



## WHAT DO YOU DO WITH YOUR 'NECESSARY EVILS' IN THE CURRENT OIL MARKET? LOOKING AT THE RELIABILITY, AVAILABILITY AND MAINTENANCE FUNCTIONS OF YOUR BUSINESS IN UNCERTAIN TIMES

PRESENTED BY:  
STEPHEN O'BRIEN AND JIM WATT  
RAM CONSULTANTS

The biggest 'necessary evil' of any manufacturing entity is maintenance. Whether it constitutes routine maintenance, breakdown maintenance or turnaround maintenance it is the 'necessary evil' that no one wants.

It consists of a budget which is often formed from historical misfortune with resources to match. The links between what maintenance we do, why we do it, and how we put a value on it are often disconnected, the rationale having been lost in the sands of time.

It is unwanted by operations because they either do not want to give over the equipment for maintenance, or they do not want to give up their time to prepare and isolate the equipment and then have those 'maintenance types' running around on their plant making a mess.

So as budgets are squeezed and plants still need to be maintained - to satisfy a plethora of reasons such as safety, legal requirements, efficiency and technical developments - what is the way forward?

Welcome to the Risk Matrix.

### Why and When Do We Maintain?

This is the \$64,000 question.

I would hazard a guess that many clients do not really know the basis of their maintenance. It will be a combination of requirements, including those of the legal entities which govern the operation of the facility, which in most cases will be accepted verbatim with no challenge. It will be because inspection tells us we need to do it; it will be because we've always done it.

The fact is, if you can't measure you cannot improve.

In addition to this there will be the operations paranoia caused by the perceived unreliability of the pet pumps which mean that any minor problems have to be dealt with immediately, at any cost, irrespective of how poor the repair may be under the circumstances.

There will also be an aspect of 'the OEM manual says...' and, 'the warranty will be invalidated unless...', even though the equipment is 20 years old.

As for 'when', this could vary from, 'when it's broken', through 'when it's not performing' to 'when operations will allow us to have it'!

After all, maintenance never (or at least seldom) break anything, so if operations never ran any of the equipment it would never need maintenance and reliability would be 100%, unfortunately availability would be 0%!

### How Do We Compare to Others?

Within our industry, there are myriad benchmarks available, often pointing out that "our performance is lagging", whether this is in terms of maintenance costs, or resulting reliability and availability.





Whilst benchmarks can be useful in identifying gaps, they do not reveal the steps necessary in order to realise opportunities for improvement. This takes careful consideration of work practices, processes, organisational and technical issues and then the development of improvement initiatives aimed at driving up performance.

Application of risk management principles, specifically applied to maintenance and reliability, offers a powerful methodology to help close the gaps versus competition, and if we are fortunate enough to already be in a competitive position, then to maintain our competitive edge.

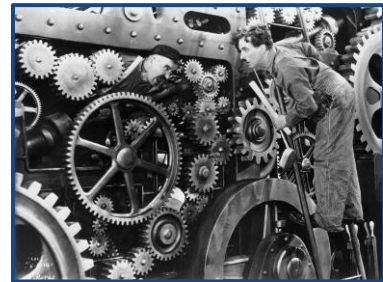
You may be reading this thinking, “we already apply risk management to our maintenance and reliability programmes”, but are you getting the full benefit?

Unfortunately experience suggests that risk management is often applied inconsistently and as a result does not deliver as intended. The good news is that this particular problem doesn't have to be difficult to resolve, and has the potential to yield huge benefits.

## But What Are the Real Drivers?

However we look at the indices, the one thing we want from any maintenance strategy is:

1. Do not hurt anybody
2. Spend the minimum amount of money possible
3. Ensure that the plant is available to perform at its given capacity for a given window of time
4. If we have to shut down the plant, ensure that we minimise the period



## How Can We Achieve This Effectively?

Risk Based Maintenance is a philosophy which determines that we:

- Do the right work and do the work the right way,
- Cut out the imaginary (risk averse) emergency work
- Implement proactive and reactive reliability systems to reduce the real emergency work
- Improve Reliability and decrease costs in any market conditions

## Risk Based Maintenance and Reliability

So how should we maintain our assets and maintain/ improve the reliability of the facility?

We should break each asset down to its component parts, decide what is the best maintenance for each of the components and then carry that out. So what would you see as the problems with this? Some of the issues may be:

- The analysis may take longer than the facility will run for
- The resource requirement will be more expensive than the profit of the facility
- The analysis team will never be able to dedicate enough time to get to the end of the exercise
- The resulting maintenance recommendations will:
  - Never have sufficient resource to execute and will therefore never be completed
  - Cost even more than the analysis
  - Have no buy in from anyone involved
  - Require more downtime than the facility can allow, killing availability



- Clog the maintenance management system to a point of collapse
- Require an army of planners and schedulers
- Result in an ever increasing backlog of work which will soon become unmanageable

This may seem negative but there are, of course, some positives:

- The facility will be immaculately maintained
- Reliability will be high because there will never be any breakdowns (maybe), this may be because there will never be any production, so availability will be low

So what's important? Maintenance should:

- Enable the assets to perform as required by the facility
- Prevent failures which effect production (complete or partial loss of function)
- Spend their money wisely, so contributing to the achievement of the company's profit objectives

What should a reliability and maintenance methodology do? It should:

- Reduce equipment downtime and increase availability using a combination of predictive and preventive maintenance programmes
- Ensure that work is performed efficiently through good planning, material support and coordinated work execution
- Control its own workload (backlog management, adherence to daily schedules)
- Establish processes, procedures and best practices to achieve optimal response to emergent work
- Create and maintain measurements of maintenance performance
- Provide meaningful management reports to enhance control of maintenance operations

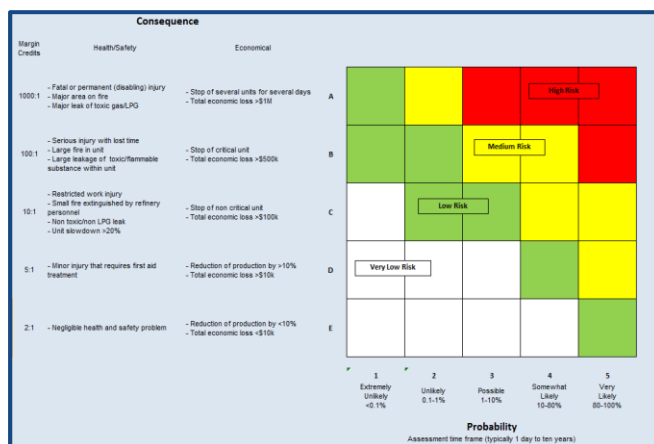
All good stuff, if you get it right then it sounds easy, but what are we doing all this work on, surely not all of the assets? If we do, we're back to square one!

The key is prioritisation, we cannot do all of the above on all of the assets all of the time, so we have to decide the basis of our methodology.

The key is prioritisation. We cannot do all of the above on all of the assets all of the time, so we need to decide the basis of our methodology – ensure that we do the most important work and reduce the unimportant. In order to do this, we need to determine what the most important work is.

We can do this in seven simple steps:

1. Create a risk matrix
2. Calibrate the risk matrix to our own needs
3. Use the risk matrix to determine the criticality of all of our assets
4. Decide if the risk of failure of those assets is acceptable within a given time window
5. If it isn't decide what maintenance will restore our confidence
6. Make sure that the work is cost effective and actually reduces the risks
7. Carry out the maintenance





With a few modifications we can also use our calibrated matrix to determine what work we can exclude from our shutdown schedules and prioritise our emergent work.

So what are the advantages of a risk based approach?

- All maintenance work is either:
  - Part of the strategy developed from assessing the risk of failure of the asset
  - Risk assessed and prioritised when it is a result of emergent work
  - Determined to be necessary, in the case of turnaround work
- Because the risk is assessed by a multi-disciplined team, all participants understand and agree:
  - The importance of the maintenance
  - The reason for the expenditure
  - The effect on reliability and availability
- Maintenance becomes part of the operating strategy
- It becomes easier to:
  - Continuously improve your reliability and maintainability
  - Manage life-cycle cost and obsolescence
  - Minimise uncertainty and eliminate root-cause failures
  - Maximise use of your Computerised Maintenance Management System (CMMS)
  - Use maintenance and reliability information to manage the business of maintenance
  - Control your spare parts inventory
  - Evaluate, measure and improve maintenance performance and service
  - Recognise the importance of the maintenance and reliability teams
  - Increase core competencies of maintenance personnel (training, coaching and development);
  - Develop adaptability and versatility (flexibility, multi-skilled, capability)
  - Establish effective maintenance planning, estimating and scheduling
  - Develop pride in ownership (operator-based maintenance)
  - Establish and control your budgets
- And maybe most importantly of all - stop wasting money on unnecessary maintenance!

## Conclusions

We cannot avoid maintenance. We do, however, need to carry out maintenance correctly, cost-effectively and risk based.

We also need to carry out maintenance which improves our reliability and availability.

To do this we need to innovate, educate and coach our maintenance and operations personnel, to think about what maintenance we are doing and how we can do it better.

The responsibility for improvements, and indeed optimisation, of maintenance and reliability cannot be given to the Maintenance/Reliability Department alone.



# WHITE PAPER

A Yokogawa Company

July 2016

Operations has a huge part to play and must take an active role in managing both maintenance and reliability. Through the application of risk management, this can be achieved in a positive and effective manner.

One final note, if you have read this paper and think that it is all old news to you and that you already do all of the above, coming soon is the next KBC White Paper in the series, which will discuss 'how effective is your maintenance optimisation'.

## About KBC

KBC Advanced Technologies is a leading consultancy and software provider to the global hydrocarbon processing industry. With over 30 years of experience, KBC combines industry leading technology with experienced engineers and operations personnel using robust methodologies to create personalised, sustainable solutions for its clients.

For more information, visit [www.kbcat.com](http://www.kbcat.com).

To contact any of our offices, please visit <http://www.kbcat.com/locations>.