

DEVELOPMENT OF FRETTING CORROSION MAPS

Fretting, an accelerated surface damage that occurs at the interface of contacting materials subjected to small oscillatory movement is a common problem in many engineering applications. The deleterious effect of fretting in electrical connections assumes significance as it influences the reliability and system performance. Though fretting itself may not result in failure of an electrical connection, the deleterious effect of fretting is a great deal of concern since fretting leads to the accumulation of the wear debris and oxidation products in the contact zone in the form of a thick highly localized insulating layer. The formation of such an insulating layer results in a rapid increase in contact resistance and eventually leads to virtually an open circuit. Though such a phenomenon evolves with time, the main difficulty in predicting is that it is influenced by many interdependent factors and it is not easy to detect. This warrants a thorough understanding of the fretting corrosion behaviour under varying experimental conditions. Since several factors influence the life-time of tin-plated contacts under fretting conditions, mapping the fretting–corrosion behaviour would be of immense help in the development of reliability models and life-time estimation approaches, to predict the life-time of connector contacts. We have developed the fretting corrosion maps for tin plated copper contacts based on the change in contact resistance and based on the extent of fretting wear and oxidation, assessed by surface analytical techniques, under varying experimental conditions. These maps are useful in identifying the various zones such as, oxidation-dominant, oxidation-fretting, fretting-oxidation and fretting wear-dominant and, to assess the risk of failure, under a given set of conditions. The proposed fretting corrosion maps are not quantitative to predict the exact life-time of the tin-plated copper alloy contacts. However, they will be useful to draw some guidelines about the performance of such contacts under various conditions. For further information, please refer the following paper:

1. T.S.N. Sankara Narayanan, Young Woo Park and Kang Yong Lee, Fretting-corrosion mapping of tin-plated copper alloy contacts, [Wear, 262 \(1-2\) \(2007\) 228-233](#).