

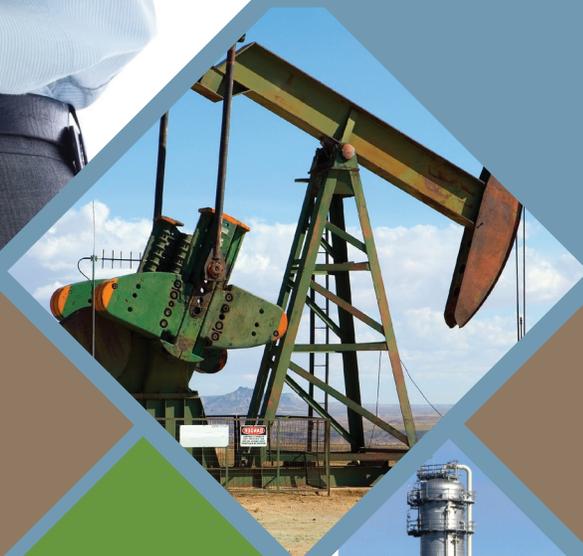
Aladon

The Risk & Reliability

GLOBAL NETWORK

RELIABILITY CENTERED MAINTENANCE (RCM2™ AND RCM3™)

WELL DEFINED PROCESS
COMPLIANT TO RCM
STANDARD



www.aladon.com

WHY CHOOSE ALADON FOR YOUR RCM PROGRAM?

- Aladon pioneered RCM for industrial application more than 30 years ago (RCM2™)
- Aladon applied RCM to every endeavor known to mankind and bring real life experience
- Aladon places risk and reliability mainstream with Physical Asset Management
- Aladon changes minds and hearts of people responsible for reliability
- Aladon trains more people in RCM than any other RCM provider
- Aladon innovates with latest integrated methodologies
- Do not rely on luck to avoid catastrophic events
- Aladon empowers operators and maintainers

BACKGROUND AND HISTORY OF ALADON'S RCM METHODOLOGY:

Since the research that was done by the Maintenance Steering Group (MSG) led by Stan Nowlan and Howard Heap in the airline industry in the 1960s and 1970s which led to the subsequent release of the report called Reliability-centered Maintenance (RCM) in 1978, Aladon under leadership of John Moubray pioneered the development and implementation of RCM for the industrial sector. Moubray developed and trademarked the rigorous and robust seven question process called RCM2™. The seven questions of the RCM2 process follows the logic of the methodology that originated from the work by Nowlan and Heap and Moubray preserved the intent of their thought process. However, the 1978 report also gave birth to many derivatives and streamlined versions of RCM of which very few were actually close to the original intent of Nowlan and Heap. In 1986 Moubray founded Aladon and created The Aladon Network comprised of certified professionals with industry experience called Aladon Practitioners. The Aladon Network applied RCM2 on more assets and in more industries than any other form of RCM. Aladon and The Aladon Network have trained delegates around the globe in RCM2 Introductory course and applied RCM2 for more than 30 years in almost all endeavors known to mankind.

Because of the confusion that surrounded multiple versions of RCM, industry felt the need for a standard. The SAE JA 1011 standard (released in 1999) describes the minimum criteria a process must possess to be called RCM. John Moubray's book called *Reliability Centered Maintenance (RCMII)* is a key reference in the standard.

Aladon continuously review new technologies and standards to ensure Aladon's RCM is current and in line with industry needs to continue safe and effective operations of their assets while ensuring regulatory compliance. The following paragraphs will describe the RCM2 process and the progression to RCM3™ (Aladon's Risk-based RCM), the need for the change and the benefits to our clients.



RCM2™:

Before we describe the RCM2 process, we need to define maintenance and RCM2.

The purpose of maintenance is:

To cause **any physical asset** to continue to do **whatever its users want it to do**.

RCM2 is:

The process used to determine what must be done to ensure that **any physical asset** continues to do **what its users want it to do in its present operating context**.

RCM2 does so by asking the following seven questions:

- What are its functions (what do its users want it to do)?
- In what ways can it fail (functional failures)?
- What causes it to fail (failure modes)?
- What happens when it fails (failure effects)?
- Does it matter if it fails (consequences of failure)?
- Can anything be done to predict or prevent the failure?
- What do we do if we cannot predict or prevent the failure?

RCM2 achieves this goal by focusing on the functional requirements (preserving the asset's functions - what the users want) while minimizing or eliminating the consequences of failures associated with these functions. RCM2 does this through applying these seven questions to every critical asset while using a robust decision logic to develop the most effective PM program. The outcome of the RCM2 process is a maintenance program that is both technically feasible and worth doing.

RCM2 will consider the following recommendations:

- Predictive maintenance
- Condition-based maintenance
- Preventive maintenance (scheduled overhaul / scheduled discard)
- Functional checks (Failure finding tasks)
- One-time changes (training, procedures, redesigns)
- No scheduled maintenance (run-to-failure)

The application of RCM2 leads to greater safety, environmental integrity, higher reliability and uptime, lower maintenance cost and higher motivation of workforce.



RCM3™:

Through more than 30 years of experience applying RCM2 and realizing the world of maintenance continues to change with new technologies, our methodology was advanced to a risk-based approach to mainstream and align risk and reliability strategies with organizational management strategies for physical assets. Our risk-based RCM (RCM3) is fully aligned with the newest technologies and underpins the international asset management standards (e.g. ISO 55000 and ISO 31000). RCM3 is fully compliant and exceeds the requirements of the SAE RCM standard.

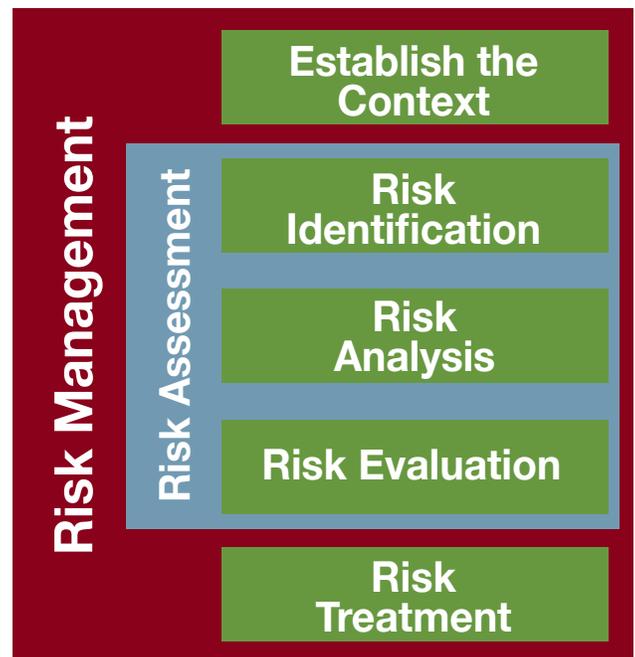
RCM3 is:

A process used to define the minimum required **safe amount of maintenance**, engineering and other risk management strategies **to ensure a tolerable level of safety, environmental integrity and cost effective operational capability** as specified in the organization's asset management standard.

On the surface, the two processes look very similar, but RCM3 is a drastic improvement over the RCM process as defined in the SAE standard. Our risk-based RCM process allows organizations not only to identify operator and maintenance risks (physical and economical), but also to quantify these risks. Once the risks have been identified, the people closest to the assets are in a position to identify the best risk management strategies that would reduce or eliminate these risks to within tolerable levels. This includes **operator driven reliability programs** as well as **organizational or corporate responsibilities**.

RCM3 achieves these objectives through the following nine steps:

- What are the operating conditions (operating context)?
- What are its functions (what do its users want it to do)?
- In what ways can it fail (failed states)?
- What causes it to fail (failure cause and mechanism)?
- What happens when it fails (failure effects)?
- Does it matter if it fails (consequences of failure)?
- What are the physical and economic business risks (risks quantified)?
- Can anything be done to manage the risks proactively?
- What do we do if we cannot manage the risks proactively?



The advantage of our approach is:

- More decisions are made at lowest level bringing about real change through empowerment
- Risk-based approach allows for faster decision making and rapid implementation, saving time
- No longer the need for up front criticality assessment, integrated approach within RCM process, saving time and resources
- Improved risk management decisions especially for managing safety systems and protective devices



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