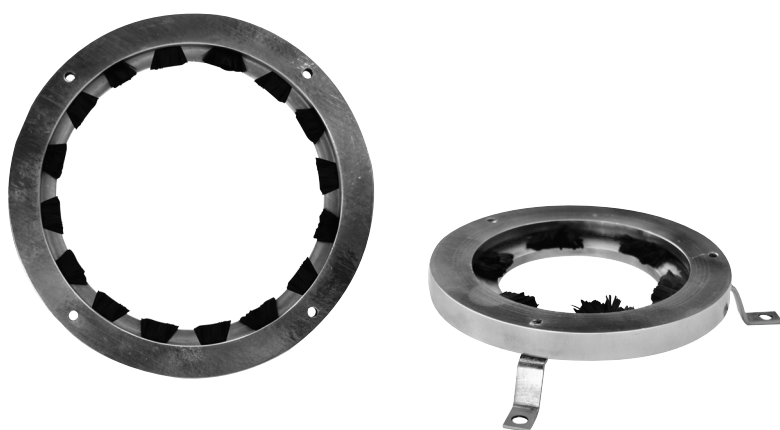


Reducing Downtime, Increasing Motor life!



EARTHRINGS™

“Bearing Protection Ring”



Earthings are used to protect bearings from the negative side effects of High Shaft Voltages, that are present from modern day variable speed drives (VSD's), for both AC and DC motors, as well as eddy currents from large AC motors. Research has shown an increase of bearing life by up to 400% with the use of Earthings.



Eddy Currents Damaging Bearing Grease - Increasing Service Intervals.



The darkened finish was caused by electric currents.

The “Picket Fence” pattern is due to shaft voltages.



VSDs ARE THE LARGEST SINGLE SOURCE OF BEARING FAILURES IN THE WORLD TODAY.

VSDs are the largest single source of bearing failures in the world today. There is a 57% increase in bearing failures worldwide, which is due to the introduction of IGBT Variable Speed Drives.

Older VSDs operated at a lower switching frequency and did not create many bearing problems, with the advent of the newer IGBT VSDs, the higher switching frequencies have created more unbalance and thereby creating higher shaft currents that increase motor failure.

Bearing current problems are nothing new to engineers, but it is the alarming rate of increase in this problem that is becoming a worry to factories and mines. SGS, a company in the USA, undertook a survey on 1000 AC motors on Variable Speed Drives. 250 of the motors monitored had bearing faults appearing by month 18, and of motors averaging 24 months production time, 65% had electrical bearing faults appearing.

OUT OF DATE SOLUTIONS

So what are the solutions to this problem?

As EDM is brought about by high shaft currents, the most effective way is to reduce these shaft currents. This has been assisted by the use of filters for variable speed drives. This has had mixed results and the research is not conclusive, therefore the filter manufacturers will not guarantee the products solves electrical bearing damage.

None have been 100% effective, and have performance (and / or high cost) problems of their own.

The next solution is to make sure that the high electrical currents and voltages that are passing the bearings on their way to ground, are redirected so that they do not pass through the bearings. This is the most effective solution, and there are many systems that have been in place over the years that try to solve this problem (mainly in relation to the old Eddy-current problem). None have been 100% effective, and have performance (and / or high cost) problems of their own.

The most popular solutions South African companies have used in solving Eddy-current problems, which are similar, but are not the same as VSD capacitive currents are the following:

- Insulated bearings
- Insulated bearing housings
- Carbon block brushes
- Copper or bronze metal brushes

Insulated bearings: These are effective but are not guaranteed against EDM by the bearing manufacturers. They also do not stop the bearing currents going into the driven equipment machinery (gearboxes, pump casings etc.), which can transfer the problems to other areas in which problems had not previously been experienced. With shaft voltages unable to escape through the motor bearings, there is a massive increase of current through the motor shaft. This can lead to the higher risk of ionization in hazardous areas. The initial, and on-going cost of ownership of insulated bearings in South Africa is also very high.

Insulated bearing housings: Since normally only one insulated end shield is fitted, this solution is not 100% effective when used to protect the motors bearings against VSDs. In addition the capacitive currents differ from Eddy-currents, and the use of only one insulated housing would just increase the shaft currents in the other bearings. This method, of using two insulated housings per motor, is also very expensive as well as increasing the currents diverted to the driven equipment, and the associated risks involved.

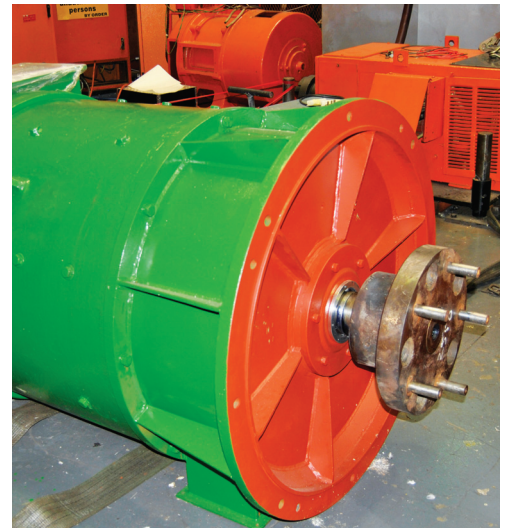
Carbon block housings: Conventional shaft grounding brushes need frequent maintenance and become less effective over time. They rely on the spring tension to press the brush against the rotating shaft. This causes the brush material to wear - sometimes in as little as 3 months as it rubs on the shaft. In addition, oil, grease, dirt or oxidation will break the conductive path and reduce the carbon brushes from discharging shaft currents effectively.

Copper or bronze metal brushes: These brushes are very abrasive, wear out faster, and are therefore not maintenance free. These need constant monitoring to prevent the build up of contaminants.



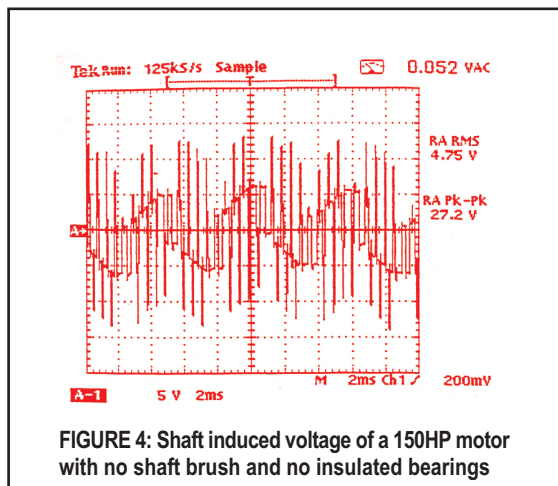
224 kw Motor from the Illovo Group with Earthings.

400 kw Motor from Transnet. Earthings installed on site.



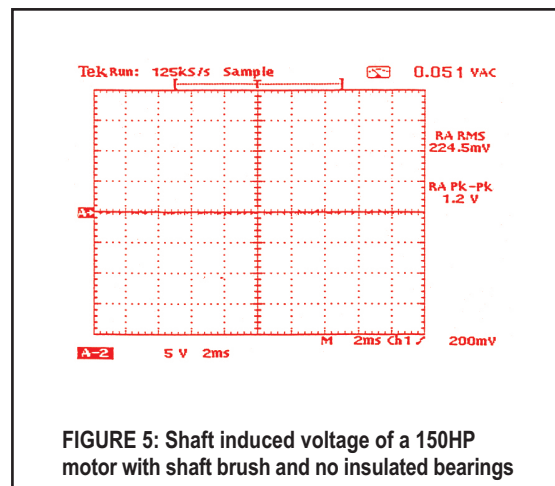
CASE STUDIES

BEFORE

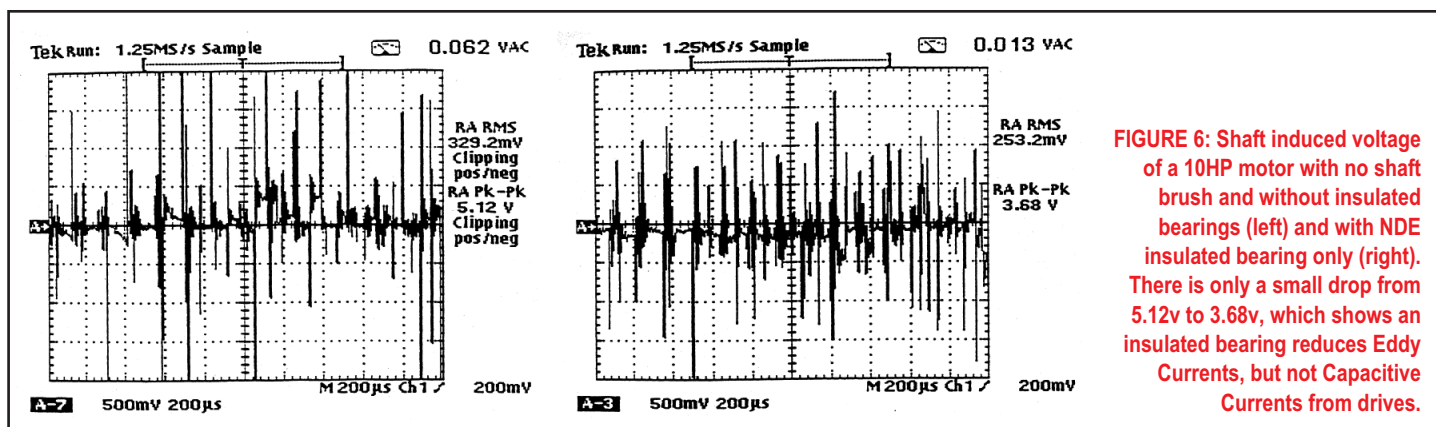


A 150 HP Motor was tested on a VSD Drive, shaft currents were 27.2v Pk-Pk

AFTER



A 150 HP Motor with a shaft brush & no insulated bearing fitted, has reduced shaft currents to only 1.2v Pk-Pk



"A major supplier of paper products just had a 1100 kW motor fail even though it had an insulated bearing on the non drive end side"

There is also a long held belief that carbon brushes on the shaft of a motor protect the motor against shaft voltages.

"A customer which recently serviced two of their 1,9 megawatt AC motors at one of the leading motor repair shops in South Africa, asked us to test the shaft voltages of both motors shortly after the motors were serviced and fitted with insulated housings as well as large carbon brushes on the drive end of both shafts."

"Both motors failed the shaft voltage testing (as witnessed by the customer), with one motor recording excessively high shaft voltages"
- Siva Naidoo -- Armature Winding Technician. Earthings pty Ltd.

"Carbon brushes, non drive end insulated housings and bearings, can be helpful, but are proven to be highly erratic , and therefore are not considered a reliable solution in the modern industrial environment." -Troy Timm, Director of Earthings PTY LTD.

Earthings are designed to Protect & Extend the Life of your electric motors.

At Earthings Pty Ltd we Offer:-

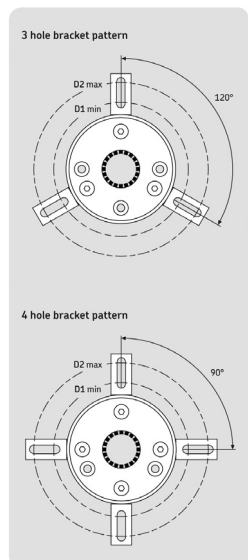
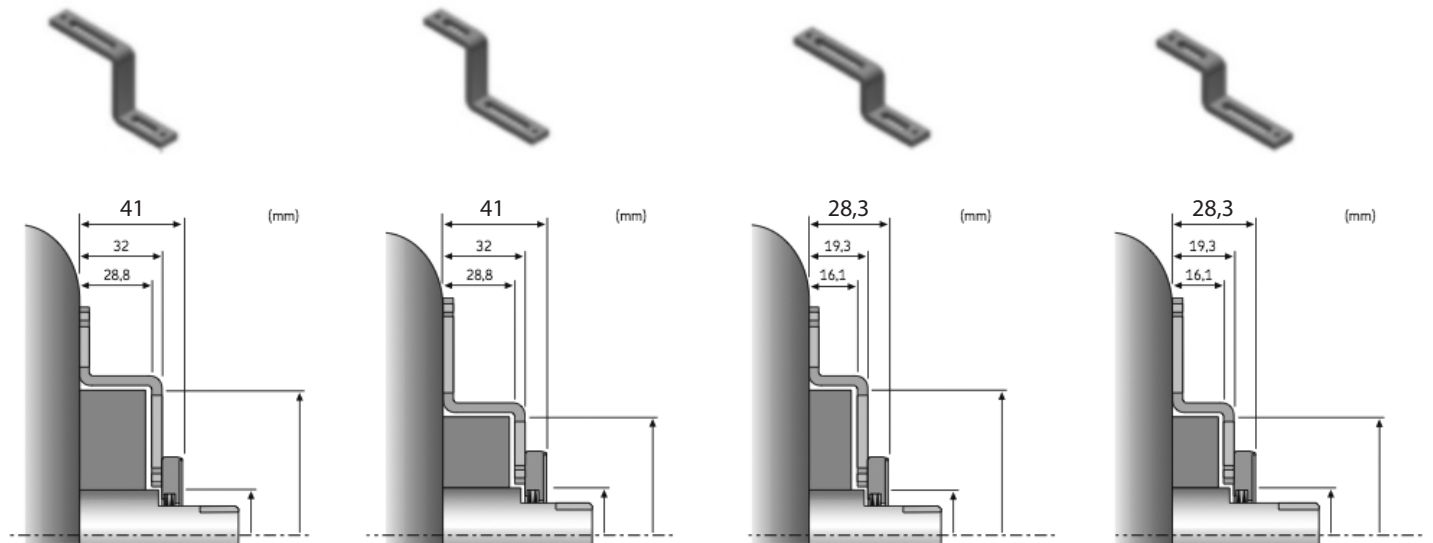
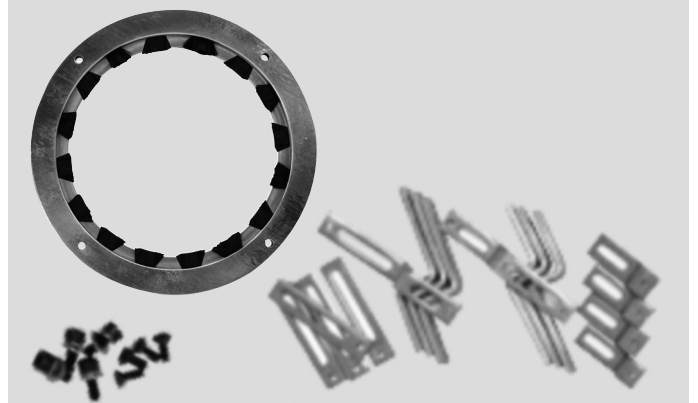
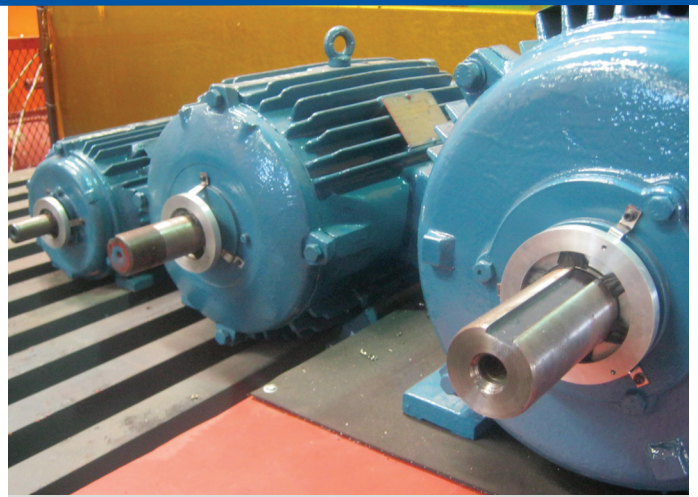
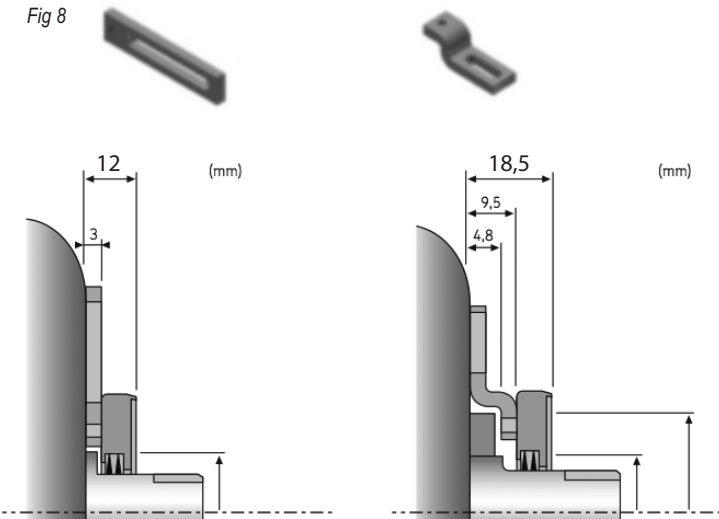
- Standard low Voltage Earthings
- Hv Earthing - for high voltage and large motor applications.
- Only bearing current protection with a 2 year Guarantee!
- Local back up and after sales service.
- Full training anywhere in Africa.
- Can be mounted directly on to motor, or with brackets .
- Comes in split ring option, for easy on site installation.

Please see the video on our website for a live demonstration! At www.earthings.co.za

The Earthing Kits consist of the following items:

- Shaft grounding ring with an aluminium brush holder which helps ensure that the conductive brushes are in contact with the surface of the motor shaft
- Four different sets of mounting brackets (4 brackets per set) which virtually ensures that the Earthing kit can be fitted to almost all IEC frame motors.
- Selection of mounting screws and washers.

Fig 8



- **Maintenance free**
- **Easily Installed in minutes - even in the field**
- **Convenient mounting brackets and customized brackets**
- **Contamination proof - unaffected by dirt, grease or other contaminants**
- **The only product with an unlimited 2 year Guarantee**



Tel: (031) 461 4411 • Email: sales@wykosa.co.za

Website: www.earthings.co.za