Vibration Thresholds for Fretting Corrosion in Electrical Connectors

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***Abstract*- Single frequency vibration tests were used to induce fretting corrosion in tin alloy plated contacts. The samples used in this study were connectors consisting of 25 pairs of mated pin and socket contacts. Experimental results for a variety of vibration levels, frequencies, and wiring tie-off lengths are presented. The experiments consisted of running a series of vibration tests at each frequency where the excitation level was stepped through a range of g-levels. During each test run contact resistance was monitored as a performance characteristic. The results exhibit threshold behavior at each frequency for the onset of fretting degradation. Typically a plateau region was observed where similar g-levels produced similar fretting rates. It was also found that outside the plateau region the g-levels varied according to the dynamic behavior of the mechanical system. In addition, a transfer matrix model was used to analyze these results. An empirical fit of the data correlated well with the model when damping was used. This analysis revealed the importance of the bending moment induced at the contact interface as a result of excitation levels and tie-off configurations. Consequently, it is concluded that dynamic response of the mechanical system under various g-levels and tie off configurations can greatly impact the performance of a connector system subjected to vibration stresses.**