

# RCM II - Implementation...

RCM II is best implemented by review teams made up of the people who know the equipment best...



...operators, maintainers, technicians, technical experts, suppliers, manufacturers and/or designers...

The review team is led through the analysis by an expert facilitator, who ensures the RCM II methodology is applied correctly and all the issues are addressed...



The basic information for the system or asset is compiled in the RCM II Information Worksheet where the Functions, Functional Failures, Failure Modes, and Failure Effects are identified...

The Failure Consequences are then determined and the appropriate Failure Management Policy or Default Action selected for each Failure Mode...



The application of the RCM II methodology ensures that all the issues are fully understood by the review team and the organisation...

**RCM II – thoughtware, not software...**

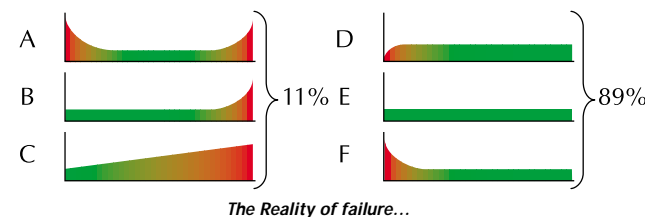
## The Benefits of successful RCM II implementation

- **Greater Safety and Environmental Integrity**
- **Enhanced Risk Management**
- **Optimised Asset Availability and Reliability**
- **Improved Quality and Customer Service**
- **Greater Maintenance Cost Effectiveness and Efficiency**
- **Longer Useful Asset Life**
- **Greater Motivation of Individuals**
- **Better Teamwork**
- **Comprehensive Database**
- **Transparency of Process with Audit Trail**
- **An Integrated Framework**

# Reliability-centred Maintenance II – thoughtware, not software...

## A Brief History of Reliability-centred Maintenance

RCM has its origins in the aircraft industry in the late 1950s and early 1960s, when it was realised that the traditional maintenance philosophy of scheduled overhauls was based on a flawed belief that the majority of failures were age related. Extensive research revealed that only 11% of aircraft components suffered from age related failure, and a staggering 68% were most likely to fail when new or immediately after maintenance. That discovery necessitated a whole new approach to determining aircraft maintenance requirements, commencing with MSG-1 in 1968, which was applied to the Boeing 747, and the generic MSG-2 in 1970.



The landmark development in the history of RCM was Stan Nowlan and Howard Heap's 1978 report "Reliability-centred Maintenance", which remains the basis of RCM II. RCM was rapidly taken up by other industries, including transport, petro-chemical, mining, steel making, manufacturing, and utilities.

**RCM II: "a process used to determine the maintenance requirements of any physical asset in its operating context"**

The RCM II process asks the seven questions over leaf for each asset or system in its operating context. This is because RCM II recognises that if we use identical assets differently, then their maintenance requirements will also differ.

**The RCM II Information Worksheet: gathering the basic information**

The first four of seven questions are answered on the RCM II Information sheet (or FMEA)

- **Functions:** what functions and performance standards do the users of the asset want in its present operating context?
- **Functional Failures:** in what ways can the asset fail to do what the users want?
- **Failure Modes:** what can cause each Functional Failure?
- **Failure Effects:** what are the physical effects of each failure?

## How We Can Help

The Asset Partnership's highly experienced RCM II Practitioners offer world class services in:

- *Integrating RCM II initiatives into Asset Management Strategies*
- *"In house", syndicated and public RCM II training courses*
- *Ongoing technical support of RCM II Projects*
- *RCM II Project support, including functional breakdown of asset systems, criticality analysis, and general project management*
- *Maintenance schedule packaging, writing and loading into Computerised Maintenance Management Systems (CMMS)*

## Failure Consequences

The fifth of the seven questions asks how does each failure matter, since it is a basic tenet of RCM II that what we are trying to avoid is the **consequences** of each failure, rather than the failure itself. For any task to be worth doing, it must be able to deal successfully with the consequences of failure. In RCM II, the Failure Consequences are:

- **Hidden Failures:** Hidden failures are functional failures which will not be evident in normal circumstances, and usually concern protective devices which are not fail safe.
- **Safety or Environmental:** Failures that could hurt or kill someone, or lead to the breach of an environmental standard.
- **Operational:** Where the functional failure will have some adverse effect on operational capability.
- **Non Operational:** Where the only cost is the cost of repair.

## Pro-active Tasks and Default Actions

The sixth and seventh questions ask what can be done to predict or prevent failure, or if not, what can then be done. RCM II provides strict criteria for assessing if a task is "technically feasible" in addressing the failure mode. The pro-active and default tasks (in order of preference) are:

- **On Condition Tasks:** where items are checked (or inspected) and left in service if they are performing satisfactorily.
- **Scheduled Restoration and Discard Tasks:** where items are either overhauled or replaced at a specified frequency regardless of their condition.
- **Failure Finding Tasks:** where Hidden Functions are checked to determine if they are still working.
- **No Scheduled Maintenance:** where no action is taken to prevent failure.
- **Redesign:** where items or processes are redesigned.

The answers to the fifth, sixth and seventh questions along with the resulting proactive tasks or default actions are entered into the RCM II Decision Worksheet.

Only those tasks which are both technically feasible and worth doing are selected. This ensures that tasks that will have no or little effect in reducing failure rates or are of no benefit will be eliminated from scheduled maintenance routines.

## World Class Training in RCM II

Our world class suite of RCM II training programmes give delegates an unrivalled understanding of the fundamental logic and processes of RCM II and asset management principles.

Our training programmes include:

- *One Day Introduction to Physical Asset Management, for Senior Managers*
- *Three Day Introductory RCM II Programme, for review team members and others interested in learning more about RCM II.*
- *Ten Day RCM II Facilitator Programme, for review team facilitators.*
- *Two Day Condition Based Maintenance in the Context of RCM Programme, for facilitators and review team members.*

## Reliability-centred Maintenance:

*"a process used to determine the maintenance requirements of any physical asset in its operating context"*

The RCM process entails asking seven questions about the asset or system under review:

- *what are the functions and associated performance standards of the asset in its present operating context?*
- *in what ways can it fail to fulfil its functions?*
- *what causes each functional failure?*
- *what happens when each failure occurs?*
- *in what ways does each failure matter?*
- *what can be done to predict or prevent each failure?*
- *what should be done if a suitable proactive task cannot be found?*

RCM II is fully compliant with SAE standard JA-1011 "Evaluation Criteria for Reliability-centered Maintenance (RCM) Processes"

# Reliability-centred Maintenance II

**The Asset Partnership** is proud to be a member of the **ALADON** world wide network of licensees, the recognised leaders in Reliability-centred Maintenance training and application.

We offer advice and training in an integrated suite of practical solutions designed to minimise operational, safety and environmental risk, maximise profit, and minimise asset management and maintenance costs.

**The Asset Partnership** is the Australian agent for **sparesFinder.com**, the one stop service on the world wide web for locating engineering spare parts – in your organisation or someone else's.

Services offered by The Asset Partnership include:

- A comprehensive suite of world class Reliability-centred Maintenance II and advanced asset management training courses
- RCM Toolkit – the specialist RCM II software to facilitate rapid and accurate RCM II analysis
- Reliability Centred Spares (RCS) – software for determining optimum spares holdings
- Operational Reliability – the ability of an organisation to operate in a reliable, safe and consistent manner
- General asset management consulting, including strategy, culture, structures, systems and performance

For further information about us and our services, visit our web site at [www.assetpartnership.com](http://www.assetpartnership.com) and look for the links.

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# RCM

...the foundation of advanced asset management technologies, processes, systems...



...and responsible physical asset custodianship...

