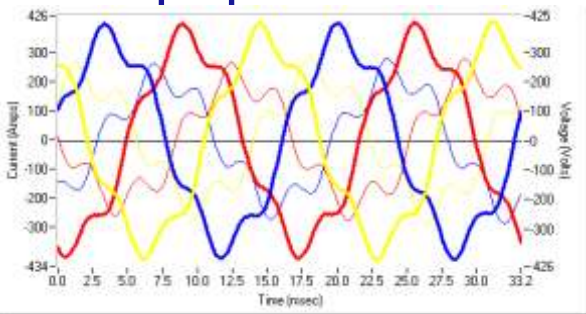
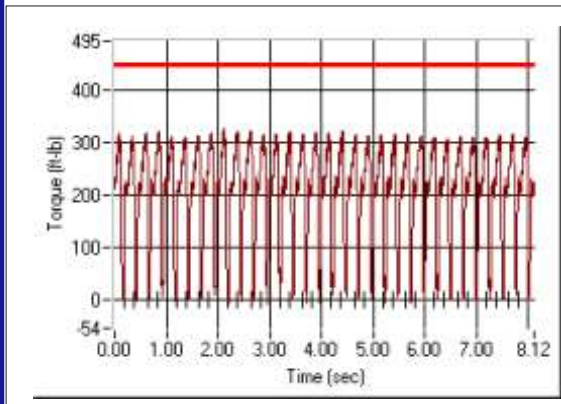


Reoccurring Bad Bearing in a Chiller Motor



A 400 horsepower, 460 volt York chiller motor, operating on a York soft-start had developed an audible harmonic drone and a physical pulsating vibration.

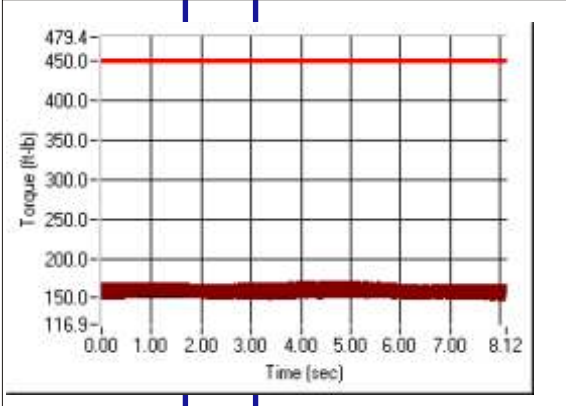
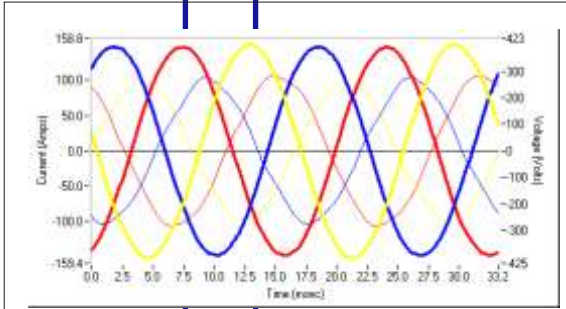


York technician, Mr. Herb Brown, a 26 year veteran had diagnosed the problem as a bad bearing within the chiller motor, a problem he had encountered numerous times. He estimated the time to separate the unit, replace the bearing, recondition the motor, reassemble the unit and return it

to operation would be two weeks at a cost of over \$4,500.00. Mr. Tim Thomas was called in to verify the cause of the recent change in the motors performance and he performed a vibration analysis on the unit. The collected data did not appear to identify any problem area and the results were inconclusive at best. He then performed dynamic testing with the Baker Explorer and the collected data showed on the above graphs.

The top one shows the voltage and current time wave-forms for the three phases, (a=red, b=blue, c=yellow). The voltage traces are the thicker lines and the currents are the thinner lines. The figure's voltage waveforms show extremely large harmonics, which are the reason for the current's harmonics and the humming plus vibrations. The second figure shows the torque time wave-form in the brown trace, and the nameplate calculated torque is the displayed red trace. This torque signature shows oscillations of relatively low frequencies, varying between zero and 75% torque four times every second.

After seeing the erratic sine waves Mr. Ron Larson, York's drive specialist was brought in and he immediately identified the problem as a faulty comparator card in the soft start. Mr. Larson replaced the card and the motor was again returned to operation. The audible harmonic drone and the physical pulsations were gone. New data was collected and the following graphs were recorded which appear to show normal operation.



The next two figures show the electrical and mechanical time wave-forms respectively. The extreme voltage harmonics, which were causing the current harmonics, are gone. Note that the torque ripple of the healthy operation is extremely smooth. Now, the maximum torque pulled in steady-state is literally half of what used to be the peaking, cyclic loading to the motor. Neither the motor nor the chiller is prematurely aging any longer.

The faulty card cost the customer less than \$200.00 and the motor was restored to a normal operating mode in minutes instead of weeks. The customer's savings were far greater than his test and repair costs and both York and this customer have realized the value of dynamic testing and the Baker Explorer.

