AS IEC 60300.3.11—2004
IEC 60300-3-11:1999

AS IEC 60300.3.11

Australian Standard™

Dependability management

Part 3.11: Application guide—Reliability centred maintenance

STANDARDS AUSTRALIA

This Australian Standard was prepared by Committee QR-005, Dependability. It was approved on behalf of the Council of Standards Australia on 12 February 2004 and published on 1 April 2004.

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This Standard was issued in draft form for comment as DR 03534.

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First published as AS IEC 60300.3.11—2004.

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Published by Standards Australia International Ltd
GPO Box 5420, Sydney, NSW 2001, Australia

ISBN 0 7337 5799 5

PREFACE

This Standard was prepared by the Standards Australia Committee QR-005, Dependability. This Standard is identical with, and has been reproduced from, IEC 60300-3-11:1999, *Dependability management,* Part 3-11: *Application guide – Reliability centred maintenance*.

'Dependability' is a collective term for performance characteristics (reliability, availability, maintainability) of simple or complex products and systems. The AS IEC 60300 series of dependability management Standards provide general guidelines for establishing a dependability management system to meet most organizational or project needs, supported by a 'tool kit' of non-prescriptive standards on a range of dependability application guidelines and methods.

As this Standard is reproduced from an international standard, the following applies:

(a) Its number appears on the cover and title page while the International Standard number appears only on the cover.

(b) In the source text 'this part of IEC 60300' should read 'this Australian Standard'.

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References to International Standards should be replaced by references to Australian or Australian/New Zealand Standards, as follows:

Reference to International Standard		*Australian/New Zealand Standard*	
IEC		AS/NZS	
60300-3-9	Dependability management—Part 3: Application guide—Section 9: Risk analysis of technological equipment	3931	Risk analysis of technological systems—Application guide

Only International Standard referenced documents identical to Australian or Australian/New Zealand Standards have been listed.

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INTRODUCTION

Reliability Centred Maintenance (RCM) was initially developed for the commercial aviation industry in the late 1960s, ultimately resulting in the publication of the document, MSG-3, upon which the modern usage of RCM is based. It is now a proven and accepted methodology used in a wide range of industries.

The methodology described in this standard is based largely on the tried and tested procedures in MSG-3, but is equally applicable to a variety of equipment other than aircraft.

It should be noted that this is one of the original procedures for implementing RCM, but is not the only method in use. The document sets out to explain the principles and to demonstrate their use by the application of the MSG-3 methodology. Other methodologies are used in other industries, and standards particular to those industries will show the detailed application.

Reliability centred maintenance (RCM) is a method for establishing a preventive maintenance programme which will efficiently and effectively allow the achievement of the required safety and availability levels of equipment and structures, which is intended to result in improved overall safety, availability and economy of operation.

RCM provides for the use of a decision logic tree to identify applicable and effective preventive maintenance requirements for equipment and structures according to the safety, operational and economic consequences of identifiable failures, and the degradation mechanism, responsible for those failures. The end result of working through the decision logic is a judgement as to the necessity of performing a maintenance task.

The basic steps in undertaking an RCM analysis are as follows:

– defining the system and/or subsystem boundaries;
– defining the functions of each system or subsystem;
– identifying functionally significant tems (FSI);
– identifying the pertinent FSI functional failure causes;
– predicting the effects and probability of these failures;
– using a decision logic tree to categorize the effects of the FSI failures;
– identifying applicable and effective maintenance tasks which comprise the initial maintenance programme;
– redesign of the equipment or process, if no applicable tasks can be identified;
– establishing a dynamic maintenance programme, which results from a routine and systematic update of the initial maintenance programme and its revisions, assisted by the monitoring, collection and analysis of in-service data.

All tasks are based on safety in respect of personnel and environment, and on operational or economic concerns. However, it should be noted that the criteria considered will depend on the nature of the product and its application. For example, a production process will be required to be economically viable, and may be sensitive to strict environmental considerations, whereas an item of defence equipment should be operationally successful, but will have less stringent safety, economic and environmental criteria. The importance of particular steps will therefore

depend on the application, as will for example the identification of items deemed to be functionally significant.

Successful application of RCM requires a good understanding of the equipment and structure, and the associated systems, subsystems and items of equipment, together with the possible failures, and the consequences of those failures.

The application of RCM requires detailed analyses of the product and its functions, which can be labour intensive and therefore comparatively expensive. For this reason, RCM is a technique which is usually only applied where maintenance is critical to the safety and effective operation of the product and where failures would have serious safety, environmental or operational effects. The use of RCM is therefore dependent on the type of product and its application, but can be used by any size of manufacturing organization according to the requirements of the project.

AUSTRALIAN STANDARD

Dependability management
Part 3.11:
Application guide—Reliability centred maintenance

1 Scope

This part of IEC 60300 provides guidelines for the development of an initial preventive maintenance programme for equipment and structures using reliability centred maintenance (RCM) analysis techniques. References to a maintenance programme in this standard implies that it is a preventive maintenance programme.

This application guide is an extension of IEC 60706-4. Those maintenance activities recommended in IEC 60706-4 which relate to preventive maintenance may be implemented using reliability centred maintenance methodology.

RCM analysis can be applied to items such as a ground vehicle, ship, power station, aircraft, etc, which are made up of equipment and structure, e.g. a building, airframe or ship's hull. Typically an equipment comprises a number of electrical, mechanical, instrumentation or control systems and subsystems which can be further broken down into progressively smaller groupings, as required.

RCM techniques specifically applicable to structures are given in annex A.

This standard is restricted to the application of RCM techniques and does not include aspects of maintenance support, which are covered by other standards in the IEC 60706 series.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of IEC 60300. At the time of publication, the editions indicated were valid. All normative documents are subject to revision, and parties to agreements based on this part of IEC 60300 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

IEC 60050(191):1990, *International Electrotechnical Vocabulary (IEV) – Chapter 191: Dependability and quality of service*

IEC 60300-3-9:1995, *Dependability management – Part 3: Application guide – Section 9: Risk analysis of technological systems*

IEC 60706-4:1992, *Guide on maintainability of equipment – Part 4 – Section 8: Maintenance and maintenance support planning*

IEC 60812:1985, *Analysis techniques for system reliability – Procedure for failure mode and effects analysis (FMEA)*

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