



QualiTest® Diagnostics

7030 Ryburn Dr. Millington, TN

Phone: (901) 873-5300

Fax: (901) 873-5301

www.gohispeed.com

May 18, 2020

Nucor Roll Mill
Jackson-Flowood, MS

Subject: May vibration survey

Most of the machines surveyed were found to be in good condition with the exception of 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.

Defects

Roll Stand 1A Planetary Gearbox

Overall vibration amplitudes are varying with survey while gearbox data show signs of distress. We will continue to monitor this unit closely. Still rated as a **CLASS I** defect for now.

Roll Stand 1 Motor

There is a significant amount of 360 Hz. vibration especially at the drive end of the motor. This appears to be a sixth harmonic of line frequency. This indicates a drive problem such as SCR card fault. It is recommended to inspect the drive as soon as practical. Motor is also showing some signs of outer race bearing issue but appears to be minor at this time. This issue will be monitored closely. Because of the electrical vibration, this is rated as a **CLASS II** defect.

Roll Stand 2 int. Gearbox

Input rpm sidebands around the gear mesh frequencies indicate possible oscillation of the input gear set. This could be from an issue with the speed synch on the drives, drive line slop, or some other process issue. Gearbox may need an internal inspection in the future. Rated as a **CLASS I** defect.

Roll Stand 4

Int. gearbox vibration has varied from month to month. Data has been showing some signs of gear wear and or gear misalignment at the input to intermediate side. Speed and load may have some effect on the fluctuation of amplitude. We will continue to monitor this issue closely. Rated as a **CLASS I** defect.

Roll Stand 5

Vibration was about the same in the gearbox outboard side this survey. A dominant gear mesh vibration is present towards the output of the 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. Rated as a **CLASS I** defect for now.

Roll Stand 5 Cooling Fan Motor

There still appears to be a vibration in this unit that may be due to imbalance of the fan wheel. Inspect, clean fan wheel as time allows. Ensure all bolts are tight. We will monitor this closely. Rated as a **CLASS II** defect.

Roll Stand 6

A dominant gear mesh vibration is present towards the output of the gearbox. Overall vibration increased slightly from last month. The up and down amplitude of this peak is likely due to change in tooth load and speed. This issue seems to have begun after gearbox was repaired. We will continue to monitor this very closely. Rated as a **CLASS I** defect.

Roll Stand 7

Output side of the gearbox vibration increased 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 amplitude this month, this is rated as a **CLASS II** defect.

Roll Stand 13 Cooling Fan Motor

Fan appears to have vibration associated with fan imbalance. Resonance may also be a factor as this vibration does seem to vary slightly depending on the speed of the DC motor. We will monitor this closely. Rated as a **CLASS I** defect.

Ejector Fan

Harmonic vibrations are present in the recent data. Overall amplitudes of the motor and fan have also increased this month. This could be due to process parameters. Mill was running hot and fast during the survey. Bearing closest to the fan wheel still has higher than normal acceleration amplitude. Data shows an extreme amount of high freq. noise floor which usually means bearing has severe wear. This is concerning considering this is a newly installed bearing. For now, it is recommended to pop the cap ASAP and inspect bearing ensuring lubrication is present between the rollers and the race. Ensure grease is clean as well. Because of the high freq. vibration amplitudes, this is rated as a **CLASS II** defect.

Combustion Air Fan

Harmonic vibrations are present in the recent data. Overall amplitudes of the motor and fan have also increased this month. This could be due to process parameters. Mill was running fast during the survey which likely had the furnace temperature on the high side. This could affect the air inside the fan and may cause some of the vibration. For now we will monitor this closely next survey. Rated as a **CLASS I** defect.

North Quincy Air Compressor

Compressor section has a very high amount of acceleration this survey along with several harmonics of lobe pass frequency. High frequency trend data shows this month to be the highest amplitude on record with amplitude peaking at 4 g's RMS. This could be an indication of internal wear of the compressor. Compressor may need attention in the near future. We will for sure monitor this closely. Because of the increased acceleration, this is rated as a **CLASS II** defect.

South Quincy Air Compressor

Motor 4 x rpm vibration varies from month to month. Data has also shown (in the past) high frequency electrical type vibration such as 2 x line frequency, stator slot pass, and or rotor bar pass frequency vibrations. This usually indicates an electrical issue is present such as winding issue, rotor issue, etc. We will monitor this issue closely. This is rated as a **CLASS I** defect for now.

Abbreviated Last Measurement Summary

Database: nucorja9.rbm
Station: Roll Mill Rolls

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
-----	-----	-----
STD1A - Stand 1A	(14-May-20)	
	OVERALL LEVEL	1K-20KHz
MOH	.069 In/Sec	.032 G-s
MIH	.046 In/Sec	.100 G-s
MIA	.065 In/Sec	.108 G-s
COH	.248 In/Sec	.227 G-s
GIA	.070 In/Sec	.084 G-s
GIH	.150 In/Sec	.069 G-s
GI2	.131 In/Sec	.135 G-s
GI3	.111 In/Sec	.233 G-s
GI4	.088 In/Sec	.077 G-s
GI5	.064 In/Sec	.074 G-s
GI6	.060 In/Sec	.076 G-s
GOH	.039 In/Sec	.059 G-s
STD2A - Stand 2A	(14-May-20)	
	OVERALL LEVEL	1K-20KHz
MOH	.040 In/Sec	.017 G-s
MIH	.045 In/Sec	.127 G-s
MIA	.070 In/Sec	.063 G-s
COH	.087 In/Sec	.029 G-s

STD1	- Stand 1	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.064 In/Sec	.034 G-s
MIH	.076 In/Sec	.105 G-s
MIA	.255 In/Sec	.088 G-s
GIA	.044 In/Sec	.052 G-s
GIH	.057 In/Sec	.028 G-s
COH	.113 In/Sec	.040 G-s
STD2	- Stand 2	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.078 In/Sec	.047 G-s
MIH	.122 In/Sec	.064 G-s
MIA	.107 In/Sec	.050 G-s
GIA	.077 In/Sec	.060 G-s
GIH	.130 In/Sec	.380 G-s
COH	.403 In/Sec	.028 G-s
STD3	- Stand 3	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.050 In/Sec	.147 G-s
MIH	.086 In/Sec	.092 G-s
MIA	.176 In/Sec	.085 G-s
GIA	.035 In/Sec	.026 G-s
GIH	.036 In/Sec	.058 G-s
COH	.179 In/Sec	.016 G-s
STD4	- Stand 4	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.062 In/Sec	.082 G-s
MIH	.079 In/Sec	.046 G-s
MIA	.089 In/Sec	.109 G-s
GIA	.080 In/Sec	.174 G-s
GIH	.052 In/Sec	.019 G-s
COH	.159 In/Sec	.042 G-s
STD5	- Stand 5	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.052 In/Sec	.037 G-s
MIH	.056 In/Sec	.031 G-s
MIA	.103 In/Sec	.025 G-s
GIA	.097 In/Sec	.0059 G-s
GIH	.051 In/Sec	.033 G-s
GOH	.199 In/Sec	.133 G-s
COH	.522 In/Sec	.035 G-s
STD6	- Stand 6	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.071 In/Sec	.259 G-s
MIH	.051 In/Sec	.057 G-s
MIA	.092 In/Sec	.040 G-s
GIA	.075 In/Sec	.016 G-s
GIH	.072 In/Sec	.094 G-s
GOH	.247 In/Sec	.347 G-s
COH	.279 In/Sec	.186 G-s
STD7	- Stand 7	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.075 In/Sec	.105 G-s
MIH	.056 In/Sec	.226 G-s
MIA	.080 In/Sec	.148 G-s
GIA	.141 In/Sec	.149 G-s
GIH	.211 In/Sec	.170 G-s
GOH	.153 In/Sec	.073 G-s
COH	.371 In/Sec	.116 G-s
STD9	- Stand 9	(14-May-20)
	OVERALL LEVEL	1K-20KHz
MOH	.078 In/Sec	.097 G-s

	MIH	.242 In/Sec	.042 G-s
	MIA	.060 In/Sec	.054 G-s
	GIA	.100 In/Sec	.043 G-s
	GIH	.067 In/Sec	.547 G-s
	COH	.193 In/Sec	.074 G-s
STD11	- Stand 11	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.019 In/Sec	.053 G-s
	MIH	.029 In/Sec	.028 G-s
	MIA	.044 In/Sec	.055 G-s
	GIA	.066 In/Sec	.026 G-s
	GIH	.045 In/Sec	.103 G-s
	GOH	.036 In/Sec	.090 G-s
	COH	.123 In/Sec	.023 G-s
STD12	- Stand 12	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.021 In/Sec	.081 G-s
	MIH	.032 In/Sec	.092 G-s
	MIA	.058 In/Sec	.159 G-s
	COH	.104 In/Sec	.064 G-s
STD13	- Stand 13	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.084 In/Sec	.252 G-s
	MIH	.086 In/Sec	.112 G-s
	MIA	.065 In/Sec	.065 G-s
	GIA	.034 In/Sec	.294 G-s
	GIH	.036 In/Sec	.093 G-s
	GOH	.046 In/Sec	.052 G-s
	COH	.336 In/Sec	.280 G-s
STD14	- Stand 14	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.104 In/Sec	.134 G-s
	MIH	.073 In/Sec	.085 G-s
	MIA	.068 In/Sec	.109 G-s
	GIA	.084 In/Sec	.072 G-s
	GIH	.050 In/Sec	.047 G-s
	GOH	.040 In/Sec	.019 G-s
	COH	.495 In/Sec	.135 G-s
STD15	- Stand 15	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.076 In/Sec	.226 G-s
	MIH	.074 In/Sec	.387 G-s
	MIA	.077 In/Sec	.538 G-s
	GIA	.076 In/Sec	.030 G-s
	GIH	.034 In/Sec	.140 G-s
	COH	.180 In/Sec	.093 G-s
STD16	- Stand 16	(14-May-20)	
	OVERALL LEVEL	1K-20KHz	
	MOH	.044 In/Sec	.243 G-s
	MIH	.053 In/Sec	.289 G-s
	MIA	.049 In/Sec	.236 G-s
	GIA	.078 In/Sec	.072 G-s
	GIH	.042 In/Sec	.065 G-s
	GOH	.035 In/Sec	.085 G-s
	COH	.181 In/Sec	.175 G-s
NORTH AC	- NORTH AIR COMPRESSOR QUINCY	(14-May-20)	
	OVERALL LEVEL	1 - 20 KHz	
	MOH	.166 In/Sec	.245 G-s
	MIH	.200 In/Sec	.330 G-s
	MIA	.278 In/Sec	.164 G-s
	OVERALL LEVEL	1K-20KHz	
	CIA	.317 In/Sec	.428 G-s
	CIH	.334 In/Sec	.433 G-s

COH	.268 In/Sec	.467 G-s
WEST AC - WEST AIR COMPRESSOR QUINCY (14-May-20)		
	OVERALL LEVEL	1 - 20 KHz
MOH	.218 In/Sec	.313 G-s
MIH	.232 In/Sec	.341 G-s
MIA	.094 In/Sec	.0098 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.256 In/Sec	.450 G-s
CIH	.270 In/Sec	.365 G-s
COH	.243 In/Sec	.612 G-s

Database: nucorja9.rbm
Station: Roll Mill Utilities

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
-----	-----	-----
HYDPMP1 - Hydraulic Pump East (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.232 In/Sec	.144 G-s
MIH	.514 In/Sec	.113 G-s
PIV	.161 In/Sec	.771 G-s
HYDPMP3 - Hydraulic Pump West (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.138 In/Sec	.348 G-s
MIH	.370 In/Sec	.273 G-s
PIV	.314 In/Sec	2.324 G-s
DESFAN - Desolution Fan (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.020 In/Sec	.053 G-s
MIH	.025 In/Sec	.049 G-s
MIA	.018 In/Sec	.077 G-s
COMFAN - Combustion Air Fan (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.163 In/Sec	.272 G-s
MIH	.123 In/Sec	.307 G-s
MIA	.241 In/Sec	.206 G-s
FIH	.120 In/Sec	.174 G-s
FOH	.213 In/Sec	1.649 G-s
EJCFAN - Ejector Air Fan (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.047 In/Sec	.536 G-s
MIH	.052 In/Sec	1.475 G-s
MIA	.249 In/Sec	.527 G-s
FIA	.084 In/Sec	.529 G-s
FIH	.054 In/Sec	1.885 G-s
FOH	.072 In/Sec	1.839 G-s
COLPMP2 - Furnace Cooling Pump center (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.123 In/Sec	.125 G-s
MIH	.112 In/Sec	.354 G-s
MIA	.086 In/Sec	.233 G-s
FCTSOUTH - Furnace CT Drive South (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.224 In/Sec	.055 G-s
MIH	.139 In/Sec	.133 G-s
MIA	.140 In/Sec	.100 G-s
FCTNORTH - Furnace CT Drive North (14-May-20)		
	OVERALL LEVEL	1K-20KHz
MOH	.388 In/Sec	.087 G-s
MIH	.140 In/Sec	.047 G-s

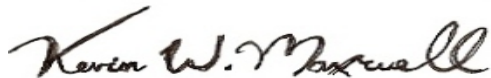
MIA		.164 In/Sec	.043 G-s
SCLPMP1 - Scale Pit Pump South (14-May-20)			
	OVERALL LEVEL	1K-20KHz	
MOH	.385 In/Sec	.288 G-s	
MOV	.302 In/Sec	.553 G-s	
MIV	.123 In/Sec	.113 G-s	
MIH	.165 In/Sec	.122 G-s	
MIA	.146 In/Sec	.072 G-s	
CTWTR2 - CT Pump West (14-May-20)			
	OVERALL LEVEL	1K-20KHz	
MOH	.144 In/Sec	.312 G-s	
MIH	.089 In/Sec	.457 G-s	
MIA	.114 In/Sec	.512 G-s	
MILWTR3 - Mill Water Pump West (14-May-20)			
	OVERALL LEVEL	1K-20KHz	
MOH	.074 In/Sec	.454 G-s	
MIH	.059 In/Sec	.843 G-s	
MIA	.037 In/Sec	.291 G-s	
MILWTR1 - Mill Water Pump East (14-May-20)			
	OVERALL LEVEL	1K-20KHz	
MOH	.075 In/Sec	.193 G-s	
MIH	.066 In/Sec	.311 G-s	
MIA	.035 In/Sec	.114 G-s	

Clarification Of Vibration Units:

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

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



QualiTest® Diagnostics

Cell: 901-486-4565

Email: kwilliam@gohispeed.com