The SALVO Process

The overall SALVO Process is a top-down targeting of the key problems and needs for attention, followed by a bottom-up evaluation, justification and coordination of what is worth doing, when, to address these issues. In particular, it addresses some of the most critical cost-, performance- and risk-based decisions in asset management; decisions such as "*How can I make a robust and convincing business case for optimal intervals for inspection and maintenance?" or "How can I make a robust and convincing business case for preventive maintenance – even when asset deterioration and failure risks are uncertain?".*

These decisions frequently involve very uncertain assumptions about risk, performance impact and life cycle costs. Individual decisions also need to be considered in the context of competing priorities, budget or resource constraints and opportunities to bundle of work with other activities. It is also essential to develop a clear and credible business case in language that financial investors, safety managers, regulators and technical staff can all understand and accept.

Preventive maintenance (Extract from chapter 5)

The planned versus unplanned maintenance decision is conceptually fairly simple but, in mathematical terms, extremely complex – particularly if the planned activity introduces some element of risk itself, or there is more than one failure mode involved, or the corrective maintenance response to a failure does not fully 'reset the clock' for subsequent planned activities.

The SALVO methods incorporate the full depth of Renewal Theory and Reliability Engineering calculations, and further extend these to evaluate the mutual 'censoring' effects of one failure mode upon the exposure to another (and *vice versa*). For example, if a pump has a risk of foreign object damage as well as seal degradation and impeller wear, then the frequency of damage by the foreign objects (and consequent corrective maintenance) may change the proportion of pumps whose seals reach the point of failure, or bearings wear out. Similarly, the failure of bearings will normally result in seals being changed during the repair – so the frequency of bearing failures affects the risks of seal failures.

This is not a guidebook on reliability engineering, but some basic concepts need to be understood in order to appreciate what has to be 'under the skin' in the modelling and optimization of preventive maintenance tasks and their intervals. Many current commercial tools are claiming to 'optimize' planned maintenance but only consider a simplified trade-off between [PM cost] and [probability x consequence of a single asset failure mode]. Real life tends to have more complexity and risk interdependencies.

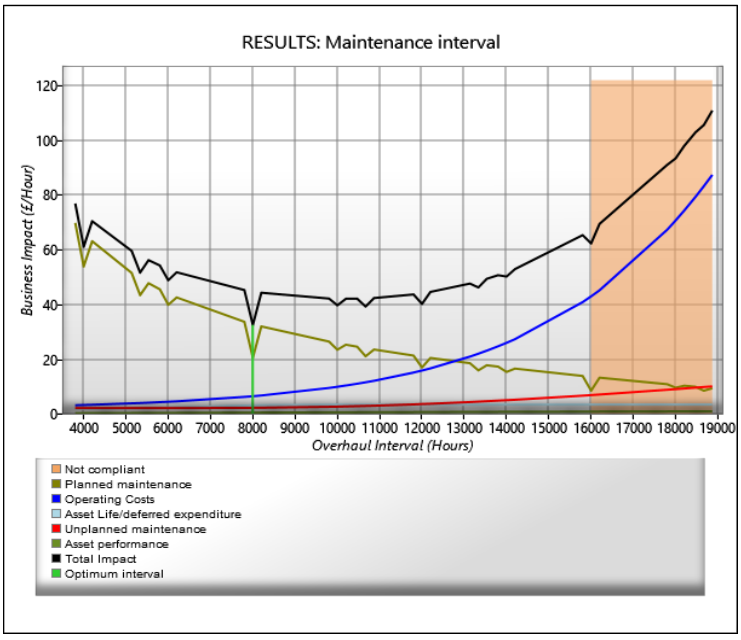

Figure title – The optimal timing for the overhaul of a roller assembly, showing the interaction of unplanned maintenance, operating costs, performance and life extension risks and alignment with shutdown opportunities in the overall decision making process

All the methods described in the book are field-proven, practical ways to target the right problems in the first place, to identify appropriate interventions and risk control options, and to evaluate the cost/benefits of these options, even when available hard data is limited. Uniquely, SALVO brings together the human factors of motivation, cross-disciplinary collaboration and communication skills, with the technical and financial disciplines necessary to develop a robust business case for optimal asset management strategies.

Buy the book ***'Asset management decision-making: The SALVO Process'*** written by John Woodhouse online at www.twpl.com