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

February 25, 2022

Nucor Roll Mill
Jackson-Flowood, MS

Subject: February vibration survey

Below is a summary report for the monthly Roll Mill vibration survey that was performed on February 24, 2022. 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.

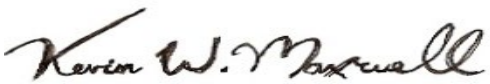
Class II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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
Vibration data is lower this month. Likely due to run speed being much slower this survey. However, spectral data of the first three sections at the input side are showing synchronous and non-synchronous peaks. This may indicate some gear and bearing issues. We will monitor this closely and recommend continuing to monitor temps closely and prepare to take actions as scheduling and parts become available. Rated as a **CLASS II** defect.

Roll Stand 3
Outboard motor bearing is starting to show some signs of bearing issue. Data is showing outer race defects harmonics on the ODE bearing. This will be monitored very closely in the coming surveys. Rated as a **CLASS II** defect for now.

Roll Stand 5
Gear mesh vibration decreased some 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. This is rated as a **CLASS II** defect.

Roll Stand 6
Gear mesh vibration decreased this month. Overall amplitude at the outboard side horizontal was .24 ips-pk. 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. Because of the high amplitude this month, this issue is rated as a **CLASS II** defect.

Roll Stand 7
Gearbox vibration was down this month from .17 to .08 ips-pk. This is significantly low compared to average. Likely due to run speed being slow 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 high amplitudes in the gearbox and bearing defect related vibrations in the motor, this is rated as a **CLASS II** defect.

Roll Stand 14
Gearbox input axial data shows a predominant pulse in the time waveform. Amplitude is also higher this survey. Increase from .08 to .14 ips at the GIA. Gearbox was operating much slower this survey also which has made most equipment this month operate at lower vibration amplitudes. The axial vibration along with the pulse type vibration may indicate a gear issue. Inspect gearbox and motor/gearbox input side gear couplings as time allows. Rated as a **CLASS II** defect.

Roll Stand 16
New motor was not in operation this survey.

Furnace Cooling Tower Drives North and South
Motors had lower vibrations this survey; however, the normally high vibration in the motor 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 or air flow turbulence in this unit. We will continue to monitor this issue closely. Rated as a **CLASS II** defect.

Mill Water West Pump
Top thrust bearing is showing signs of bearing defects according to the spectral data of the Outboard end of the motor. This appears to be light defects at this time and will be monitored closely. Rated as a **CLASS I** defect.

Hydraulic Pump East

Pump has high vane pass harmonics in spectral data. High acceleration amplitudes are also present. This is usually caused by restricted flow or internal pump wear. Check filter system ensuring pump is receiving proper flow for now. Rated as a **CLASS II** defect.

```
Abbreviated Last Measurement Summary
                    **********************************

                Database:  nucorja9.rbm
                Station:   Roll Mill Rolls


        MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
        -----------------             -------------       ----------

        STD1A       - Stand 1A                      (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
               MOH                     .069 In/Sec       .055 G-s
               MIH                     .058 In/Sec       .033 G-s
               MIA                     .063 In/Sec       .133 G-s
               COH                     .176 In/Sec       .089 G-s
               GIA                     .025 In/Sec       .040 G-s
               GIH                     .054 In/Sec       .288 G-s
               GI2                     .043 In/Sec       .180 G-s
               GI3                     .056 In/Sec       .854 G-s
               GI4                     .028 In/Sec       .041 G-s
               GI5                     .021 In/Sec       .155 G-s
               GI6                     .015 In/Sec       .063 G-s
               GOH                     .016 In/Sec       .030 G-s

        STD2A       - Stand 2A                      (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
               MOH                     .058 In/Sec       .157 G-s
               MIH                     .065 In/Sec       .019 G-s
               MIA                     .104 In/Sec       .112 G-s
               COH                     .074 In/Sec       .043 G-s

        STD1        - Stand 1                       (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
               MOH                     .115 In/Sec       .231 G-s
               MIH                     .083 In/Sec       .042 G-s
               MIA                     .547 In/Sec       .186 G-s
               GIA                     .029 In/Sec       .018 G-s
               GIH                     .072 In/Sec       .010 G-s
               COH                     .105 In/Sec       .012 G-s

        STD2        - Stand 2                       (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
               MOH                     .141 In/Sec       .049 G-s
               MIH                     .160 In/Sec       .159 G-s
               MIA                     .467 In/Sec       .497 G-s
               GIA                     .200 In/Sec       .020 G-s
               GIH                     .059 In/Sec       .063 G-s
               COH                     .159 In/Sec       .044 G-s

        STD3        - Stand 3                       (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
               MOH                     .077 In/Sec       .136 G-s
               MIH                     .165 In/Sec       .027 G-s
               MIA                     .382 In/Sec       .305 G-s
               GIA                     .037 In/Sec       .026 G-s
               GIH                     .038 In/Sec       .024 G-s
               COH                     .191 In/Sec       .051 G-s

        STD4        - Stand 4                       (24-Feb-22)
                                      OVERALL LEVEL     1K-20KHz
```

	MOH	.065 In/Sec	.037 G-s
	MIH	.074 In/Sec	.022 G-s
	MIA	.100 In/Sec	.054 G-s
	GIA	.039 In/Sec	.0068 G-s
	GIH	.041 In/Sec	.039 G-s
	COH	.129 In/Sec	.058 G-s

STD5 - Stand 5 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.031 In/Sec	.025 G-s
MIH	.063 In/Sec	.057 G-s
MIA	.068 In/Sec	.050 G-s
GIA	.081 In/Sec	.0047 G-s
GIH	.119 In/Sec	.053 G-s
GOH	.282 In/Sec	.298 G-s
COH	.399 In/Sec	.044 G-s

STD6 - Stand 6 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.082 In/Sec	.027 G-s
MIH	.097 In/Sec	.012 G-s
MIA	.150 In/Sec	.017 G-s
GIA	.030 In/Sec	.0080 G-s
GIH	.020 In/Sec	.0092 G-s
GOH	.286 In/Sec	.067 G-s
COH	.442 In/Sec	.098 G-s

STD7 - Stand 7 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.043 In/Sec	.132 G-s
MIH	.080 In/Sec	.199 G-s
MIA	.110 In/Sec	.355 G-s
GIA	.039 In/Sec	.0047 G-s
GIH	.031 In/Sec	.010 G-s
GOH	.081 In/Sec	.048 G-s
COH	.341 In/Sec	.092 G-s

STD8 - Stand 8 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.032 In/Sec	.0090 G-s
MIH	.043 In/Sec	.097 G-s
MIA	.056 In/Sec	.128 G-s
GIA	.051 In/Sec	.094 G-s
GIH	.031 In/Sec	.013 G-s
COH	.140 In/Sec	.058 G-s

STD9 - Stand 9 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.057 In/Sec	.107 G-s
MIH	.076 In/Sec	.021 G-s
MIA	.159 In/Sec	.100 G-s
GIA	.090 In/Sec	.010 G-s
GIH	.057 In/Sec	.019 G-s
COH	.183 In/Sec	.138 G-s

STD10 - Stand 10 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.031 In/Sec	.0088 G-s
MIH	.069 In/Sec	.060 G-s
MIA	.083 In/Sec	.037 G-s
GIA	.039 In/Sec	.063 G-s
GIH	.030 In/Sec	.059 G-s
COH	.127 In/Sec	.045 G-s

STD11 - Stand 11 (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.025 In/Sec	.013 G-s
MIH	.027 In/Sec	.027 G-s
MIA	.039 In/Sec	.144 G-s
GIA	.044 In/Sec	.026 G-s

	GIH	.034 In/Sec	.071 G-s
	GOH	.028 In/Sec	.077 G-s
	COH	.177 In/Sec	.027 G-s

STD12	- Stand 12		(24-Feb-22)
		OVERALL LEVEL	1K-20KHz
	MOH	.019 In/Sec	.026 G-s
	MIH	.023 In/Sec	.087 G-s
	MIA	.023 In/Sec	.094 G-s
	COH	.089 In/Sec	.050 G-s

STD13	- Stand 13		(24-Feb-22)
		OVERALL LEVEL	1K-20KHz
	MOH	.066 In/Sec	.038 G-s
	MIH	.072 In/Sec	.113 G-s
	MIA	.153 In/Sec	.114 G-s
	GIA	.036 In/Sec	.064 G-s
	GIH	.025 In/Sec	.033 G-s
	GOH	.028 In/Sec	.027 G-s
	COH	.219 In/Sec	.264 G-s

STD14	- Stand 14		(24-Feb-22)
		OVERALL LEVEL	1K-20KHz
	MOH	.085 In/Sec	.182 G-s
	MIH	.096 In/Sec	.087 G-s
	MIA	.077 In/Sec	.127 G-s
	GIA	.138 In/Sec	.058 G-s
	GIH	.050 In/Sec	.029 G-s
	GOH	.028 In/Sec	.022 G-s
	COH	.294 In/Sec	.357 G-s

STD15	- Stand 15		(24-Feb-22)
		OVERALL LEVEL	1K-20KHz
	MOH	.080 In/Sec	.286 G-s
	MIH	.052 In/Sec	.045 G-s
	MIA	.052 In/Sec	.053 G-s
	GIA	.038 In/Sec	.216 G-s
	GIH	.048 In/Sec	.494 G-s
	COH	.149 In/Sec	.131 G-s

NORTH AC	- NORTH AIR COMPRESSOR QUINCY		(24-Feb-22)
		OVERALL LEVEL	1 - 20 KHz
	MOH	.200 In/Sec	1.451 G-s
	MIH	.186 In/Sec	1.039 G-s
	MIA	.196 In/Sec	.788 G-s
		OVERALL LEVEL	1K-20KHz
	CIA	.477 In/Sec	.654 G-s
	CIH	.173 In/Sec	.576 G-s
	COH	.293 In/Sec	.446 G-s

SOUTH AC	- SOUTH AIR COMPRESSOR QUINCY		(24-Feb-22)
		OVERALL LEVEL	1 - 20 KHz
	MOH	.114 In/Sec	1.341 G-s
	MIH	.249 In/Sec	1.377 G-s
	MIA	.109 In/Sec	.979 G-s
		OVERALL LEVEL	1K-20KHz
	CIA	.342 In/Sec	.720 G-s
	CIH	.158 In/Sec	.407 G-s
	COH	.348 In/Sec	.295 G-s

Station: Roll Mill Utilities

MEASUREMENT POINT		OVERALL LEVEL	HFD / VHFD
HYDPMP1	- Hydraulic Pump East		(24-Feb-22)
		OVERALL LEVEL	1K-20KHz
	MOH	.093 In/Sec	.170 G-s

MIH	.147 In/Sec	.273 G-s
PIV	.297 In/Sec	4.688 G-s

HYDPMP3 - Hydraulic Pump West (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.151 In/Sec	.197 G-s
MIH	.309 In/Sec	.686 G-s
PIV	.279 In/Sec	1.025 G-s

DESFAN - Desolution Fan (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.027 In/Sec	.040 G-s
MIH	.031 In/Sec	.030 G-s

COMFAN - Combustion Air Fan (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.097 In/Sec	.168 G-s
MIH	.084 In/Sec	.178 G-s
MIA	.057 In/Sec	.099 G-s
FIH	.055 In/Sec	.038 G-s
FOH	.077 In/Sec	.257 G-s

EJCFAN - Ejector Air Fan (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.084 In/Sec	.252 G-s
MIH	.094 In/Sec	.283 G-s
MIA	.086 In/Sec	.181 G-s
FIA	.058 In/Sec	.225 G-s
FIH	.059 In/Sec	.451 G-s
FOH	.101 In/Sec	.411 G-s

COLPMP2 - Furnace Cooling Pump center (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.201 In/Sec	.137 G-s
MIH	.101 In/Sec	.173 G-s
MIA	.096 In/Sec	.112 G-s

FCTSOUTH - Furnace CT Drive South (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.469 In/Sec	.057 G-s
MIH	.219 In/Sec	.077 G-s
MIA	.691 In/Sec	.082 G-s

FCTNORTH - Furnace CT Drive North (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.313 In/Sec	.077 G-s
MIH	.191 In/Sec	.103 G-s
MIA	.123 In/Sec	.052 G-s

SCLPMP1 - Scale Pit Pump South (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.112 In/Sec	.229 G-s
MOV	.106 In/Sec	.757 G-s
MIV	.071 In/Sec	.136 G-s
MIH	.152 In/Sec	.190 G-s
MIA	.084 In/Sec	.080 G-s

CTWTR2 - CT Pump West (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.138 In/Sec	.242 G-s
MIH	.110 In/Sec	.168 G-s
MIA	.082 In/Sec	.165 G-s

MILWTR3 - Mill Water Pump West (24-Feb-22)

	OVERALL LEVEL	1K-20KHz
MOH	.087 In/Sec	.553 G-s
MIH	.052 In/Sec	.564 G-s
MIA	.036 In/Sec	.293 G-s

MILWTR1 - Mill Water Pump East (24-Feb-22)

		OVERALL LEVEL	1K-20KHz
	MOH	.057 In/Sec	.139 G-s
	MIH	.035 In/Sec	.276 G-s
	MIA	.025 In/Sec	.179 G-s

C3NORTH1 - C3 NORTH CRANE1 (23-Feb-22)

		OVERALL LEVEL	1K-20KHz
	GIA	.613 In/Sec	.289 G-s
	GIH	.346 In/Sec	.279 G-s
	GIV	.759 In/Sec	.385 G-s
	GOH	.315 In/Sec	.216 G-s
	GOV	.429 In/Sec	.363 G-s
	GOA	.513 In/Sec	.308 G-s

C3NORTH2 - C3 NORTH CRANE2 (23-Feb-22)

		OVERALL LEVEL	1K-20KHz
	GIA	.294 In/Sec	.404 G-s
	GIH	.329 In/Sec	.231 G-s
	GIV	.368 In/Sec	.392 G-s
	GOH	.440 In/Sec	.200 G-s
	GOV	.649 In/Sec	.348 G-s
	GOA	.293 In/Sec	.399 G-s

C3SOUTH1 - C3 SOUTH CRANE1 (23-Feb-22)

		OVERALL LEVEL	1K-20KHz
	GIA	.413 In/Sec	.275 G-s
	GIH	.309 In/Sec	.358 G-s
	GIV	.654 In/Sec	.557 G-s
	GOH	.259 In/Sec	.187 G-s
	GOV	.734 In/Sec	.323 G-s
	GOA	.440 In/Sec	.346 G-s

C3SOUTH2 - C3 SOUTH CRANE2 (23-Feb-22)

		OVERALL LEVEL	1K-20KHz
	MOH	.365 In/Sec	.571 G-s
	MOV	.331 In/Sec	.188 G-s
	MIH	.315 In/Sec	.689 G-s
	MIV	.342 In/Sec	.226 G-s
	MIA	.947 In/Sec	.306 G-s
	GIA	.244 In/Sec	.310 G-s
	GIH	.356 In/Sec	.310 G-s
	GIV	1.215 In/Sec	.272 G-s
	GOH	.327 In/Sec	.250 G-s
	GOV	.758 In/Sec	.227 G-s
	GOA	.898 In/Sec	.265 G-s

Clarification Of Vibration Units:

Acc --> G-s RMS

Vel --> In/Sec PK