COST/RISK OPTIMISATION CASE STUDY

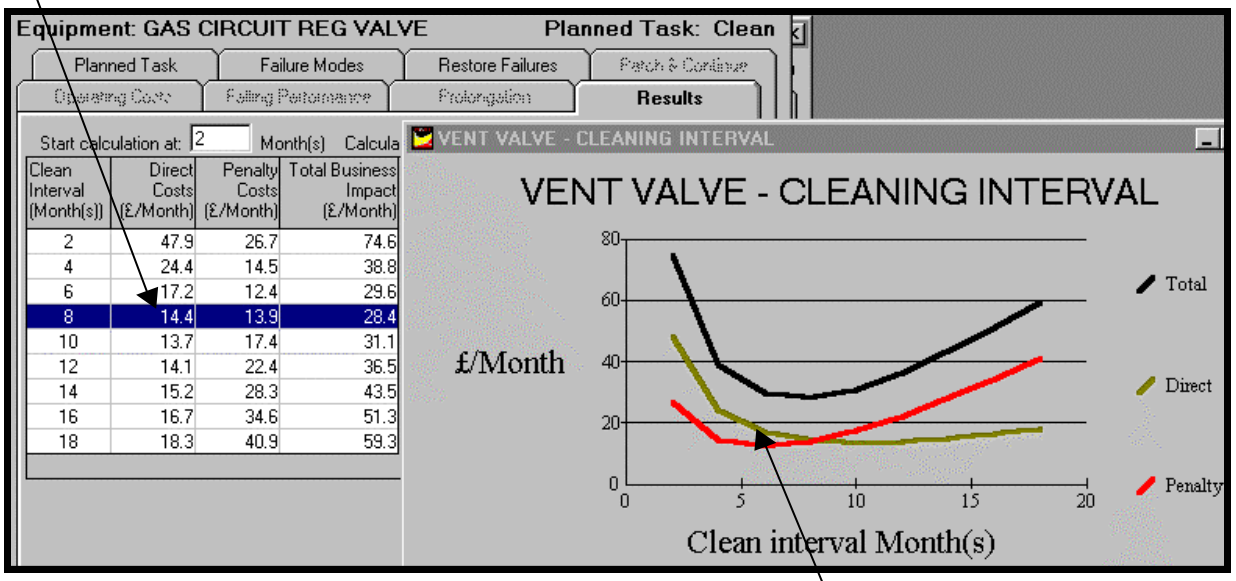
REF:	010
INDUSTRY:	Water supply
PROJECT:	Preventive maintenance
DECISION TYPE:	Optimum PM intervals; PM task evaluation; PM opportunities; Time Vs usage based PM; Optimum shutdown intervals; Reliability, Efficiency & longevity combinations
CLIENT:	UK water supplier
TASK:	Devise an optimum maintenance strategy for cleaning of the vent valve system, part of the chlorine gas supply loop. Identify any reduction in Total Business Impact compared to the existing strategy.

RESULTS

APT-MAINTENANCE revealed that the optimal maintenance strategy would be eight monthly intervals. The Total Business Impact, which is a reflection of costs and risks, of testing every eight months would be 25% less than the current 12 monthly strategy.

If the tests were carried out in conjunction with related inspection tasks for other items in the chlorine gas supply loop, of which the vent valves are part, the optimum interval would be every six to 12 months.

Optimum maintenance interval



Variation in direct costs associated with different maintenance intervals

DEMONSTRATES

- Significant potential reduction in Total Business Impact when switching to an optimal maintenance strategy based on robust analysis
- RCM and APT-MAINTENANCE techniques working in unison
- Limitations of RCM-only analysis
- The flexibility and simplicity of using APT-MAINTENANCE to assess various inspection strategies
- That APT-MAINTENANCE is a viable alternative to safety-critical decisions based on subjective judgement.

DETAILS

The study group established that inspections of the vent valve operation at each of the utility's 15 sites were carried out on a 12 monthly cycle. It was noted that the valves are particularly prone to corrosion and poor performance of the valve seat and that their failure threatened the performance of the whole chorine gas supply loop, in part due to the concentration of plant. On average three valve callouts due to failures were reported each year and repairs were carried out without incurring penalty costs. However, callouts tended to occur at night when the cost of failure was four times that of a regular inspection.

Although the direct costs of maintenance inspections were minimal, the penalty costs associated with failure of the vent valve process, and in turn the Loop, were identified as high due to adverse public reaction.

The RCM study contained a subjective judgement that inspection of the vent valve operation should be carried out every three months on the basis of reported failures and penalty costs.

ANALYSIS

APT-MAINTENANCE software was used to assess the validity of the RCM recommendations. APT-MAINTENANCE converted the range-estimates into a series of quantified probability patterns for the lifespan of the valves using additional data supplied by the client on direct and penalty costs for routine maintenance and restore/failure callouts.

The vent valve cleaning activities were considered in isolation and as part of the wider maintenance programme for the entire chlorine gas supply loop to demonstrate the versatility of APT-MAINTENANCE. Naturally these two studies produced different answers which are outlined above under **'Results'**.

The results are affected by the value put on the penalty costs of failure consequences, a factor that can currently only be estimated. However, it is safe to assume that the current inspection interval of 12 months does not provide the best combination of costs and risks and the three monthly strategy proposed by the RCM study is unnecessary.

This simple study reveals how MACRO tools such as APT-MAINTENANCE can augment the findings of traditional approaches like RCM and provide accurate, quantifiable solutions.

Using APT-MAINTENANCE the team 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.

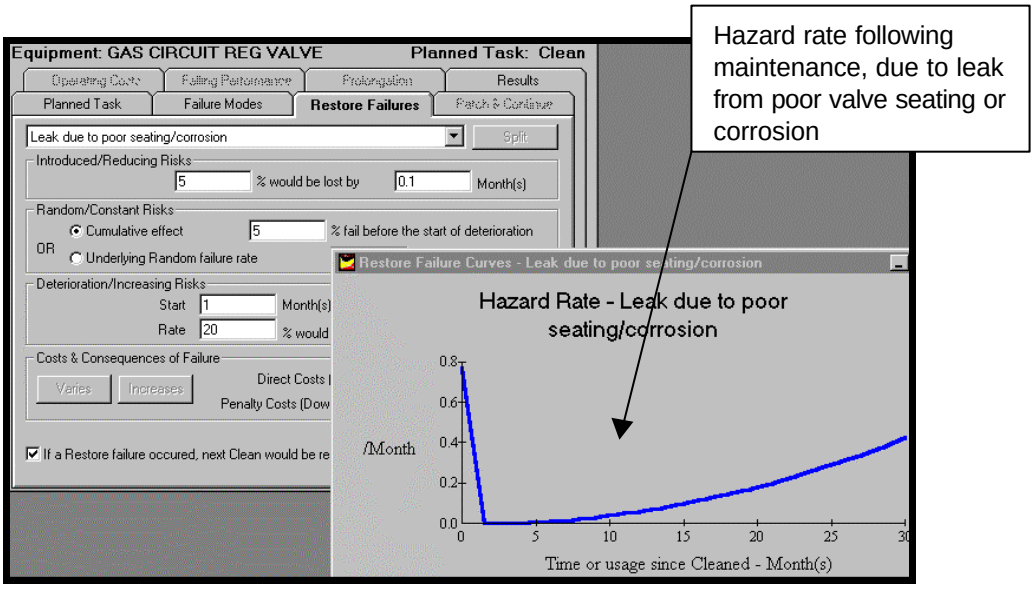
APT-MAINTENANCE

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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