Possible Mechanism for Observed Dynamic Resistance

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Abstract

A possible mechanism was proposed to explain the observance of motion induced short-term discontinuities in degraded tin plated contacts (less than 1 microsecond). This mechanism requires unique conditions where cold-welded wear particles are stretched and sheared to the fracture limit during sliding. It is speculated that the release of elastic energy during fracture propagates through the surface structure at the speed of sound and causes rapid changes in contact resistance. An analysis of the microstructure was conducted and indicates this mechanism is theoretically possible. Moreover, data are provided that show incremental changes in normal force can cause counter intuitive changes in resistance. This data shows large changes occur during loading and unloading and it's believed these changes are the result of micro rocking that's induced by the step loading system. It is estimated the distances covered by rocking range from a few to tens of microns and the large changes in resistance are thought to result from making the breaking cold welded asperities. In addition, this data suggests that a static contact resistance threshold for discontinuities exist around 100 milli-ohm level. This is in agreement with other authors and lends credibility to the use of static contact resistance as a measure of contact stability.

Key words: Fretting, fretting damage, voltage waveforms, deterioration, contact resistance.