HI-SPEED INDUSTRIAL SERVICE

QualiTest® Diagnostics

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July 13, 2022

Grammar Inc.
Shannon, MS

The following is a summary of findings from the vibration survey that was performed on July 12, 2022. Please note that only defects found are included in the summary report. An abbreviated last measurement survey report of all equipment is included at the end of this report.

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.

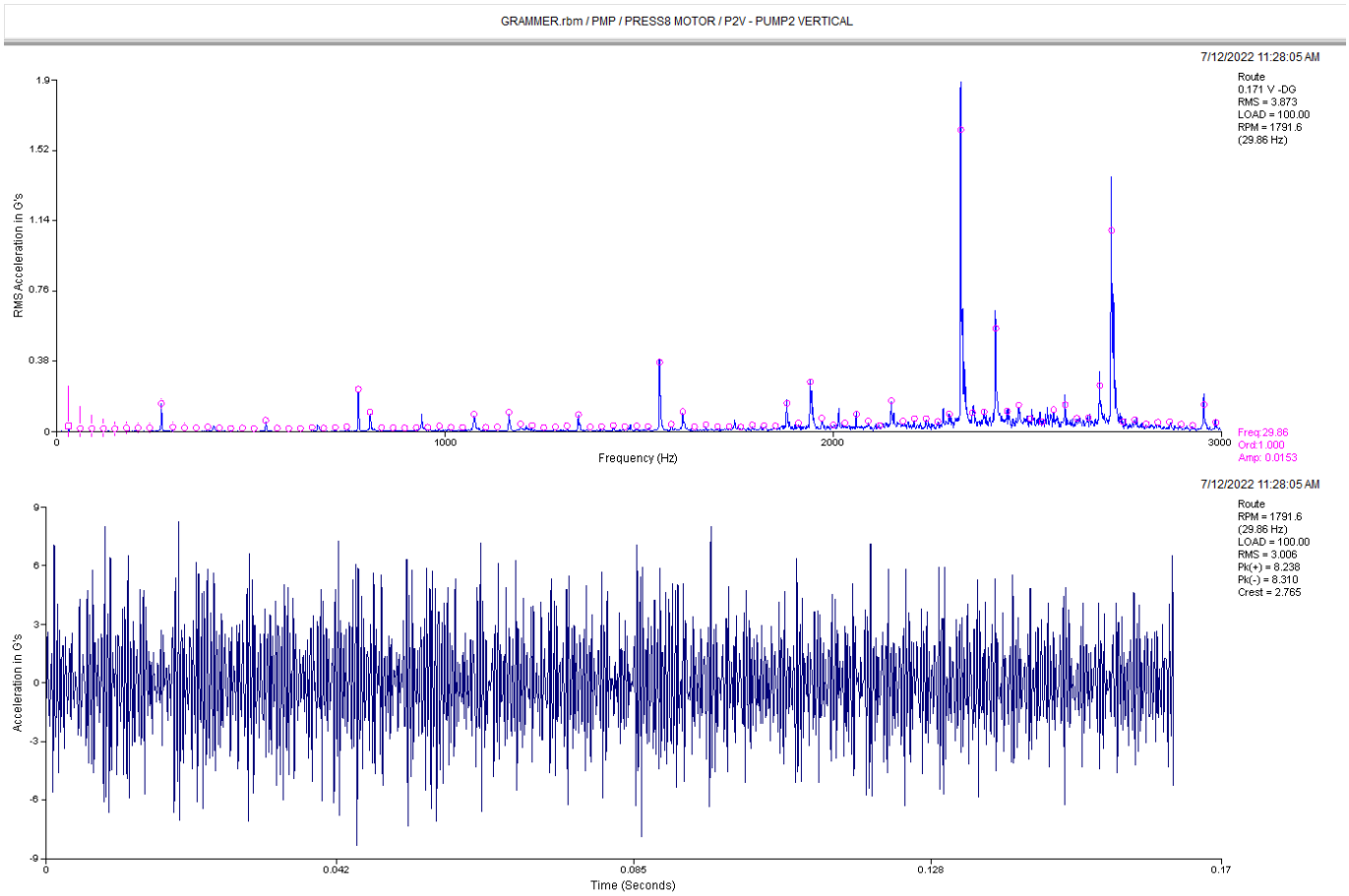
CLASS II: Defect (s) present that may cause problem in long term (2-6 months). Repair during normal maintenance scheduling. Continue to monitor.

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

Defect Summary

Press 8 Hyd. Pump 2 CLASS II



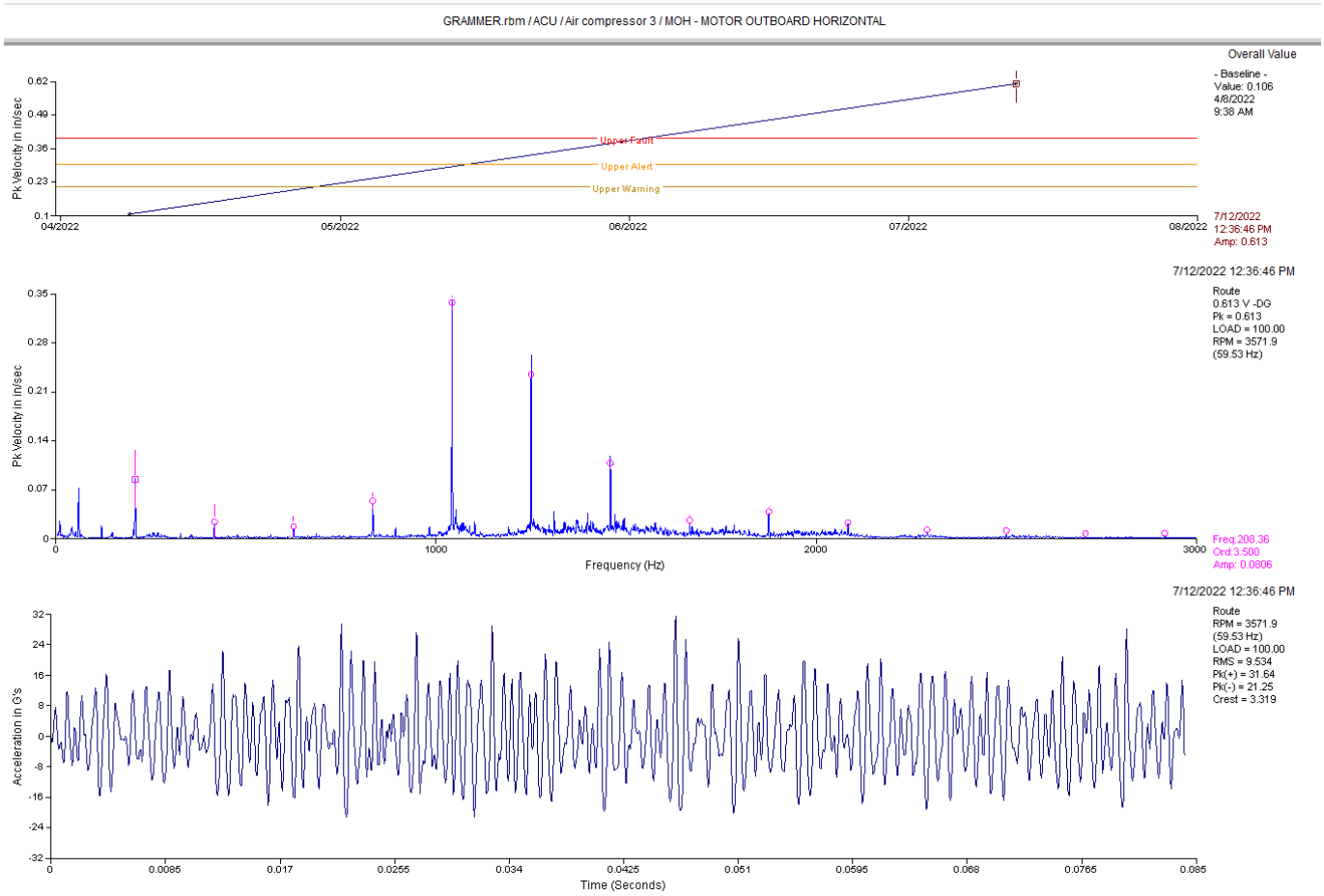
Observation:

Pump 2 data shows high frequency vibration that appears to be a harmonic of pump rpm. Several rpm harmonics are present in the vertical data shown. Amplitude in waveform data is 16 g's peak to peak.

Recommendation:

Peaks present in this pump data usually indicate internal wear or restricted flow. For now, ensure pump filtering system (if equipped) is operating properly and not restricting pump flow. We will monitor this closely. Pump may need attention in the coming months.

Air Compressor 3 CLASS III



Observation:

Motor outboard horizontal data shows multiple peaks that appear to be non-synchronous to rpm. Trend data does show a huge increase in amplitude.

Recommendation:

Compressor was very noisy when data was collected and was shut down to prevent further damage, so we only got one point of vibration. We need more info on this compressor such as compressor type and speeds to help with diagnosis; however, data indicates an issue with the unit. Inspect motor and compressor for internal issues SOON.

Abbreviated Last Measurement Summary

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Database: GRAMMER.rbm
Area: PRESS MOTORS-HYDRAULIC PUMPS

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
P1-M2 - PRESS1 MOTOR	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.110 In/Sec	.518 G-s
MOV - MOTOR OUTBOARD VERTICAL	.056 In/Sec	.269 G-s
MIH - MOTOR INBOARD HORIZONTAL	.072 In/Sec	.175 G-s
MIV - MOTOR INBOARD VERTICAL	.093 In/Sec	.827 G-s
MIA - MOTOR INBOARD AXIAL	.078 In/Sec	.117 G-s
P1A - PUMP1 AXIAL	.142 In/Sec	2.034 G-s
P1V - PUMP1 VERTICAL	.115 In/Sec	2.225 G-s
P2A - PUMP2 AXIAL	.340 In/Sec	.940 G-s
P2V - PUMP2 VERTICAL	.097 In/Sec	1.267 G-s
P3A - PUMP3 AXIAL	.219 In/Sec	1.628 G-s
P3V - PUMP3 VERTICAL	.110 In/Sec	1.324 G-s
P2-M2 - PRESS2 MOTOR	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.030 In/Sec	.221 G-s
MOV - MOTOR OUTBOARD VERTICAL	.047 In/Sec	.408 G-s
MIH - MOTOR INBOARD HORIZONTAL	.068 In/Sec	.595 G-s
MIV - MOTOR INBOARD VERTICAL	.054 In/Sec	.876 G-s
MIA - MOTOR INBOARD AXIAL	.165 In/Sec	.250 G-s
P1A - PUMP1 AXIAL	.259 In/Sec	1.682 G-s
P1V - PUMP1 VERTICAL	.109 In/Sec	1.303 G-s
P2A - PUMP2 AXIAL	.206 In/Sec	2.067 G-s
P2V - PUMP2 VERTICAL	.098 In/Sec	1.252 G-s
P3A - PUMP3 AXIAL	1.357 In/Sec	1.188 G-s
P3V - PUMP3 VERTICAL	.085 In/Sec	.921 G-s
P3-M2 - PRESS3 MOTOR2	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.105 In/Sec	.459 G-s
MOV - MOTOR OUTBOARD VERTICAL	.082 In/Sec	.227 G-s
MIH - MOTOR INBOARD HORIZONTAL	.108 In/Sec	.396 G-s
MIV - MOTOR INBOARD VERTICAL	.140 In/Sec	1.035 G-s
MIA - MOTOR INBOARD AXIAL	.076 In/Sec	.968 G-s
P1A - PUMP1 AXIAL	.101 In/Sec	.952 G-s
P1V - PUMP1 VERTICAL	.146 In/Sec	1.028 G-s
P2A - PUMP2 AXIAL	.168 In/Sec	1.093 G-s
P2V - PUMP2 VERTICAL	.052 In/Sec	.970 G-s
P3A - PUMP3 AXIAL	.146 In/Sec	.518 G-s
P3V - PUMP3 VERTICAL	.137 In/Sec	1.168 G-s
P4-M2 - PRESS4 MOTOR	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.212 In/Sec	.181 G-s
MOV - MOTOR OUTBOARD VERTICAL	.043 In/Sec	.239 G-s
MIH - MOTOR INBOARD HORIZONTAL	.023 In/Sec	.149 G-s
MIV - MOTOR INBOARD VERTICAL	.035 In/Sec	.296 G-s
MIA - MOTOR INBOARD AXIAL	.031 In/Sec	.243 G-s
P1A - PUMP1 AXIAL	.043 In/Sec	.954 G-s
P1V - PUMP1 VERTICAL	.049 In/Sec	.822 G-s
P2A - PUMP2 AXIAL	.042 In/Sec	.481 G-s
P2V - PUMP2 VERTICAL	.049 In/Sec	1.008 G-s
P3A - PUMP3 AXIAL	.054 In/Sec	.338 G-s
P3V - PUMP3 VERTICAL	.046 In/Sec	.411 G-s
P5-M2 - PRESS5 MOTOR	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.041 In/Sec	.418 G-s
MOV - MOTOR OUTBOARD VERTICAL	.028 In/Sec	.427 G-s

MIH - MOTOR INBOARD HORIZONTAL	.031 In/Sec	.344 G-s
MIV - MOTOR INBOARD VERTICAL	.087 In/Sec	.982 G-s
MIA - MOTOR INBOARD AXIAL	.034 In/Sec	.366 G-s
P1A - PUMP1 AXIAL	.081 In/Sec	1.347 G-s
P1V - PUMP1 VERTICAL	.088 In/Sec	1.379 G-s
P2A - PUMP2 AXIAL	.118 In/Sec	.767 G-s
P2V - PUMP2 VERTICAL	.230 In/Sec	1.346 G-s
P3A - PUMP3 AXIAL	.137 In/Sec	1.159 G-s
P3V - PUMP3 VERTICAL	.140 In/Sec	2.311 G-s

P6-M2 - PRESS6 MOTOR	(12-Jul-22)		
	OVERALL LEVEL	1K-20KHz	
MOH - MOTOR OUTBOARD HORIZONTAL	.067 In/Sec	.320 G-s
MOV - MOTOR OUTBOARD VERTICAL	.073 In/Sec	.243 G-s
MIH - MOTOR INBOARD HORIZONTAL	.080 In/Sec	.198 G-s
MIV - MOTOR INBOARD VERTICAL	.085 In/Sec	.117 G-s
MIA - MOTOR INBOARD AXIAL	.079 In/Sec	.372 G-s
P1A - PUMP1 AXIAL	.123 In/Sec	.480 G-s
P1V - PUMP1 VERTICAL	.123 In/Sec	.502 G-s
P2A - PUMP2 AXIAL	.033 In/Sec	.228 G-s
P2V - PUMP2 VERTICAL	.019 In/Sec	.269 G-s
P3A - PUMP3 AXIAL	.145 In/Sec	.219 G-s
P3V - PUMP3 VERTICAL	.145 In/Sec	.324 G-s

P7-M2 - PRESS7 MOTOR	(12-Jul-22)		
	OVERALL LEVEL	1K-20KHz	
MOH - MOTOR OUTBOARD HORIZONTAL	.059 In/Sec	.401 G-s
MOV - MOTOR OUTBOARD VERTICAL	.036 In/Sec	.242 G-s
MIH - MOTOR INBOARD HORIZONTAL	.046 In/Sec	.221 G-s
MIV - MOTOR INBOARD VERTICAL	.040 In/Sec	.160 G-s
MIA - MOTOR INBOARD AXIAL	.031 In/Sec	.099 G-s
P1A - PUMP1 AXIAL	.112 In/Sec	.453 G-s
P1V - PUMP1 VERTICAL	.052 In/Sec	.436 G-s
P2A - PUMP2 AXIAL	.051 In/Sec	.820 G-s
P2V - PUMP2 VERTICAL	.028 In/Sec	.363 G-s
P3A - PUMP3 AXIAL	.059 In/Sec	.343 G-s
P3V - PUMP3 VERTICAL	.057 In/Sec	.284 G-s

P8-M2 - PRESS8 MOTOR	(12-Jul-22)		
	OVERALL LEVEL	1K-20KHz	
MOH - MOTOR OUTBOARD HORIZONTAL	.067 In/Sec	.389 G-s
MOV - MOTOR OUTBOARD VERTICAL	.136 In/Sec	.655 G-s
MIH - MOTOR INBOARD HORIZONTAL	.070 In/Sec	.856 G-s
MIV - MOTOR INBOARD VERTICAL	.081 In/Sec	.829 G-s
MIA - MOTOR INBOARD AXIAL	.084 In/Sec	.770 G-s
P1A - PUMP1 AXIAL	.095 In/Sec	1.598 G-s
P1V - PUMP1 VERTICAL	.062 In/Sec	.625 G-s
P2A - PUMP2 AXIAL	.098 In/Sec	.930 G-s
P2V - PUMP2 VERTICAL	.171 In/Sec	4.937 G-s
P3A - PUMP3 AXIAL	.238 In/Sec	1.669 G-s
P3V - PUMP3 VERTICAL	.123 In/Sec	2.349 G-s

Area: AIR Compressors

MEASUREMENT POINT	OVERALL LEVEL	HFD / VHFD
P1-M2 - Air compressor 1	(12-Jul-22)	
	OVERALL LEVEL	1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL	.044 In/Sec	.541 G-s
MOV - MOTOR OUTBOARD VERTICAL	.055 In/Sec	.252 G-s
MIH - MOTOR INBOARD HORIZONTAL	.040 In/Sec	.516 G-s
MIV - MOTOR INBOARD VERTICAL	.069 In/Sec	.458 G-s
MIA - MOTOR INBOARD AXIAL	.054 In/Sec	.760 G-s
P2V - PUMPINBOARD VERTICAL	.090 In/Sec	.906 G-s
PIA - PUMP1 outboard AXIAL	.084 In/Sec	.648 G-s
P1V - PUMP1 OUTBOARD VERTICAL	.077 In/Sec	.820 G-s
PiV - PUMP INBOARD HORZONTAL	.040 In/Sec	.388 G-s

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P2-M2       - Air compressor 2              (12-Jul-22)
                                             OVERALL LEVEL     1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL               .080 In/Sec      1.036 G-s
MOV - MOTOR OUTBOARD VERTICAL                 .097 In/Sec      1.579 G-s
MIH - MOTOR INBOARD HORIZONTAL                .071 In/Sec       .748 G-s
MIV - MOTOR INBOARD VERTICAL                  .081 In/Sec       .501 G-s
MIA - MOTOR INBOARD AXIAL                     .140 In/Sec       .137 G-s
P2V - PUMPINBOARD VERTICAL                    .136 In/Sec      1.098 G-s
PIA - PUMP1 outboard AXIAL                    .069 In/Sec       .612 G-s
P1V - PUMP1 OUTBOARD VERTICAL                 .032 In/Sec       .013 G-s
PiV - PUMP INBOARD HORZONTAL                  .064 In/Sec      .0054 G-s

P2-m3       - Air compressor 3              (12-Jul-22)
                                             OVERALL LEVEL     1K-20KHz
MOH - MOTOR OUTBOARD HORIZONTAL               .613 In/Sec      4.428 G-s

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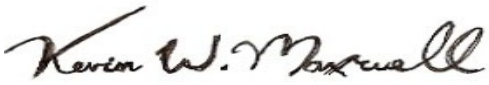
As always, it has been a pleasure to serve Arkema. If there are any comments or questions, do not hesitate to contact us.

Sincerely,



ISO Certified Vibration Analyst, Category III

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