COST/RISK OPTIMISATION CASE STUDY

REF:	002
INDUSTRY:	Privatised utility
PROJECT:	Preventive maintenance
DECISION TYPE:	Optimum PM intervals; PM task evaluation; PM opportunities; Optimum shutdown interval; Reliability, efficiency & longevity combinations
CLIENT:	UK water utility
TASK:	Recommend an optimum maintenance strategy for the bundle of six tasks that comprise testing of the chlorine gas supply loop

RESULTS

The study was established to seek an optimum maintenance interval for the bundled tasks associated with the chlorine gas supply loop. Vent valve cleaning was found to have a significant effect on the results of the bundled tasks. The group recommended that this task be separated from the other activities and cleaned at a higher frequency, and remaining work be performed on alternate visits.

When the vent valve cleaning was separated out, a two-yearly inspection interval for every other task in the maintenance of the chlorine gas supply loop was found to provide the optimum combination of risks and costs. It represented a reduction in the Total Business Impact of 30% compared to the current policy of inspection at a variety of intervals, which were constant but varied between tasks.

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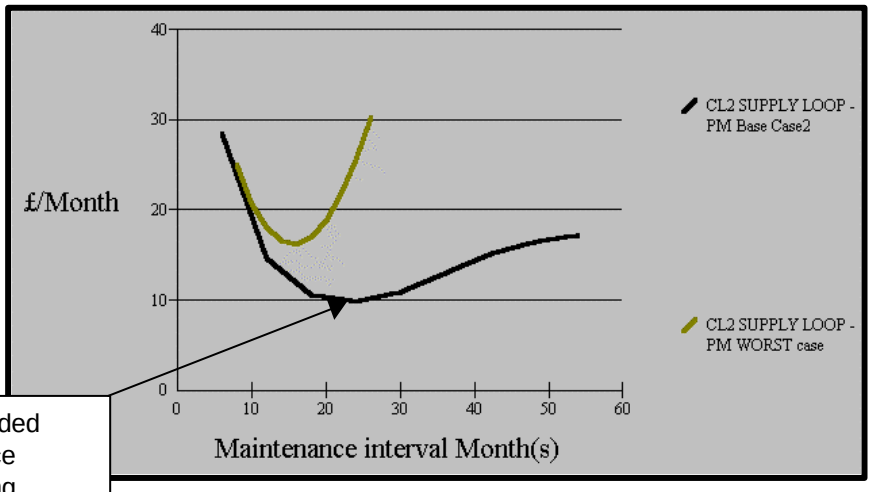

Recommended maintenance interval using worst-case figures

DEMONSTRATES

- APT-MAINTENANCE's capacity to analyse the costs and risks associated with multiple tasks and optimise the intervals individually or as a bundle
- Limitations of subjective judgement of multiple maintenance requirements
- RCM and APT-MAINTENANCE tasks working in unison
- Limitations of RCM-only analysis
- APT-MAINTENANCE's ability to analyse the interactions between several probabilities of failure
- Significant potential reduction in Total Business Impact when switching to an optimal maintenance strategy based on robust analysis using APT-MAINTENANCE

DETAILS

The client operates 15 chlorine gas supply sites, one of which was chosen for a test of APT-MAINTENANCE. The study team of client executives and consultants from The Woodhouse Partnership Ltd noted that the loops regulate the introduction of chlorine into the water supply as part of the purification process and comprise several components and processes that are split into four separate inspection tasks:

- Vent valve cleaning (12 monthly inspections)
- Regulator changeover switch spring (12 monthly inspections)
- Regulator balance spring, diaphragm, regulator body, flow tube inspection and room heater testing (mix of six and 12 monthly inspections)
- Regulator body replacement (condition/failure)

The client conducted a Reliability Centred Maintenance (RCM) study which identified the efficient performance of the vent valve operation, which acts as a buffer to regulate the flow of chlorine gas, as a major contributor to the overall reliability of the site. The RCM study also suggested the following inspection intervals:

- Vent valve cleaning
  - three monthly
- Regulator balance switch spring
  - six monthly
- Regulator balance spring, diaphragm etc - 12 monthly
- Regulator body replacement
  - 5 yearly

APT-MAINTENANCE

The bundle of inspection tasks associated with the single-site loop posed an interesting challenge for the study group and APT-MAINTENANCE. Determining the optimum inspection strategy for a variety of processes is complex and demands assessment of the interactions between several probabilities of failure and the effect that the failure of one process has on the others.

APT-MAINTENANCE software was used to determine the complex pattern of risks. The Woodhouse Partnership range-estimated the probability patterns for various failure modes and consequences, including the direct and penalty impact and the costs of the planned maintenance and this data was inputted.

To demonstrate the capability of APT-MAINTENANCE results were supplied that included and excluded the vent valve cleaning activity which showed a marked influence on the optimum interval.

This simple project demonstrates how APT-MAINTENANCE techniques can augment the findings of traditional approaches like RCM and provide accurate, quantifiable solutions that demonstrate the comparative validity of a variety of options.

Using APT-MAINTENANCE the study group was quickly able to provide an optimised cost/risk assessment of simple and complex failure modes using incomplete data. The findings demonstrated the shortcomings of traditional, subjective approaches to inspection strategies and in turn how optimum inspection intervals can significantly reduce the Total Business Impact.

APT-MAINTENANCE has been described as the single most important breakthrough in maintenance decision-making in the last 20 years. It finally gives asset managers the tools to base their policies and strategies on logical calculation and valid evidence, rather than subjective judgement.

APT-MAINTENANCE reconstructs the business role of maintenance by creating a link between business tasks and operational benefits such as reliability, performance and equipment failure. The link is displayed in graphical and cost-tabular formats and clearly demonstrates the best compromise and the dependencies upon each influence. APT-MAINTENANCE interprets historical records captured by maintenance information systems.

APT-MAINTENANCE calculates the best preventive maintenance interval or equipment replacement point and puts numbers to the costs, benefits and risks of alternative maintenance strategies. It is a highly sophisticated yet simple-to-use tool for balancing equipment reliability, performance and efficiency, maintenance costs, downtime impact and lifespan. It identifies optimal cost and risk strategies, tests the sensitivity of weak and range-estimated information and quantifies the impact of constraints or intangibles.

APT-MAINTENANCE justifies what work is required and when and demonstrates the value of historical maintenance records. Using APT-MAINTENANCE it is possible to select optimum combinations of preventive, condition-based and on-failure techniques.

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