

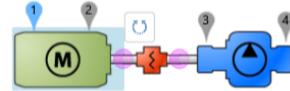


Expertise Report

Filter: Equipment name (+) \ Tree order (+)

Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #1		
Designation			
Abbreviation	BP#1		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:55:42	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 19.8 Hz / 1190 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Parameters sheet

Diagnosis

Misalignment and Pump cavitations

Good overall state for component 'Electric motor'.

Fair state for the component 'Pump'.

Highest vibrations measured at Pump OB Bearing Vertical with Overall velocity of 3.44mm/s and dominant peak of 2x Motor RPM caused by Misalignment, Pump Cavitations and Pump IB Bearing Noise - Lubrications

Recommendations

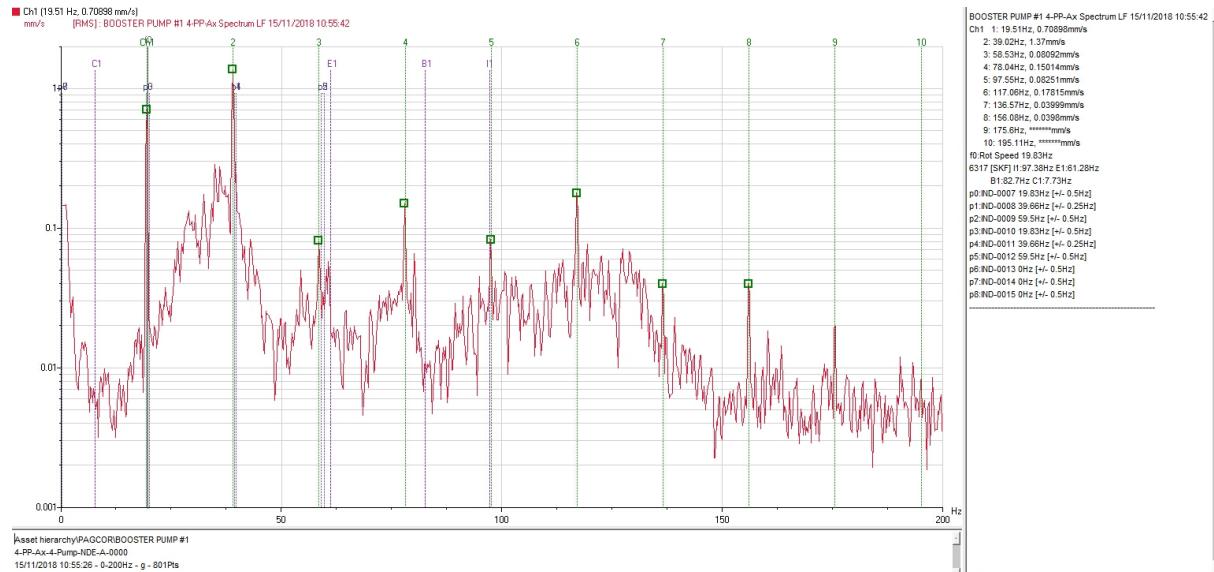
Realign Motor and Pump Shaft

Realign Motor and Pump shaft or coupling using Precision Laser Alignment tool.

Cavitation to be watched: process control and action might be needed. Follow the dynamic behavior of the pump to prevent impeller damage.

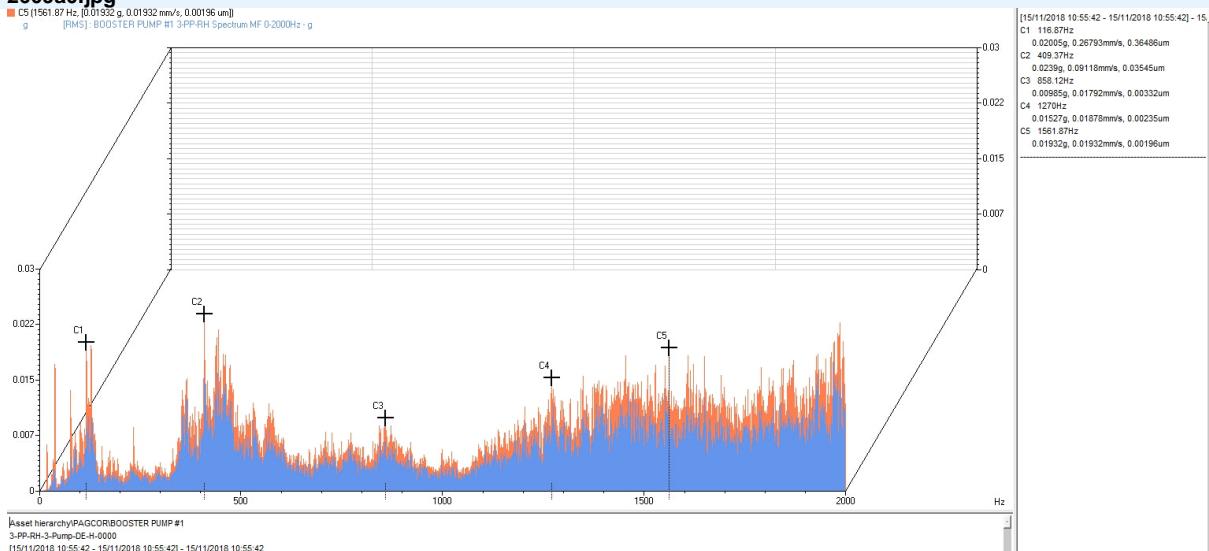
Regrease Pump Bearings with fresh greases

180c58.jpg



2x Peak is an indication of slight misalignment

2609a0.jpg

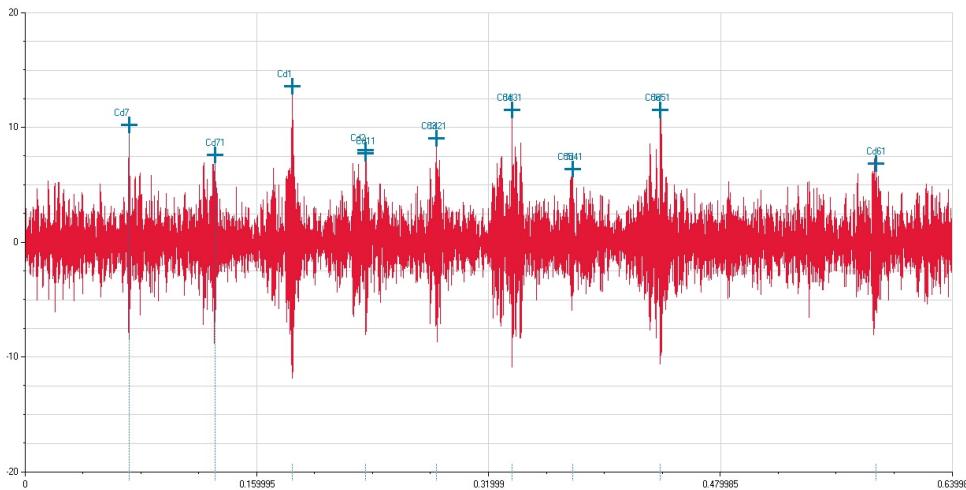


Elevated base or humps are an indications of Noise from Pump Cavitations and Bearing Noise

a0cb2.jpg



Cd7 (0.07207 s, 10.2 g) Cd1 (0.13107 s, 7.6 g) d<0.059 s [16.94 Hz] d'<2.595 g [25%]
g : BOOSTER PUMP #1 3-PP-RH Time wave 15/11/2018 10:55:42



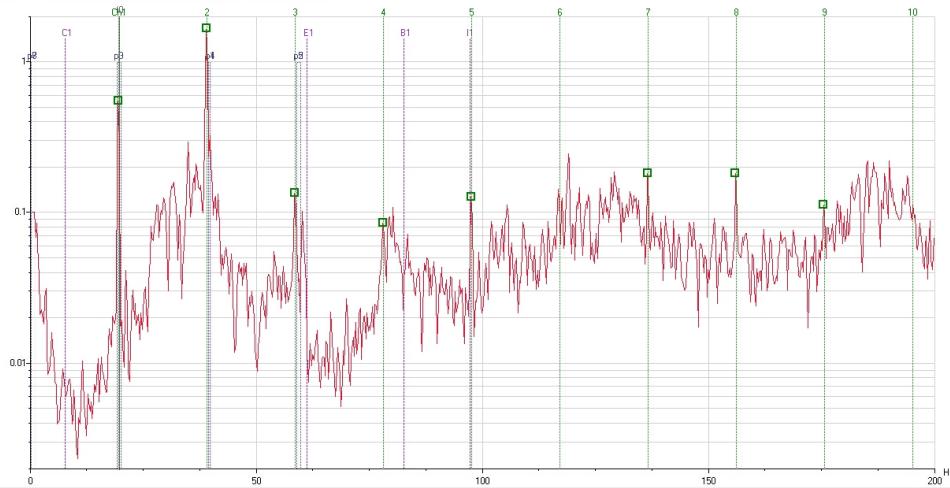
BOOSTER PUMP #1 3-PP-RH Time wave 15/11/2018 10:55:42

Cd1 0.13107s
13.57g
0.23519s
7.73g
dx[0.05066s, 19.77Hz]
dy[-5.8230g (-42.941%)
Cd2 0.23521s
7.99g
0.28433s
9.07g
dx[0.04912s, 20.35Hz]
dy[-1.08g (13.52%)
Cd3 0.28433s
9.07g
0.33846s
11.53g
dx[0.05212s, 19.18Hz]
dy[-2.46g (27.2%)
Cd4 0.33846s
11.53g
0.37835s
6.35g
dx[0.04169s, 23.88Hz]
dy[-5.1810g (-44.899%)
Cd5 0.37835s
6.35g
0.43875s
11.51g
dx[0.06030s, 16.55Hz]
dy[-5.15g (81.12%)
Cd6 0.43875s
11.51g
0.58748s
6.82g
dx[0.14965s, 6.72Hz]
dy[-4.6902g (-40.725%)
Cd7 0.07207s
10.2g
0.13107s
7.6g
dx[0.0595s, 16.94Hz]
dy[-2.595g (-25.44%)

Asset hierarchy\PAGCOR\BOOSTER PUMP #1
3-PP-RH-3-Pump-DE-H-0000
15/11/2018 10:54:31 - 0-63996047s - g - 32768Pts

180648.jpg

Ch1 (19.51 Hz, 0.55441 mm/s)
mm/s [RMS]: BOOSTER PUMP #1 3-PP-Ax Spectrum LF 15/11/2018 10:55:42



BOOSTER PUMP #1 3-PP-Ax Spectrum LF 15/11/2018 10:55:42

Ch1 1: 19.51Hz, 0.55441mm/s
2: 39.02Hz, 0.168mm/s
3: 58.53Hz, 1.13508mm/s
4: 78.04Hz, 0.08562mm/s
5: 97.55Hz, 0.12744mm/s
6: 117.07Hz, *****mm/s
7: 136.59Hz, 0.10499mm/s
8: 156.11Hz, 0.16221mm/s
9: 175.62Hz, 0.11271mm/s
10: 195.11Hz, *****mm/s
10 Rot Speed 19.83Hz
6317 [SKF] 11.38Hz E1:81.28Hz
B1:8.7Hz C1:7.73Hz
p0:ND-0007 19.83Hz [+/- 0.5Hz]
p1:ND-0008 39.68Hz [+/- 0.25Hz]
p2:ND-0009 59.5Hz [+/- 0.5Hz]
p3:ND-0010 79.4Hz [+/- 0.5Hz]
p4:ND-0011 99.0Hz [+/- 0.25Hz]
p5:ND-0012 59.5Hz [+/- 0.5Hz]
p6:ND-0013 0Hz [+/- 0.5Hz]
p7:ND-0014 0Hz [+/- 0.5Hz]
p8:ND-0015 0Hz [+/- 0.5Hz]

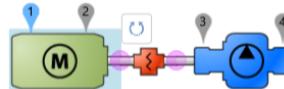
Asset hierarchy\PAGCOR\BOOSTER PUMP #1
3-PP-Ax-3-Pump-DE-A-0000
15/11/2018 10:54:38 - 0-200Hz - g - 801Pts

2x Peak is an indication of slight misalignment



Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #2		
Designation			
Abbreviation	BP#2		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:52:36	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 19.5 Hz / 1171 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Diagnosis

Pump Bearings Fault - Lubrication

Good overall state for component 'Electric motor'.

Fair state for component 'Pump'.

Highest vibrations measured at Pump OB Bearing Axial with Overall velocity of 2.79mm/s caused by Pump Bearings Early stage Fault - Outer Race.

Recommendations

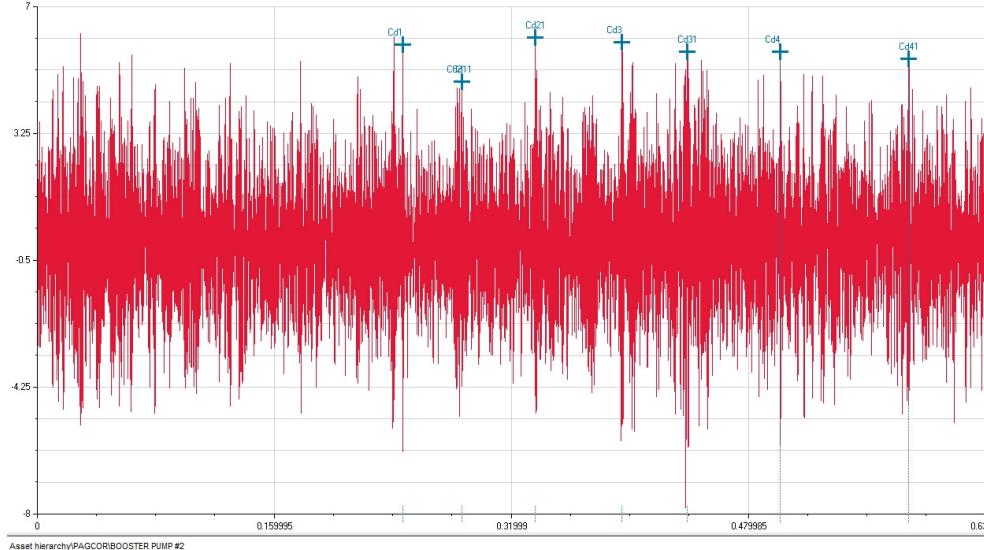
Purge Pump Bearings with fresh greases

Purge Pump Bearings with fresh greases

1a0648.jpg

Cd1 (0.50159 s, 5.67 g) Cd41 (0.59882 s, 5.46 g) dv<0.09869 s [11.53 Hz] dv=0.2053 g (-3%)

g : BOOSTER PUMP #2 4-PP-RH Time wave 15/11/2018 10:52:36



BOOSTER PUMP #2 4-PP-RH Time wave 15/11/2018

Cd1 0.24695s

5.89g

0.28683s

4.77g

dx[0.03968s, 25.07Hz]

dv=1.098g (-18.852%)

Cd2 0.28683s

4.77g

0.33626s

6.08g

dx[0.04943s, 20.22Hz]

dv=1.3g (27.3%)

Cd3 0.39447s

5.95g

0.43904s

5.69g

dx[0.04457s, 22.43Hz]

dv=0.2885g (4.8452%)

Cd4 0.50158s

5.67g

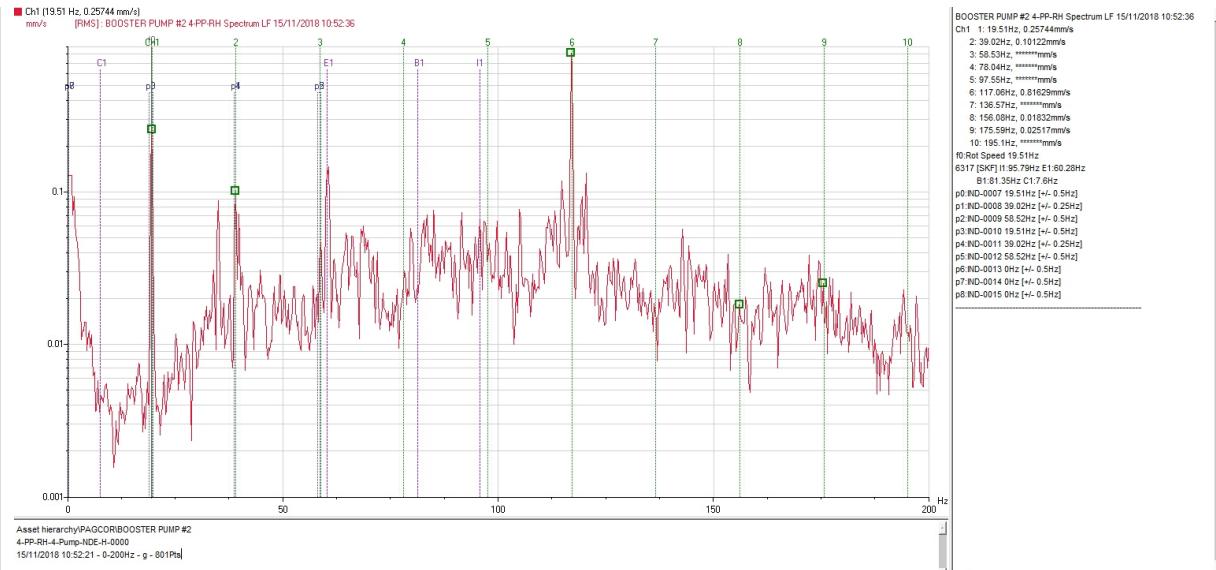
0.58823s

5.46g

dx[0.08669s, 11.53Hz]

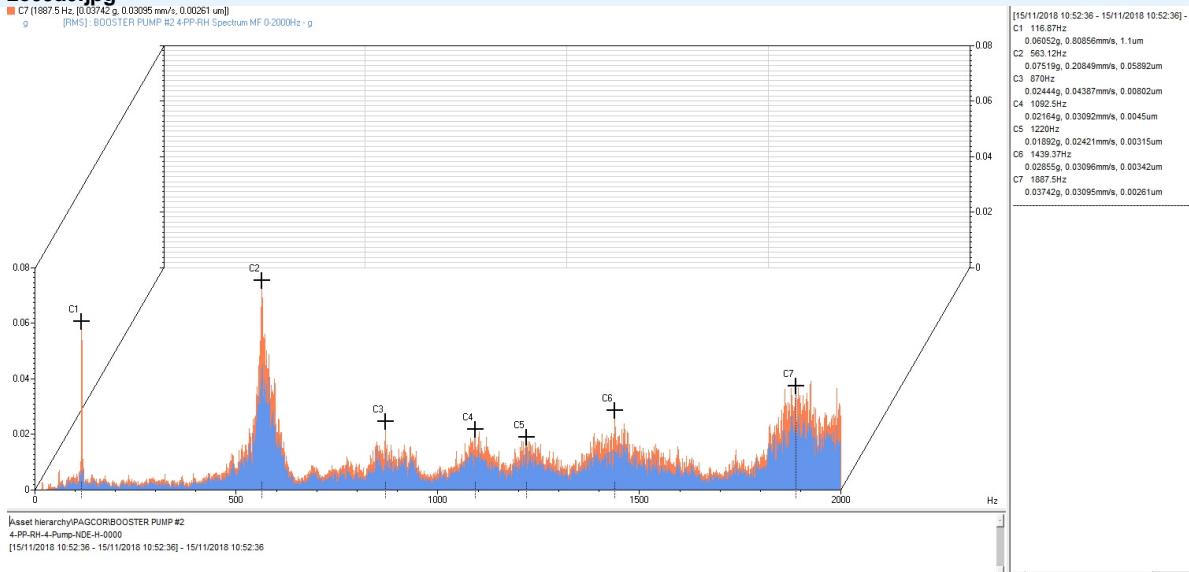
dv=-0.2053g (-3.6183%)

29098a.jpg



1x BPFO peak - Bearing Outer Race Fault

2c09a0.jpg

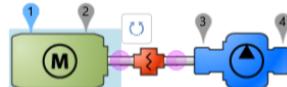


Noise generated at High frequencies due to lubrications problem



Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #3		
Designation			
Abbreviation	BP#3		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:49:19	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 19.8 Hz / 1190 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Diagnosis

Misalignment and Pump Cavitations

Good overall state for component 'Electric motor'.

Fair state for the component 'Pump'.

Highest vibrations measured at Pump OB Bearing Vertical with Overall velocity of 5.55mm/s and dominant peak of 1x Blade Pass Frequency (119.25Hz) caused by Misalignment and Pump Cavitations

Recommendations

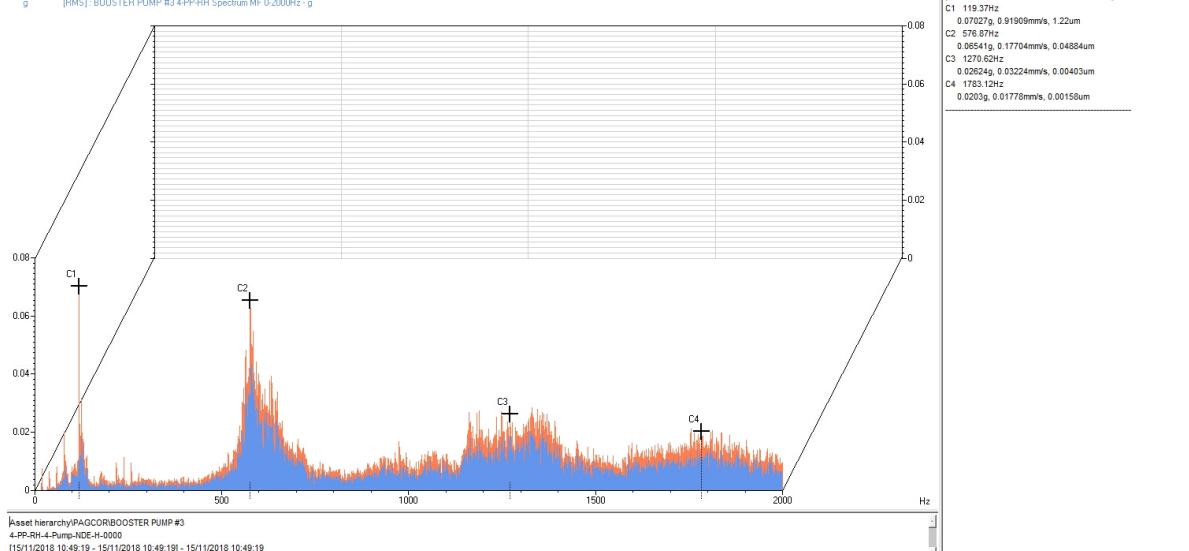
Realign Motor & Pump Shaft, Monitor Cavi

Realign Motor and Pump shaft or coupling using Precision Laser Alignment tool.

Cavitation to be watched: process control and action might be needed. Follow the dynamic behavior of the pump to prevent impeller damage.

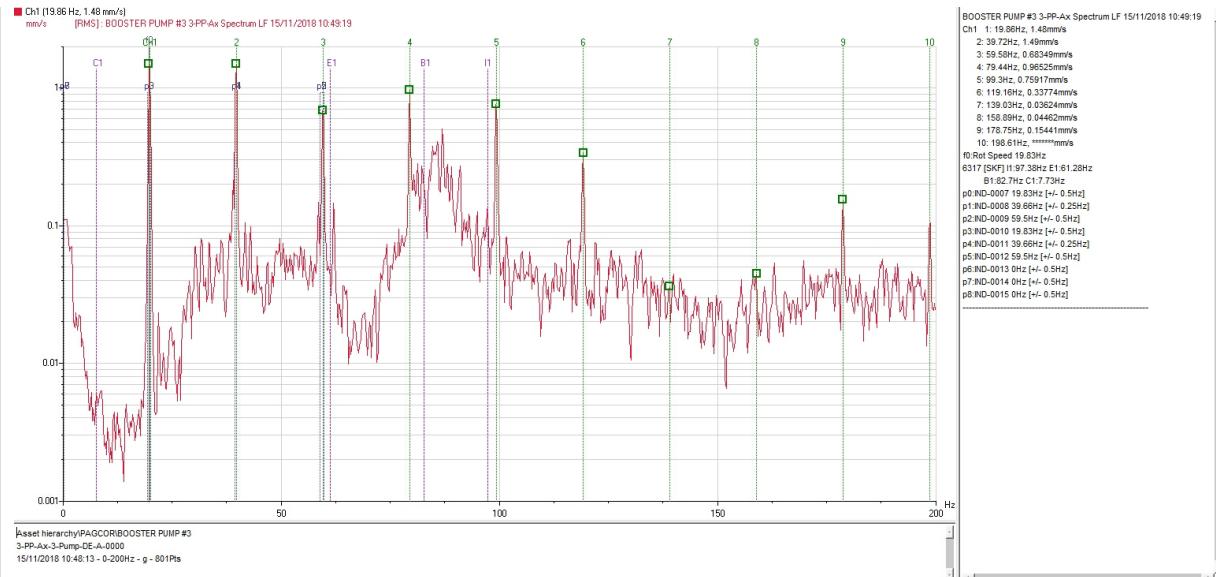
250cda.jpg

C4 [1783.12 Hz, 0.0203 g, 0.01778 mm/s, 0.00158 um]
g [RMS]: BOOSTER PUMP #3 4-PP-RH Spectrum MF 0-2000Hz · g



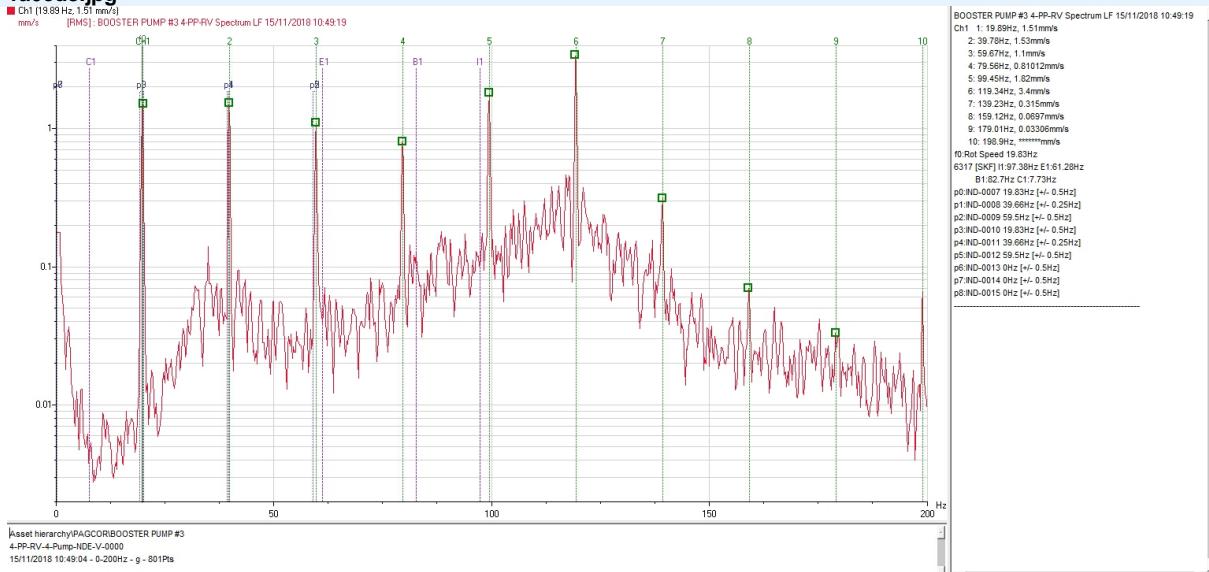
1x Blade Passing Frequency peak and elevated base or humps are an indications of pump cavitations Fault

2709f6.jpg



1x, 2x peak are an indications of slight Misalignment. Magnitude is minimal, but still need to verify actual alignment conditions.

1a0cd8.jpg



Dominant peak at Blade Passing Freq due to cavitations



Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #4		
Designation			
Abbreviation	BP#4		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:46:08	GOOD <i>Health is good for a long time service without restriction.</i>	Speed 19.8 Hz / 1190 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Diagnosis

Vibrations are within acceptable levels

Good overall state for component 'Electric motor'.
Good overall state for component 'Pump'.

Parameters sheet

Recommendations

Continue monitor vibrations periodically

Continue monitor vibrations periodically

3009f6.jpg

■ Ch1 (19.88 Hz, 1.27 mm/s)
[RMS]: BOOSTER PUMP #4 3-PP-RV Spectrum MF 15/11/2018 10:46:08



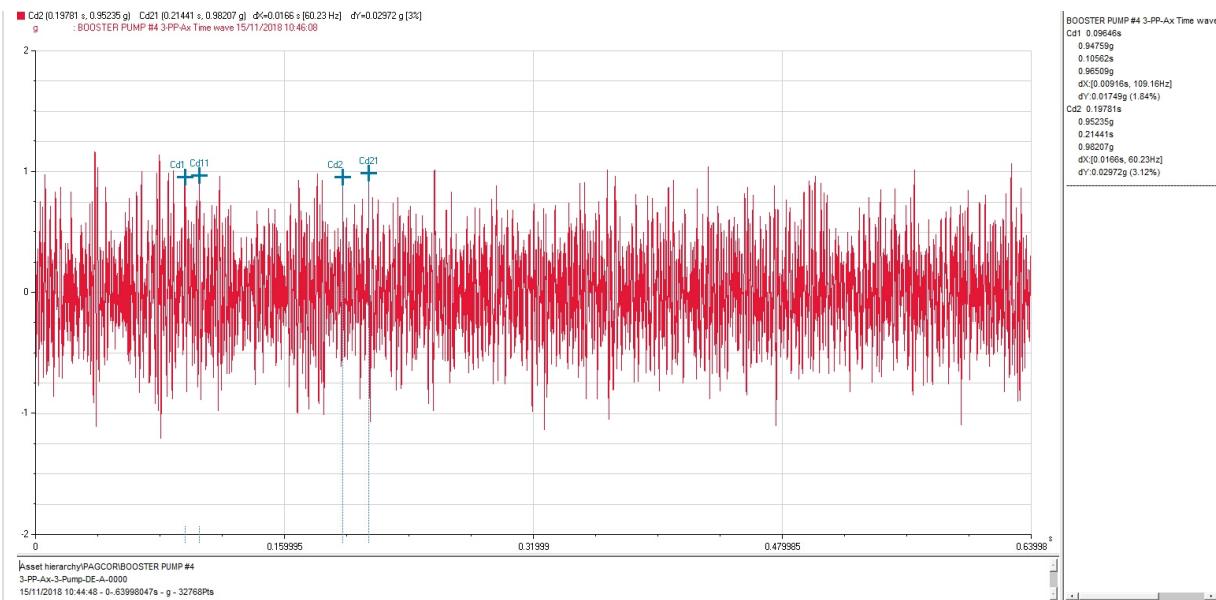
BOOSTER PUMP #4 3-PP-RV Spectrum MF 15/11/2018 10:46:08

```

Ch1: 1: 19.8Hz, 1.27mm/s
2: 39.78Hz, 0.22982mm/s
3: 59.64Hz, *****mm/s
4: 79.52Hz, 0.14387mm/s
5: 99.4Hz, 0.21974mm/s
6: 119.3Hz, 0.05333mm/s
7: 139.2Hz, *****mm/s
8: 159.04Hz, *****mm/s
9: 178.92Hz, *****mm/s
10: 198.8Hz, *****mm/s
11: 218.68Hz, *****mm/s
12: 238.56Hz, 0.20014mm/s
13: 258.45Hz, *****mm/s
14: 278.33Hz, *****mm/s
15: 298.21Hz, 0.0651mm/s
16: 318.1Hz, 0.03076mm/s
17: 337.98Hz, *****mm/s
18: 357.85Hz, 0.0271mm/s
19: 377.73Hz, *****mm/s
20: 397.61Hz, *****mm/s
21: 417.49Hz, *****mm/s
22: 437.37Hz, *****mm/s
23: 457.25Hz, *****mm/s
24: 477.13Hz, *****mm/s
25: 497.01Hz, *****mm/s
26: 516.89Hz, 0.04591mm/s
27: 536.77Hz, *****mm/s
28: 556.65Hz, *****mm/s
29: 576.54Hz, 0.14437mm/s
30: 596.42Hz, *****mm/s
31: 616.3Hz, *****mm/s
32: 636.18Hz, *****mm/s
33: 656.06Hz, *****mm/s
34: 675.94Hz, *****mm/s
35: 695.82Hz, *****mm/s
36: 715.7Hz, *****mm/s
37: 735.58Hz, *****mm/s
38: 755.46Hz, *****mm/s
39: 775.35Hz, 0.0142mm/s
40: 795.23Hz, *****mm/s
41: 815.11Hz, *****mm/s
42: 834.99Hz, *****mm/s
43: 854.87Hz, 0.00545mm/s
44: 874.74Hz, *****mm/s

```

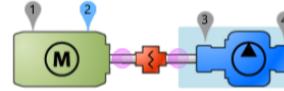
340bfe.jpg





Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #5		
Designation			
Abbreviation	BP#5		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:40:18	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 19.8 Hz / 1185 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Diagnosis

Pump Cavitations & Bearing Noise at Pump

Good overall state for component 'Electric motor'.

Fair State for the component 'Pump'.

Highest vibrations measured at Pump OB Bearing Axial with Overall velocity of 3.84mm/s caused by Pump Cavitations and Bearing Noise at Pump IB Bearing.

Recommendations

Monitor the evolution

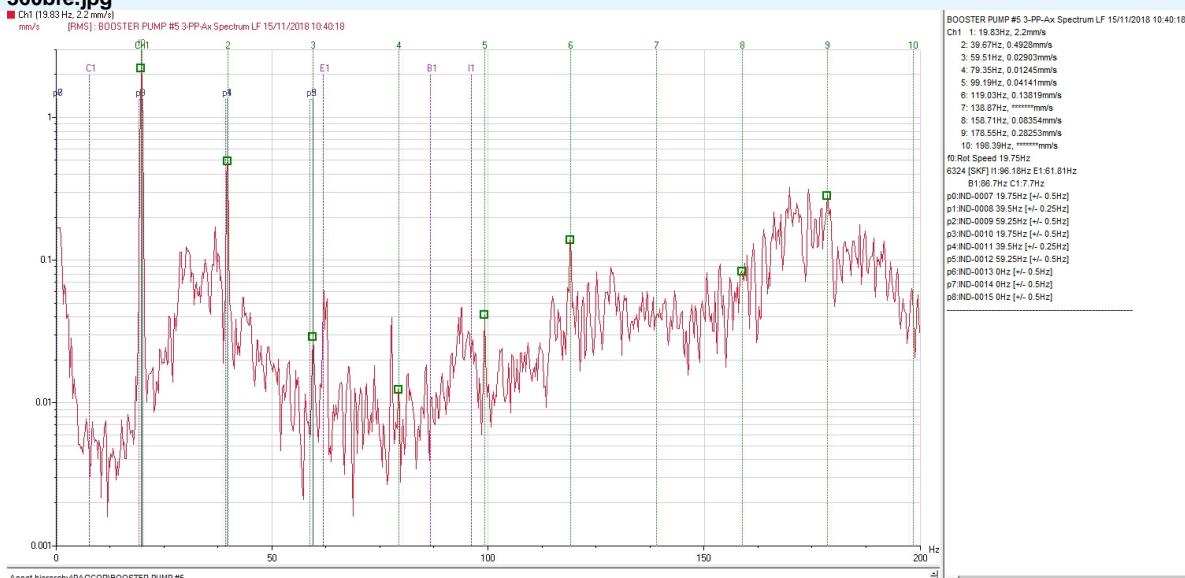
Cavitation to be watched: process control and action might be needed. Follow the dynamic behavior of the pump to prevent impeller damage.

Location "3-Pump-DE" slight

Location "4-Pump-NDE" to be watched

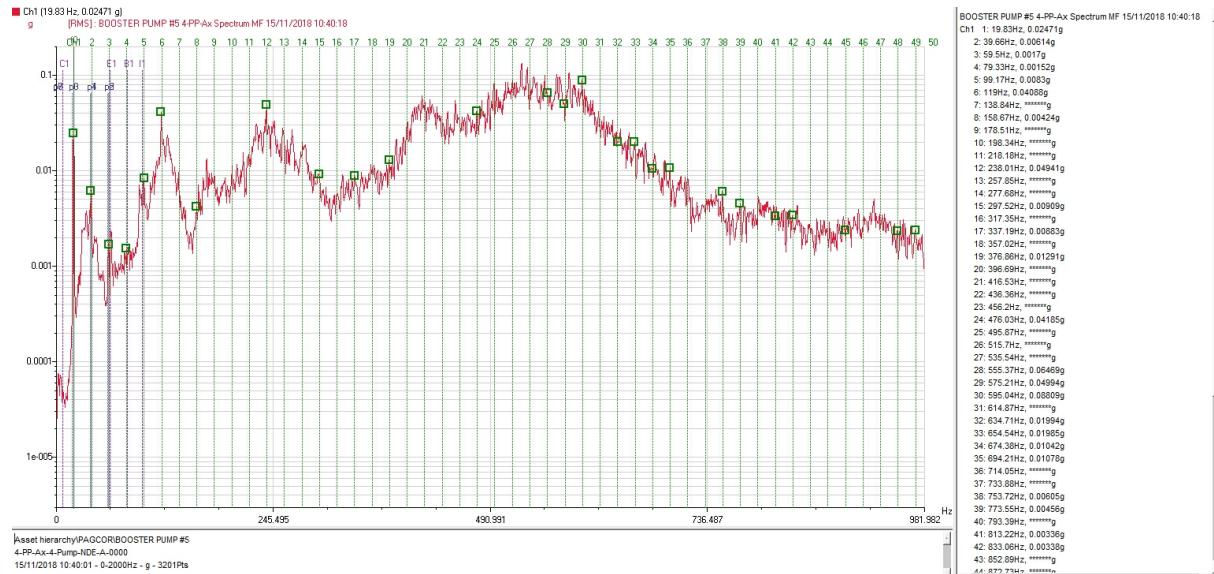
Regrease Pump IB Bearing with fresh greases

360bfe.jpg

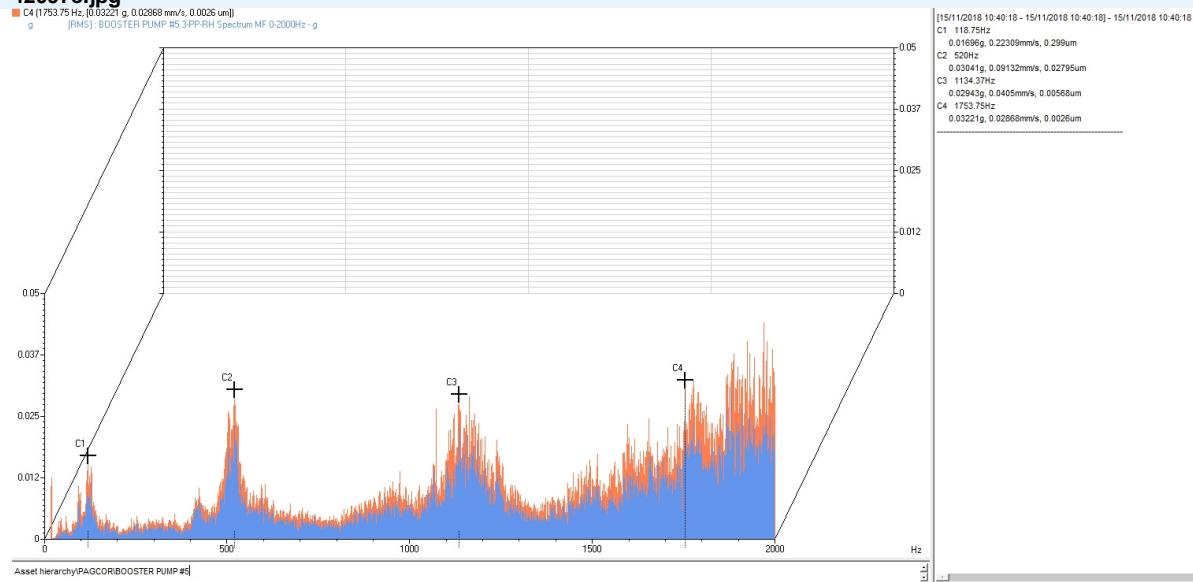


Asset hierarchy\PAGCOR\BOOSTER PUMP #5

3d09a0.jpg



42097e.jpg

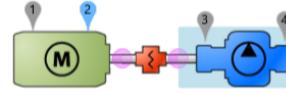


Elevated base or humps at High frequencies are an indications of combination Noise from Pump Cavitations and Lubrication issues



Location	PAGCOR\		
Designation			
Equipment	BOOSTER PUMP #6		
Designation	BP 6		
Abbreviation	BP#6		
Serial No	AD139026-1		
Model	KSB 40M HEAD		
Periodicity (d)	Normal 60 Alarm 15		
TECO			
	Previous Advice	Condition	Rotation Speed

Fixed speed



Date 15/11/2018 10:36:28	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 19.8 Hz / 1185 rpm Author u1 System - Serial FALCON - 11407 Sensor Connector
Condition DfCnd		

Diagnosis & Recommendation

Diagnosis

Pump Cavitations & Pump OB Brg Noise

Good overall state for component 'Electric motor'.

Fair State for the component 'Pump'.

Highest vibrations measured at Pump OB Bearing Vertical with Overall velocity of 3.17mm/s caused by Pump Cavitations & Pump OB Bearing Noise

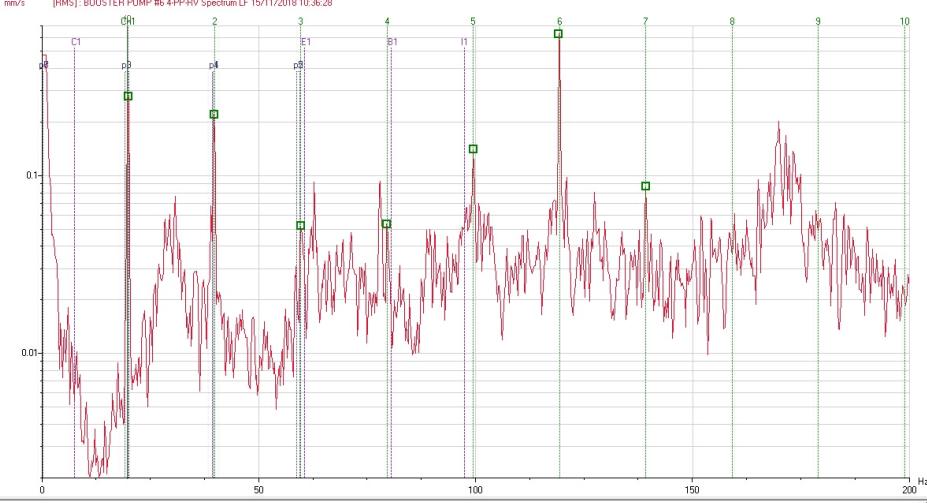
Recommendations

Monitor Slight cavitations

Monitor Slight cavitations, Regrease Pump OB Bearing with fresh greases

1809d8.jpg

■ Ch1 (19.88 Hz, 0.2797 mm/s)
mm/s [RMS]: BOOSTER PUMP #6 4-PP-RV Spectrum LF 15/11/2018 10:36:28



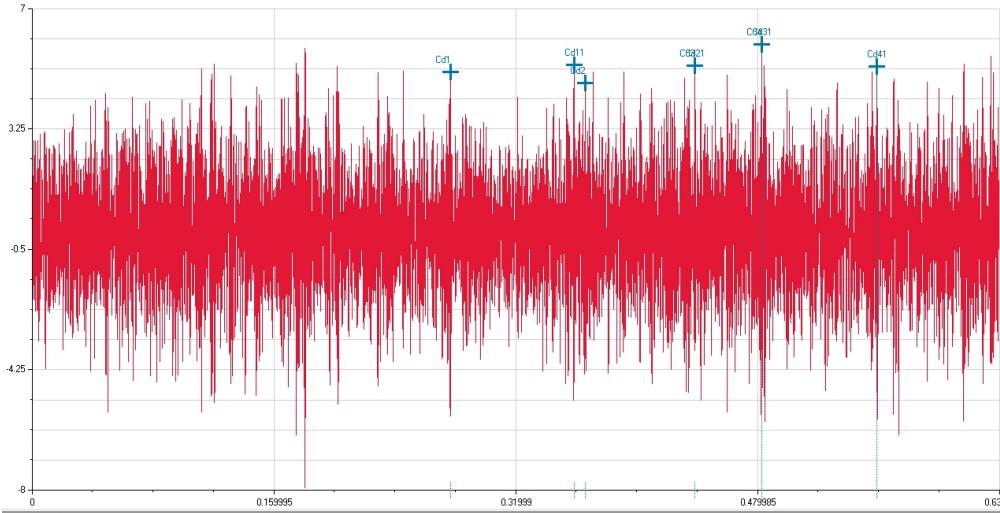
BOOSTER PUMP #6 4-PP-RV Spectrum LF 15/11/2018 10:36:28

Ch1: 1: 19.88Hz, 0.2797mm/s
2: 39.66Hz, 0.2207mm/s
3: 59.44Hz, 0.05196mm/s
4: 79.22Hz, 0.05325mm/s
5: 99.00Hz, 0.14027mm/s
6: 118.33Hz, 0.02548mm/s
7: 138.11Hz, 0.00861mm/s
8: 158.99Hz, *****mm/s
9: 178.89Hz, *****mm/s
10: 198.88Hz, *****mm/s
10.Rot Speed 19.75Hz
6320 (S/N) 11.97.38Hz E1.6.0.63Hz
B1:80.5Hz C1:7.5Hz
p0:IND-0007 19.75Hz [+/- 0.5Hz]
p1:IND-0008 39.5Hz [+/- 0.2Hz]
p2:IND-0009 59.25Hz [+/- 0.2Hz]
p3:IND-0010 79.0Hz [+/- 0.2Hz]
p4:IND-0011 98.75Hz [+/- 0.2Hz]
p5:IND-0012 118.5Hz [+/- 0.2Hz]
p6:IND-0013 138.25Hz [+/- 0.5Hz]
p7:IND-0014 158.0Hz [+/- 0.5Hz]
p8:IND-0015 177.75Hz [+/- 0.5Hz]

200648.jpg



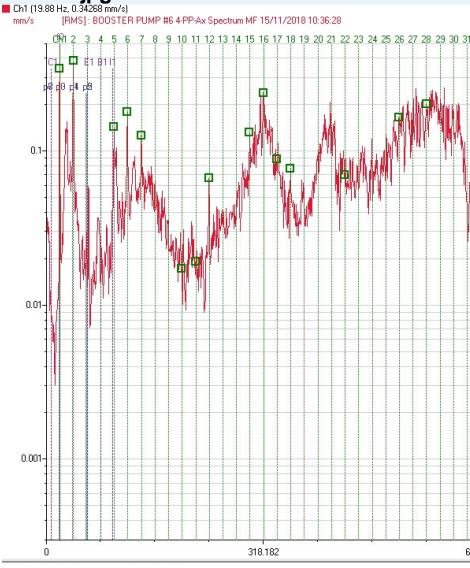
■ Ch4 (0.48361 s, 5.89 g) Ch11 (0.55884 s, 5.18 g) dX<0.07623 s [13.11 Hz] dY>0.7028 g [-11%]
9 BOOSTER PUMP #6 4-PP-RH Time wave 15/11/2018 10:36:28



BOOSTER PUMP #6 4-PP-RH Time wave 15/
Cd1 0.27689s
5.02g
0.35896s
5.22g
dX[0.08197a, 12.19Hz]
dY[0.23331g (4.74%)
Cd2 0.36625s
4.69g
0.43698s
5.22g
dX[0.07244s, 13.8Hz]
dY[0.33339g (11.4%)
Cd3 0.36909s
5.22g
0.48261s
5.89g
dX[0.04392s, 22.76Hz]
dY[0.66288g (12.67%)
Cd4 0.40261s
5.89g
0.55884s
5.16g
dX[0.07623s, 13.11Hz]
dY[-0.7028g (-11.92%)

Asset hierarchy\PAGCOR\BOOSTER PUMP #6
4-PP-RH-4-Pump-NSE-H-0000
15/11/2018 10:36:04 - 0-63998047s - g - 32768Pts

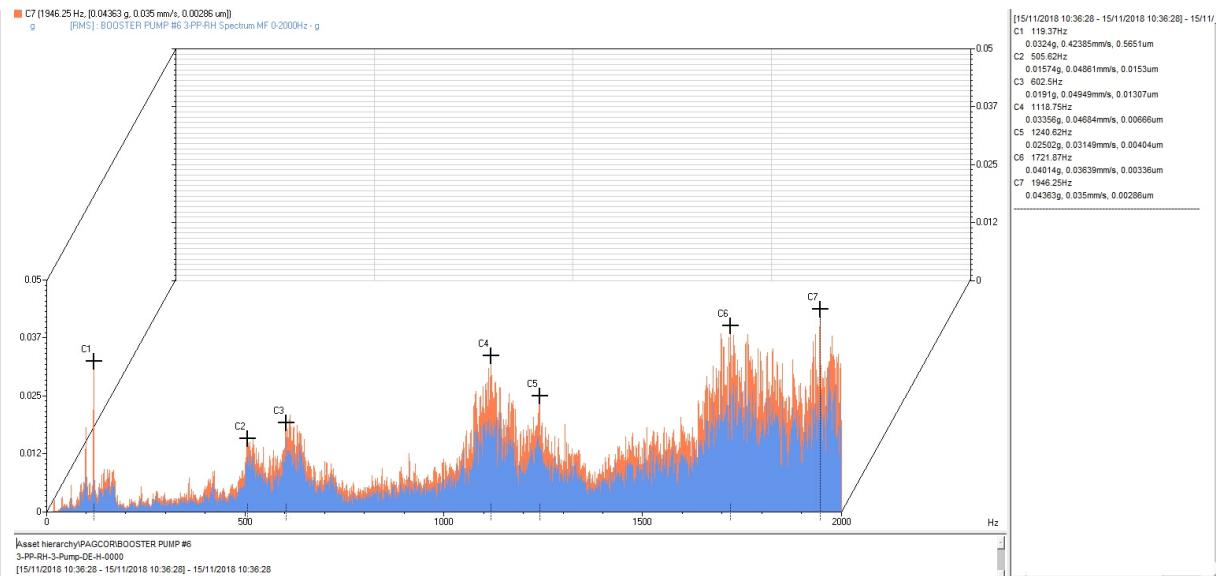
350b18.jpg



BOOSTER PUMP #6 4-PP-Ax Spectrum MF 15/11/2018 10:36:28
Ch1: 1: 19.68Hz, 0.34265mm/s
2: 39.76Hz, 0.38378mm/s
3: 59.84Hz, *****mm/s
4: 79.52Hz, *****mm/s
5: 99.4Hz, 0.14305mm/s
6: 119.28Hz, 0.17866mm/s
7: 139.16Hz, 0.12606mm/s
8: 159.04Hz, *****mm/s
9: 178.92Hz, *****mm/s
10: 198.8Hz, 0.01715mm/s
11: 218.69Hz, 0.01911mm/s
12: 238.56Hz, 0.06549mm/s
13: 258.44Hz, *****mm/s
14: 278.32Hz, *****mm/s
15: 298.2Hz, 0.13156mm/s
16: 318.08Hz, 0.23783mm/s
17: 337.96Hz, 0.13039mm/s
18: 357.84Hz, 0.07697mm/s
19: 377.72Hz, *****mm/s
20: 397.6Hz, *****mm/s
21: 417.49Hz, *****mm/s
22: 437.37Hz, 0.06965mm/s
23: 457.25Hz, *****mm/s
24: 477.13Hz, *****mm/s
25: 497.01Hz, *****mm/s
26: 516.89Hz, 0.16522mm/s
27: 536.77Hz, 0.12009mm/s
28: 556.65Hz, 0.20097mm/s
29: 576.53Hz, *****mm/s
30: 596.41Hz, *****mm/s
31: 616.29Hz, *****mm/s
32: 636.17Hz, *****mm/s
33: 656.05Hz, *****mm/s
34: 675.93Hz, *****mm/s
35: 695.81Hz, *****mm/s
36: 715.69Hz, *****mm/s
37: 735.57Hz, *****mm/s
38: 755.45Hz, *****mm/s
39: 775.33Hz, *****mm/s
40: 795.21Hz, *****mm/s
41: 815.09Hz, *****mm/s
42: 834.98Hz, 0.0104mm/s
43: 854.86Hz, *****mm/s
44: 874.74Hz, 0.00737mm/s

Asset hierarchy\PAGCOR\BOOSTER PUMP #6

45097e.jpg



Elevated base or humps at High frequencies are an indications of combination Noise from Pump Cavitations and Lubrication issues at Pump OB Bearing

4609a0.jpg



BOOSTER PUMP #6 4-PP-RV Spectrum MF 15/11/2018 10:36:28

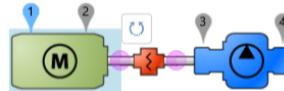
Ch1	1: 19.87Hz, 0.31232mm/s
2:	39.75Hz, 0.20152mm/s
3:	59.63Hz, *****mm/s
4:	79.51Hz, *****mm/s
5:	99.39Hz, 0.16525mm/s
6:	119.27Hz, 0.08037mm/s
7:	139.15Hz, 0.10054mm/s
8:	159.03Hz, *****mm/s
9:	178.9Hz, *****mm/s
10:	198.79Hz, *****mm/s
11:	218.66Hz, *****mm/s
12:	238.54Hz, 0.10934mm/s
13:	258.42Hz, *****mm/s
14:	278.3Hz, *****mm/s
15:	298.19Hz, 0.10899mm/s
16:	318.08Hz, 0.11008mm/s
17:	337.93Hz, *****mm/s
18:	357.81Hz, 0.05025mm/s
19:	377.69Hz, *****mm/s
20:	397.57Hz, *****mm/s
21:	417.45Hz, *****mm/s
22:	437.33Hz, 0.07715mm/s
23:	457.21Hz, *****mm/s
24:	477.09Hz, 0.15199mm/s
25:	496.97Hz, 0.10899mm/s
26:	516.84Hz, 0.20092mm/s
27:	536.72Hz, *****mm/s
28:	556.6Hz, *****mm/s
29:	576.48Hz, *****mm/s
30:	596.36Hz, *****mm/s
31:	616.24Hz, *****mm/s
32:	636.12Hz, *****mm/s
33:	655.99Hz, *****mm/s
34:	675.87Hz, *****mm/s
35:	695.75Hz, *****mm/s
36:	715.63Hz, *****mm/s
37:	735.51Hz, *****mm/s
38:	755.39Hz, *****mm/s
39:	775.27Hz, *****mm/s
40:	795.15Hz, *****mm/s
41:	815.03Hz, *****mm/s
42:	834.9Hz, *****mm/s
43:	854.78Hz, *****mm/s
44:	874.66Hz, 0.11145mm/s

Asset hierarchy/PAGCOR/BOOSTER PUMP #6
4-PP-RV-4-Pump-HDE-V-0000
15/11/2018 10:36:08 - g - 2000Hz - g - 3201Pts



Location	PAGCOR\		
Designation			
Equipment	STORAGE PUMP #1		
Designation			
Abbreviation	SP#1		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 11:02:24	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 17.5 Hz / 1051 rpm
Condition DfCnd		Author u1 System - Serial FALCON - 11407 Sensor Connector

Diagnosis & Recommendation

Diagnosis

Misalignment and Pump Cavitations

Good overall state for component 'Electric motor'.

Fair State for the component 'Pump'.

Highest vibrations measured at Pump OB Bearing Axial with Overall velocity of 4.47mm/s and dominant peak of 2x Motor RPM caused by Misalignment and Pump Cavitations

Recommendations

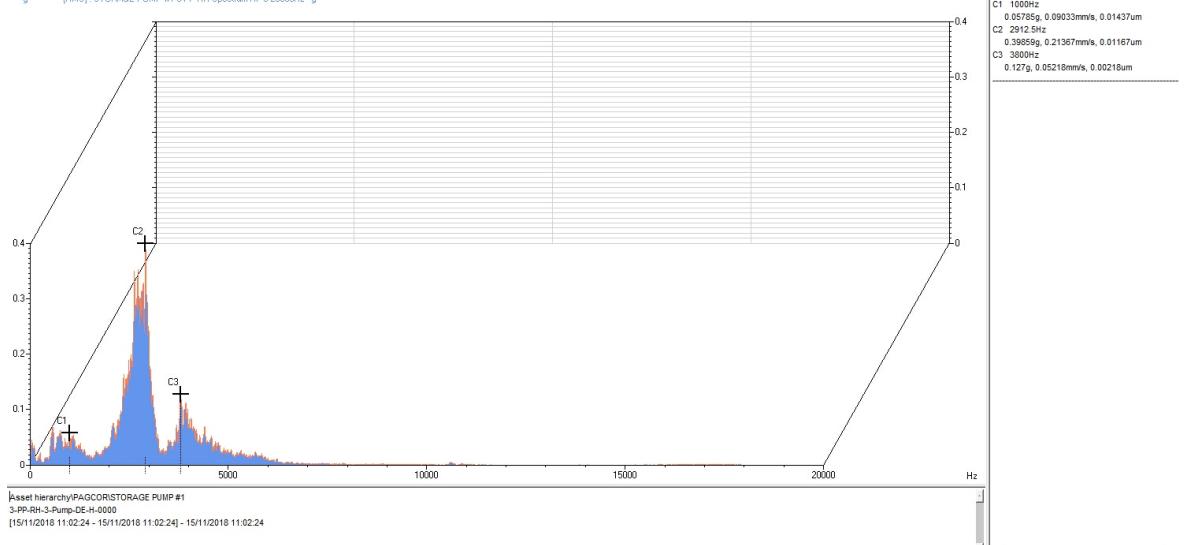
Realign Motor and Pump Shaft

Realign Motor and Pump shaft or coupling using Precision Laser Alignment tool.

Cavitation to be watched: process control and action might be needed. Follow the dynamic behavior of the pump to prevent impeller damage.

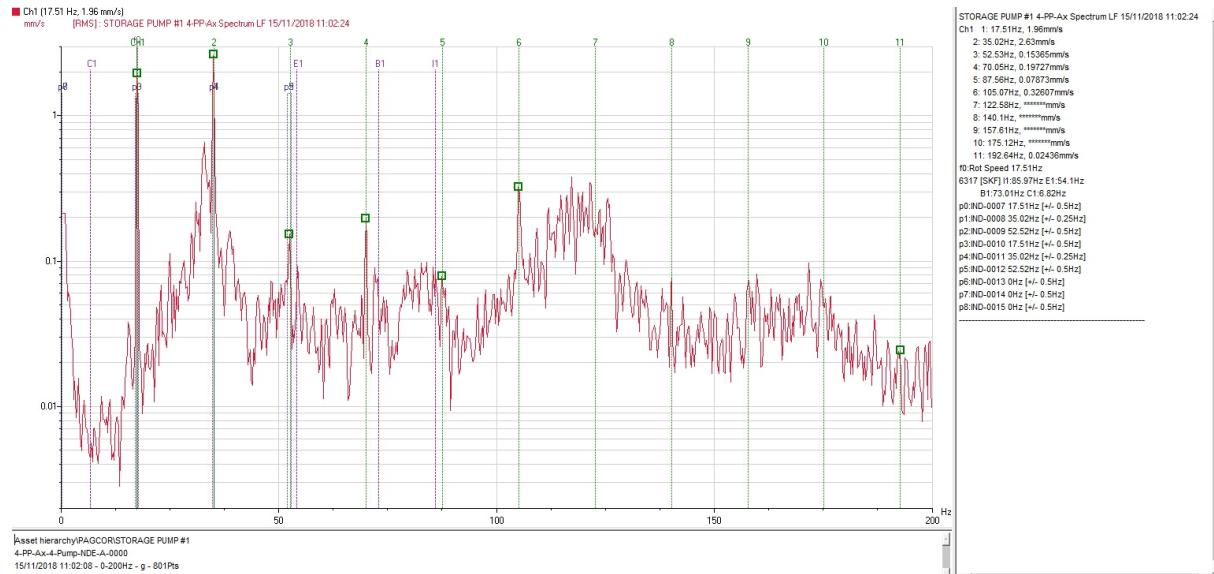
120cd8.jpg

C3 [3800 Hz, 0.127 g, 0.05218 mm/s, 0.00218 um]
g [RMS]: STORAGE PUMP #1 3-PP-RH Spectrum HF 20000Hz - g



Elevated base or humps are an indications of Noise from Pump Cavitations

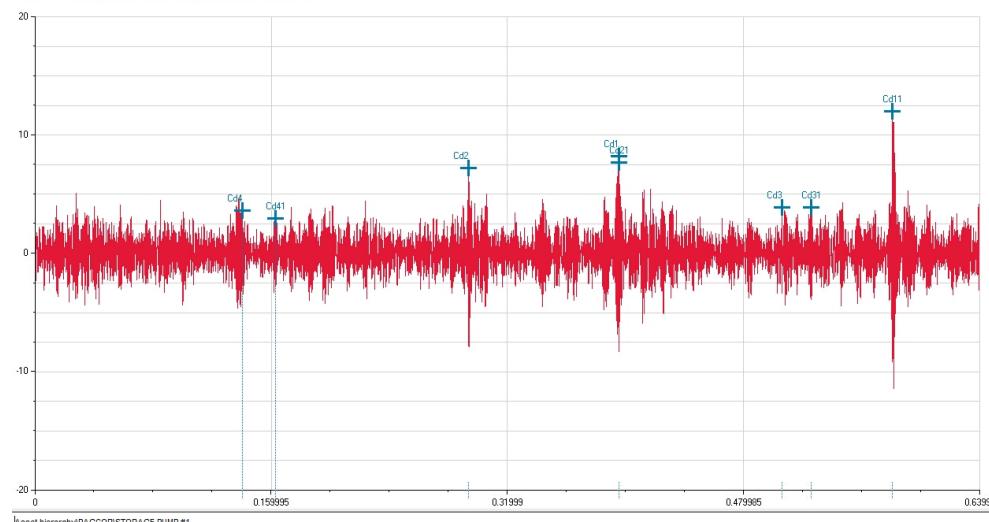
20cce.jpg



1x and 2x Peak at FFT - are an indications of Misalignment

80c00.jpg

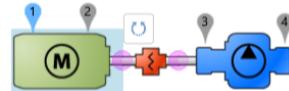
■ Cd4 (0.14039 s, 3.55 g) Cd41 (0.16308 s, 2.9 g) dX<0.02269 s [44.06 Hz] dY>0.6515 g [18%]
g : : STORAGE PUMP #1 4-PP-RH Time wave 15/11/2018 11:02:24





Location	PAGCOR\		
Designation			
Equipment	STORAGE PUMP #2		
Designation			
Abbreviation	SP#2		
Serial No			
Model			
Periodicity (d)	Normal 60	Alarm 15	
Previous Advice	Condition	Rotation Speed	

Fixed speed



Date 15/11/2018 10:59:20	FAIR <i>Health is not acceptable for a long time service.</i>	Speed 17.5 Hz / 1051 rpm
Condition DfCnd		Author u1 System - Serial FALCON - 11407 Sensor Connector

Diagnosis & Recommendation

Diagnosis

Pump Cavitations

Good overall state for component 'Electric motor'.

Fair State for the component 'Pump'.

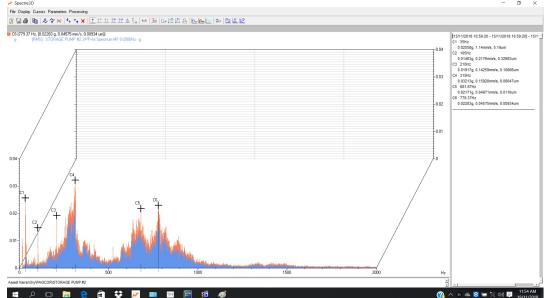
Highest vibrations measured at Pump OB Bearing Axial with Overall velocity of 2.87mm/s caused by Pump Cavitations

Recommendations

Monitor the evolution

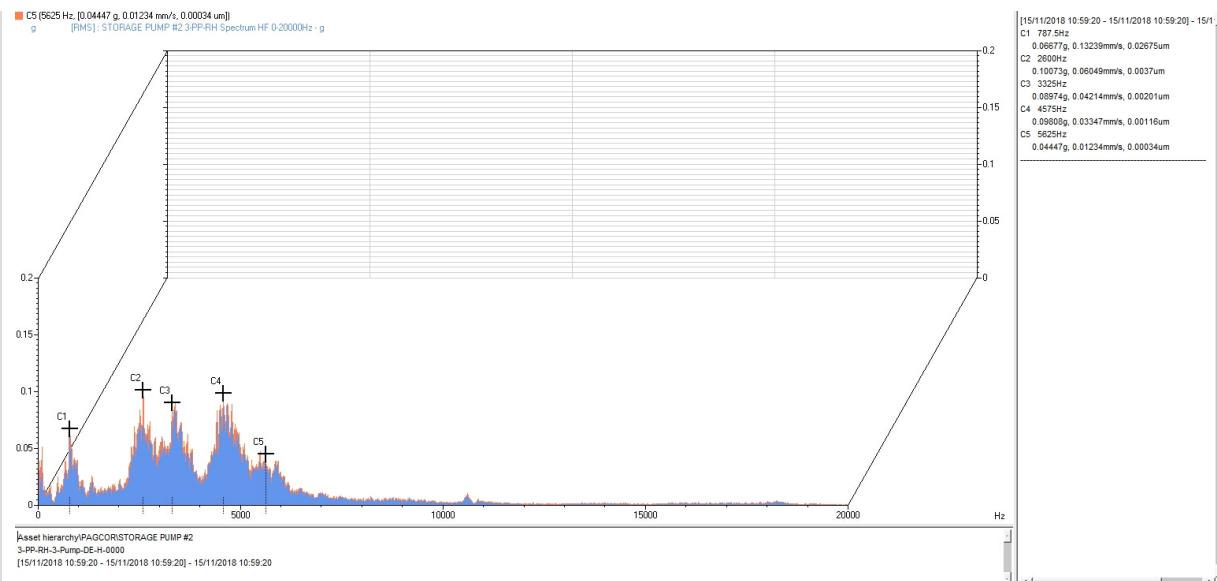
Cavitation to be watched: process control and action might be needed. Follow the dynamic behavior of the pump to prevent impeller damage.

Pagcor_SP#2 FFT.jpg



Elevated base or humps are an indications of Noise from Pump Cavitations

160c58.jpg



Elevated base or humps are an indications of Noise from Pump Cavitations

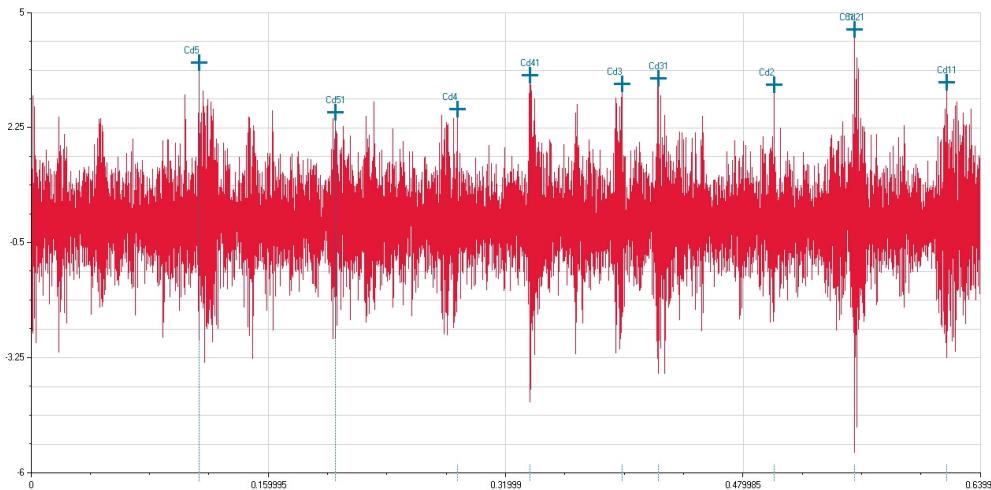
240970.jpg



60cda.jpg



■ Cd5 (0.11343 s, 3.79 g) Cd51 (0.20539 s, 2.62 g) d<0.09195 s [10.87 Hz] dy=1.1775 g [-30%]
g : STORAGE PUMP #2 3-PP-RH Time wave 15/11/2018 10:59:20



STORAGE PUMP #2 3-PP-RH Time wave 15/11/2018 10:59:20

Cd1 0.05517s
4.59g
0.01753s
3.32g
dx[0.06236s, 16.03Hz]
dy=-1.2553g (-27.34%)
Cd2 0.09093s
3.26g
0.055517s
4.59g
dx[0.05423s, 18.43Hz]
dy=1.32g (40.62%)
Cd3 0.30857s
3.26g
0.42261s
3.42g
dx[0.02423s, 41.25Hz]
dy=0.1349g (4.07%)
Cd4 0.28777s
2.68g
0.33619s
3.42g
dx[0.04841s, 20.65Hz]
dy=0.8104g (30.15%)
Cd5 0.11343s
3.79g
0.20539s
2.62g
dx[0.09195s, 10.87Hz]
dy=-1.1775g (-30.99%)

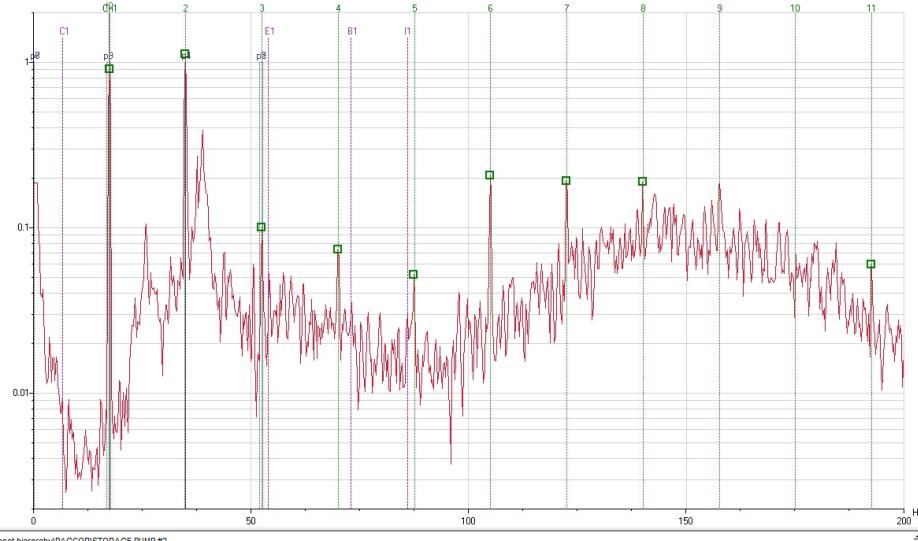
Asset hierarchy\PAGCOR\STORAGE PUMP #2
3-PP-RH-3-Pump-DE-H-0000
15/11/2018 10:58:12 -0- 63998047s -g - 32768Ps

Non Periodic Pulsation due to cavitations

70cde.jpg

■ Ch1 (17.5 Hz, 0.91145 mm/s)

mm/s [RMS]: STORAGE PUMP #2 4-PP-Ax Spectrum LF 15/11/2018 10:59:20

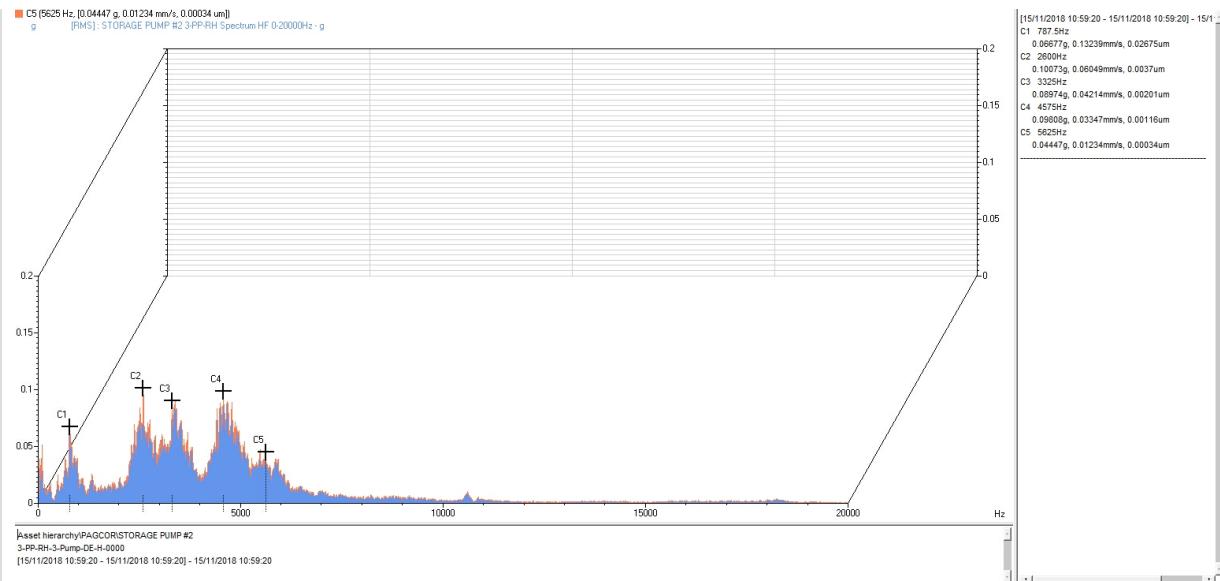


STORAGE PUMP #2 4-PP-Ax Spectrum LF 15/11/2018 10:59:20

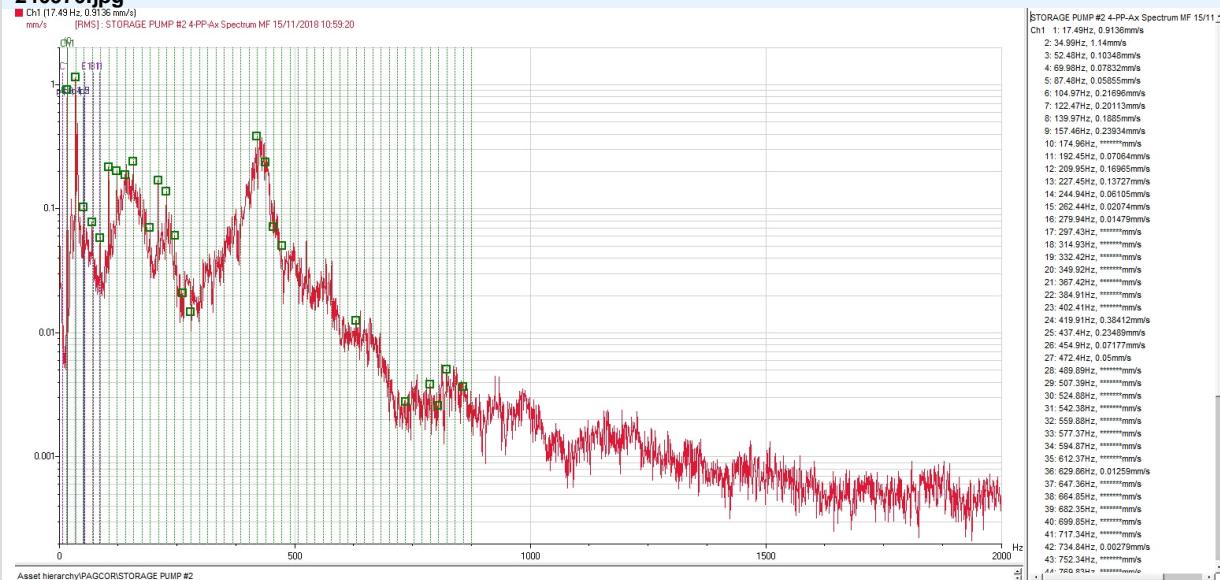
CH1: 1.175Hz, 0.91145mm/s
2: 35.01Hz, 1.11mm/s
3: 52.52Hz, 0.1004mm/s
4: 70.03Hz, 0.07353mm/s
5: 87.54Hz, 0.05188mm/s
6: 105.05Hz, 0.20692mm/s
7: 122.56Hz, 0.19195mm/s
8: 140.07Hz, 0.16874mm/s
9: 157.57Hz, *****mm/s
10: 175.08Hz, *****mm/s
11: 192.59Hz, 0.05955mm/s
10: Rot Speed 17.5Hz
6317 (SKF) 11.85.97Hz, E1.14.1Hz
B1.73.0Hz, C1.82Hz
p0.IND-0007 17.51Hz [+/- 0.5Hz]
p1.IND-0008 35.02Hz [+/- 0.5Hz]
p2.IND-0009 52.52Hz [+/- 0.5Hz]
p3.IND-0010 70.03Hz [+/- 0.5Hz]
p4.IND-0011 87.54Hz [+/- 0.5Hz]
p5.IND-0012 105.05Hz [+/- 0.5Hz]
p6.IND-0013 122.56Hz [+/- 0.5Hz]
p7.IND-0014 140.07Hz [+/- 0.5Hz]
p8.IND-0015 157.57Hz [+/- 0.5Hz]

Asset hierarchy\PAGCOR\STORAGE PUMP #2

160c58.jpg



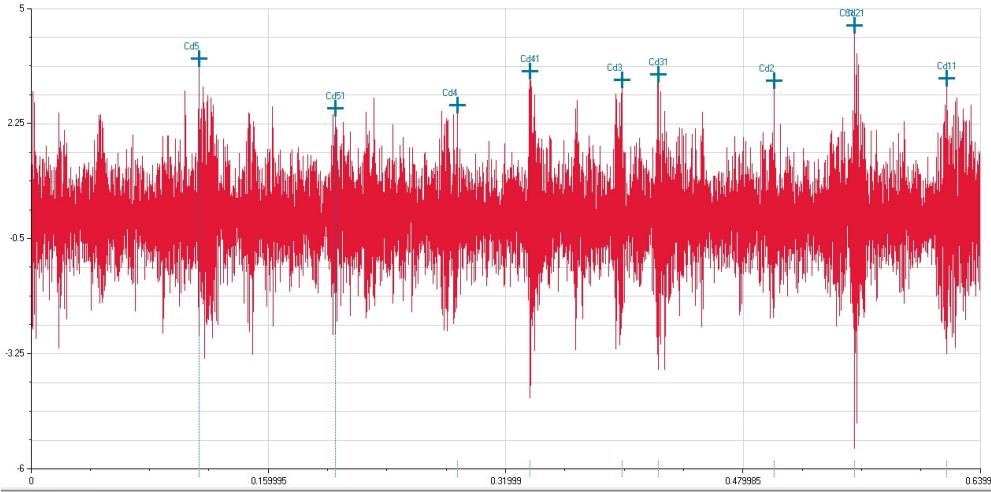
240970.jpg



60cda.jpg



■ Cd5 (0.11343 s, 3.79 g) Cd51 (0.20539 s, 2.62 g) d<0.09195 s [10.87 Hz] dy=1.1775 g [-30%]
g : STORAGE PUMP R2 3-PP-RH Time wave 15/11/2018 10:59:20



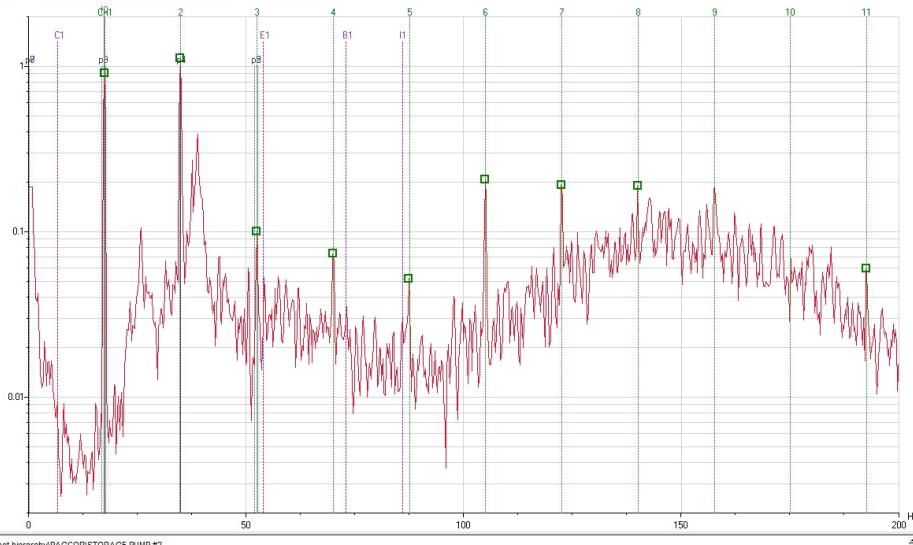
STORAGE PUMP #2 3-PP-RH Time wave 15/11/2018 10:59:20

Cd1 0.55517s
4.59g
0.01753s
3.26g
d<0.06236s, 16.03Hz
dy=-1.2553g (-27.34%)
Cd2 0.50938s
3.26g
0.55517s
4.59g
d<0.05423s, 18.43Hz
dy=1.32g (40.62%)
Cd3 0.38678s
3.26g
0.42261s
3.42g
d<0.02423s, 41.25Hz
dy=0.1349g (4.07%)
Cd4 0.28777s
2.68g
0.33619s
3.42g
d<0.04841s, 20.65Hz
dy=0.8104g (30.15%)
Cd5 0.11343s
3.79g
0.20539s
2.62g
d<0.09195s, 10.87Hz
dy=-1.1775g (-30.99%)

Asset hierarchy\PAGCOR\STORAGE PUMP #2
3-PP-RH-3-Pump-DE-H-0000
15/11/2018 10:58:12 -0- 63998047s -g - 32768Pis

70cde.jpg

■ Ch1 (17.5 Hz, 0.91145 mm/s)
mm/s [RMS]: STORAGE PUMP #2 4-PP-Ax Spectrum LF 15/11/2018 10:59:20



STORAGE PUMP #2 4-PP-Ax Spectrum LF 15/11/2018 10:59:20

CH1: 1.175Hz, 0.91145mm/s
2: 35.01Hz, 1.11mm/s
3: 52.52Hz, 0.1004mm/s
4: 70.03Hz, 0.07353mm/s
5: 87.54Hz, 0.05168mm/s
6: 105.05Hz, 0.02692mm/s
7: 122.56Hz, 0.19195mm/s
8: 140.07Hz, 0.16874mm/s
9: 157.57Hz, *****mm/s
10: 175.08Hz, *****mm/s
11: 192.59Hz, 0.05955mm/s
10: Rot Speed 17.5Hz
6317 (SKF) 11.85.97Hz, E1.14.1Hz
B1.73.0Hz, C1.82Hz
p0.IND-0007 17.5Hz [+/- 0.5Hz]
p1.IND-0008 35.02Hz [+/- 0.5Hz]
p2.IND-0009 52.52Hz [+/- 0.5Hz]
p3.IND-0010 70.03Hz [+/- 0.5Hz]
p4.IND-0011 87.54Hz [+/- 0.5Hz]
p5.IND-0012 105.05Hz [+/- 0.5Hz]
p6.IND-0013 122.56Hz [+/- 0.5Hz]
p7.IND-0014 140.07Hz [+/- 0.5Hz]
p8.IND-0015 157.57Hz [+/- 0.5Hz]

Asset hierarchy\PAGCOR\STORAGE PUMP #2