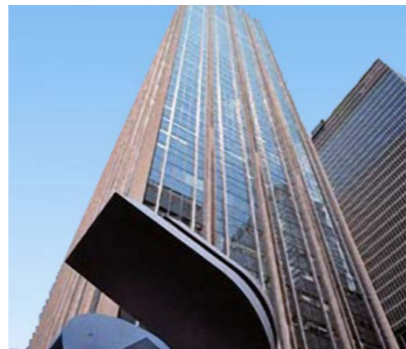


Protecting VFD-Driven Motors with



Motors Waste Energy!

- AC motors run at constant speed — *regardless of load*
- Old-fashioned throttling mechanisms reduce motor speed, *but not energy consumption*

VFDs Save Energy!

- Variable Frequency Drives (VFDs), or inverters, can dramatically reduce energy consumption
- VFDs can save 30% or more in energy costs

but...

VFDs Cause Shaft Currents that Kill Motors!

- VFD-induced shaft currents can destroy motor bearings:
- Causing premature motor failure
- Diminishing the reliability of an entire system
- Completely wiping out cost savings from the use of VFDs

Consider these facts:

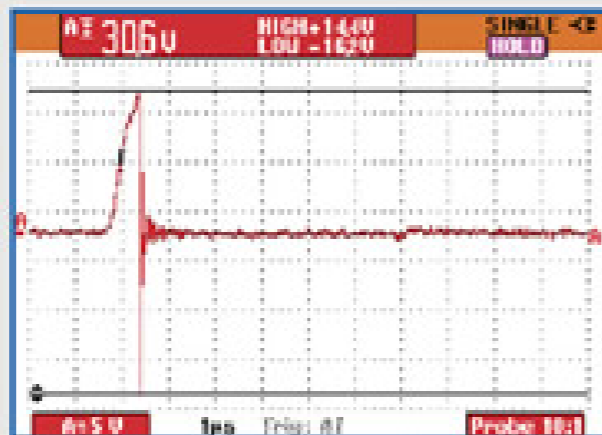
- Motor bearings are designed to last 100,000 hours, yet
VFD-driven motors often fail within 1 month
- Of the VFD-driven fan motors installed in a 30-story building,
all failed within 1 year (two within 6 months)
- A major US pharmaceutical now specifies shaft grounding rings
on all VFD-driven motors
after experiencing 50% failure rate
- VFD-induced motor failures are estimated to cause
hundreds of thousands of hours of unplanned downtime annually

VFD-Induced Shaft Voltages...

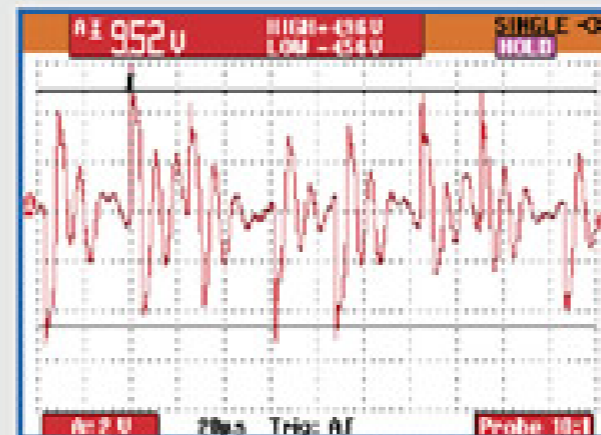


*Typical
shaft voltage
wave forms*

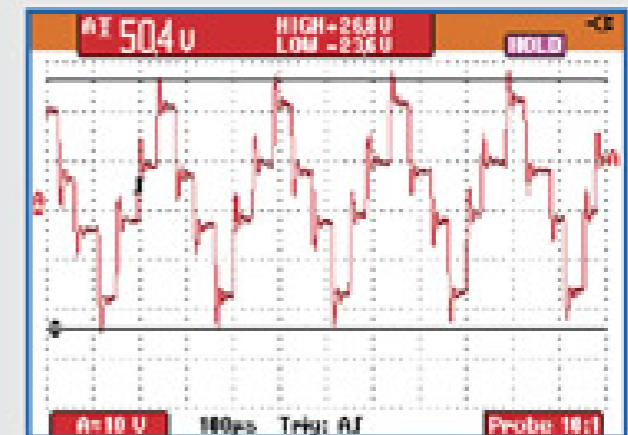
The following types of readings indicate potential bearing currents in your motor:



High amplitude EDM
discharge pattern

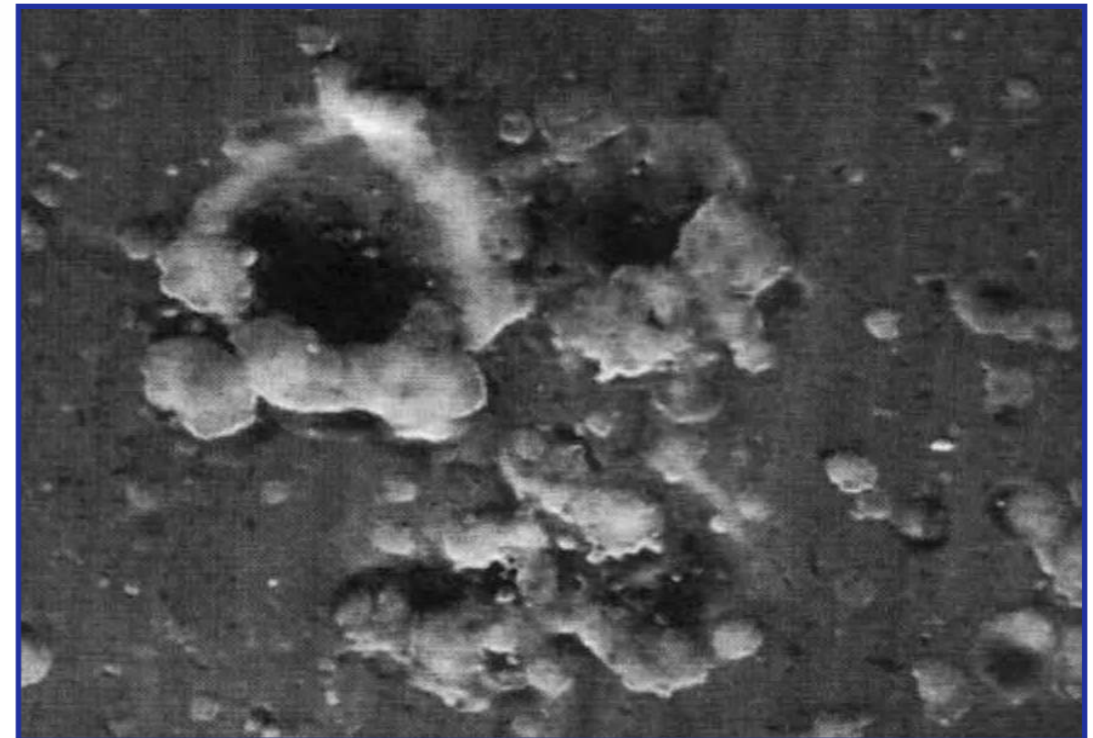
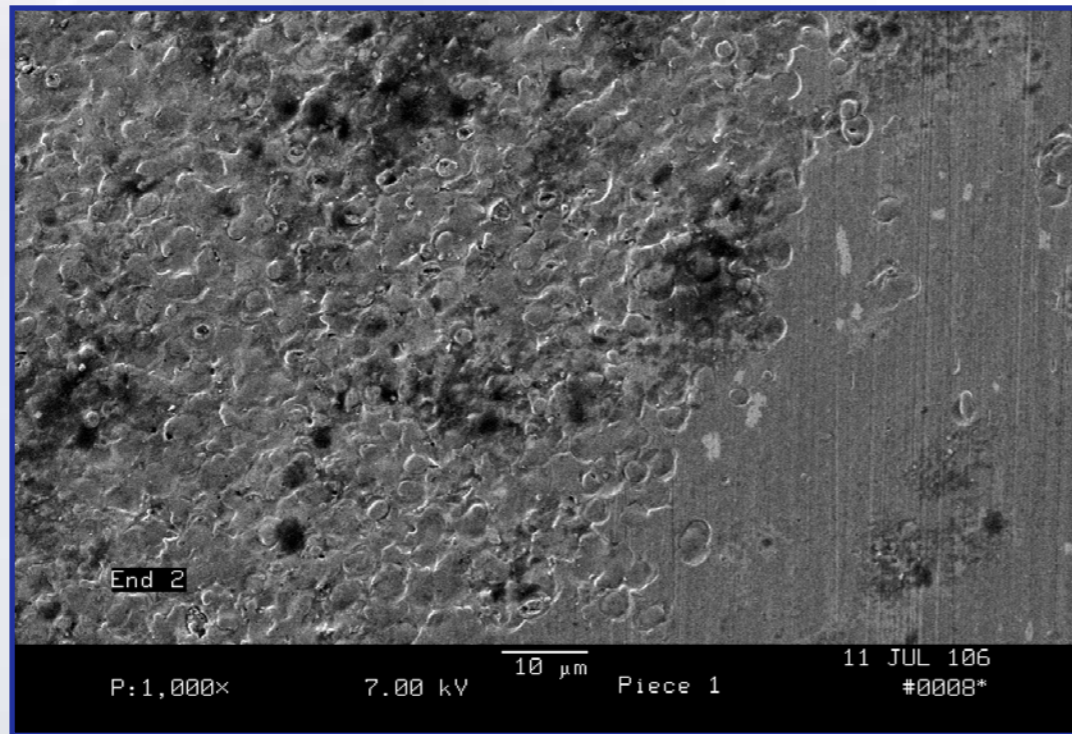


Low amplitude voltage
discharge pattern



High Peak to Peak
common mode voltage

Produce EDM Bearing Damage



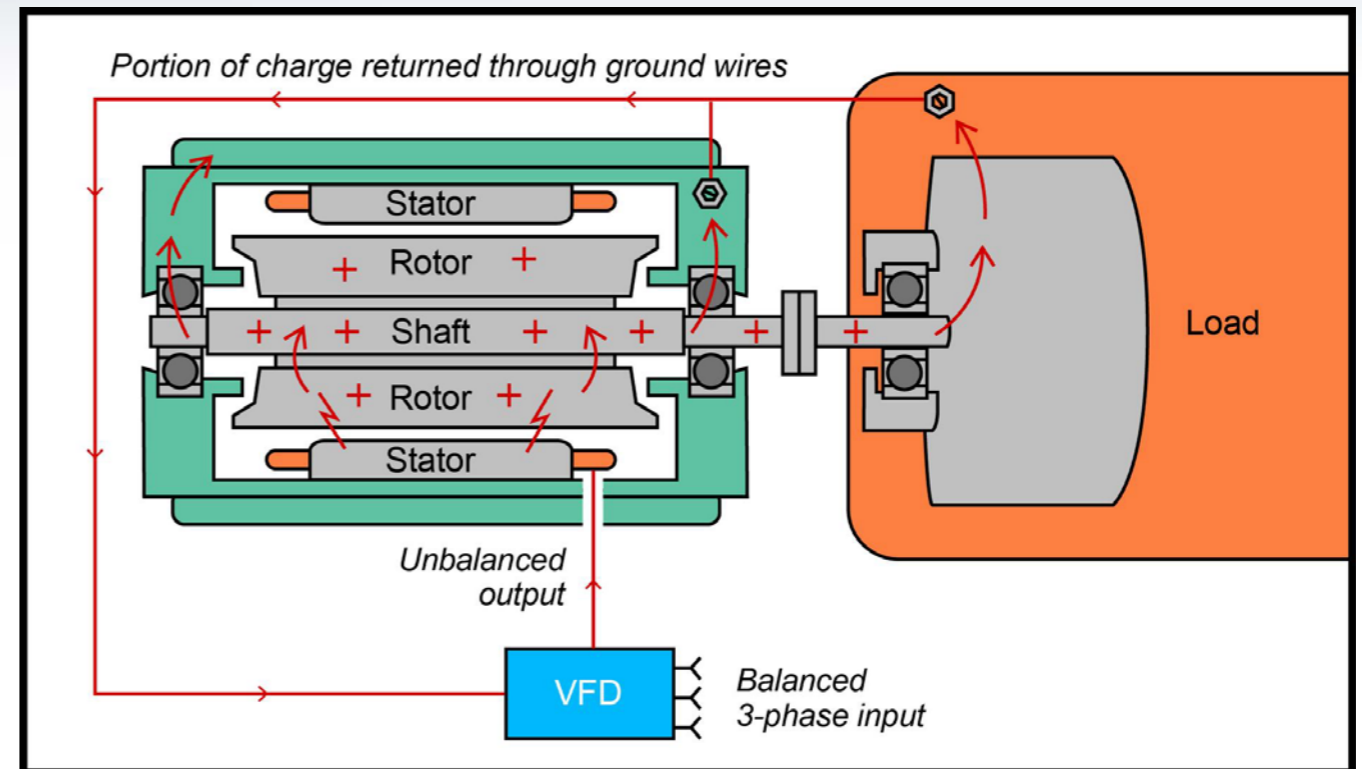
Pitting due to Electrical Discharge Machining (as seen under an electron microscope)

and Fluted Bearings



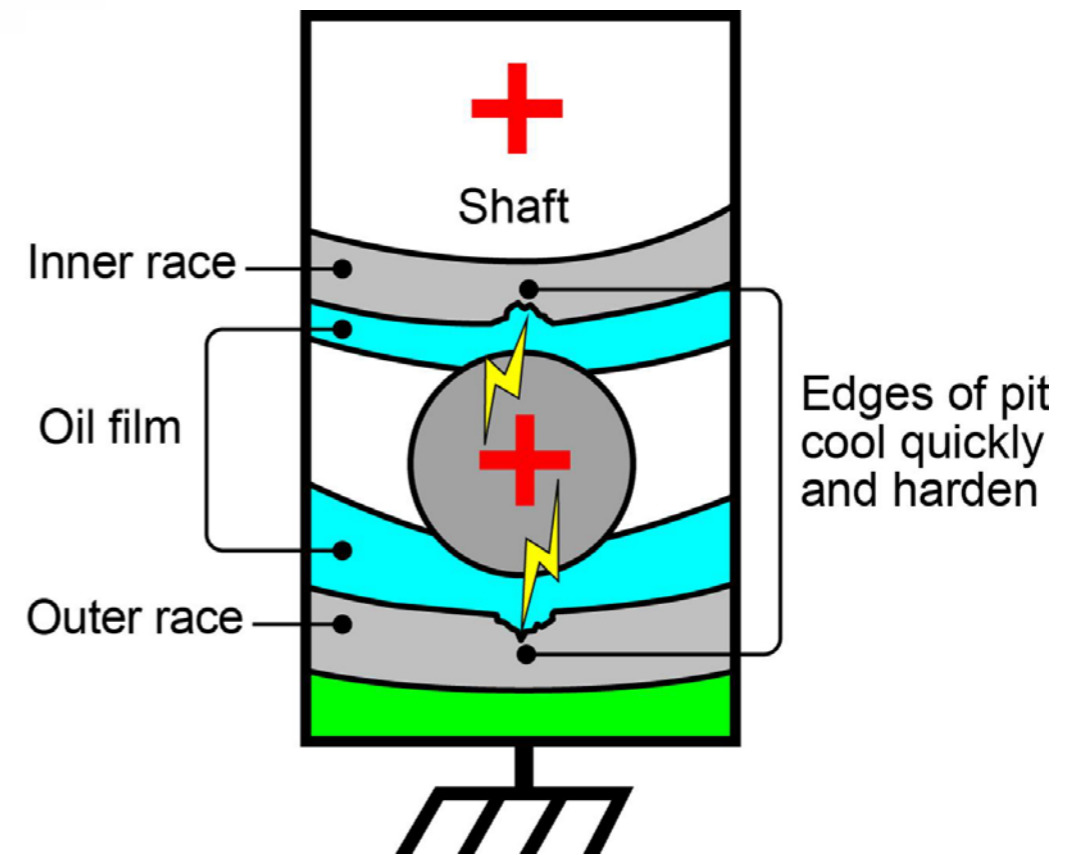
Causing bearings to fail...

- VFD pulses to the motor create capacitively coupled common mode voltage on motor shaft
- Voltage builds up until it exceeds dielectric insulation value of bearing's oil film
- Voltage looks for path to ground, discharges through bearings



and motors to fail

- Voltage arcs through bearing, and electrical discharge machining (EDM) produces thousands of pits
- Eventually, the rolling ball bearing causes fluting damage to race
- Bearings degrade, resulting in bearing and motor failure



Unmatched Bearing Protection



- Completely encircles motor shaft
- Provides continuous grounding — regardless of RPM
- No maintenance required



AEGIS[®] SGR Effectiveness Test

- **Shaft voltage readings**
- **Before and After**
- **Installation of
AEGIS[®] SGR
on VFD-driven motor**

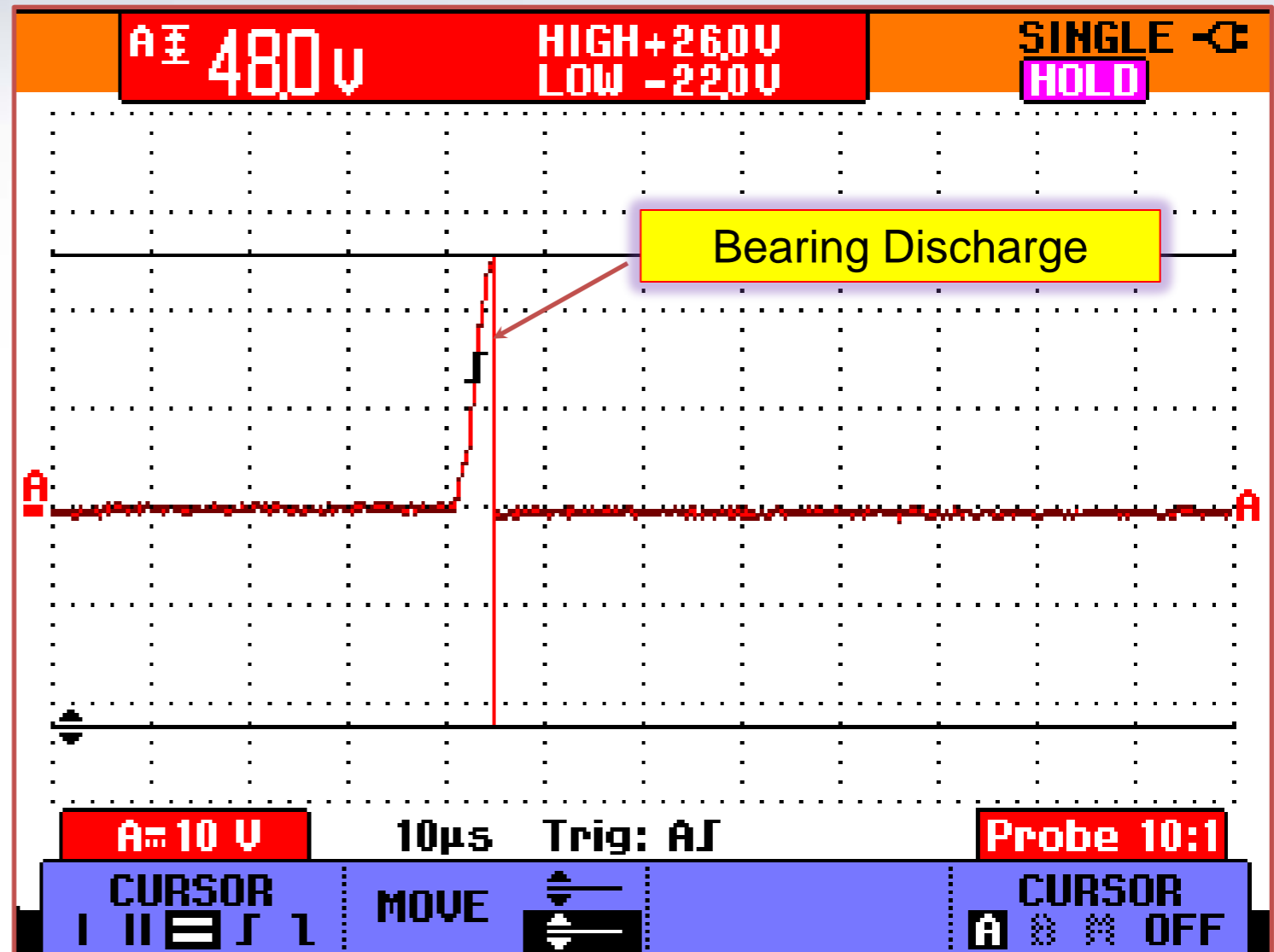
Before AEGIS[®] Installation

Shaft Voltage
Reading:

48 V peak

Equipment:
Motor: Baldor 15 HP
VFD: ABB

Test Settings:
10 V/div; 10 μ sec/div



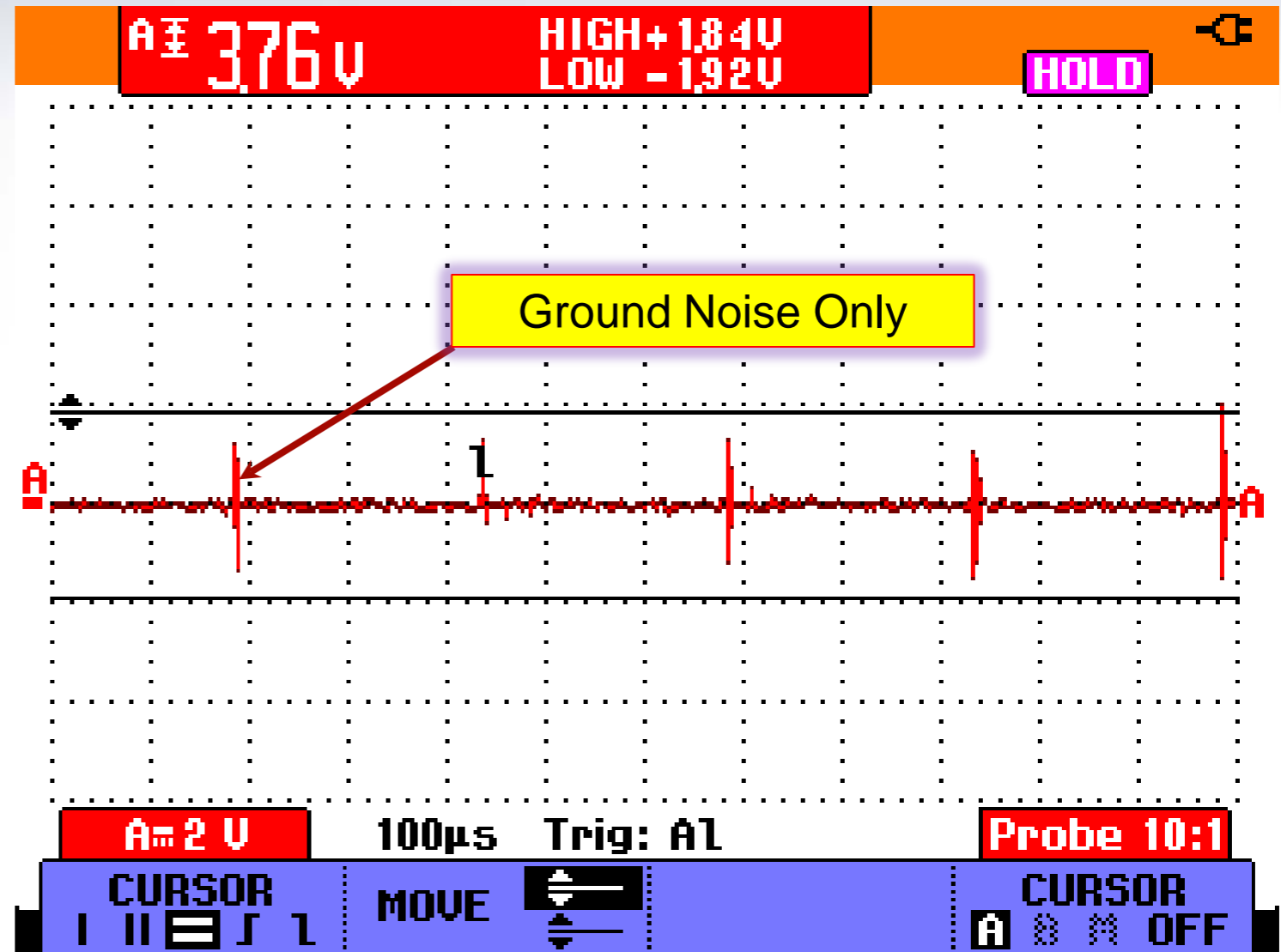
After AEGIS[®] Installation

Shaft Voltage Reading:

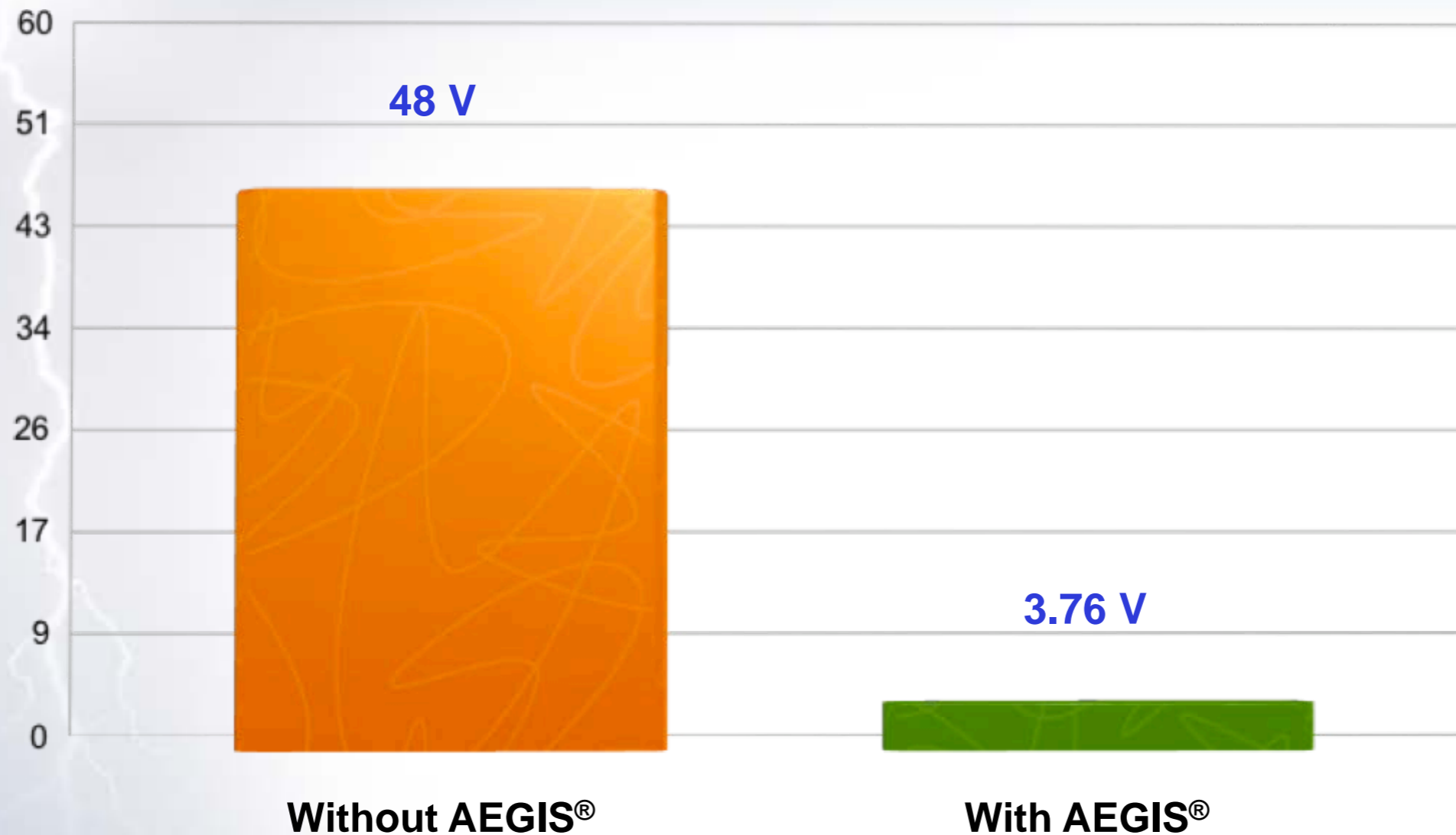
3.76 V peak!

Equipment:
Motor: Baldor 15 HP
VFD: ABB

Test Settings:
2 V/div; 100 μ sec/div

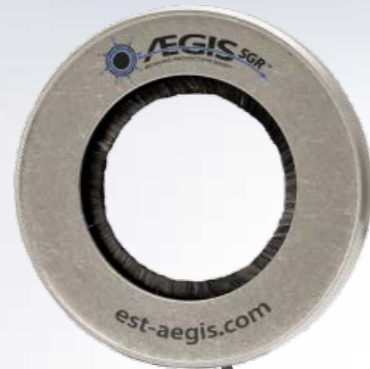


AEGIS[®] Safely Channels Damaging Shaft Currents to Ground

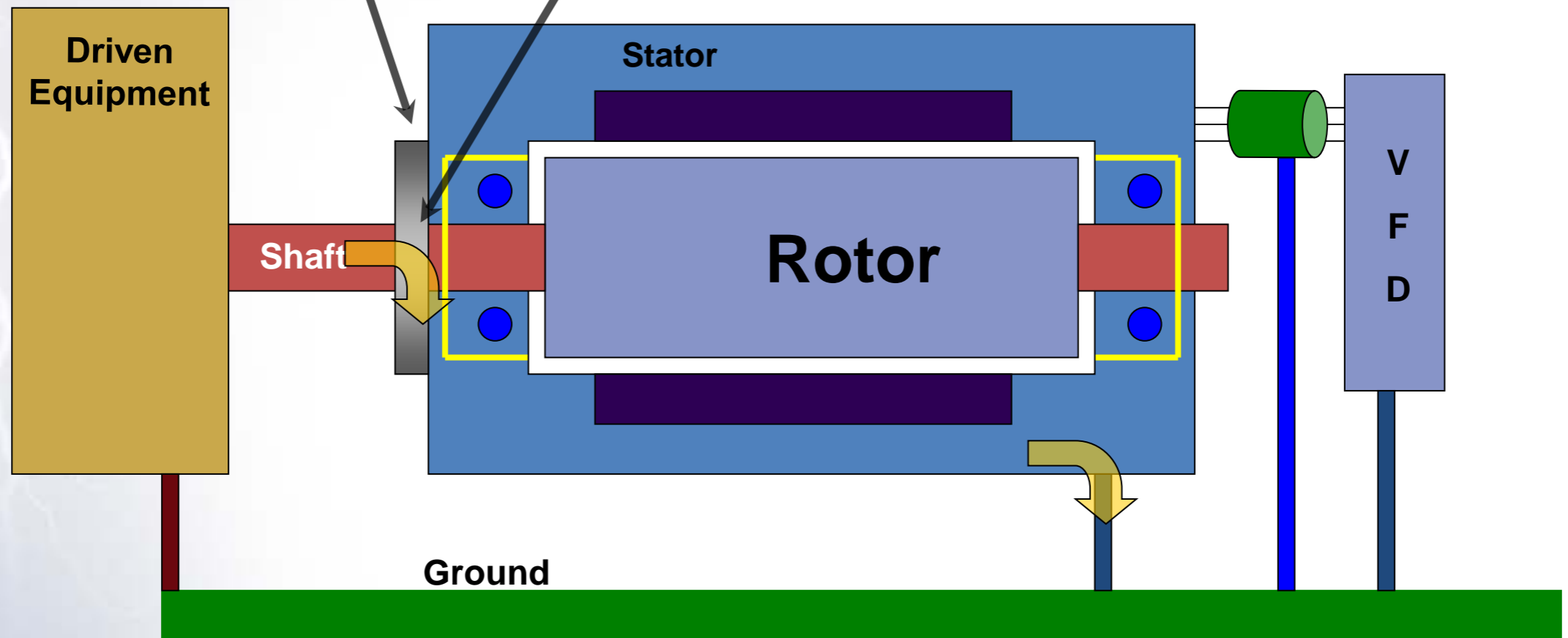


Best Practices Motors up to 100 HP

**AEGIS® Shaft Grounding
Ring on DE**

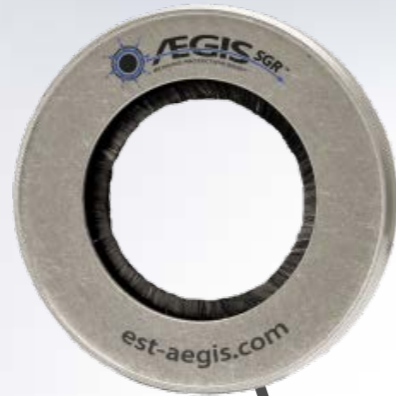


**Recommend AEGIS®
Colloidal Silver Shaft
Coating PN CS015**



Best Practices Motors over 100 HP

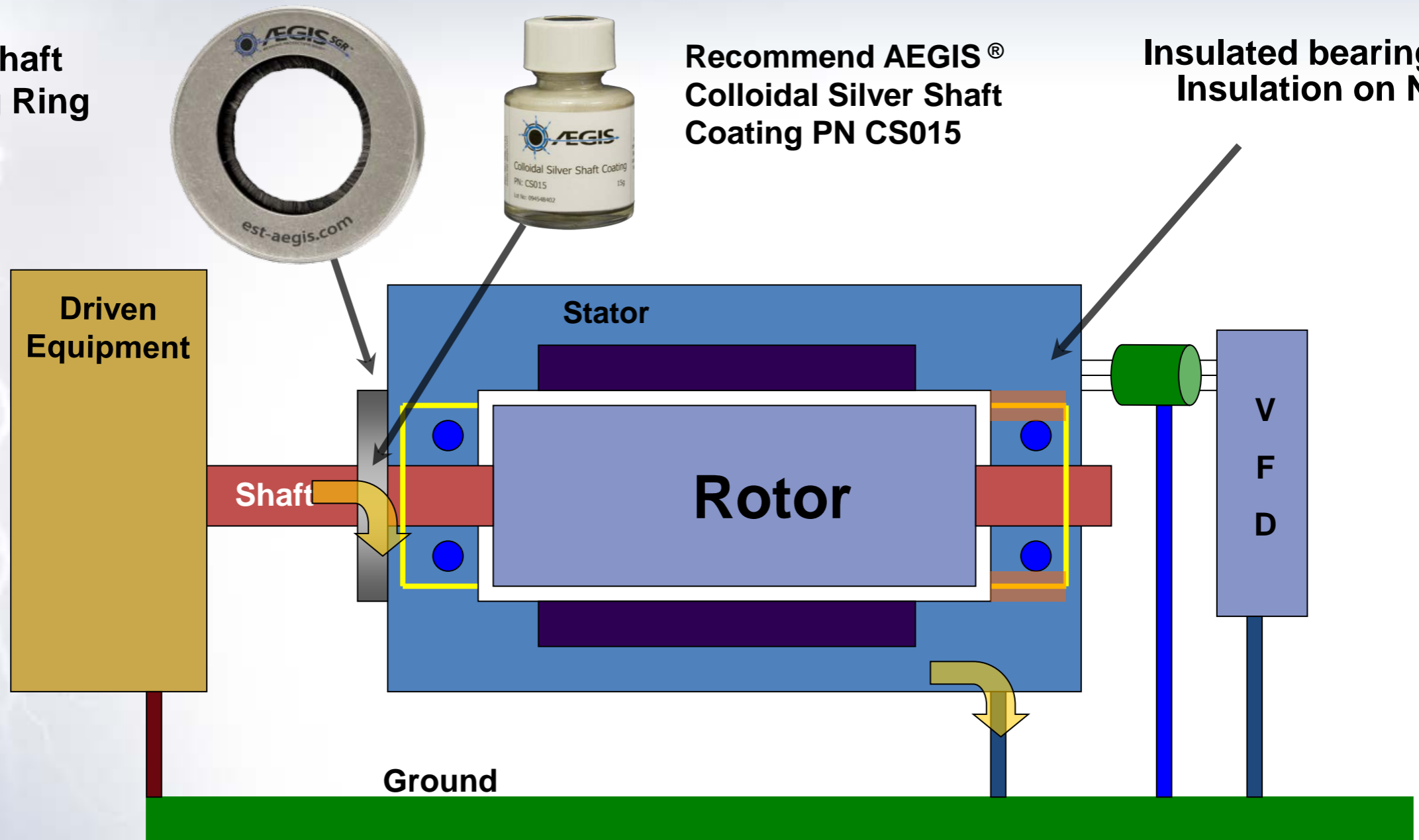
**AEGIS® Shaft
Grounding Ring
on DE**



**Recommend AEGIS®
Colloidal Silver Shaft
Coating PN CS015**



**Insulated bearing or
Insulation on NDE**



AEGIS® SGR Prevents Bearing Damage



VFDs save money, but

***...without effective,
long-term bearing protection...***

these savings can vanish!



makes
VFD-driven systems
and the energy savings
they generate

sustainable!

2006-2013 AEGIS® Awards



2007	FROST & SULLIVAN
	North American Motors & Drives Product Value Leadership of the Year Award

