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September 18, 2020

Nucor Roll Mill
Jackson-Flowood, MS

Subject: September 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

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 has been a significant amount of 360 Hz. vibration especially at the drive end axial of the motor. There are also several rpm sidebands around the 360 Hz. peak. This indicates a drive problem such as SCR card fault. There could also be an issue with the armature. It is recommended to inspect the drive as soon as practical. 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 5
Vibration decreased 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 fastening bolts are tight. We will monitor this closely. Rated as a **CLASS II** defect.

Roll Stand 6
Overall vibration decreased from last 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. 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 decreased 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. Rated as a **CLASS I** defect.

Roll Stand 9
Vibration has increased this survey in the input side of the gearbox. Overall amplitude much higher than normal. Data shows several harmonics at what appears to be gear mesh frequency of the input gear. It is unclear if process/load is affecting this sudden increase in amplitudes. An inspection of the gearbox may be needed in the near future. 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
There still seems to be higher than normal high frequency acceleration amplitude in the fan bearings. This could possibly be a lubrication issue. We will monitor this issue closely. Rated as a **CLASS I** defect for now.

Furnace Cooling Tower Drive South

Motor has an increase in 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 due to the fact that 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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             Database:  nucorja9.rbm
             Station:   Roll Mill Rolls

       MEASUREMENT POINT             OVERALL LEVEL       HFD / VHFD
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       STD1A      - Stand 1A                      (17-Sep-20)
                                    OVERALL LEVEL     1K-20KHz
              MOH                    .107 In/Sec       .029 G-s
              MIH                    .089 In/Sec       .039 G-s
              MIA                    .087 In/Sec       .099 G-s
              COH                    .254 In/Sec       .070 G-s
              GIA                    .065 In/Sec       .043 G-s
              GIH                    .126 In/Sec       .075 G-s
              GI2                    .092 In/Sec       .048 G-s
              GI3                    .079 In/Sec       .142 G-s
              GI4                    .059 In/Sec       .155 G-s
              GI5                    .043 In/Sec       .054 G-s
              GI6                    .035 In/Sec       .056 G-s
              GOH                    .038 In/Sec       .015 G-s

       STD2A      - Stand 2A                      (17-Sep-20)
                                    OVERALL LEVEL     1K-20KHz
              MOH                    .048 In/Sec       .034 G-s
              MIH                    .056 In/Sec       .093 G-s
              MIA                    .115 In/Sec       .026 G-s
              COH                    .106 In/Sec       .049 G-s

       STD1       - Stand 1                       (17-Sep-20)
                                    OVERALL LEVEL     1K-20KHz
              MOH                    .069 In/Sec       .067 G-s
              MIH                    .090 In/Sec       .090 G-s
              MIA                    .169 In/Sec       .037 G-s
              GIA                    .073 In/Sec       .028 G-s
              GIH                    .084 In/Sec       .027 G-s
              COH                    .103 In/Sec       .063 G-s

       STD2       - Stand 2                       (17-Sep-20)
                                    OVERALL LEVEL     1K-20KHz
              MOH                    .071 In/Sec       .040 G-s
              MIH                    .090 In/Sec       .116 G-s
              MIA                    .160 In/Sec       .115 G-s
              GIA                    .113 In/Sec       .017 G-s
              GIH                    .087 In/Sec       .073 G-s
              COH                    .400 In/Sec       .078 G-s

       STD3       - Stand 3                       (17-Sep-20)
                                    OVERALL LEVEL     1K-20KHz
              MOH                    .066 In/Sec       .247 G-s
              MIH                    .161 In/Sec       .040 G-s
              MIA                    .192 In/Sec       .063 G-s
              GIA                    .034 In/Sec       .164 G-s
              GIH                    .044 In/Sec       .175 G-s
              COH                    .170 In/Sec       .043 G-s

       STD4       - Stand 4                       (17-Sep-20)
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		OVERALL LEVEL	1K-20KHz
	MOH	.059 In/Sec	.067 G-s
	MIH	.085 In/Sec	.036 G-s
	MIA	.074 In/Sec	.060 G-s
	GIA	.073 In/Sec	.042 G-s
	GIH	.062 In/Sec	.020 G-s
	COH	.193 In/Sec	.022 G-s

STD5 - Stand 5 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.055 In/Sec	.083 G-s
	MIH	.068 In/Sec	.042 G-s
	MIA	.100 In/Sec	.028 G-s
	GIA	.080 In/Sec	.0047 G-s
	GIH	.049 In/Sec	.015 G-s
	GOH	.142 In/Sec	.106 G-s
	COH	.639 In/Sec	.046 G-s

STD6 - Stand 6 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.046 In/Sec	.086 G-s
	MIH	.040 In/Sec	.030 G-s
	MIA	.105 In/Sec	.029 G-s
	GIA	.101 In/Sec	.0045 G-s
	GIH	.035 In/Sec	.026 G-s
	GOH	.180 In/Sec	.182 G-s
	COH	.256 In/Sec	.031 G-s

STD7 - Stand 7 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.044 In/Sec	.134 G-s
	MIH	.058 In/Sec	.105 G-s
	MIA	.051 In/Sec	.053 G-s
	GIA	.042 In/Sec	.011 G-s
	GIH	.030 In/Sec	.013 G-s
	GOH	.125 In/Sec	.064 G-s
	COH	.383 In/Sec	.107 G-s

STD8 - Stand 8 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.037 In/Sec	.011 G-s
	MIH	.042 In/Sec	.161 G-s
	MIA	.050 In/Sec	.032 G-s
	GIA	.058 In/Sec	.0045 G-s
	GIH	.050 In/Sec	.010 G-s
	COH	.167 In/Sec	.078 G-s

STD9 - Stand 9 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.047 In/Sec	.027 G-s
	MIH	.105 In/Sec	.117 G-s
	MIA	.062 In/Sec	.036 G-s
	GIA	.125 In/Sec	.022 G-s
	GIH	.059 In/Sec	.095 G-s
	COH	.197 In/Sec	.060 G-s

STD10 - Stand 10 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.029 In/Sec	.042 G-s
	MIH	.039 In/Sec	.030 G-s
	MIA	.036 In/Sec	.022 G-s
	GIA	.058 In/Sec	.140 G-s
	GIH	.040 In/Sec	.250 G-s
	COH	.084 In/Sec	.093 G-s

STD11 - Stand 11 (17-Sep-20)

		OVERALL LEVEL	1K-20KHz
	MOH	.030 In/Sec	.042 G-s
	MIH	.035 In/Sec	.068 G-s
	MIA	.056 In/Sec	.095 G-s

	GIA	.073 In/Sec	.044 G-s
	GIH	.054 In/Sec	.093 G-s
	GOH	.039 In/Sec	.116 G-s
	COH	.119 In/Sec	.025 G-s

STD12 - Stand 12 (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.021 In/Sec	.038 G-s
MIH	.034 In/Sec	.081 G-s
MIA	.040 In/Sec	.144 G-s
COH	.124 In/Sec	.055 G-s

STD13 - Stand 13 (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.077 In/Sec	.205 G-s
MIH	.107 In/Sec	.400 G-s
MIA	.097 In/Sec	.139 G-s
GIA	.063 In/Sec	.063 G-s
GIH	.051 In/Sec	.093 G-s
GOH	.046 In/Sec	.252 G-s
COH	.378 In/Sec	.610 G-s

NORTH AC - NORTH AIR COMPRESSOR QUINCY (17-Sep-20)

	OVERALL LEVEL	1 - 20 KHz
MOH	.123 In/Sec	.159 G-s
MIH	.125 In/Sec	.384 G-s
MIA	.204 In/Sec	.096 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.247 In/Sec	.456 G-s
CIH	.221 In/Sec	.557 G-s
COH	.182 In/Sec	.595 G-s

SOUTH AC - SOUTH AIR COMPRESSOR QUINCY (17-Sep-20)

	OVERALL LEVEL	1 - 20 KHz
MOH	.060 In/Sec	.813 G-s
MIH	.112 In/Sec	.395 G-s
MIA	.098 In/Sec	.397 G-s
	OVERALL LEVEL	1K-20KHz
CIA	.185 In/Sec	.569 G-s
CIH	.128 In/Sec	.380 G-s
COH	.174 In/Sec	.497 G-s

Database: nucorja9.rbm
Station: Roll Mill Utilities

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD

HYDPMP2 - Hydraulic Pump Center (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.151 In/Sec	.317 G-s
MIH	.365 In/Sec	.164 G-s
PIV	.270 In/Sec	.938 G-s

HYDPMP3 - Hydraulic Pump West (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.072 In/Sec	.380 G-s
MIH	.239 In/Sec	.810 G-s
PIV	.210 In/Sec	.457 G-s

DESFAN - Desolution Fan (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.038 In/Sec	.038 G-s
MIH	.037 In/Sec	.038 G-s

COMFAN - Combustion Air Fan (17-Sep-20)

	OVERALL LEVEL	1K-20KHz
MOH	.100 In/Sec	.158 G-s
MIH	.103 In/Sec	.233 G-s

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            MIA                      .140 In/Sec       .113 G-s
            FIH                      .070 In/Sec       .247 G-s
            FOH                      .119 In/Sec      1.783 G-s

      EJCFAN     - Ejector Air Fan               (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .044 In/Sec       .180 G-s
            MIH                      .047 In/Sec       .664 G-s
            MIA                      .043 In/Sec       .436 G-s
            FIA                      .068 In/Sec       .967 G-s
            FIH                      .028 In/Sec      1.741 G-s
            FOH                      .047 In/Sec      1.160 G-s

      COLPMP2    - Furnace Cooling Pump center   (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .108 In/Sec       .172 G-s
            MIH                      .134 In/Sec       .548 G-s
            MIA                      .127 In/Sec       .029 G-s

      FCTSOUTH   - Furnace CT Drive South        (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .266 In/Sec       .086 G-s
            MIH                      .121 In/Sec       .057 G-s
            MIA                      .356 In/Sec       .032 G-s

      FCTNORTH   - Furnace CT Drive North        (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .367 In/Sec       .073 G-s
            MIH                      .255 In/Sec       .106 G-s
            MIA                      .106 In/Sec       .071 G-s

      SCLPMP2    - Scale Pit Pump North          (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .233 In/Sec       .189 G-s
            MIH                      .171 In/Sec       .248 G-s
            MIA                      .124 In/Sec       .063 G-s
            PIH                      .117 In/Sec       .165 G-s

      CTWTR2     - CT Pump West                  (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .140 In/Sec       .557 G-s
            MIH                      .108 In/Sec       .301 G-s
            MIA                      .136 In/Sec       .211 G-s

      MILWTR3    - Mill Water Pump West          (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .048 In/Sec       .407 G-s
            MIH                      .049 In/Sec       .653 G-s
            MIA                      .030 In/Sec       .311 G-s

      MILWTR1    - Mill Water Pump East          (17-Sep-20)
                                  OVERALL LEVEL     1K-20KHz
            MOH                      .085 In/Sec       .257 G-s
            MIH                      .039 In/Sec       .284 G-s
            MIA                      .037 In/Sec       .124 G-s

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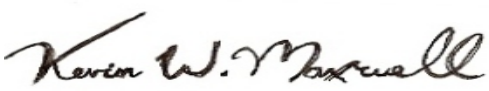
As always, it has been a pleasure to NUCOR Steel Flowood, MS. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



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