.062 In/Sec	.029 G-s
MIH	.124 In/Sec	.088 G-s
MIA	.184 In/Sec	.113 G-s
GIA	.026 In/Sec	.019 G-s

	GIH	.036 In/Sec	.022 G-s
	COH	.147 In/Sec	.043 G-s

STD4 - Stand 4 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.062 In/Sec	.016 G-s
MIH	.114 In/Sec	.092 G-s
MIA	.095 In/Sec	.139 G-s
GIA	.046 In/Sec	.119 G-s
GIH	.057 In/Sec	.097 G-s
COH	.181 In/Sec	.020 G-s

STD5 - Stand 5 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.055 In/Sec	.039 G-s
MIH	.064 In/Sec	.102 G-s
MIA	.123 In/Sec	.049 G-s
GIA	.167 In/Sec	.137 G-s
GIH	.092 In/Sec	.030 G-s
GOH	.245 In/Sec	.226 G-s
COH	.450 In/Sec	.082 G-s

STD6 - Stand 6 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.074 In/Sec	.014 G-s
MIH	.048 In/Sec	.046 G-s
MIA	.122 In/Sec	.018 G-s
GIA	.097 In/Sec	.0087 G-s
GIH	.050 In/Sec	.020 G-s
GOH	.813 In/Sec	.571 G-s
COH	.281 In/Sec	.033 G-s

STD7 - Stand 7 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.046 In/Sec	.101 G-s
MIH	.048 In/Sec	.055 G-s
MIA	.098 In/Sec	.140 G-s
GIA	.045 In/Sec	.014 G-s
GIH	.034 In/Sec	.022 G-s
GOH	.190 In/Sec	.100 G-s
* COH	.468 In/Sec	.261 G-s

STD8 - Stand 8 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.055 In/Sec	.013 G-s
MIH	.062 In/Sec	.043 G-s
MIA	.050 In/Sec	.084 G-s
GIA	.045 In/Sec	.040 G-s
GIH	.065 In/Sec	.011 G-s
COH	.245 In/Sec	.258 G-s

STD9 - Stand 9 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.059 In/Sec	.026 G-s
MIH	.062 In/Sec	.104 G-s
MIA	.119 In/Sec	.148 G-s
GIA	.074 In/Sec	.014 G-s
GIH	.108 In/Sec	.012 G-s
COH	.188 In/Sec	.094 G-s

STD10 - Stand 10 (29-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.046 In/Sec	.026 G-s
MIH	.065 In/Sec	.041 G-s
MIA	.095 In/Sec	.039 G-s
GIA	.091 In/Sec	.059 G-s
GIH	.073 In/Sec	.116 G-s
COH	.177 In/Sec	.198 G-s

STD11 - Stand 11 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.020 In/Sec	.025 G-s
	MIH	.026 In/Sec	.119 G-s
	MIA	.039 In/Sec	.078 G-s
	GIA	.117 In/Sec	.050 G-s
	GIH	.082 In/Sec	.152 G-s
	GOH	.066 In/Sec	.023 G-s
	COH	.166 In/Sec	.051 G-s

STD12 - Stand 12 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.034 In/Sec	.029 G-s
	MIH	.031 In/Sec	.132 G-s
	MIA	.043 In/Sec	.160 G-s
	COH	.118 In/Sec	.030 G-s

STD13 - Stand 13 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.050 In/Sec	.118 G-s
	MIH	.095 In/Sec	.129 G-s
	MIA	.152 In/Sec	.274 G-s
	GIA	.031 In/Sec	.045 G-s
	GIH	.037 In/Sec	.022 G-s
	GOH	.033 In/Sec	.097 G-s
	COH	2.660 In/Sec	.183 G-s

STD14 - Stand 14 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.079 In/Sec	.297 G-s
	MIH	.075 In/Sec	.033 G-s
	MIA	.077 In/Sec	.528 G-s
	GIA	.088 In/Sec	.050 G-s
	GIH	.054 In/Sec	.026 G-s
	GOH	.046 In/Sec	.018 G-s
	COH	.282 In/Sec	.277 G-s

STD15 - Stand 15 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.063 In/Sec	.109 G-s
	MIH	.050 In/Sec	.082 G-s
	MIA	.052 In/Sec	.045 G-s
	GIA	.053 In/Sec	.294 G-s
	GIH	.034 In/Sec	.104 G-s
	COH	.126 In/Sec	.088 G-s

STD16 - Stand 16 (29-Aug-24)

		OVERALL LEVEL	1K-20KHz
	MOH	.049 In/Sec	.123 G-s
	MIH	.092 In/Sec	.124 G-s
	MIA	.047 In/Sec	.272 G-s
	GIA	.100 In/Sec	.118 G-s
	GIH	.046 In/Sec	.093 G-s
	GOH	.032 In/Sec	.099 G-s
	COH	.693 In/Sec	.116 G-s

NORTH AC - NORTH AIR COMPRESSOR QUINCY (29-Aug-24)

		OVERALL LEVEL	1 - 20 KHz
	MOH	.096 In/Sec	.355 G-s
	MIH	.094 In/Sec	.384 G-s
	MIA	.075 In/Sec	.442 G-s
		OVERALL LEVEL	1K-20KHz
	CIA	.291 In/Sec	.614 G-s
	CIH	.169 In/Sec	.596 G-s
	COH	.208 In/Sec	.416 G-s

SOUTH AC - SOUTH AIR COMPRESSOR QUINCY (29-Aug-24)

		OVERALL LEVEL	1 - 20 KHz
	MOH	.243 In/Sec	.351 G-s
	MIH	.220 In/Sec	.326 G-s
		OVERALL LEVEL	1K-20KHz

CIA		.291 In/Sec	.774 G-s
CIH		.257 In/Sec	.337 G-s
COH		.260 In/Sec	.360 G-s

WEST AC - WEST AIR COMPRESSOR QUINCY (29-Aug-24)

	OVERALL LEVEL	1 - 20 KHz
MOH	.181 In/Sec	.523 G-s
MIH	.198 In/Sec	.089 G-s
MIA	.219 In/Sec	.014 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.336 In/Sec	.371 G-s
CIH	.232 In/Sec	.277 G-s
COH	.152 In/Sec	.308 G-s

Station: Roll Mill Utilities

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD

HYDPMP1 - Hydraulic Pump East (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.101 In/Sec	.491 G-s
MIH	.192 In/Sec	.505 G-s
PIV	.386 In/Sec	6.162 G-s

HYDPMP3 - Hydraulic Pump West (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.090 In/Sec	1.333 G-s
MIH	.285 In/Sec	.984 G-s
PIV	.299 In/Sec	9.083 G-s

DESFAN - Desolution Fan (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.034 In/Sec	.071 G-s
MIH	.040 In/Sec	.120 G-s
MIA	.080 In/Sec	.053 G-s

COMFAN - Combustion Air Fan (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.093 In/Sec	.115 G-s
MIH	.080 In/Sec	.164 G-s
MIA	.059 In/Sec	.091 G-s
FIH	.057 In/Sec	.247 G-s
FOH	.080 In/Sec	.547 G-s

COLPMP2 - Furnace Cooling Pump center (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.275 In/Sec	.612 G-s
MIH	.064 In/Sec	.594 G-s
MIA	.158 In/Sec	.323 G-s

FCTSOUTH - Furnace CT Drive South (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.169 In/Sec	.087 G-s
MIH	.079 In/Sec	.185 G-s
MIA	.425 In/Sec	.119 G-s

FCTNORTH - Furnace CT Drive North (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.121 In/Sec	.088 G-s
MIH	.199 In/Sec	.157 G-s
MIA	.139 In/Sec	.068 G-s

SCLPMP2 - Scale Pit Pump North (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.225 In/Sec	.245 G-s
MIH	.181 In/Sec	.567 G-s
MIA	.162 In/Sec	.216 G-s
PIH	.124 In/Sec	.617 G-s

CTWTR1 - CT Pump East/Middle Pump (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.100 In/Sec	.432 G-s
MIH	.096 In/Sec	.424 G-s
MIA	.091 In/Sec	.362 G-s

MILWTR2 - Mill Water Pump Center (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.112 In/Sec	1.002 G-s
MIH	.059 In/Sec	1.378 G-s
MIA	.057 In/Sec	.774 G-s

MILWTR1 - Mill Water Pump East (28-Aug-24)

	OVERALL LEVEL	1K-20KHz
MOH	.044 In/Sec	.237 G-s
MIH	.036 In/Sec	.424 G-s
MIA	.040 In/Sec	.539 G-s

Clarification Of Vibration Units:

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