

# COST/RISK OPTIMISATION CASE

## STUDY

**REF:** 007  
**INDUSTRY:** Power supply  
**PROJECT:** Predictive/Condition Monitoring  
**DECISION TYPES:** Inspection & CM intervals; CM cost/benefit justification; failure finding inspections  
**CLIENT:** UK Power Supplier  
**TASK:** Assess the costs and risks associated with wooden pole maintenance and recommend an optimum inspection interval.

## RESULTS

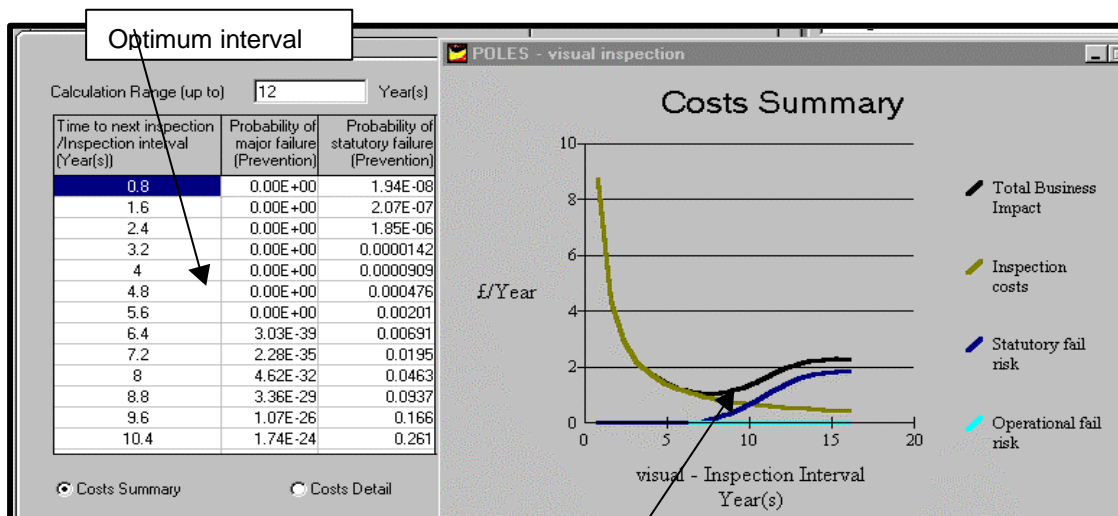
A cost/risk optimisation study incorporating APT-INSPECTION analysis found that the optimum maintenance interval for wooden poles was 12 years.

If the client switched to a 12-yearly strategy from the current five-yearly policy this would save £400,000 per year.

However, the actual frequency is closer to the optimum at seven years.

If the interval was only extended to 10 years, the savings compared to the average current actual practice would be £120,000.

These improvements include a 30% reduction in planned maintenance costs as well as the effects of changes in unplanned maintenance repairs, risk exposures and Total Business Impact (TBI).



Reduction in total business impact

## DEMONSTRATES

- The benefits of incorporating APT-INSPECTION into cost/risk optimisation studies
- The substantial cost savings that can be achieved using objective assessment instead of subjective judgments
- The effect of strategy optimisation on the Total Business Impact
- The simplicity of APT-INSPECTION
- The study's ability to cope with incomplete data by using advanced software analysis
- Quantification of test data sensitivity when range estimating

## DETAILS

The client, a major UK power supplier, maintains approximately 500,000 wooden poles which support electricity cables across the province. The poles are subject to rot and the company's existing policy involved undertaking a visual inspection every five years. The inspection consists of a hammer test for signs of rot and, if warning signs are detected, ultrasonic inspection to verify the

extent of the problem. However, the number of poles and the backlog of maintenance activities meant that the actual frequency of inspection was thought to be around seven-yearly.

Deterioration rates for the poles vary widely, and the client estimates that only 13% are vulnerable to rot.

## ANALYSIS

Client records were used to develop a table showing the number of poles of different ages together with their age at diagnosis of necessary replacement. A variety of costs and failure consequences were considered in conjunction with the company's staff, ranging from successful diagnosis of rot, and timely replacement, to hazard.

The study also considered the accuracy of different monitoring methods, such as visual or ultrasonic, and the uncertainty of failure points given changing weather conditions and

loading. Every factor was range-estimated and tested for sensitivity using APT-INSPECTION software.

APT-INSPECTION enhanced the study's findings by providing the suggested strategies outlined above under 'Results'. They clearly show the Total Business Impact (TBI) of a variety of inspection strategies. TBI refers to the combined effect of costs and risks arising from a particular strategy on the client's balance sheet.

## APT-INSPECTION

APT-INSPECTION is a flexible software tool that helps Asset Managers plan optimum inspection strategies for all types of asset. It will optimise the associated costs and risks, using incomplete data if necessary, and range-estimates can be used to test data sensitivity.

APT-INSPECTION will compare current policy against optimum policy and provide a financial measure of the Total Business Impact of each strategy. It will highlight the often vast disparity in costs between optimum

strategies based on calculation and existing policies based on subjective judgment or supplier recommendations. The software has the versatility to cope with any inspection task individually or as a 'bundle' of activities.

APT-INSPECTION is one of a range of MACRO evaluation tools that is allied to the expertise of The Woodhouse Partnership to address the cost/risk assessment of engineering and management decisions.

The screenshot shows the 'Equipment : wooden pole' and 'Inspection Task : visual' configuration. The 'Failure Prevention' section includes 'Deterioration Mode' set to 'ROT' and 'Deterioration Measurement Description' set to 'Visual/aural diagnosis on hammering'. The 'Point of Failure' section has a 'Permissible Limit is at' of 75 % and is set to 'By Average and Uncertainty' with an 'Average Point of Failure' of 25 % and 'Uncertainty (+ or -)' of 5 %. The 'Costs of Failure' section shows 'Exceeding Permissible Limit' with a 'Direct Cost' of £ 'Varies' and 'Operational Failure' with a 'Direct Cost' of £ 65. A 'Variable Cost Entry' window is also visible, showing 'POLES visual inspection' with a 'Direct Cost' of 'ROT - Exceeding Permissible Limit - Direct Cost' and a table of 'Percentage of Occasions' and 'Cost per Occasion'.

Percentage of Occasions	Cost per Occasion
7 %	£ 40
6 %	£ 500
87 %	£ 0
100 %	

Direct & penalty cost assessment

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