Machinery & Equipment MRO

Myths About RCM

You know that reliability centered maintenance can lead to effective asset management, but you're not sure where to begin. Start by unravelling RCM facts from the myths, misconceptions and half-truths.

BY JAMES REYES-PICKNELL

espite its well-documented successes, reliability centered maintenance (RCM) has always drawn a lot of discussion and controversy. Much of it is because of a lack of understanding and "myths" generated to discredit RCM as a viable business solution. Here we attempt to fill in some of those gaps in understanding and debunk some of the myths.

RCM is a type of maintenance (wrong)

Wrong. Maintenance is an activity performed to sustain the capability and functioning of any physical asset. It can include both proactive and reactive activities. Those intended to avoid failures and their consequences are proactive. Repairs are usually reactive – taking place after something has broken down. Those activities combined are a maintenance program. RCM is none of that.

RCM is a method for determining the best activities to manage failure consequences. It uses an analysis process defined by a standard, SAE JA-1011. It produces decisions about maintenance as well as operator performed tasks, procedural changes, training upgrades, and even when it is best to allow an asset to run to failure. It produces a superior maintenance program and it can be part of your ongoing continual improvement program efforts, but it is not "maintenance."

RCM is a lot of work (myth)

The best RCM analyses are carried out by teams of people who know the assets best – usually operators, maintainers, planners and engineers. Occasionally it involves manufacturers and other specialists. Well-selected analysis teams comprise three or four persons, plus a facilitator. All need training – about two days is enough for most first-time participants. Any new method will require training and some programs require considerably more than two days. A typical analysis project will take a week to perform. The cost of that typical analysis is five person weeks of time – about 175 working hours.



Most analyses produce anywhere from 13 to 32 per cent reduction in maintenance costs – some much more. Savings accrue from reductions in repair work (typically three times the cost of proactive work) and from elimination of unnecessary PM work. It is common to find that existing PM programs are actually inducing failures in some assets. If you have a maintenance department with only 10 personnel (a small operation), you are expending roughly 18,760 hours of labour per year. Savings of 2,439 to 6,000 hours are possible per year. That's enough to pay for the first year RCM effort on 14 to 34 assets/ systems, and that is enough for most operations to cover all their important assets.

Given the numbers, RCM saves a lot of work! And we haven't even talked about the additional production capacity and revenue generation, which often far outweighs the maintenance savings.

RCM must be done on all your assets (wrong)

When RCM was relatively new, the leading proponents argued that RCM was needed on all assets because you just don't know which equipment contains the failure modes that could have serious safety or environmental consequences. From a theoretical perspective that is accurate, but more practically, we know which of our assets carry the greatest risks. If we didn't know that, then we couldn't do any form of Asset Criticality Analysis. The potential for safety and environmental impacts is usually known for all of our assets. Since we know that, we can weed out the non-critical assets – those with no anticipated safety and environmental impacts, and those with only minor operational / production impacts.

RCM training is excessive (myth)

If you want different results you need to change what you are doing. To do that, you will need to change your thinking. In many cases, that means you will need some sort of education or training, or you won't get different results. The amount of



training investment depends on the particular brand of RCM that you choose.

The newest brand is RCM-R, by Conscious Reliability. RCM analyst training is only 2.5 days (and includes an exam). To learn how to do the reliability analysis there is an optional advanced course (3.5 days including an exam) that mathematically savvy analysts can take.

Their facilitators require more. They need that advanced math class plus another skills class (2.5 days including an exam). In total, they will receive about 8.5 days of classroom instruction (includes the basic and advanced classes) plus coaching from an experienced facilitator (five to 10 days). Along the way they should have performed at least five full analyses, each of which produces usable results on their plant assets.

Most organizations have only two or three facilitators (one is usually not enough). If you train one full basic class (20 people) and two facilitators from that group, you will have invested a total of 62 training days, plus another 110 person days of analysis time (for seven analyses). You will have produced seven usable RCM analysis results – half of your first year effort in a smaller organization considering the numbers in myth 2.

Yes, it requires training, pilot project facilitation and coaching support, but the training component is roughly a third of the first year's potential effort in a smaller organization. The average amount of training for those two persons is just over three days – probably less than 1.5 per cent of their working year. If you believe that is excessive, then you really can't expect to see a lot of improvement from today's performance using any method!

Shortcut RCM methods and PM Optimization are faster and cheaper (wrong)

I've never been a fan of shortcut methods. There are a number that are just plain dangerous. John Moubray, one of the architects of RCM, wrote an excellent paper on that back in 2000. However, there are some streamlined methods that are better than others. Nevertheless, they require that those using them undergo RCM training in order to understand the concepts they are shortcutting. Consequently, the training for those is actually longer than it is for RCM.

During the analyses they do, they are usually skipping steps that are a part of a proper RCM analysis. They are omitting information in the process. That missing information makes decision making more challenging. That can result in questionable decisions and it often takes longer overall because of discussions in the team that is lacking information.

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In the end, those so-called streamlined or shortcut methods can actually take longer to complete and their decisions are always somewhat questionable.

PM optimization can be an exception. If used as an initial analysis method, it will very likely miss failure modes that RCM catches. It is inherently less thorough. However, if it is used to optimize a program developed using RCM, it can be beneficial as well as quicker than a complete RCM review.

RCFA is just as good as RCM (myth)

Root Cause Failure Analysis (RCFA or RCA) is inherently reactive to failures that have already occurred. It is used where failures have resulted in some unacceptable/unwanted consequence. You've suffered a major loss of production or customer service, a quality, safety or environmental incident. RCFA is quite precise – it targets a specific event. Because it is usually successful in eliminating future occurrences of that same incident it almost always has a high apparent return on investment. It's only too bad that you had to rely on the incident occurring before you apply the method.

If you think that is fine, then the next time you get on an airplane to go somewhere, just ask yourself if you would be happy if they developed its maintenance program with RCFA.

I can do RCM on my own (wrong)

We engineers are really smart and we know it. However, sometimes we are too smart for our own good and for the good of our employers. We need to set our egos aside and accept that teamwork produces better results than we can do on our own.



RCM requires inputs from operations, maintenance, experienced personnel and technicians, as well as engineering. RCM isn't really expensive when you consider its benefits – it generates a lot of value. However, organizations who pay too much attention to their accountants, are often looking to keep costs down without considering the value they may be missing.

Because RCM is an analysis process that is quite technically involved, it is sometimes delegated to more junior engineers to perform. They usually lack sufficient field experience and that practical perspective that technicians always have. Most of our corporate maintenance management systems have relatively poor reliability data. Younger engineers tend to rely on those systems, often not realizing just how weak the data really is. That data is usually not much use in RCM analysis work. Doing RCM on your own will inherently leave out valuable insights that can only come from those field technicians and make up for that bad data in corporate systems.

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Yes, you can produce an RCM analysis on your own, but it will be lacking in practical insights to the decisions made. RCM is an optimization tool – don't cheap out and sub-optimize it.

Anyone can facilitate an RCM analysis (myth)

There are many good facilitators for business throughout the world. There are societies for facilitators and extensive program and certifications for them. They are truly good at general facilitation. Some specialize in specific methodologies and types of facilitation work. RCM is one such field where specialization is needed.

When facilitating general business meetings it is not necessary to have a deep understanding of the subject matter – you only need to be good at facilitation and let the team do the brain work. RCM is not like that though. It is quite technical and technical people in the team can easily get into too much detail and get sidetracked onto related (but irrelevant) topics.

An RCM facilitator must be a technical person who can understand what is going on. He or she must also understand the RCM process well, the math that is required and how to apply it and know enough about maintenance technologies to make up for any gaps the team being analyzed may lack. Without those, the analysis can go dramatically off track, produce erroneous results and take much longer to produce than it should.

A lot of RCM projects fail (some truth to this one)

By now you can see that RCM does require some dedicated effort and a great deal of care. When organizations decide to do RCM, most of them do choose to do it "right." If they have cut corners, they usually realize at some point that they need to do a better job and they correct themselves. However, more importantly than good RCM execution, success requires comprehensive follow-up after the analysis effort is completed.

I've been in a number of organizations that have done RCM "years ago" and they claim that it either had no impact or its initially positive impact disappeared over time.

Where it had no impact, a bit of digging revealed that they didn't implement the results of the analysis into their day-today programs. Maintenance and operational tasks were never embedded into their PM programs and operating procedures. Training and procedural changes were never implemented. Design change recommendations were never acted upon. Those organizations treated RCM as an analytical exercise only and failed to grasp that it is far more than that.

Where results were initially positive and diminished, the organizations did not keep the RCM effort going. Beyond the

initial analysis and implementation there is much to do to ensure the results are valid. Operational circumstances change, asset performance expectations change, personnel change, maintenance execution discipline can fluctuate, etc. All of those can impact on the decisions made and later tasks, task frequencies, even failure modes. Those organizations have failed to take full ownership of the RCM program as an ongoing continual improvement tool.

To avoid this failure the organization must treat RCM as an ongoing program. How they do that will vary by organization and industry, but it must be done or the effort will ultimately produce less than the desired outcomes.

RCM is a maintenance project (wrong)

RCM originated in the aircraft industry where a great deal of energy was put into making sure designs were reliable and maintainable. Operators (pilots) don't do maintenance beyond performance of their pre-flight checks (which are actually a combination of condition monitoring and failure finding tests). Sustaining reliability was predominantly a maintenance activity and hence the use of the word "maintenance" in the name of RCM. Application of RCM in most other industries however, requires the inputs and participation of people from other departments – primarily operations, planning and engineering.

Implementing the outcomes of your RCM analysis will touch on several other parts of your organization – procedures, processes, training / HR, operations, engineering and of course your PM program. If maintenance is the sole party to the analysis, those groups will be less likely to assist in implementing the decisions and you will end up with a failed program.

Keeping the RCM effort going as a continual improvement program will also require more than just maintenance input and support. Without top-level managerial support, in environments of continual cost reduction pressures and production output pressures, the improvement program can easily become neglected.

RCM requires broad-based participation and support across multiple departments and strong managerial support to get maximum benefit. **MRO**

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