



The Age of the RCM Analyst From Isolated Specialist to Integrated Knowledge Manager

Adapted from the book -The Maintenance Scorecard

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He developed the RCM Analyst method in response to the increasing challenges to implementing RCM during the late 20th century and early 21st century and currently works with selected clients throughout the world. He has worked through the majority of capital-intensive industries and over twenty countries in the areas of asset management, reliability and RCM.

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Implementing RCM

When the RCM standard was published in 1999ⁱ it laid to rest many of the more contentious issues regarding what RCM is and what it isn't. Finally there is a standard that companies can use to determine which process could legitimately call itself RCM, and therefore were more likely to represent the original intentions and focus contained within the RCM methodology. This was a crucial step in the evolution of the RCM method particularly as setting minimum criteria eliminates methods that are either counter-productive, with respect to the original RCM report, or even dangerous.

Recent studies, throughout the globe, have shown this to be a key issue for companies in their selection of RCM consultancy firms and this trend appears set to continue into the future.ⁱⁱ However, not all questions have been answered by the standard. One issue that is often debated is how to implement the process into modern asset management organizations.

Implied within original report was the need to use analysis teams, a cross section of operations staff, maintenance staff and engineering staff all who had a stake in the reliability of the assets under review. This model for implementation quickly became the standard implementation tool and, after popularization at the beginning of the 1990's, is still widely applied today.

Successful analysis teams require a leader or facilitator, a trained group of participants and the time that is required to complete the analysis. There are a number of variations on this theme throughout the world, each with their own particular characteristics.

The team approach is, generally, a good method of completing analyses, embedding paradigm shifts in asset management and ensuring that a wide group of people are exposed to the principles and practices contained within the RCM method.

However, it has left the method open to its strongest criticism throughout the years, that it is resource heavy and time consuming. This has prevented many organizations from fully implementing RCM, or at times from even beginning with an RCM implementation. In some instances companies have abandoned their RCM efforts for this very reason, even though they remained convinced of the benefits and need to implement this fundamental aspect of any maintenance regime or program. This has particularly been the case in installations where the number of assets is in the millions and the value of the asset base is often measured in billions.

One of the most disturbing consequences of this issue has been the growth in popularity of non-compliant forms of RCM in order to overcome this issue. The case against streamlined forms of RCM has been made in the past and was one of the key reasons behind the original drafting of the RCM standard.

Another response to the perceived resource heavy nature of implementing reliability-centred maintenance has been the increased use of sole analysts to conduct the analysis work. Sole analysts are generally people with a high level of technical expertise coupled with a high degree of knowledge regarding the RCM process and its application. At times sole analysts are employees of the company trying to implement RCM, in the majority of cases however, they are external consultants who are contracted to perform specific analyses.

While the use of sole analysts in the RCM does allow for easier and more rapid implementation, it also has inherent problems. Of particular note is the lack of ability of one person to have all of the information that is required to perform analyses to an adequate level. However other issues involve the lack of auditing processes and abilities, the lack of knowledge transfer to the organization as a whole, and the vulnerability of the organization if this one person should decide to leave.

The belief that one person has the information required to do an entire RCM analysis alone is a dangerous one and is a concept that can easily lead to a misapplication of the concepts of RCM, or skewed results. This is particularly true in when analysts are recently trained. However, even without taking this issue into account, the most frequent outcome of using sole analysts for RCM implementation is a lack of company-wide understanding, and buy-in



to the process. This often leads to frustration and can even lead to the abandonment of the initiative.

The Changing Nature of the Maintenance Workforce

If reliability centred maintenance is to continue as a central plank of asset management policy and strategic planning, then it needs to adapt to the realities of the modern workforce. These realities cover three wide-ranging areas and are part of the reason why the team-based approach is becoming increasingly difficult to carry through to a successful completion. These are:

- Increases in the levels of efficiency of the maintenance workforce
- The impact on asset management of the information evolution
- The increased sophistication of workers

Increases in efficiency

When the original report was written, and then later when RCM was popularized, the make-up of the maintenance workforce was very different to what it is today. During the late 1980's, and throughout in the 1990's, this changed dramatically in response to increased competition levels, industry privatization and de-regulation as well as the increasing costs of asset acquisition and maintenance.

During this period many capital intensive and manufacturing corporations began to see ballooning costs for asset management and began to realise that there were significant gains to be made through focussing on costs within this area. The result was that the easy savings out of companies in terms of efficiency improvement.

This often meant sweeping reductions in the numbers of maintenance and engineering personnel. This was facilitated through a large number of initiatives that have assisted this trend including, cross skilled workforces, automating duties and responsibilities through the application of technological solutions, out-sourcing of roles and responsibilities, inventory optimization and other rationalization methods, and at times merely forcing a reduction of numbers with little or no engineering logic.

As a result the maintenance workforce of the early 21st century is very lean, agile and flexible compared to what it was when RCM began its journey into wider industry. Regardless of the productivity gains that are promised within an RCM implementation it is often a physical impossibility for companies to spare the resources required to complete the analytical part of the work under the standard team based facilitation methods.

In cases such as these, no amount of good will on behalf of interested companies can change this constraint. This has placed team-based implementation methods of RCM out of the reach of many capital-intensive organizations. This problem is compounded when the required experts are not in the same location, or the same company or when input from suppliers is required. Getting people such as these into one location for an extended period, in order to ensure accurate analyses, turns a routine analytical review into a complex and expensive task.

However, these same organizations are finding significant limitations on their ability to reduce costs through "traditional" methods of rationalization and removal of redundancy. For them it is more important than ever to look at more sophisticated means of improving the cost effectiveness of the business as a whole, particularly if they are to maintain some of the cost savings that were achieved under rationalization initiatives.

This has had another effect on the workforce as a whole, that of increased mobility. Today's worker is more likely to change jobs regularly than during the recent past. This exposes corporations to the potential danger of losing highly trained sole analysts and, therefore, risking the success of the RCM initiative as part of the living maintenance program.

The Impact of Technology

Another fundamental change in the way that we work today is the ready availability of information. Asset management has benefited greatly from the advent of the information



age, today there is a lot of reliability information being captured in corporate enterprise asset management systems, regularly published on the Internet as well as a greater level of cooperation available from manufacturers under pressure to maintain market share.

As a result of this change, much of the information that is required to perform an RCM analysis is rarely more than a conference call, an email or an Internet search away. Previously the information required doing an RCM analysis needed to be coached from a group of experienced professionals. Today it can be extracted via any number of targeted mediums of communication, including short duration meetings as time permits.

In 1978, when the report was first written, and then later in 1991, when RCM began to become more widely applied, information and communication technology was in its infancy. Today there are ranges of factors that differentiate the modern asset management environment from this earlier time:

- ❑ Organizations have failure and other equipment data and although the integrity and quality of this data is still not fantastic, it is improving and will continue to do so. This is beginning to enable some areas of probabilistic analysis, which has previously not been possible due to a range of reasons.
- ❑ Ease of communication has become the norm. Mobile telephones, pagers, internet messaging services, internet conferencing, video conferencing, chat rooms, forums, bulletin boards and a host of other technologies have made talking to anyone on the planet far easier than it has ever been. This greatly improves the ability of lead analysts to collect the required information regarding any reliability aspect of equipment.
- ❑ The Internet has made it easier to find information regarding almost any theme possible. Particularly through approved content sites where information is vetted and checked for accuracy. Many product providers and manufacturers now publish far more information than previously, as well as a range of consultancies who have attempted, with varying levels of success, to produce wide ranging analytical templates.

These aspects of technology have made information far more accessible to all members of the engineering community, and allow for a different focus to be taken when looking at collecting the information required for performing an RCM analysis.

Sophistication of the workforce

A final change to the workforce is the increasing levels of sophistication. In the past, converting analyses into day-to-day routines required no more than a job-card process, possibly a simple scheduling tool and the will to get the job done.

Today the majority of organizations use large-scale CMMS or EAM style systems, mobile working systems and a range of other technological tools. Implementing RCM analyses can be a complex undertaking, particularly if the resulting data needs to be of a high enough quality to be used within an RCM Scorecardⁱⁱⁱ or other advanced business intelligence application.

RCM implementations in the early 21st century have become sources of incredible benefit through combining these outputs with the possibilities of modern technology. The potential for increased fault code validity and quality, the potential for increased quality of the asset information portfolio, as well as the growing ability to integrate technologies such as telemetry, SCADA, mobile working, knowledge engineering and a range of others.

This highlights one of the growing issues regarding asset management and the implementation of RCM analyses. In recent studies over 40% of respondents stated that the principal problem that companies have when implementing RCM is in converting them from analyses into operational realities.

This is further exacerbated by the complexities involved in modern technological tools for asset management. Analysts of the future will need to have a greater degree of understanding of the issues surrounding implementation, particularly concerning the management of data, short term planning and scheduling and an array of other issues in this area.



Maintenance technicians are also operating in a more sophisticated manner than at the time when RCM began to be popularized. Today many workers and multi-skilled, allowing for easier access to information, they are also likely to have participated in a stalled or failed attempt to implement RCM either at their current place of work or at some time in the past. In some organizations operations personnel are trained in light maintenance duties or are integrated roles where they are expected to do both the operations as well as the maintenance tasks on the machinery.

This change in the complexity of the asset management environment has both positive and negative consequences for the implementation of RCM. On the positive side many maintenance technicians have a wider knowledge base than previously and are able to contribute more to the analysis than if they were single discipline only. However this broad skill base also underscores their importance to their place of work and reduces the time that they are able to be away from the day-to-day operations.

Adapting to the Future

In order for RCM to survive as managerial discipline and continue to contribute to the growth of asset management, then it will need to adapt to modern realities. In particular to the practicalities surrounding the implementation aspects of RCM, reducing the risk of impact on the organization, enabling the implementation of analyses into part of the day-to-day operations and making full use of the available technology to increase the speed, quality and permanence of the reliability initiative.

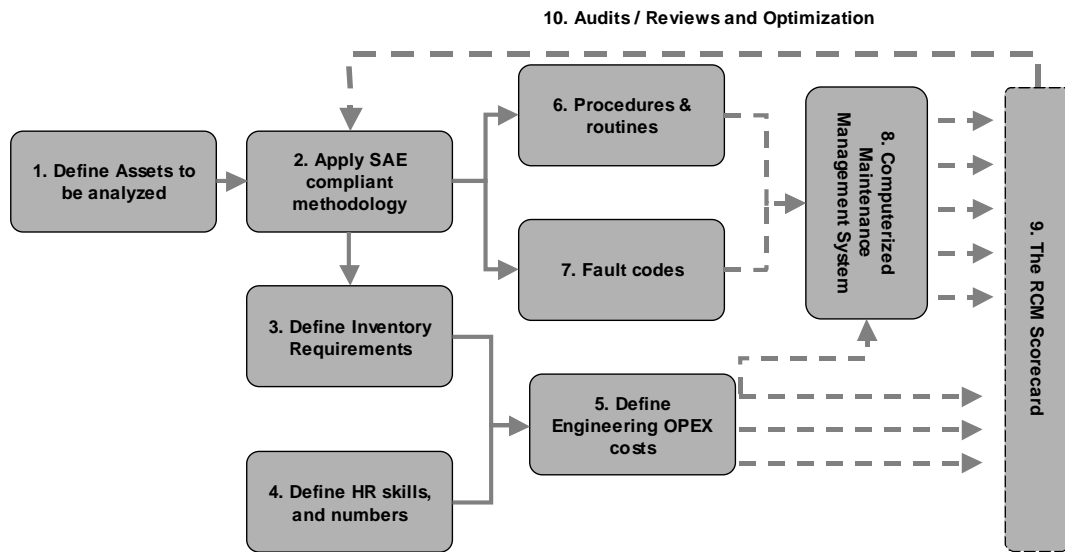
This requires a dramatic change from today's approach to performing RCM analyses, an approach that allows it to be as flexible and responsive as the organizations that it is being implemented into, as well as an approach that takes in all the aspects of the modern maintenance environment. Today, an implementation of RCM is directed primarily at performing SAE compliant analyses. However, if we are to overcome many of the common errors that have surfaced in RCM implementations over the past 15 years, and increase the success rate, then this focus will need to change significantly.

A focus on merely the analyses will need to be replaced with a focus on the end-to-end processes and business changes that are required to make RCM a successful part of the day-to-day activities of an organization. An end-to-end process involves starting from the equipment selection, applying the analyses and then converting these analyses into useful information for generating maintenance routines, generating modification requests, integration with risk based budgeting and forecasting activities, and then monitoring and improving the analyses through a regimented and thorough review and audit process.

The lack of these elements is one of the driving reasons that RCM often ends up being merely nice analyses gathering dust on a shelf somewhere. It is also one of the driving reasons behind the lack of ability of many corporations to successfully gain all of the benefits that their previous investments in information technology offer them.



Figure 1. Overview of the RCM Analyst Method



This process is a world away from where RCM implementations are today, and has created the need for a new category of RCM experts who are able to work across all areas of an RCM implementation to ensure its short-term success as well as its long-term viability. Within this document this person is referred to as the RCM Analyst.

The Role of the RCM Analyst

The role of RCM analyst is nearly as old as the methodology itself, however this role too has had to change with the march of time. Previous incarnations of the RCM analyst involved a highly technically capable person, working within the confines of a software program, and venturing out to interview members of the workforce from time to time when part of an analysis needed attention. Other incarnations of the RCM analyst included skilled facilitators who would coach information from a team of knowledgeable people regarding the asset under scrutiny.

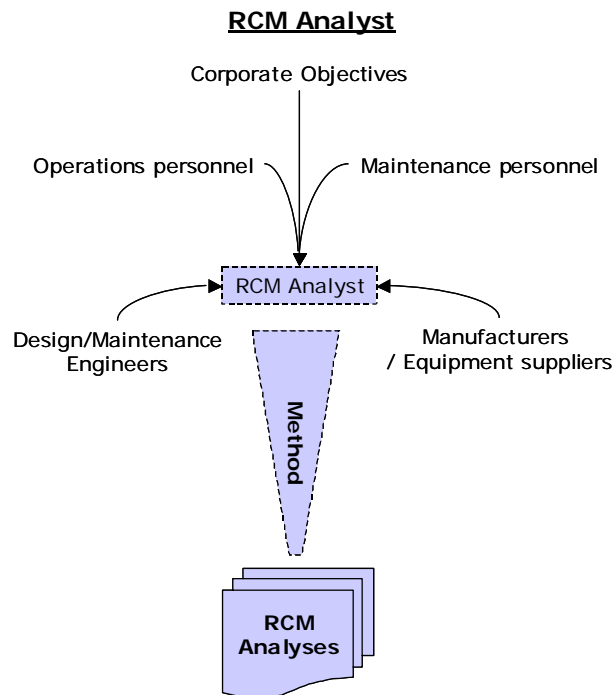
However, as can be seen by the information presented thus far, here is a growing need to find a balance between the two ways of implementing RCM, the balance between the facilitated team and the one-person analysis project.

Tomorrow's RCM Analyst will need to have a wide range of skills. These will include skills of facilitation, skills of interviewing and distilling large volumes of information as well as a deep knowledge of the skills required to implement RCM successfully. The role of the RCM Analyst in industry has moved from that of isolated specialist to that of integrated knowledge manager. They are the leaders, facilitators, audit leaders, advisors and the overall owners of the RCM process, and they are instrumental in its successful application.

An interesting tie-in between the RCM Analyst and the Maintenance Scorecard (MSC) methodology is the need for analysts to be able to have access to, translate and interpret the corporate objectives of their organizations. The danger of team-facilitated analyses in isolation is that often these can be done without the input of corporate level goals such as efficiency or productivity requirements. Within financially regulated industries this can become even more acute as benefits from asset management are skewed at times by regulatory limitations.



Figure 2. RCM Analyst method in action



This is a role that requires specialist training and guidance in order to ensure that RCM continues to achieve the goals and objectives set out in the original report, that of the most cost effective, safe levels of maintenance. RCM remains a vital part of any company's asset management regime and with each year the application of the original concepts are applied to wider and wider fields of endeavour, a trained RCM Analyst will need to not only be aware of the current areas where RCM, and RCM style thinking, can yield results, but also be able to highlight other areas where the method may be able to assist in achieving corporate goals.

The RCM analyst role is principally one of facilitating analysis teams, conducting interviews, collecting and organizing information, applying these to the structured approach contained within the SAE compliant RCM methodology and taking the analyses through to successful implementation. This includes pre-analysis selection of assets and post-analysis application of metrics and monitoring processes.

The analyst approach is based around making the best use of technology through conference calls, Internet communications and holding targeted meetings rather than committing valuable resources to long periods of analysis time. This requires the analyst to undertake much of the information finding, analytical research and performing the analyses with minimal input and to strike the balance between facilitated sessions and individual work.

The analyst is also the driving force behind the auditing and approval, implementation and future review as a part of the organizations continuous improvement initiatives. In other words there are a range of championing functions that the analyst will need to fill, however, this cannot be done without a deep understanding of the issues involved and of how to best navigate these.

This requires an Analyst to be trained in a range of skills including:

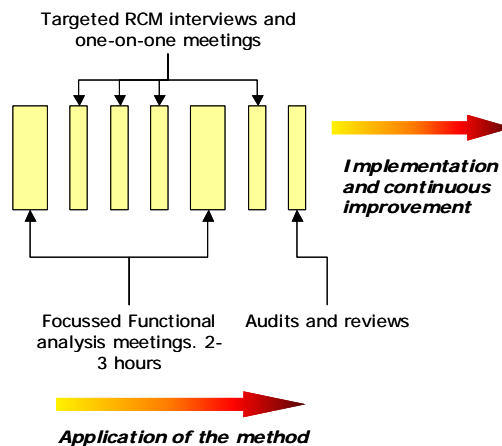
- ❑ Identifying areas where RCM can deliver the most benefits to their organization
- ❑ How to apply the SAE compliant RCM Analyst methodologies.
- ❑ Use of quantitative methods to take advantage of the increasing level of data that is available for reliability initiatives.



- ❑ Facilitation, interviewing and communications skills design to minimise the time required from additional resources, while maximising the time that they are used for.
- ❑ Implementation skills with regard to data management, planning and scheduling and data capture. This includes a deep understanding of how to best utilise CMMS applications in the implementation of RCM.
- ❑ The auditing process, the review processes and the optimization process using the RCM scorecard
- ❑ Recognizing where RCM thinking can be applied and not restricting this to the creation of maintenance regimes for traditional reasons only. This often takes trained analysts outside of the box of maintenance and further into the realm of asset management.

There are a multitude of skills in each one of these areas. These have been gleaned from application of RCM into a range of different industry types in different countries and with a range of different workforce issues.

Figure 3. Applying the RCM Analyst method



The RCM analyst is a highly trained and skilled professional and is part of the leading edge of asset management. This role is imperative to the ongoing success and growth of RCM as a central plank of modern asset management. As the discipline continues to evolve and to become more sophisticated, the abilities that are required to meet modern objectives also need to become more sophisticated.

Without taking this step toward the future, both consulting organizations as well as capital-intensive companies will be depriving themselves of the potential advantages that come from implementing advanced reliability concepts such as this and will remain in the industrial age thinking prevalent prior to the information revolution. At best organizations find themselves staffed with competent and focussed professionals, at worst they gain the services of a modern age knowledge manager.

ⁱ SAE JA1011 - published by SAE www.sae.org

ⁱⁱ The new perspectives benchmarking survey that was published by www.strategic-advantages.com

ⁱⁱⁱ The RCM Scorecard was first published in the book The Maintenance Scorecard: Creating Strategic Advantage, by Daryl Mather published by Industrial press and available through Amazon.