

Reliability Growth Modeling for Spare Parts Provisioning

Won Jung
Department of Industrial Engineering
Taegu University

Abstract

Under current reliability warranty legislature, military contractors are required to provide warranties on parts and materials specifically against product failure. Coupling the reliability warranty requirement for military hardware, written guarantees should be provided in connection with the procurement of spare parts. Therefore, the reliability group must be well aware of what the equipment will actually demonstrate over an extended period of time including growth (or improvement) in systems reliability. The concept of reliability growth recognizes that increased usage will identify product deficiencies through failures and as the deficiencies are corrected, the product slowly improves resulting in reliability growth. In expensive military materials with complex hardware subsystems and with even moderate volumes of production, the failure to perform from a reliability standpoint could be an extremely expensive proposition. This requires considerable diligence in the application of reliability techniques.

This paper presents a methodology for spare provisioning of military flight hardware under reliability growth. In this work, two basic problems were addressed: (1) determining the number of spares needed at the flightlines to replace failed items; and (2) determining the number of spares needed at the depot to supply replaceable items to the flightlines. Outputs from this model include recommended parts stocking levels at both the flightlines and central depot which are driven by specifications on risk of stockout at each of these locations. This model can also be used to determine staffing requirements. The throughput of a depot depends on the size of the physical facility and on the staffing. Once the physical size of the depot is determined it is exceedingly difficult to expand the facility and increased throughput can only be accomplished by adding repair personnel or overtime operation.