HI-SPEED INDUSTRIAL SERVICE QualiTest® Diagnostics

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April 1, 2021

Nucor Roll Mill
Jackson-Flowood, MS

Subject: March vibration survey

Below is a summary report for the monthly Roll Mill vibration survey that was performed on March 31, 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

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 2
Previously, 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 vibration was not present this month. There are some low-level gear mesh peaks, but nowhere near the amplitude that was present a while back. This may be due to the gearbox running at a different 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 5
Drive motor is starting to show some signs of bearing issue in the drive end bearing. There is still a dominant gear mesh vibration is present from time to time 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. Because of the motor bearing issue starting to appear in the spectral data this is rated as a **CLASS II** defect for now.

Roll Stand 6
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. 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
Gearbox vibration was about the same this month. 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. Rated as a **CLASS I** 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 an issue with the drive coupling or some other structural issue such as loose fasteners. 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.

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Abbreviated Last Measurement Summary
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              Route No.  1:  RM ROLL DRIVES

      MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
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      STD1A      - Stand 1A                      (30-Mar-21)
                                  OVERALL LEVEL     1K-20KHz
             MOH                    .083 In/Sec       .030 G-s
             MIH                    .042 In/Sec       .028 G-s
             MIA                    .115 In/Sec       .099 G-s
             COH                    .181 In/Sec       .129 G-s
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	GIA	.037 In/Sec	.041 G-s
	GIH	.079 In/Sec	.054 G-s
	GI2	.051 In/Sec	.023 G-s
	GI3	.046 In/Sec	.076 G-s
	GI4	.037 In/Sec	.054 G-s
	GI5	.028 In/Sec	.020 G-s
	GI6	.021 In/Sec	.038 G-s
	GOH	.023 In/Sec	.0034 G-s

STD2A - Stand 2A (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.059 In/Sec	.014 G-s
MIH	.020 In/Sec	.051 G-s
MIA	.056 In/Sec	.045 G-s
COH	.101 In/Sec	.039 G-s

STD1 - Stand 1 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.079 In/Sec	.043 G-s
MIH	.069 In/Sec	.022 G-s
MIA	.243 In/Sec	.058 G-s
GIA	.053 In/Sec	.028 G-s
GIH	.060 In/Sec	.031 G-s
COH	.149 In/Sec	.092 G-s

STD2 - Stand 2 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.055 In/Sec	.021 G-s
MIH	.079 In/Sec	.051 G-s
MIA	.088 In/Sec	.143 G-s
GIA	.047 In/Sec	.012 G-s
GIH	.033 In/Sec	.014 G-s
COH	.117 In/Sec	.036 G-s

STD3 - Stand 3 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.043 In/Sec	.055 G-s
MIH	.104 In/Sec	.043 G-s
MIA	.353 In/Sec	.538 G-s
GIA	.030 In/Sec	.075 G-s
GIH	.044 In/Sec	.081 G-s
COH	.215 In/Sec	.022 G-s

STD4 - Stand 4 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.066 In/Sec	.077 G-s
MIH	.089 In/Sec	.063 G-s
MIA	.133 In/Sec	.531 G-s
GIA	.087 In/Sec	.268 G-s
GIH	.081 In/Sec	.170 G-s
COH	.116 In/Sec	.019 G-s

STD5 - Stand 5 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.068 In/Sec	.062 G-s
MIH	.075 In/Sec	.160 G-s
MIA	.086 In/Sec	.239 G-s
GIA	.064 In/Sec	.012 G-s
GIH	.089 In/Sec	.035 G-s
GOH	.153 In/Sec	.088 G-s
COH	.268 In/Sec	.040 G-s

STD6 - Stand 6 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.083 In/Sec	.027 G-s
MIH	.070 In/Sec	.090 G-s
MIA	.094 In/Sec	.099 G-s
GIA	.074 In/Sec	.057 G-s
GIH	.055 In/Sec	.015 G-s
GOH	.183 In/Sec	.143 G-s

STD7 - Stand 7 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.038 In/Sec	.035 G-s
MIH	.093 In/Sec	.174 G-s
MIA	.071 In/Sec	.132 G-s
GIA	.038 In/Sec	.011 G-s
GIH	.031 In/Sec	.035 G-s
GOH	.178 In/Sec	.038 G-s
COH	.260 In/Sec	.058 G-s

STD8 - Stand 8 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.039 In/Sec	.017 G-s
MIH	.062 In/Sec	.076 G-s
MIA	.115 In/Sec	.092 G-s
GIA	.061 In/Sec	.0061 G-s
GIH	.043 In/Sec	.0091 G-s
COH	.127 In/Sec	.061 G-s

STD9 - Stand 9 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.048 In/Sec	.029 G-s
MIH	.074 In/Sec	.125 G-s
MIA	.163 In/Sec	.084 G-s
GIA	.111 In/Sec	.0039 G-s
GIH	.052 In/Sec	.058 G-s
COH	.214 In/Sec	.333 G-s

STD10 - Stand 10 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.023 In/Sec	.030 G-s
MIH	.076 In/Sec	.052 G-s
MIA	.068 In/Sec	.047 G-s
GIA	.066 In/Sec	.157 G-s
GIH	.044 In/Sec	.024 G-s
COH	.131 In/Sec	.064 G-s

STD11 - Stand 11 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.032 In/Sec	.021 G-s
MIH	.037 In/Sec	.030 G-s
MIA	.062 In/Sec	.071 G-s
GIA	.031 In/Sec	.128 G-s
GIH	.036 In/Sec	.044 G-s
GOH	.052 In/Sec	.076 G-s
COH	.098 In/Sec	.044 G-s

STD12 - Stand 12 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.019 In/Sec	.034 G-s
MIH	.026 In/Sec	.063 G-s
MIA	.038 In/Sec	.096 G-s
COH	.126 In/Sec	.040 G-s

STD13 - Stand 13 (30-Mar-21)

	OVERALL LEVEL	1K-20KHz
MOH	.069 In/Sec	.157 G-s
MIH	.082 In/Sec	.384 G-s
MIA	.120 In/Sec	.288 G-s
GIA	.057 In/Sec	.082 G-s
GIH	.047 In/Sec	.098 G-s
GOH	.067 In/Sec	.235 G-s
COH	.215 In/Sec	.244 G-s

NORTH AC - NORTH AIR COMPRESSOR QUINCY (30-Mar-21)

	OVERALL LEVEL	1 - 20 KHz
MOH	.118 In/Sec	.200 G-s
MIH	.130 In/Sec	.484 G-s
MIA	.181 In/Sec	.105 G-s

		OVERALL LEVEL	1K-20KHz
	CIA	.231 In/Sec	.437 G-s
	CIH	.240 In/Sec	.378 G-s
	COH	.241 In/Sec	.530 G-s

SOUTH AC - SOUTH AIR COMPRESSOR QUINCY (30-Mar-21)

		OVERALL LEVEL	1 - 20 KHz
	MOH	.087 In/Sec	1.131 G-s
	MIH	.181 In/Sec	.455 G-s
	MIA	.087 In/Sec	.418 G-s
		OVERALL LEVEL	1K-20KHz
	CIA	.243 In/Sec	.643 G-s
	CIH	.197 In/Sec	.314 G-s
	COH	.215 In/Sec	.387 G-s

WEST AC - WEST AIR COMPRESSOR QUINCY (30-Mar-21)

		OVERALL LEVEL	1 - 20 KHz
	MOH	.212 In/Sec	.228 G-s
	MIH	.171 In/Sec	.208 G-s
	MIA	.329 In/Sec	.225 G-s
		OVERALL LEVEL	1K-20KHz
	CIA	.176 In/Sec	.471 G-s
	CIH	.186 In/Sec	.277 G-s
	COH	.119 In/Sec	.378 G-s

Route No. 1: UTILITIES

MEASUREMENT POINT		OVERALL LEVEL	HFD / VHFD

HYDPMP2 - Hydraulic Pump Center (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.075 In/Sec	.405 G-s
	MIH	.212 In/Sec	.231 G-s
	PIV	.278 In/Sec	1.030 G-s

HYDPMP3 - Hydraulic Pump West (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.095 In/Sec	.120 G-s
	MIH	.333 In/Sec	.312 G-s
	PIV	.316 In/Sec	2.412 G-s

DESFAN - Desolution Fan (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.039 In/Sec	.049 G-s
	MIH	.030 In/Sec	.044 G-s

COMFAN - Combustion Air Fan (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.120 In/Sec	.134 G-s
	MIH	.100 In/Sec	.229 G-s
	MIA	.075 In/Sec	.137 G-s
	FIH	.073 In/Sec	.069 G-s
	FOH	.090 In/Sec	.365 G-s

EJCFAN - Ejector Air Fan (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.065 In/Sec	.294 G-s
	MIH	.061 In/Sec	.446 G-s
	MIA	.047 In/Sec	.246 G-s
	FIA	.038 In/Sec	.667 G-s
	FIH	.032 In/Sec	1.452 G-s
	FOH	.066 In/Sec	1.914 G-s

COLPMP2 - Furnace Cooling Pump center (30-Mar-21)

		OVERALL LEVEL	1K-20KHz
	MOH	.329 In/Sec	.167 G-s
	MIH	.188 In/Sec	.078 G-s
	MIA	.172 In/Sec	.209 G-s

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      FCTSOUTH   - Furnace CT Drive South        (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .240 In/Sec       .027 G-s
            MIH                   .083 In/Sec       .023 G-s
            MIA                   .475 In/Sec       .021 G-s

      FCTNORTH   - Furnace CT Drive North        (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .428 In/Sec       .093 G-s
            MIH                   .268 In/Sec       .178 G-s
            MIA                   .159 In/Sec       .047 G-s

      SCLPMP1    - Scale Pit Pump South          (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .114 In/Sec       .436 G-s
            MOV                   .101 In/Sec       .366 G-s
            MIV                   .073 In/Sec       .137 G-s
            MIH                   .076 In/Sec       .143 G-s
            MIA                   .079 In/Sec       .073 G-s

      CTWTR1     - CT Pump East/Middle Pump      (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .112 In/Sec       .363 G-s
            MIH                   .077 In/Sec       .360 G-s
            MIA                   .093 In/Sec       .179 G-s

      CTWTR2     - CT Pump West                  (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .074 In/Sec       .043 G-s
            MIH                   .052 In/Sec       .019 G-s
            MIA                   .062 In/Sec      .0096 G-s

      MILWTR3    - Mill Water Pump West          (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .052 In/Sec       .360 G-s
            MIH                   .044 In/Sec       .459 G-s
            MIA                   .030 In/Sec       .500 G-s

      MILWTR1    - Mill Water Pump East          (30-Mar-21)
                                 OVERALL LEVEL     1K-20KHz
            MOH                   .047 In/Sec       .268 G-s
            MIH                   .036 In/Sec       .270 G-s
            MIA                   .036 In/Sec       .159 G-s

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   Clarification Of Vibration Units:
      Acc      -->  G-s      RMS
      Vel      -->  In/Sec   PK
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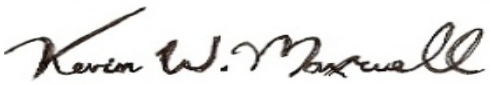
As always, it has been a pleasure to NUCOR Steel Flowood, MS. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

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