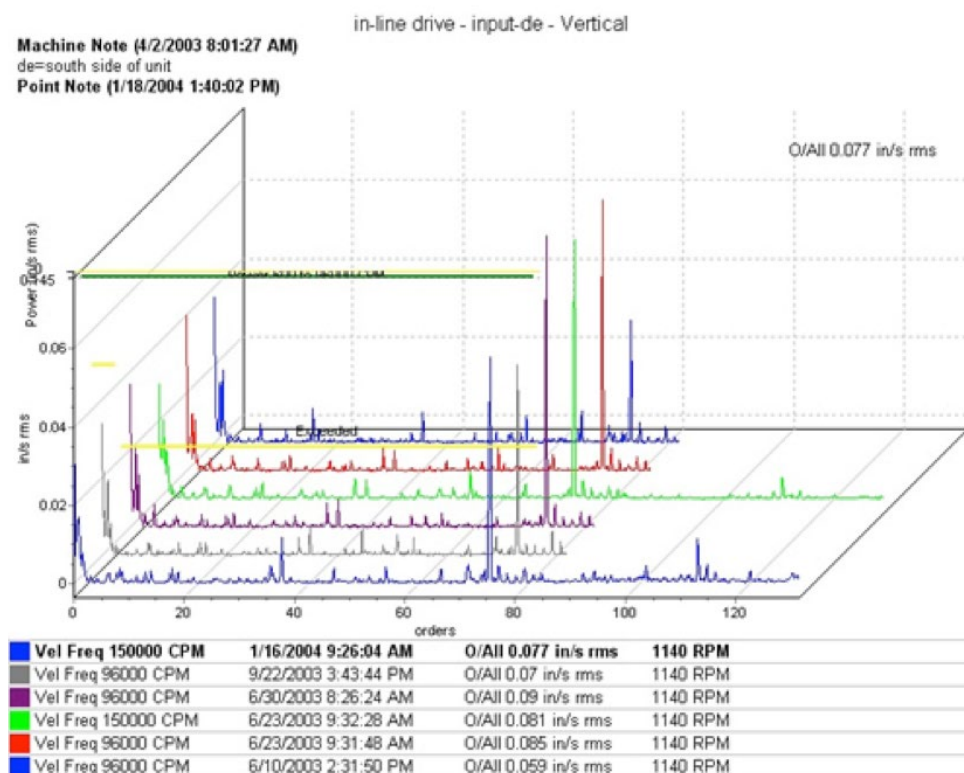


Failures in Progress

Since June, 2003, Pepper Industrial Maintenance has been observing and monitoring the imminent failure of an extremely large, high horsepower gear reducer. The customer is fully aware of the deteriorating condition of the equipment. Pepper Industrial Maintenance will continue to monitor the situation until the customer is able to remove the equipment from service for maintenance and repair.

The signatures of failure are graphically obvious in the real-life illustrations exhibited here. Follow the detective-technician's trail as he listens to the heartbeat of this huge reducer over multiple, consecutive visits. These signatures are from the actual report provided to the customer, showing the progressive deterioration.





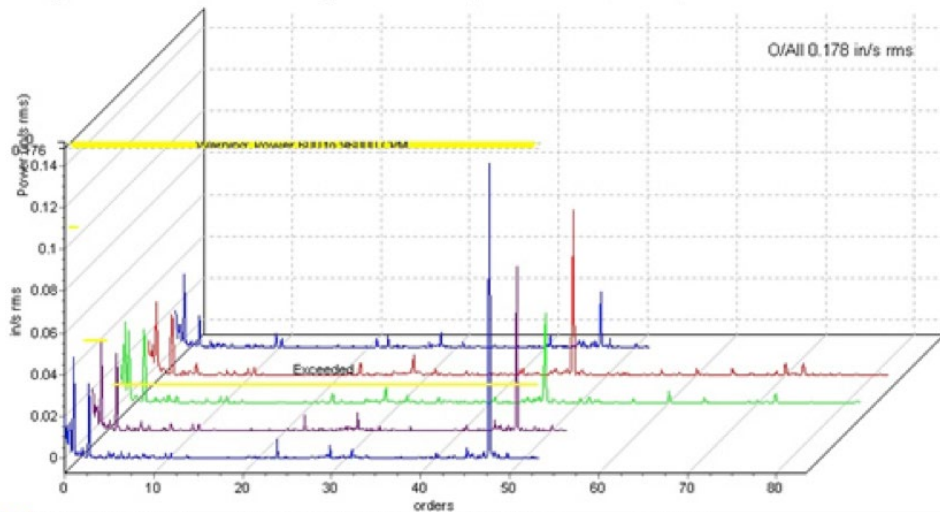
in-line drive - mtr-de - Radial

Machine Note (4/2/2003 8:01:27 AM)

de=south side of unit

Point Note (1/18/2004 1:29:30 PM)

7/3/03 Read at 9:31 was no load. steady increase indicates forces no longer confined to reducer, we are now damaging motor bearings and rotor. this chart shows bearing deterioration damage is considerable, should repair entire unit-failure is imminent.

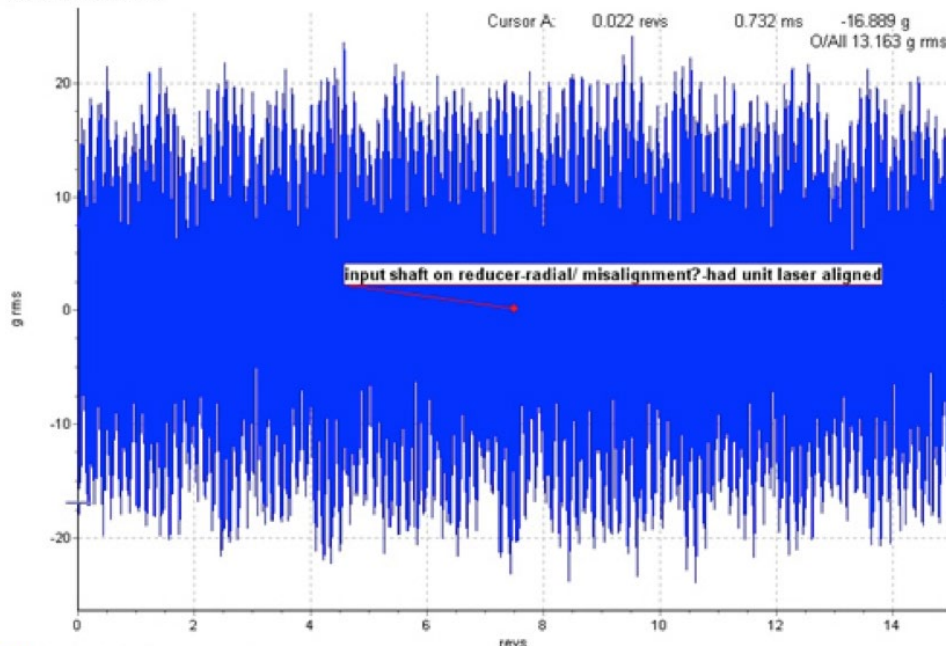


Vel Freq 96000 CPM	1/16/2004 9:24:19 AM	O/All 0.178 in/s rms	1800 RPM
Vel Freq 96000 CPM	9/22/2003 3:51:54 PM	O/All 0.105 in/s rms	1800 RPM
Vel Freq 150000 CPM	6/30/2003 8:17:31 AM	O/All 0.089 in/s rms	1800 RPM
Vel Freq 150000 CPM	6/23/2003 9:27:01 AM	O/All 0.102 in/s rms	1800 RPM
Vel Freq 96000 CPM	6/10/2003 2:43:12 PM	O/All 0.061 in/s rms	1800 RPM

in-line drive - inputslant - Not specified - Acc Time 500 ms
6/23/2003 9:40:22 AM

Machine Note (4/2/2003 8:01:27 AM)

de=south side of unit



6/23/2003 9:40:22 AM	O/All 13.163 g rms	1800 RPM
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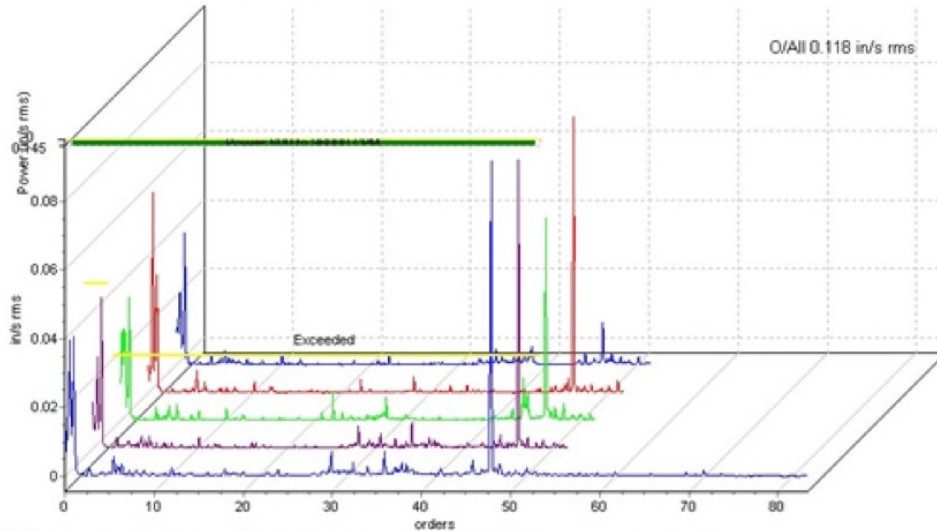
in-line drive - mtr-ode - Vertical

Machine Note (4/2/2003 8:01:27 AM)

de=south side of unit

Point Note (1/18/2004 1:37:00 PM)

see motor de comments-damage is starting



Vel Freq 150000 CPM	1/16/2004 9:25:06 AM	O/All 0.118 in/s rms	1800 RPM
Vel Freq 96000 CPM	1/16/2004 9:25:02 AM	O/All 0.105 in/s rms	1800 RPM
Vel Freq 96000 CPM	9/22/2003 3:52:58 PM	O/All 0.098 in/s rms	1800 RPM
Vel Freq 96000 CPM	6/30/2003 8:18:32 AM	O/All 0.12 in/s rms	1800 RPM
Vel Freq 96000 CPM	6/10/2003 2:44:31 PM	O/All 0.059 in/s rms	1800 RPM

in-line drive - inputslant - Vertical - Acc Time 500 ms

Machine Note (4/2/2003 8:01:27 AM)

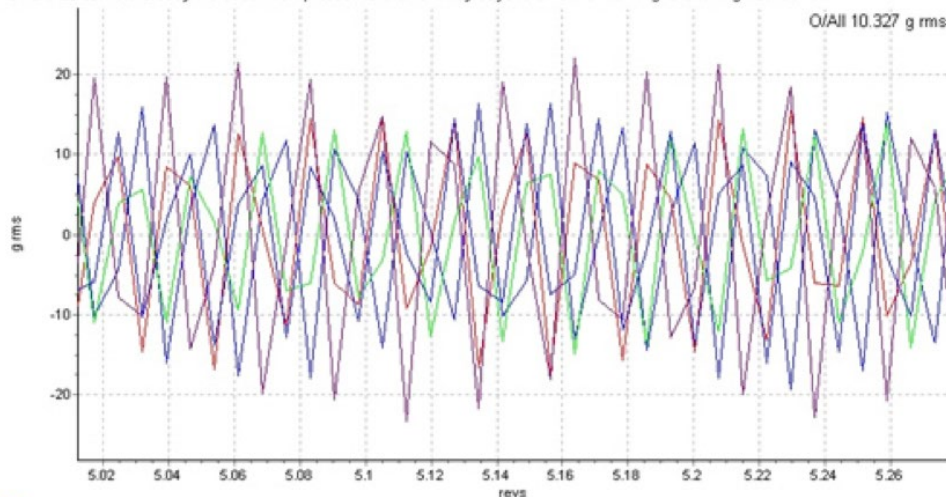
de=south side of unit

Location Note (11/10/2003 10:42:24 AM)

4/1/03 is alarm of original warning.

6/10/03 is wear-in baseline 1/16/04 shows decrease-from wear-in-unit is headed for failure

6/10-9-22/03 note steady increase in amplitude-we are now way beyond a normal warning level of high concern.



1/16/2004 9:38:19 AM	O/All 10.327 g rms	1800 RPM
9/22/2003 4:02:55 PM	O/All 14.874 g rms	1800 RPM
7/11/2003 8:17:02 AM	O/All 8.189 g rms	1800 RPM
6/30/2003 8:22:32 AM	O/All 11.522 g rms	1800 RPM
6/23/2003 9:30:45 AM	O/All 11.161 g rms	1800 RPM



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in-line drive - parallelshft<War - Vertical - Vel Freq 96000 CPM
4/1/2003 2:18:24 PM

Machine Note (4/2/2003 8:01:27 AM)

de=south side of unit

Location Note (11/10/2003 11:03:00 AM)

same as inputslant and basis for my original warning-because it exists at all is of major concern to vibration specialists.

Measurement Event Note (4/1/2003 2:18:57 PM)

