

Reliability Growth - Example

3.3.2 Reliability Growth (or in Appendix F)

Dakota reliability growth will consist of positive improvement through systematic removal of failure modes by way of positive changes in design, material, or manufacturing. Dakota reliability growth will begin at program initiation and continue through production. Reliability growth will be achieved not only through lab and flight testing, but also by way of design analysis, production experience, and operational experience.

The reliability growth test program will accomplish its goals by: (1) finding reliability problems through testing, (2) establishing a Failure Reporting, Analysis, and Corrective Action System (FRACAS) to identify root causes of failure and corrective actions, (3) incorporating corrective actions when appropriate, and (4) continual monitoring of corrective actions and the system's reliability throughout all test phases.

Dakota Reliability, Availability, and Maintainability (RAM) performance will be continuously assessed using data from development flight testing, logistics demonstration, and operational testing. Dakota reliability growth will be tracked against a reliability growth curve that estimates reliability thresholds associated with program decision points. The focus of the Dakota reliability growth program will be on identification of new and existing failure modes and correction of hardware and software failures. A failure review board consisting of Government and contractor elements will convene monthly to discuss the FRACAS data and evaluate the root cause determination, proposed corrective actions, and the verification methodology. Once corrective actions are verified and incorporated, the corrective action will continue to be monitored for fix effectiveness to assess its impact on reliability growth.

RAM Scoring Conferences will be held quarterly. All RAM data will be scored using the approved Dakota Failure Definition/Scoring Criteria, which is in compliance with the DOT&E Guidance on [Independent Operational Test and Evaluation \(OT&E\) Suitability Assessments](#). The RAM Scoring Conference voting members are the materiel developer, the combat developer, and the evaluator; however the final operational evaluation of Suitability will be based on the independent evaluators vote. Testers and technical support personnel may support the Scoring Conferences in an advisory capacity.

The goal for the reliability growth program is to demonstrate the 17-hour MTBF Full Rate Production requirement with 80 percent confidence using data from IOT&E. To provide evidence at Milestone C that reliability the reliability growth goal is achievable, the program will seek to demonstrate a MTBF of 20 hours during the Limited User Test (LUT). The development goals associated with this reliability growth program include addressing at least 80 percent of the initial failure intensity via corrective action with an average fix effectiveness factor of 70 percent.

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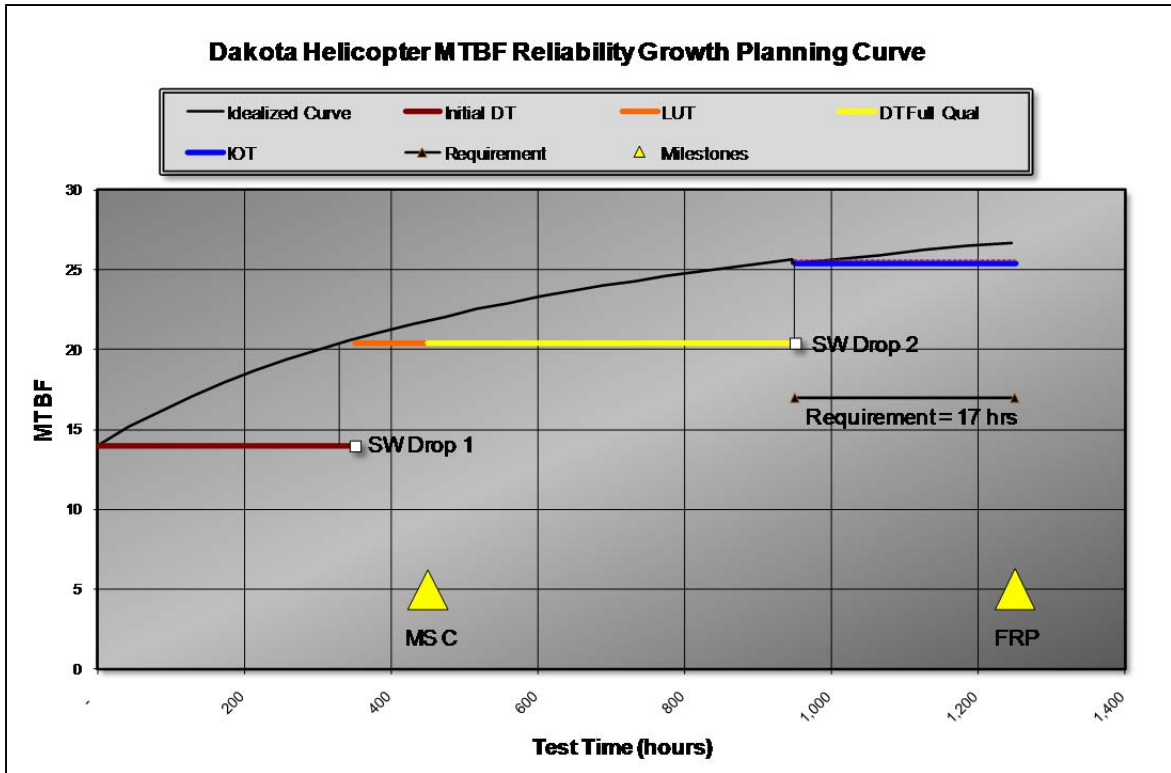


Figure 1. Reliability Growth Curve

The reliability growth plan consists of two corrective action periods for implementing corrective actions to reliability deficiencies observed during developmental test flights. Approximately nine B-mode failures are expected before the first CAP and an additional 5 are expected before the second CAP. There will be a major software release just prior to the LUT and another just prior to IOT&E. The majority of corrective actions discovered in developmental testing will be implemented in these software releases. If the true MTBF is 26 hours during the IOT, then there is a 73 percent chance Dakota will demonstrate its 17 hour requirement with 80 percent confidence.

Table 1. Projected Flight Hours Supporting Reliability Growth

Test	Test Flight Hours	Cumulative Flight Hours
Initial DT	350	350
LUT	100	450
DT Full Qualification	500	950
IOT	300	1250