



Electric Motor Testing Tip of the Week

revolutionizing *electrical* reliability

January 14, 2007

My Bearing Ate Itself

One cause of bearing damage can come from your VFD's. Yes, your Variable Frequency Drives. They create bearing current from voltage pulse overshoots that come from fast-switching IGBT (insulated gate bipolar transistors) in your drive.

How, you may ask?

Well, shaft voltages accumulate on the rotor until it exceeds the dielectric capacity of the motor bearing's lubricant, then the voltage discharges in a short pulse to ground through the bearing. After discharge, the voltage again accumulates on the shaft and then lather, rinse, repeat. This causes pitting of the bearing's rolling elements and raceways.

Over time, this charge and discharge cycle causes a groove pattern to form in the bearing called "fluting" which is a sign that the bearing has sustained severe damage. Eventually, this will lead to complete bearing failure. That's Bad Joo-Joo!

Causes of fluting:

- High VFD carrier wave frequency
- Inadequate grounding of machine

Compensated by:

- Shielded cable - you can improve high frequency grounding by installing shielded cable.
- Shaft grounding - sends bearing currents straight to ground, but not through the actual bearing.
- Insulated bearings - bearings that are insulated to prevent discharges to ground through them.
- Carrier Frequency - Setting your VFD's Carrier Frequency to just barely out of the audible range.

You are invited to submit an Electric Motor Testing Tip of your own and receive a free PdMA mug or hat if we publish it! Contact Lou at 813-621-6463 ext. 126 or lou@pdma.com.