

Predictions Based on Dynamic Use-rate Data

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With traditional warranty data used to make predictions of future failures, the response typically consists of the number of weeks (or another unit of real time) in service. Use-rate/environmental data are usually not available (automobile warranty data are an exception, where both weeks in service and number of miles driven are available for units returned for warranty repair). With new technology, however, sensors, and smart-chips are being installed in many modern products ranging from computers and printers to automobiles and aircraft engines. Thus the next generation of field data for many products will provide information on how the product has been used and the environment in which it was used. This paper was motivated by the need to predict warranty returns for a product with multiple failure modes. Cycles-to-failure/use-rate information is available for those units that are connected to the network. We use a cycles-to-failure model to compute predictions and prediction intervals for the number of warranty returns. We also present prediction methods for units not connected to the network. We also provide a comparison of asymptotic variances to provide insight into the reasons that use-rate models provide better predictions.

This talk is based on joint work with Yili Hong