
July 19, 2010

Shaft Currents and Bearing Defects

Shaft voltages and currents that can affect bearing life have been identified and described in papers dating back to the early 1900's. Various causes such as accidental potential applied to a motor frame, electrostatic charging, shaft magnetization, electric dissymmetry, and common mode voltage can each be responsible for these damaging effects. The rotor, bearings, and frame act as a secondary loop for induced currents to flow through the bearings, or via a capacitive network, voltage exists between the rotor and the iron on the stator frame developing a path across the bearing to ground. This common mode voltage can build up on the rotor and shaft to a level where it will arc over at the bearing in an effort to get to ground. When the motor is running slow the contact of the balls and the race of the bearing allow for a continuous flow of current through the bearing and prevent any voltage build up or arc. However, when the motor is running faster a thin film of grease will separate the balls from the outer race allowing for a buildup and potentially damaging arc across the conductive grease.

Solutions to this problem are isolated bearings, shaft grounding, and non-conductive grease. Less popular solutions include Faraday shields, individually tuned filters, and very expensive special inverter designs.

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.