Why do we need Insulated bearings or Shaft Grounding Brushes?

First of all lets look at the Origins of Bearing Currents.

Bearing currents are high-frequency currents that are created by induced voltage on the motors shaft. This current is then discharged through the motor bearings. This phenomenon is normally not an issue in electric motors that are powered directly by mains voltage. However, it becomes a concern for inverter driven motors where variable frequency drives (VFDs) emit pulse width modulated voltage.

When motors are supplied by VFDs, the wave form is less smooth when compared to the mains supply and actually consists of a sequence of positive and negative pulses this is often seen as a "square wave" voltage waveform.

The high-frequency current generated by the VFDs output transfers capacitance to the motor frame, and then flows through the frame looking for ground. As it travels through the frame the current generates a high frequency magnetic flux within the motor. The flux induces a high-frequency voltage along the shaft. In larger motors (75kW and up) this shaft voltage is sufficiently significant to stimulate a high-frequency circulating current which passes through the bearings.

This circulating current flows from shaft to frame through one bearing, and from the frame back to the shaft through another bearing.

As this circulating current passes through the bearing, arcing occurs and causes the grease and bearing to degrade. These arcs can produce Electrical Discharge Machining (EDM), or spark erosion of the bearing cause pitting, or stripes called fluting. This damage can occur in a short period of time, only 3 to 12 months of motor running.

How to solve the issue?

Installing an insulated bearing or grounding brush or both can help keep the bearing from degrading by stopping the circulating current flows. An insulated bearing creates an insulating barrier between the shaft and motor body. A Shaft Grounding Brush creates a more conductive route for the circulating current, so it bypasses the bearing.

AmTecs can offer Insulated bearings fitted to frame sizes 200 to 355. But it is only recommended for motors of 75kW or above. These bearings are typically fitted on the motors non-drive end.

AmTecs also offer Shaft Grounding Brushes for 315 to 355 frame motor. These brushes are typically fitted on the motors drive end.