

PART B

R&M RELATED ACTIVITIES

The structured decomposition (Part A Chapter 4) identifies a number of activities that are undertaken under the banner of R&M. Each activity has a purpose, in terms of producing a given type of information, and is performed through the use of one or more techniques (see Part C).

Chapter 1 Potential Scenario Analysis

Potential scenarios are considered in the early stages of designing a new system or of modifying an existing system for a new task. The effect of R&M performance parameters on functional performance, logistical support requirements and safety can be a key factor in determining the effectiveness of a proposed solution.

Chapter 2 R&M Performance Specification

The achievement of R&M in service stems from either luck or a clear, appropriate and realistic specification of the requirements together with a contract that enforces adherence. Various forms of specification exist and can be applied to differing parts of the specified system. There are also a number of pitfalls to be avoided if the specification is not to become the subject of protracted discussion and eventually conceded.

Chapter 3 Design for R&M Performance

R&M is built into a system at the design stage. No amount of analysis or testing can improve a design without a costly revisit to the design stage. The use of good design practice for high reliability and good field maintainability (in software and hardware) is an essential component of reducing project risk and achieving good products. (This chapter is presently being developed)

Chapter 4 Practical Review of Design for R&M

The functionality of a system is well tested during the design process. The continuity of this functionality over time and the ability to return failed equipment to a functional state is equally relevant to achieving performance in the field. Various methods of testing are available and can provide useful feedback on the performance. (This chapter is presently being developed)

Chapter 5 Theoretical Review of Design for R&M

Practical testing can only sample the failure modes of complex modern equipment. Theoretical review and analysis complements practical testing and

identifies where the defence against rarer, but important, situations is less than necessary or reasonably practicable.

Chapter 6 Theoretical Estimation of R&M Performance

Predictions are perhaps the best known and most misused tools of R&M engineering. They do have a valuable role in the project life cycle provided they are used appropriately and with knowledge of their shortcomings. (This chapter is presently being developed)

Chapter 7 Failure Consequence Analysis

The connection of failures and their effects, or conversely high level events and their causes, provides important insights into the control of undesirable events at the system level or beyond. A good model of the system failure modes facilitates the identification of the area of a system to be addressed in order to improve system R&M.

Chapter 8 Practical Demonstration of R&M

R&M Demonstrations are practical tests of the achievement of specified levels of R&M performance. They can be used to verify the achievement of specified requirements and to provide evidence to support reliability and safety cases.

Chapter 9 Production Engineering for R&M

The use of optimal practices in production (Part B Chapter 10) requires engineering to determine the areas where resources can be most effectively applied. (This chapter is presently being developed)

Chapter 10 R&M Evidence Collation

Evidence of the level of R&M performance provided is required for the initial acceptance of a system into service or even its continued use. Such evidence may also be required to support the safety case for the system or an assessment of the system's fitness for a given use. (This chapter is presently being developed)

Chapter 11 R&M in Production and Maintenance

The use of less than optimal practices in the assembly process has been identified as a major contributor to poor R&M performance in the field. It is therefore an important area to address if a product is to achieve its intrinsic reliability. (This chapter is presently being developed)

Chapter 12 Cautions and Precautions in the Use of In-Service R&M Data

The process of gathering data from in-service equipment is very beneficial to the performance of both current and future equipment. However such a process is fruitless unless all the relevant data is collected, stored and analysed.

Chapter 13 Project Management and R&M

R&M should be addressed by project management. R&M projects should be project managed. There are however some areas that require special

consideration given the long term focus of R&M activities. These include: the use, and time taken by, statistical tests; the more abstract / statistical nature of the quantities involved; and the differences between passing R&M aspects and functional / environmental aspects on to sub-contractors. (This chapter is presently being developed)

Chapter 14 R&M Data Management

R&M is a data intensive subject. Predictions specifically use past data. Often the quality of the information produced by an R&M activity is directly related to the quality of information available. The management of data, particularly historic data from other system, is key to engineering success in the future. (This chapter is presently being developed)

Chapter 15 Software R&M Analysis

This chapter discusses the techniques appropriate to the analysis, assessment and progressive assurance of the R&M characteristics of software. Techniques to be applied during each phase of the system's Life Cycle that assist the development and maintenance of software with adequate integrity and their application are discussed which are often interactive and iterative.

Chapter 16 Representing the Initial R&M Case Using Goal Structuring Notation

This chapter provides a discussion of how the Initial R&M Case may be represented using Goal Structuring Notation (GSN). The approach may be equally used to present any situation where one wishes to make a claim and where the support for that claim will be based upon evidence and argument.

