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

July 1, 2021

Nucor Roll Mill
Jackson-Flowood, MS

Subject: June vibration survey

Below is a summary report for the monthly Roll Mill vibration survey that was performed on June 29, 2021. 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.

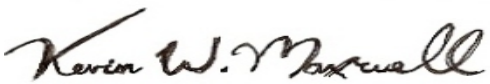
Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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 NUCOR Steel Flowood, 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

Roll Stand 1A Planetary Gearbox
Gearbox data shows some signs of minor internal defects/wear of gearbox. We will continue to monitor this unit closely. Still rated as a **CLASS I** defect for now.

Roll Stand 2
Gearbox has increased vibration this month. The drive end of the intermediate gearbox showed an increase in gear mesh frequencies with 2 and 4 x GMF being high in amplitude. Input rpm sidebands were also present around the GMF harmonics. This may be due to the gearbox running at a higher speed and load this month. We will monitor this stand very closely in the future. For now, this is rated as a **CLASS I** defect.

Roll Stand 2 Cooling Fan Motor
Cooling fan motor vibration has increased quite a bit this month. Data suggests base looseness. Inspect all hold down bolts and frame for looseness. Rated as a **CLASS II** defect.

Roll Stand 3 Cooling Fan Motor
Motor vibration has increased this month. Highest vibration is at a frequency that appears to not be synchronous with motor rpm. This could be resonance or structural issue. For now, ensure motor frame is mounted correctly to the drive motor and not loose or have soft foot. Rated as a **CLASS II** defect.

Roll Stand 5
Gear mesh vibration is about the same this month. Inspection of the gearbox does show some tooth wear in this gearbox. The up and down amplitude of this peak from month to month is likely due to change in tooth load and machine speed. We will continue to monitor this very closely. Because of the motor bearing issue starting to appear in the spectral data and the visible gear tooth defects this is rated as a **CLASS II** defect for now.

Roll Stand 6
Gear mesh vibration is up this month. A dominant gear mesh vibration is present towards the output of the gearbox. The up and down amplitude of this peak is likely due to change in tooth load and speed. We will continue to monitor this very closely. Rated as a **CLASS I** defect.

Roll Stand 7
Gearbox vibration was very high this month. Mill was running at higher speed and load this survey. We still suspect this to be possibly due to a resonant gear mesh frequency vibration. The up and down amplitude of this peak from month to month is likely due to change in tooth load and machine speed. We will continue to monitor this very closely. Because of the increase in amplitude this is rated as a **CLASS II** defect.

Roll Stand 8 Cooling Fan Motor
Motor vibration has increased this month. Highest vibration is at a frequency that appears to not be synchronous with motor rpm. This could be resonance or structural issue. For now, ensure motor frame is mounted correctly to the drive motor and not loose or have soft foot. Rated as a **CLASS II** defect.

Furnace Cooling Tower Drive South
Motor still has high axial vibration. This appears to be occurring at 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 in this unit since the blade pitch has been altered. We will continue to monitor this issue closely. Rated as a **CLASS II** defect.

Combustion Air Fan

Fan was running at a speed that appears to be structurally resonant to rpm. Speed was around 1625 rpm. Rpm harmonics are also present when this occurs which is somewhat odd. These types of harmonics typically are caused by mechanical looseness, but this vibration only occurs when unit is operating as certain rpms. We will monitor this closely. Rated as a **CLASS I** defect.

Abbreviated Last Measurement Summary
****

Database: nucorja9.rbm
Station: Roll Mill Rolls

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
STD1A - Stand 1A	(29-Jun-21)	
	OVERALL LEVEL	1K-20KHz
MOH	.082 In/Sec	.050 G-s
MIH	.061 In/Sec	.061 G-s
MIA	.125 In/Sec	.133 G-s
COH	.251 In/Sec	.213 G-s
GIA	.080 In/Sec	.364 G-s
GIH	.180 In/Sec	.148 G-s
GI2	.136 In/Sec	.122 G-s
GI3	.129 In/Sec	.207 G-s
GI4	.108 In/Sec	.691 G-s
GI5	.081 In/Sec	.314 G-s
GI6	.050 In/Sec	.167 G-s
GOH	.053 In/Sec	.037 G-s
STD2A - Stand 2A	(29-Jun-21)	
	OVERALL LEVEL	1K-20KHz
MOH	.051 In/Sec	.017 G-s
MIH	.056 In/Sec	.018 G-s
MIA	.067 In/Sec	.138 G-s
COH	.151 In/Sec	.051 G-s
STD1 - Stand 1	(29-Jun-21)	
	OVERALL LEVEL	1K-20KHz
MOH	.086 In/Sec	.061 G-s
MIH	.075 In/Sec	.014 G-s
MIA	.152 In/Sec	.018 G-s
GIA	.033 In/Sec	.043 G-s
GIH	.086 In/Sec	.015 G-s
COH	.117 In/Sec	.077 G-s
STD2 - Stand 2	(29-Jun-21)	
	OVERALL LEVEL	1K-20KHz
MOH	.088 In/Sec	.119 G-s
MIH	.168 In/Sec	.051 G-s
MIA	.157 In/Sec	.078 G-s
GIA	.235 In/Sec	.294 G-s
GIH	.157 In/Sec	.311 G-s
COH	.518 In/Sec	.047 G-s
STD3 - Stand 3	(29-Jun-21)	
	OVERALL LEVEL	1K-20KHz
MOH	.114 In/Sec	.416 G-s
MIH	.131 In/Sec	.023 G-s
MIA	.168 In/Sec	.394 G-s
GIA	.051 In/Sec	.031 G-s
GIH	.054 In/Sec	.015 G-s
COH	.456 In/Sec	.024 G-s

STD4 - Stand 4 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.076 In/Sec	.066 G-s
MIH	.073 In/Sec	.063 G-s
MIA	.093 In/Sec	.057 G-s
GIA	.076 In/Sec	.108 G-s
GIH	.064 In/Sec	.145 G-s
COH	.190 In/Sec	.031 G-s

STD5 - Stand 5 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.056 In/Sec	.110 G-s
MIH	.071 In/Sec	.061 G-s
MIA	.086 In/Sec	.287 G-s
GIA	.115 In/Sec	.024 G-s
GIH	.078 In/Sec	.057 G-s
GOH	.186 In/Sec	.176 G-s
COH	.426 In/Sec	.046 G-s

STD6 - Stand 6 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.066 In/Sec	.212 G-s
MIH	.056 In/Sec	.049 G-s
MIA	.153 In/Sec	.157 G-s
GIA	.065 In/Sec	.082 G-s
GIH	.061 In/Sec	.066 G-s
GOH	.274 In/Sec	.502 G-s
COH	.273 In/Sec	.058 G-s

STD7 - Stand 7 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.067 In/Sec	.077 G-s
MIH	.086 In/Sec	.222 G-s
MIA	.072 In/Sec	.172 G-s
GIA	.156 In/Sec	.091 G-s
GIH	.221 In/Sec	.152 G-s
COH	.330 In/Sec	.077 G-s

STD8 - Stand 8 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.087 In/Sec	.049 G-s
MIH	.092 In/Sec	.066 G-s
MIA	.113 In/Sec	.128 G-s
GIA	.067 In/Sec	.043 G-s
GIH	.076 In/Sec	.181 G-s
COH	.503 In/Sec	.104 G-s

STD9 - Stand 9 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.051 In/Sec	.144 G-s
MIH	.061 In/Sec	.128 G-s
MIA	.086 In/Sec	.221 G-s
GIA	.108 In/Sec	.133 G-s
GIH	.114 In/Sec	.235 G-s
COH	.293 In/Sec	.068 G-s

STD11 - Stand 11 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.029 In/Sec	.040 G-s
MIH	.038 In/Sec	.021 G-s
MIA	.054 In/Sec	.097 G-s
GIA	.047 In/Sec	.078 G-s
GIH	.074 In/Sec	.135 G-s
GOH	.051 In/Sec	.215 G-s
COH	.188 In/Sec	.036 G-s

STD12 - Stand 12 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.033 In/Sec	.044 G-s
MIH	.026 In/Sec	.033 G-s

	MIA	.031 In/Sec	.047 G-s
	COH	.189 In/Sec	.048 G-s

STD13 - Stand 13 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.077 In/Sec	.172 G-s
MIH	.114 In/Sec	.285 G-s
MIA	.202 In/Sec	.259 G-s
GIA	.043 In/Sec	.083 G-s
GIH	.043 In/Sec	.041 G-s
GOH	.023 In/Sec	.108 G-s
COH	.360 In/Sec	.133 G-s

STD14 - Stand 14 (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.126 In/Sec	.102 G-s
MIH	.112 In/Sec	.092 G-s
MIA	.050 In/Sec	.144 G-s
COH	.376 In/Sec	.014 G-s
GIA	.143 In/Sec	.162 G-s
GIH	.074 In/Sec	.258 G-s
GOH	.075 In/Sec	.157 G-s

NORTH AC - NORTH AIR COMPRESSOR QUINCY (29-Jun-21)

	OVERALL LEVEL	1 - 20 KHz
MOH	.218 In/Sec	.222 G-s
MIH	.178 In/Sec	.359 G-s
MIA	.268 In/Sec	.144 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.304 In/Sec	.572 G-s
CIH	.308 In/Sec	.342 G-s
COH	.232 In/Sec	.351 G-s

SOUTH AC - SOUTH AIR COMPRESSOR QUINCY (29-Jun-21)

	OVERALL LEVEL	1 - 20 KHz
MOH	.125 In/Sec	1.138 G-s
MIH	.172 In/Sec	.466 G-s
MIA	.107 In/Sec	.439 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.265 In/Sec	.539 G-s
CIH	.208 In/Sec	.306 G-s
COH	.240 In/Sec	.494 G-s

Database: nucorja9.rbm
Station: Roll Mill Utilities

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD

HYDPMP1 - Hydraulic Pump East (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.112 In/Sec	.238 G-s
MIH	.226 In/Sec	1.485 G-s
PIV	.293 In/Sec	.471 G-s

HYDPMP3 - Hydraulic Pump West (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.151 In/Sec	.170 G-s
MIH	.339 In/Sec	1.039 G-s
PIV	.402 In/Sec	.591 G-s

DESFAN - Desolution Fan (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.035 In/Sec	.048 G-s
MIH	.031 In/Sec	.036 G-s

COMFAN - Combustion Air Fan (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.201 In/Sec	.205 G-s

MIH		.174 In/Sec	.158 G-s
MIA		.115 In/Sec	.118 G-s
FIH		.154 In/Sec	.420 G-s
FOH		.174 In/Sec	.824 G-s

EJCFAN - Ejector Air Fan (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.076 In/Sec	.399 G-s
MIH	.081 In/Sec	.251 G-s
MIA	.100 In/Sec	.161 G-s
FIH	.037 In/Sec	.427 G-s
FOH	.071 In/Sec	.576 G-s

COLPMP2 - Furnace Cooling Pump center (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.309 In/Sec	.173 G-s
MIH	.111 In/Sec	.104 G-s
MIA	.170 In/Sec	.180 G-s

FCTSOUTH - Furnace CT Drive South (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.319 In/Sec	.146 G-s
MIH	.188 In/Sec	.102 G-s
MIA	.512 In/Sec	.024 G-s

FCTNORTH - Furnace CT Drive North (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.317 In/Sec	.080 G-s
MIH	.235 In/Sec	.075 G-s
MIA	.225 In/Sec	.059 G-s

SCLPMP1 - Scale Pit Pump South (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.224 In/Sec	.504 G-s
MOV	.198 In/Sec	.981 G-s
MIV	.111 In/Sec	.261 G-s
MIH	.092 In/Sec	.264 G-s
MIA	.096 In/Sec	.091 G-s

CTWTR1 - CT Pump East/Middle Pump (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.114 In/Sec	.298 G-s
MIH	.082 In/Sec	.278 G-s
MIA	.094 In/Sec	.139 G-s

MILWTR1 - Mill Water Pump East (29-Jun-21)

	OVERALL LEVEL	1K-20KHz
MOH	.058 In/Sec	.386 G-s
MIH	.056 In/Sec	.271 G-s
MIA	.038 In/Sec	.197 G-s

Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK