



Sample Predictive Maintenance Report

Vibration Analysis

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Matthews, North Carolina 28105
800-532-0415
www.ISIservesYOU.com

Vibration Analysis Priority Criteria

Repair Priority	Causal Events or Scenarios
PRIORITY 1	<ul style="list-style-type: none"> ❑ Serious or advanced anomaly noted; i.e., broken gear tooth or advanced bearing defect, or ❑ Rapid upward vibration trend indicative of increased degradation; failure may be imminent, or ❑ Any defect noted on an extremely critical or safety-related piece of equipment, or ❑ Vibration levels far above industry norm for a particular component. ❑ <i>Recommended repairs to be instituted in a timely fashion or at next earliest opportunity. If equipment should be immediately secured, customer will be informed prior to departure from site.</i>
PRIORITY 2	<ul style="list-style-type: none"> ❑ Any Priority 3 anomalies which have begun to gradually trend upwards, or ❑ Initial detection of most bearing defects with no prior machine history, or ❑ Any defect noted which, left unattended, will result in further cumulative damage to a machine; i.e., coupling misalignment resulting in bearing damage. ❑ <i>Recommended repairs to be completed during the next available outage period, if not sooner. Continued operation as a Priority 2 may result in the machine degrading to Priority 1 condition.</i>
PRIORITY 3	<ul style="list-style-type: none"> ❑ Initial detection of a minor anomaly, or ❑ Initial data collection following corrective maintenance (status update), or ❑ Any Priority 2 faults which have been re-evaluated as not trending upwards and not a long-term reliability threat. ❑ <i>Recommended repairs to be performed at a convenient time, unless otherwise specified.</i>

Note: ISI Vibration Analysts reserve the right to deviate from the above guidelines based on analyst's experience, statistical data, or industry "best-practices."

Executive Summary for Vibration Analysis

September 25, 2007

Equipment	Problem Description	Priority	08-07	07-07	06-07	Remarks
Chill Water Pump (E)						Tested OK
Chill Water Pump (W)						Tested OK
Chill Water Pump (M)			OOS			Tested OK
C.T. Pump (NE)						Tested OK
C.T. Pump (NW)		OOS	OOS	OOS	OOS	Out of service
C.T. Pump (NM)						Tested OK
C.T. Pump (SE)						Tested OK
C.T. Pump (SW)						Tested OK
C.T. Fan (NE)		OOS				Out of service
C.T. Fan (NW)						Tested OK
C.T. Fan (SE)						Tested OK
C.T. Fan (SW)	Possible loose motor shaft component.	3				slight trend
DA Pump (N)			OOS			Tested OK
DA Pump (S)				OOS	OOS	Tested OK
Electric Chiller Drive (E)						Tested OK
K-1 Vacuum Pump				OOS	OOS	Tested OK
K-2 Vacuum Pump						Tested OK
K-3 Vacuum Pump		OOS				Out of service
K-1 Agitator	Process issue.	1	1	OOS		spike
K-2 Agitator		OOS		access	2	Out of service
K-3 Agitator			2			Trend improved
T-1 Mixer	Structural damage.	2		OOS		
Base Absorber Pump (N)	Defective motor.	1	1	2		upward trend
Base Absorber Pump (S)						Tested OK
ABS Heat Exchanger Pump						Tested OK
Methanol Pump (N)						Tested OK
Methanol Pump (S)		OOS	OOS	OOS	OOS	Out of service
HCHO Transfer Pump		OOS	OOS	OOS	OOS	Out of service
HCHO Charge Pump #1		OOS	OOS	OOS	OOS	Out of service
HCHO Charge Pump #2		OOS	OOS	OOS	OOS	Out of service
Resin Oxidizer Fan						Tested OK
HCHO Oxidizer Fan						Tested OK
Blower 150 A			OOS			Tested OK
Blower 150 B		OOS				Out of service
Blower 300 A						Tested OK
Blower 300 B						Tested OK
Blower 700 A						Tested OK
Blower 700 B						Tested OK
HCHO Agitator #1			2			Trend improved
HCHO Agitator #2					OOS	Tested OK
HCHO Agitator #3				OOS		Tested OK
HCHO Agitator #4				OOS		Tested OK
HCHO Agitator #5	Possible gear wear.	2				erratic trend
HCHO Agitator #6					OOS	Tested OK
HCHO Agitator #7	Defective gearbox component	2	2	2	2	erratic trend
HCHO Agitator #8				OOS		Tested OK
HCHO Agitator #9						Tested OK
HCHO Agitator #10	Gearbox bearing lube.	2		OOS		erratic trend

Vibration Analysis

ABC Company
123 Street
Anywhere, USA
Phone
Fax



Equipment Name	Base Absorber Pump (N)	Priority	1
Equipment ID	Base Absorber Pump (N)		
Location			
Description	Horizontal induction motor direct coupled to an overhung centrifugal pump	Horsepower	20
		Voltage	480
		RPM	1755

Primary Problem:

Defective motor.

Detailed Problem Description:

Prior analysis had identified loose bolts on the pump that resulted in a jump in vibration levels. Feedback indicates these bolts have been tightened and the pump has been aligned, resulting in a drop in pump vibration levels. However, overall vibration readings are continuing to increase on the motor and are indicative of a defect with the motor, possibly electrical. Current readings are above alarm levels.

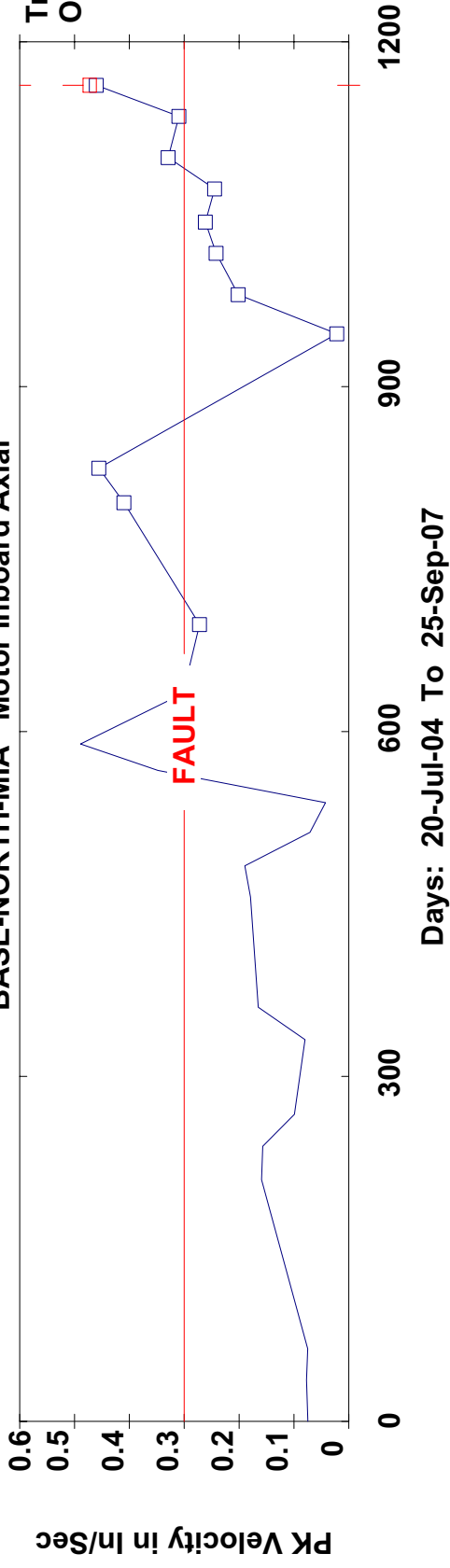
Recommended Action:

Recommend replacing the motor and performing a laser alignment and softfoot check. Provide feedback to ISI.

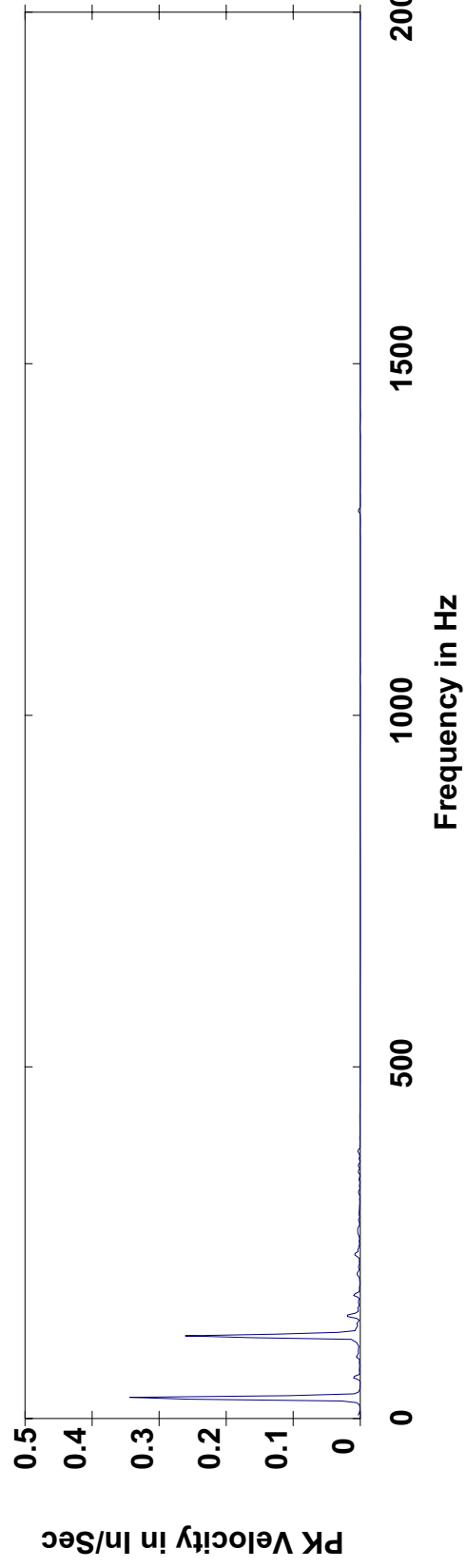
Vibration Analysis History:

Date	Priority	Description
8/29/2007	1	Loose pump bolts.
7/24/2007	2	Motor electrical fault.
2/21/2007	3	Vibration level reduction.

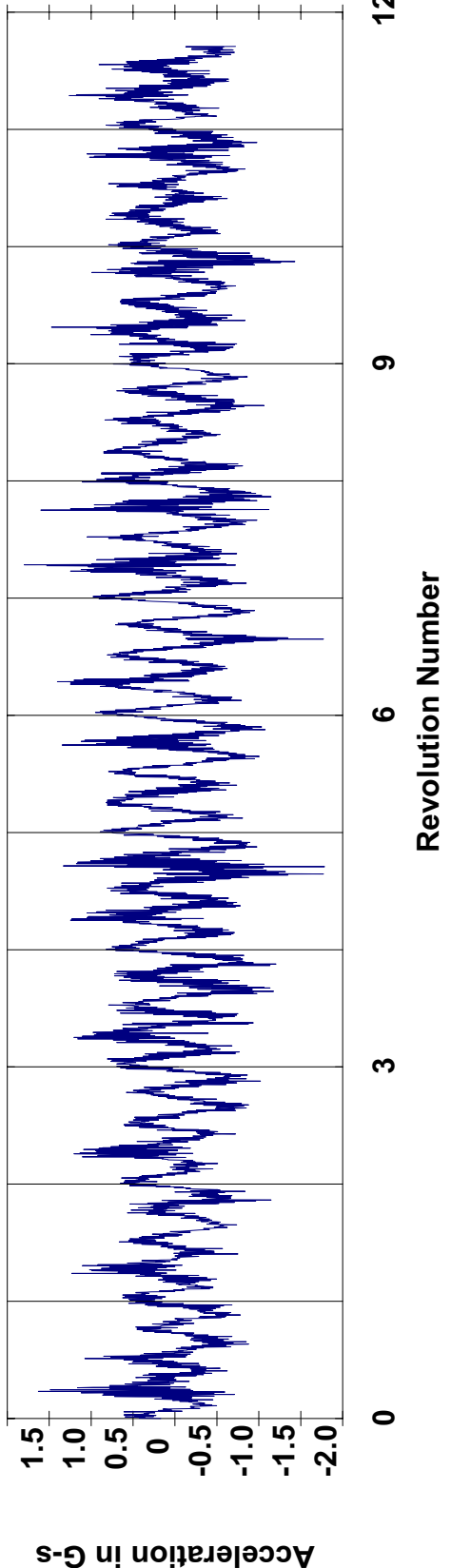
**RES - Base Absorber Pump (North)
BASE-NORTH-MIA Motor Inboard Axial**



Route Spectrum
 25-Sep-07 13:15:59
 OVERALL= .4603 V-AN
 PK = .4555
 LOAD = 100.0
 RPM = 1757. (29.28 Hz)



Route Waveform
 25-Sep-07 13:15:59
 RMS = .4509
 PK(+/-) = 1.80/1.78
 CRESTF= 3.99



**Date: 25-Sep-07
 Time: 13:15:56
 Ampl: .460**

ABC Company
123 Street
Anywhere, USA
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Vibration Analysis



Equipment Name K1 Agitator

Equipment ID K1 Agitator

Location Covered Process

Description Vertical induction motor direct coupled to a planetary gearbox

Priority

1

Horsepower 50

Voltage 480

RPM 1765

Primary Problem:

Process problem.

Detailed Problem Description:

Vibration levels have decreased since the last service call, but remain well above alarm levels. Although no feedback has been received on this matter, ISI assumes that there is still a process problem that is affecting the operation of the agitator.

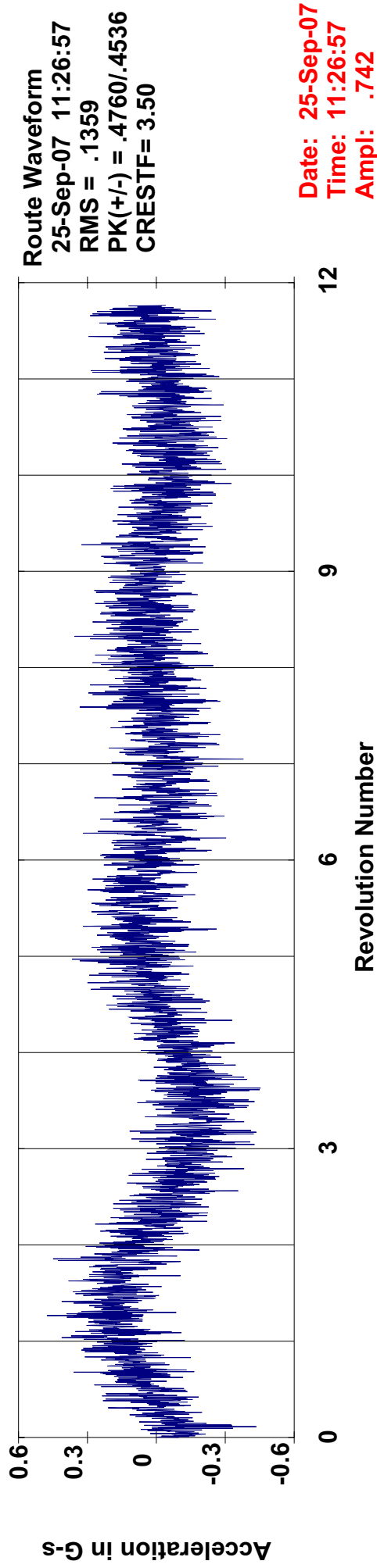
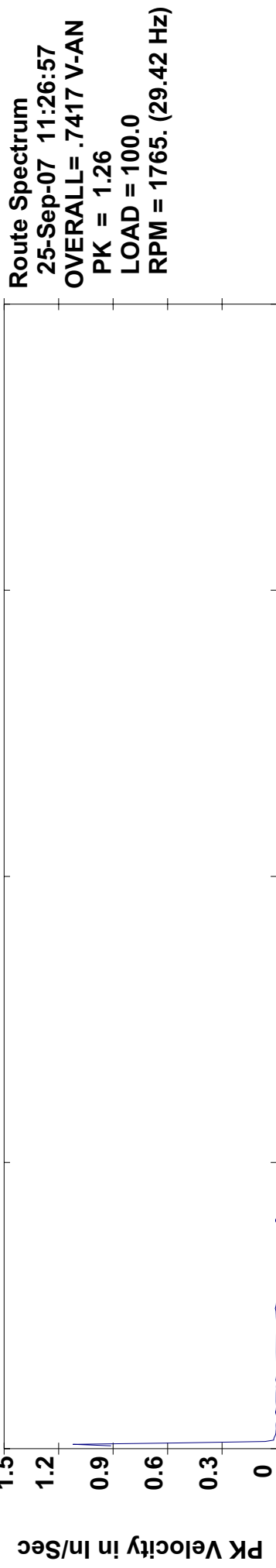
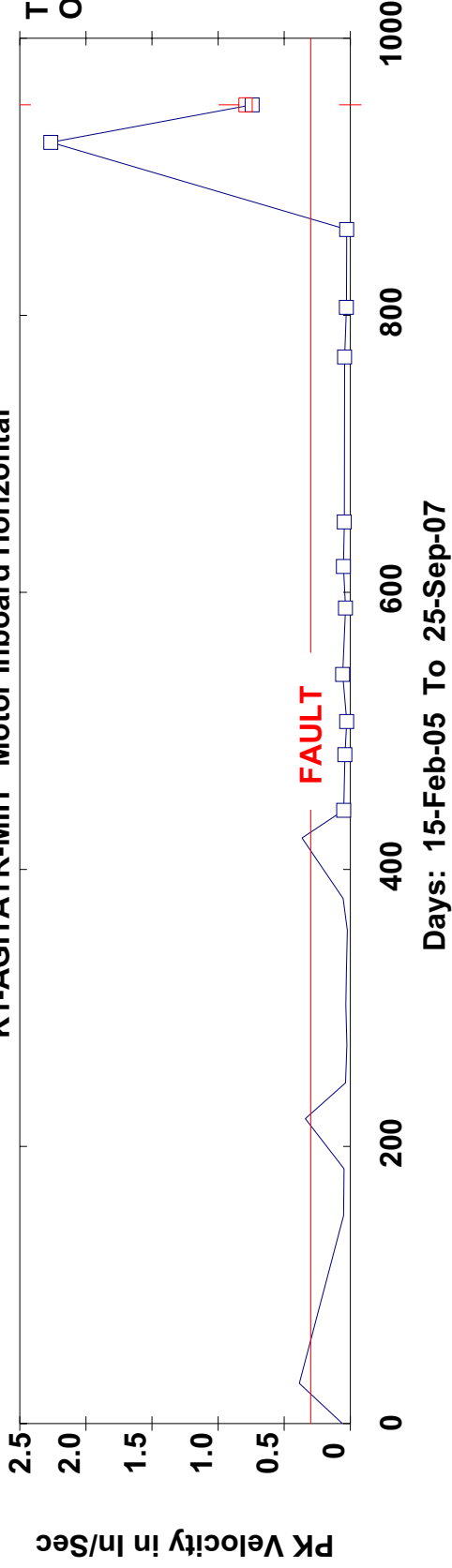
Recommended Action:

Correct the problem with the process ASAP to alleviate the excessive vibration levels. Provide feedback to ISI.

Vibration Analysis History:

Date	Priority	Description
8/29/2007	1	Process problem.

RES - K-1 Agitator
K1-AGITATR-MIH Motor Inboard Horizontal



Date: 25-Sep-07
Time: 11:26:57
Ampl: .742

ABC Company
123 Street
Anywhere, USA
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Vibration Analysis



Equipment Name HCHO Agitator #10

Equipment ID F-10

Location Covered Process

Description Horizontal induction motor direct coupled to a angle gearbox

Priority

2

Horsepower 1.5

Voltage 480

RPM 1750

Primary Problem:

Gearbox bearing lube issue.

Detailed Problem Description:

Feedback from the field indicates this gearbox sounds as if it is running a little dry on lubrication. A review of trend data shows an erratic increase in the amount of friction occurring on the output shaft bearing. Suspect either a lack of oil in the gearbox or the output shaft bearing needs greased.

Recommended Action:

Recommend checking the lube in the gearbox and grease the output shaft bearing. Provide feedback to ISI.

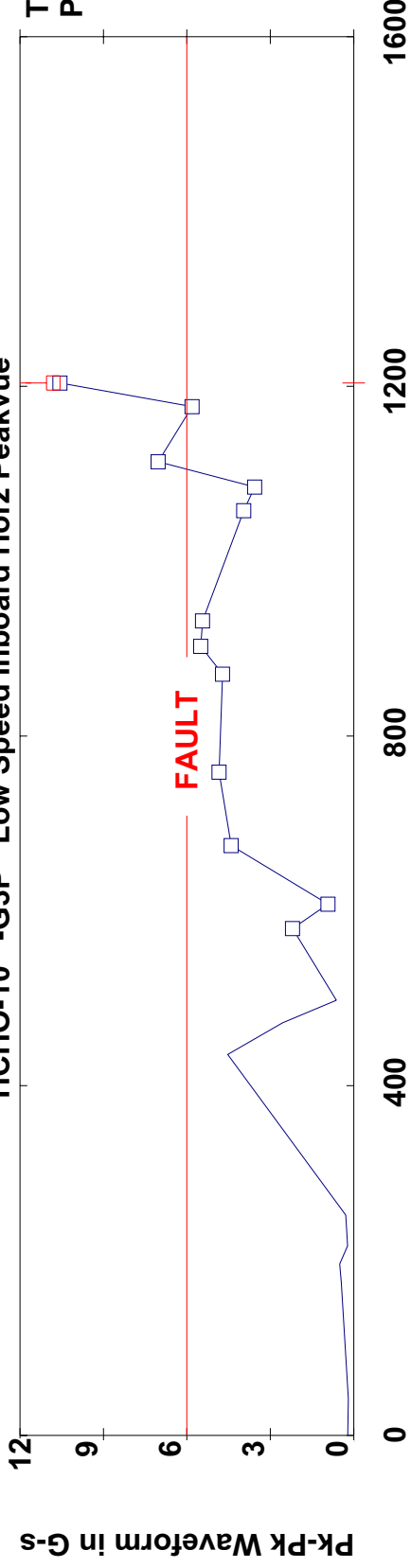
Vibration Analysis History:

Date	Priority	Description
10/19/2005	3	Vibration decrease.
9/23/2005	1	Drive defect worsening.
8/18/2005	2	Possible gearbox defect.

RES - HCHO Agitator #10

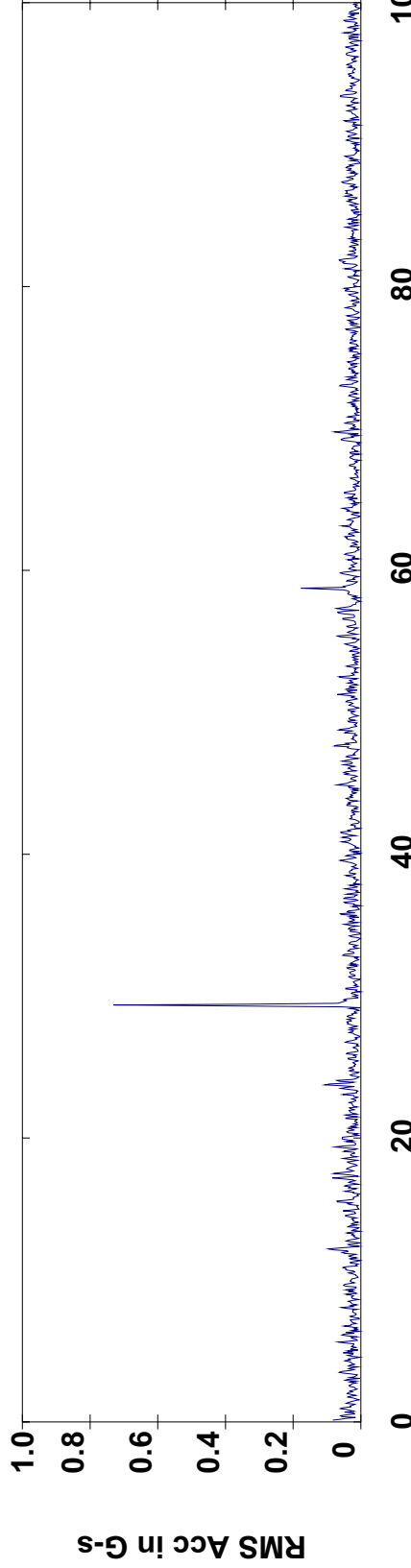
HCHO-10 -G3P Low Speed Inboard Horz Peakvue

Trend Display
PK-PK WAVEFORM



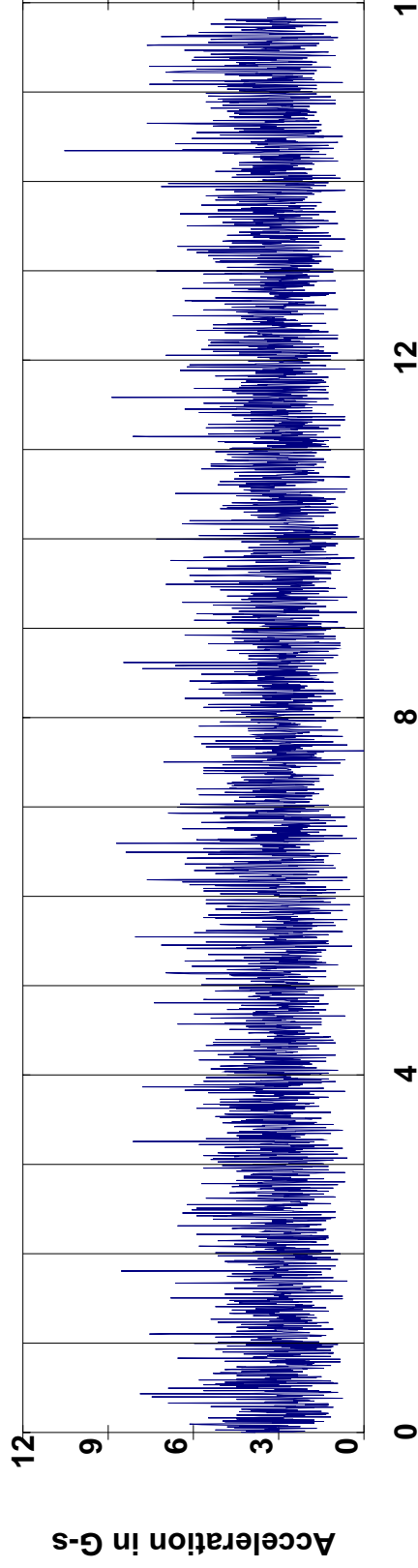
Days: 08-Jun-04 To 25-Sep-07

Route Spectrum
25-Sep-07 13:58:57
(PkVue-HP 1000 Hz)
OVERALL= 1.98 A-AN
RMS = 1.22
LOAD = 100.0
RPM = 59. (.99 Hz)



Frequency in Hz

Route Waveform
25-Sep-07 13:58:57
(PkVue-HP 1000 Hz)
RMS = 3.31
PK(+) = 10.54
CRESTF= 3.18
DCoff = 0.0



Date: 25-Sep-07
Time: 13:59:03
Ampl: 10.56

Revolution Number

ABC Company
123 Street
Anywhere, USA
Phone
Fax

Vibration Analysis



Equipment Name HCHO Agitator #7

Equipment ID F-7

Location Covered Process

Description Horizontal induction motor direct coupled to a angle gearbox

Priority

2

Horsepower 1.5

Voltage 480

RPM 1750

Primary Problem:

Defective gearbox internals.

Detailed Problem Description:

As previously reported, levels of impacting on the gearbox and motor are erratic and continuing to trend up. Suspect the cause may be due to damaged gearbox internals. Levels are well above alarm levels.

Recommended Action:

Recommend drawing a hot 3 ounce oil sample from the gearbox to verify damage is occurring and standby to replace the gearbox. Provide feedback to ISI.

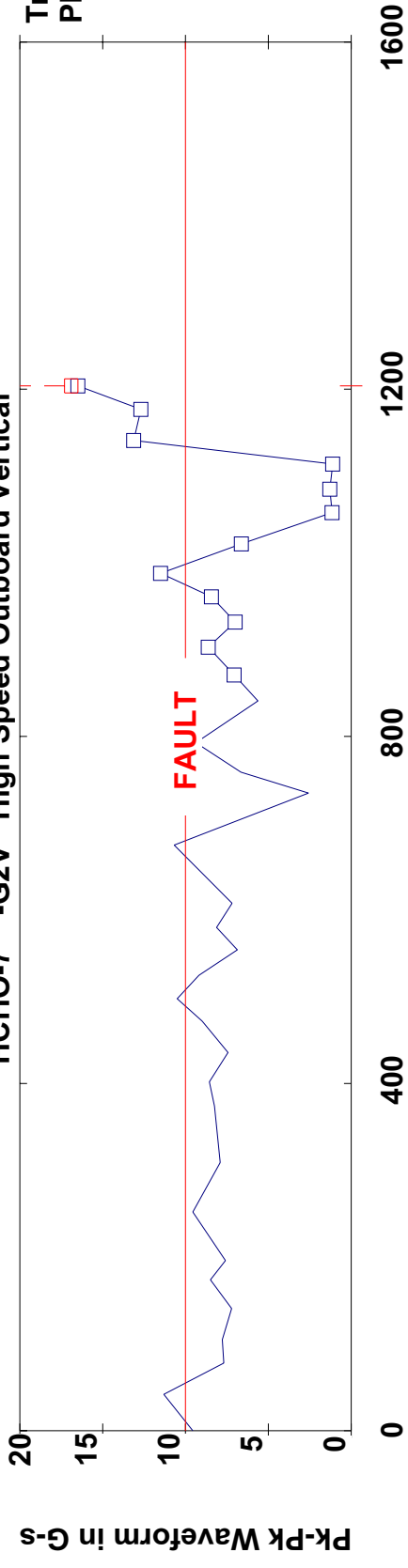
Vibration Analysis History:

Date	Priority	Description
8/29/2007	2	Defective gearbox internals.
7/24/2007	2	Defective gearbox internals.
6/27/2007	2	Defective gearbox internals.

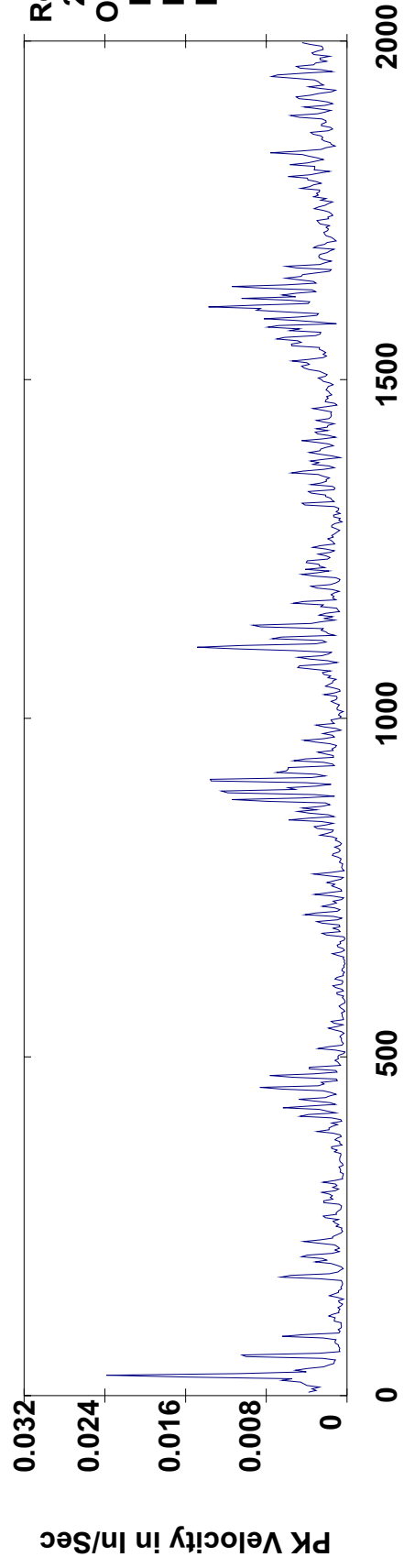
RES - HCHO Agitator #7

HCHO-7 -G2V High Speed Outboard Vertical

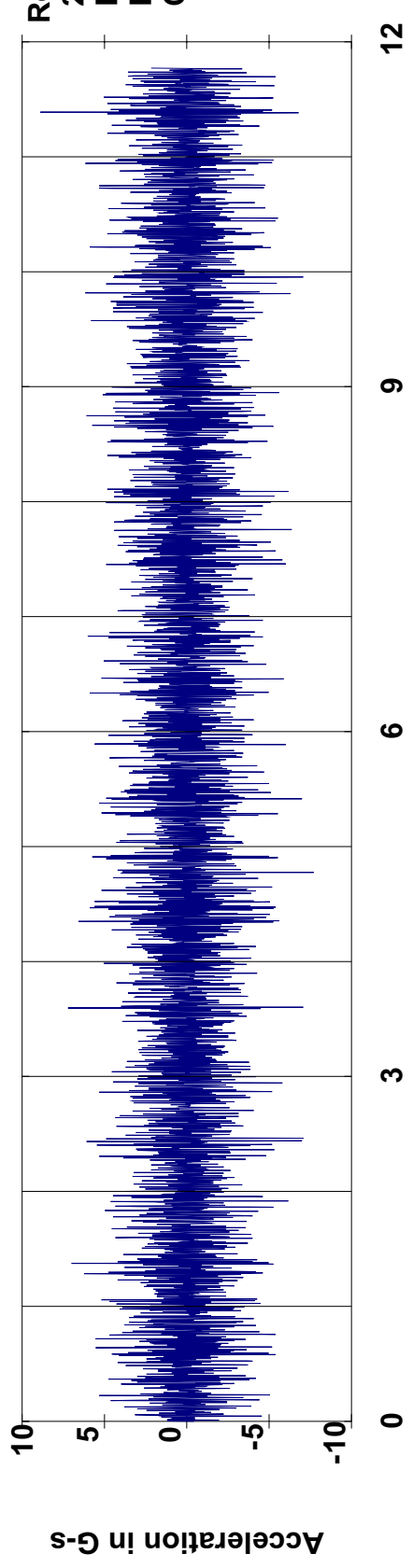
Trend Display
PK-PK WAVEFORM



Route Spectrum
25-Sep-07 13:46:48
OVERALL= .1043 V-AN
PK = .0766
LOAD = 100.0
RPM = 1766. (29.43 Hz)



Route Waveform
25-Sep-07 13:46:48
RMS = 2.13
PK(+/-) = 8.89/7.70
CRESTF= 4.17



Date: 25-Sep-07
Time: 13:46:38
Ampl: 16.50

ABC Company
123 Street
Anywhere, USA
Phone
Fax

Vibration Analysis



Equipment Name HCHO Agitator #5

Equipment ID F-5

Location Covered Process

Description Horizontal induction motor direct coupled to a angle gearbox

Priority

2

Horsepower 1.5

Voltage 480

RPM 1750

Primary Problem:

Possible gear wear.

Detailed Problem Description:

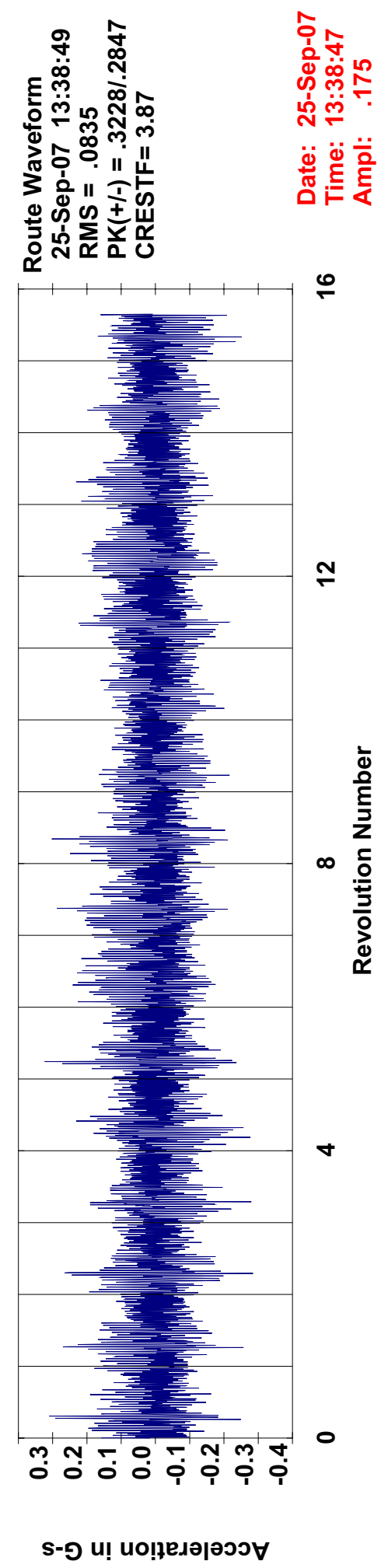
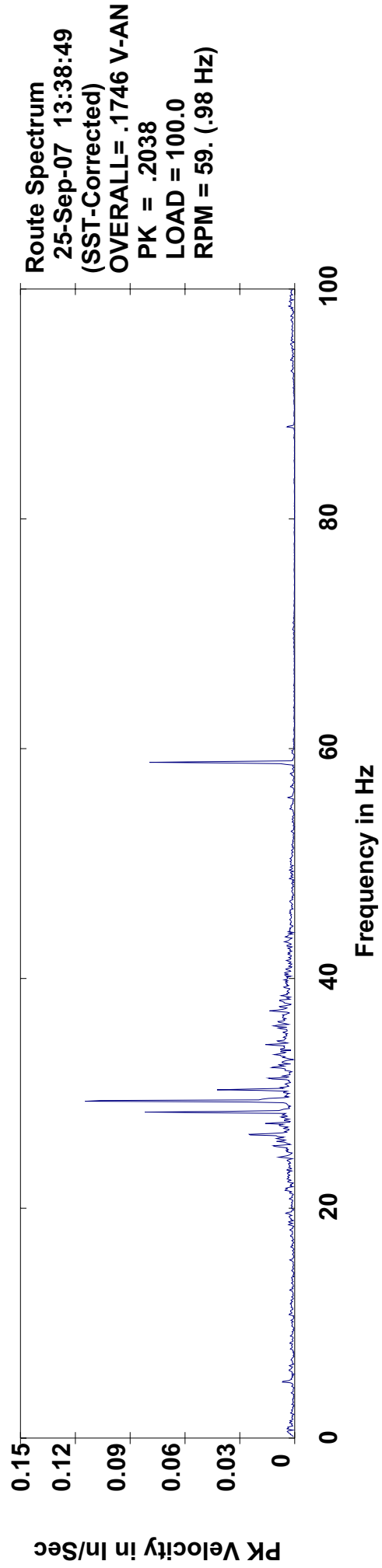
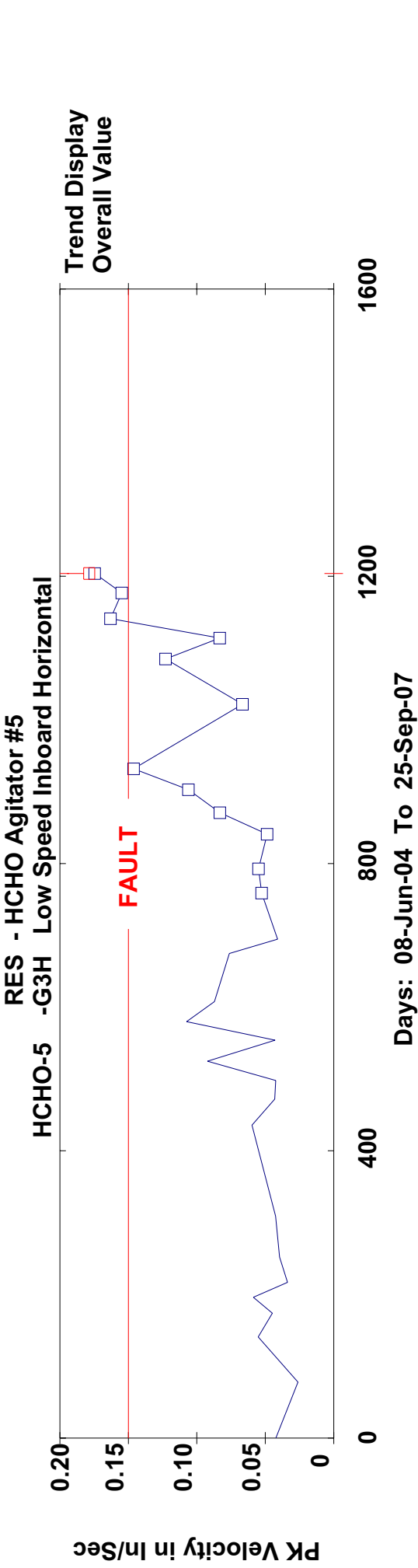
Feedback from the field indicates this gearbox sounds slightly rougher than the others. A review of trend data indicates an erratic increase on some of the gearbox test points that appears to be consistent with gear wear.

Recommended Action:

Recommend drawing a hot oil sample from the gearbox to confirm the fault and the severity. Standby to replace this gearbox should the trend continue.

Vibration Analysis History:

Date	Priority	Description
10/19/2005	3	Vibration level decrease.
12/21/2004	2	Motor and gearbox lube.
8/25/2004	2	Motor and reducer defects.



ABC Company
123 Street
Anywhere, USA
Phone
Fax



Equipment Name T1 Mixer	Priority
Equipment ID T1 Mixer	2
Location Covered Process	
Description Vertical induction motor belt-coupled to a vertical mixer shaft	Horsepower 300
	Voltage 480
	RPM 1185

Primary Problem:

Structural damage.

Detailed Problem Description:

Feedback from the field indicates cracks are appearing in the center post that meets the top cross member between the motor and mixer shafts. There also appears to be a large horizontal vibration that may be a contributing factor to the damage.

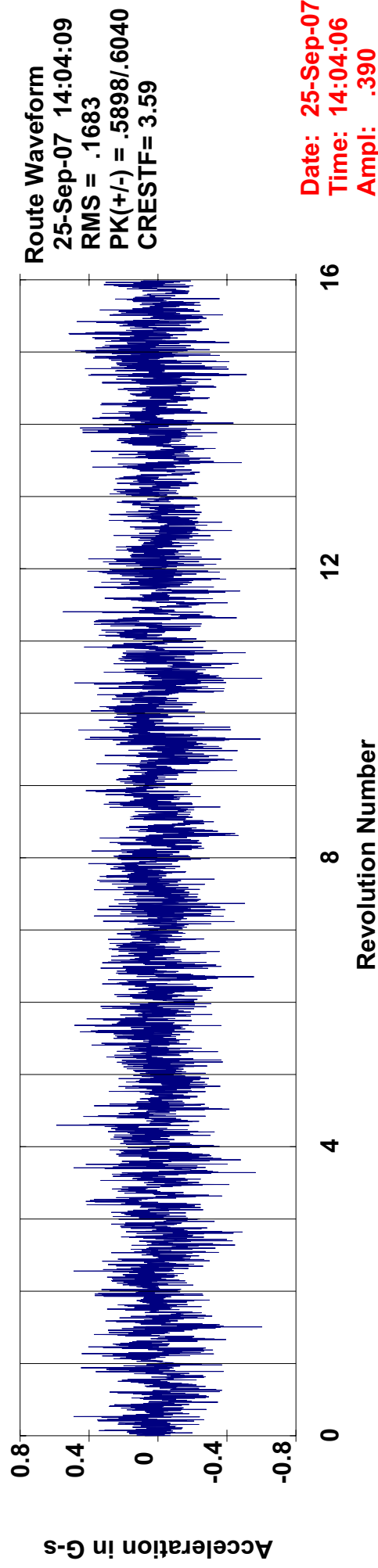
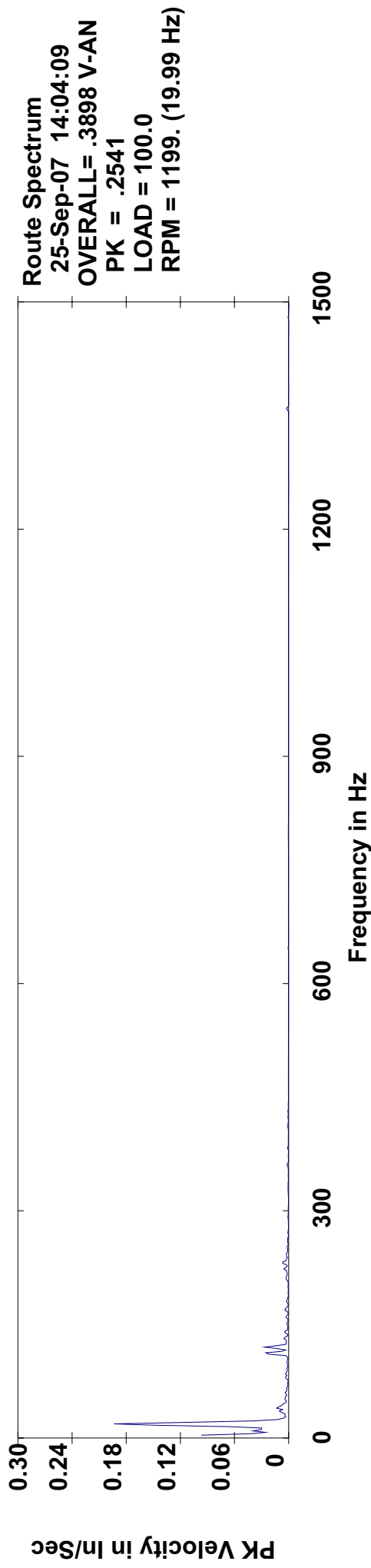
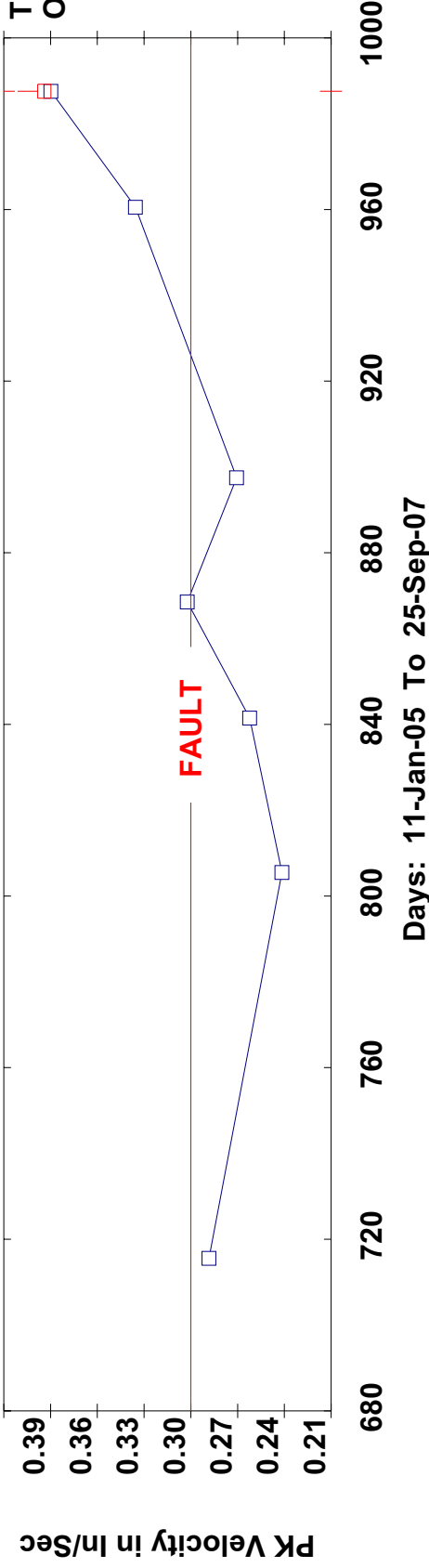
Recommended Action:

Investigate the structural damage and make repairs as necessary. Also, determine the reason for the excessive rocking of the structure and provide feedback to ISI.

Vibration Analysis History:

Date	Priority	Description
6/13/2006	2	Possible mixer imbalance.

RES - T-1 Agitator
T1-AGITATR-MOH Motor Outboard Horizontal



ABC Company
123 Street
Anywhere, USA
Phone
Fax

Vibration Analysis



Equipment Name Cooling Tower Fan (SW)	Priority
Equipment ID Cooling Tower Fan (SW)	3
Location	
Description Horizontal induction motor direct coupled to a reducer	Horsepower 100
	Voltage 480
	RPM 1770

Primary Problem:

Possible loose motor shaft component.

Detailed Problem Description:

Feedback from the field indicates this motor sounds "rough." A review of trend data indicates a slight upward trend and the possibility of a loose motor shaft component. This would be consistent with the noise being heard from the motor.

Recommended Action:

Recommend checking the motor shaft for excessive endplay using a dial indicator and inspect for loose or worn shaft components.

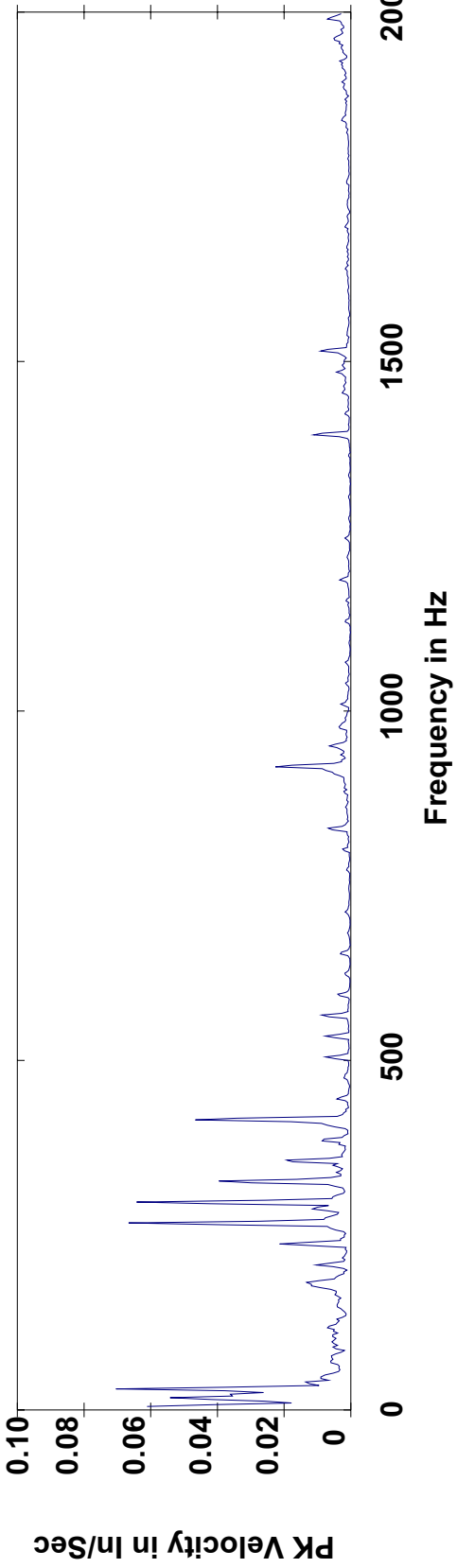
Vibration Analysis History:

Date	Priority	Description
11/28/2006	3	Vibration level reduction.
10/27/2006	1	Defective reducer.
9/27/2006	1	Defective reducer.

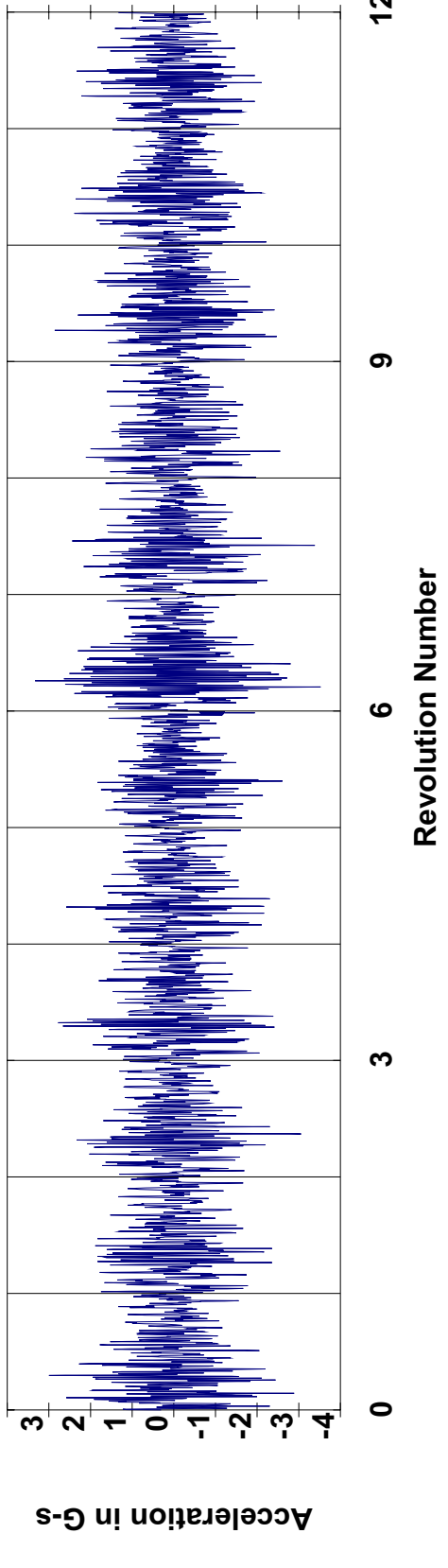
RES - Southwest CT Fan
CTFAN-SW -MIH Motor Inboard Horizontal



Route Spectrum
25-Sep-07 12:23:55
OVERALL= .2028 V-AN
PK = .1829
LOAD = 100.0
RPM = 1800. (29.99 Hz)



Route Waveform
25-Sep-07 12:23:55
RMS = .8487
PK(+/-) = 3.33/3.53
CRESTF= 4.15



Date: 25-Sep-07
Time: 12:23:54
Ampl: .203