



HARVARD

Campus Services

ENERGY & FACILITIES

Facilities Maintenance Operations (FMO) now offers Motor Shaft Grounding, a maintenance program that prevents bearing failure and significantly extends motor life.

All Variable Frequency Drives (VFD) controlling AC motors develop Induced Shaft Currents that discharge through the bearings (illustration #1). During this process, arcing between the ball bearings and the outer wall of the bearings causes fluting (illustration #2) which will eventually lead to bearing failure.

Typically, motor manufacturers estimate that a motor will last between 30,000 - 40,000 operating hours. However, fluting can reduce this life expectancy by up to 50%.

The Blackstone Case Study, outlined below, illustrates how our simple 4-step process can eliminate harmful currents and significantly reduce repair and replacement costs.

Illustration #1: Currents discharging through the bearings

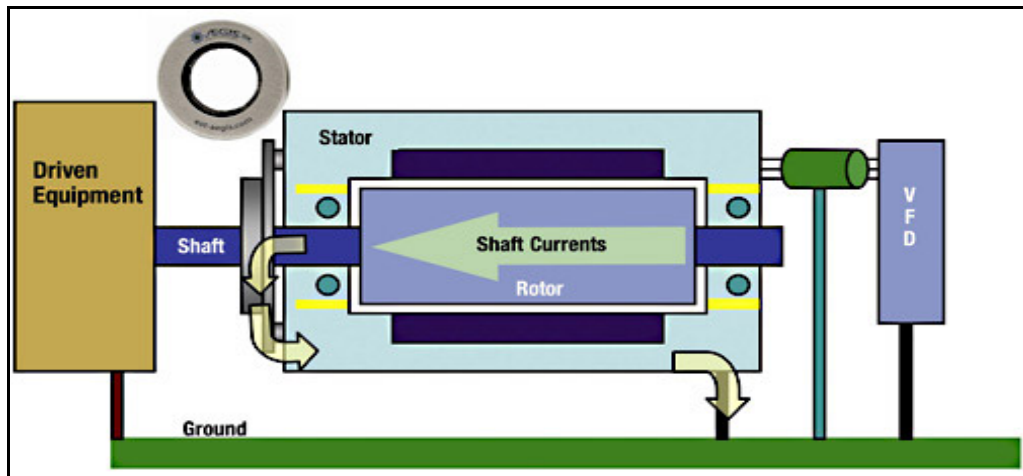


Illustration #2: Damage to the bearing wall caused by arcing



The Blackstone Case Study

Step 1: Testing

FMO monitored and recorded the voltage on the motor shaft of the chilled water pump in Blackstone South (illustration #3) using an AEGIS probe and oscilloscope. The probe, which has a high density conductive micro-fiber tip, was placed directly on the rotating shaft with the motor running (illustration #4).

Illustration #3: Motor # 1, Blackstone South, Chilled Water Pump P-1



Baldor Cat # EM3311T
Spec # 37F6144663
7.5 HP
230/460 Volts
20/10 Amps
1760 RPM
213T Frame
OBSB enclosure
S # F0507221640
Pump P-2 is similar with serial # F0507221505

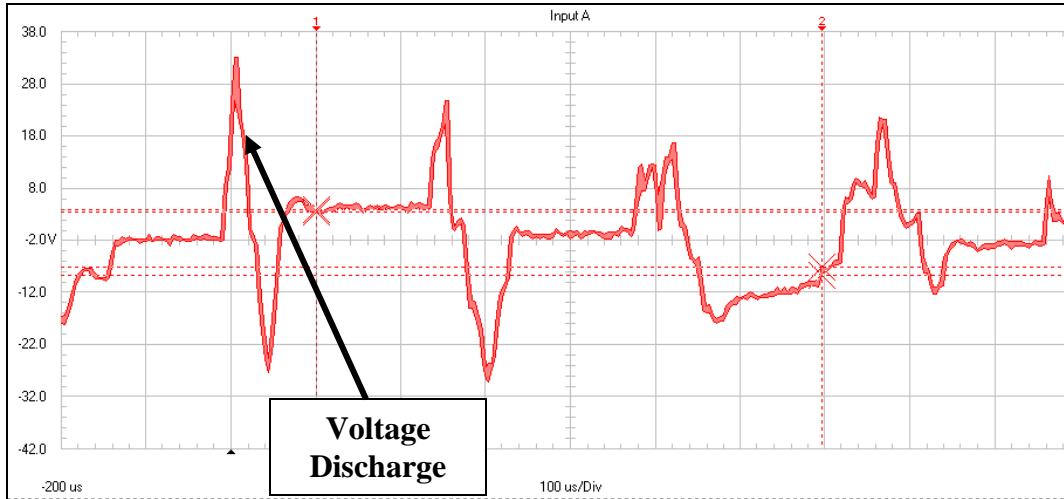
Illustration #4: The AEGIS probe placed directly on the motor shaft



Step 2: Analyze the Results

The graph below illustrates a steady discharge of harmful shaft voltages. As you'll notice later in Step 4, the absence of these voltages would result in a flat-line reading.

Illustration #5: Test results from Motor # 1 without a Shaft Grounding Ring.



Step 3: Install Grounding Ring

FMO installed an AEGIS™ SGR on the motor which is detailed below. *(Installation must be performed by a trained technician and all proper safety precautions must be followed)*

- 1) Clean the face of the motor and the shaft.



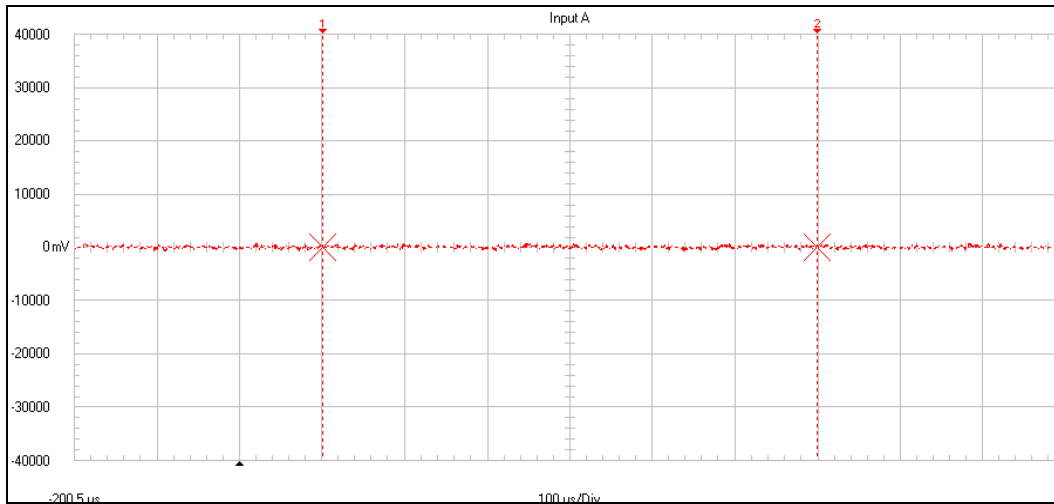
- 2) Epoxy the grounding ring onto the motor housing. The ring used at Blackstone was a Split Shaft Grounding Ring. This type is installed around the shaft, eliminating the need to remove the coupling which would require realigning the motor and pump.



Step 4: Re-test

FMO monitored and recorded the voltage on the motor shaft after the AEGIS Grounding Ring was installed. As outlined in Illustration #6, the voltage traveling through the motor shaft was eliminated.

Illustration #6: Motor #1 with a Shaft Grounding Ring



Contact Us:

For more information on Motor Shaft Grounding or to set up a consultation contact Associate Director for Maintenance Services Tony Ragucci at 617-496-3260.