

COST/RISK OPTIMISATION CASE

REF:	008
INDUSTRY:	Power supply
PROJECT:	Predictive/condition monitoring
DECISION TYPE:	Inspection & CM intervals; CM cost/benefit justification; CM methods & performance; failure finding inspections
CLIENT TASK:	UK power supplier Test the viability of the proposed maintenance policy for three types of protection relay systems for 33kV substations, recommend an optimum maintenance policy and identify potential cost savings.

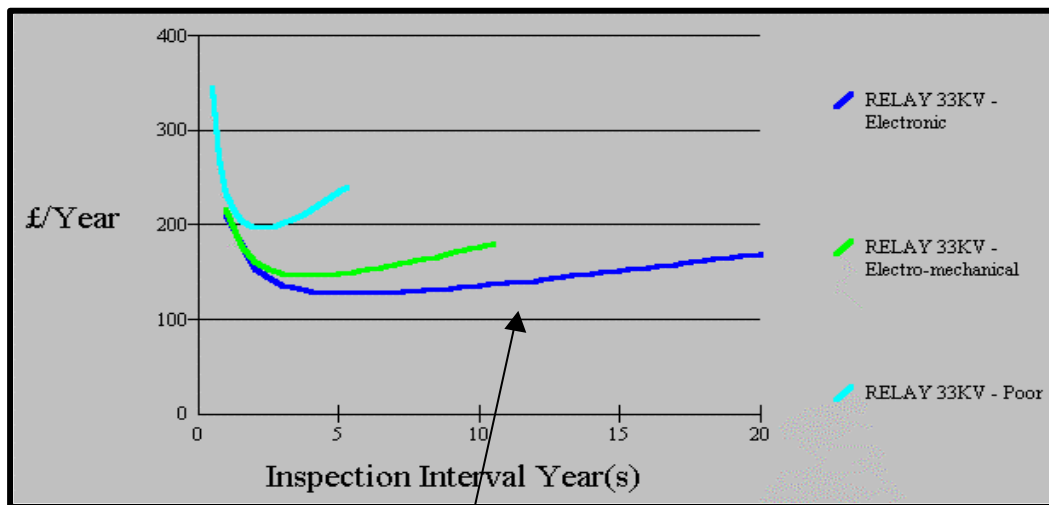
RESULTS

A cost/risk optimisation study incorporating APT-INSPECTION was initiated to determine the viability of existing and proposed maintenance intervals for a population of 5,700 protection relay systems within electricity substations. The current intervals were based on subject judgement and were found to be incorrect.

Switching to the proposed optimum strategy proposed would result in potential cost savings of £247,000 per year.

Different maintenance intervals were recommended for the three classifications of unit under consideration:

Relay group	Current policy	Optimal policy	Impact
Poor (300)	annual	2-yearly	£9,000/yr
Electro-mechanical (4,500)	annual	3-yearly	£220,000/yr
Electronic (800)	3-yearly	6-yearly	£8,000/yr
		TOTAL	£247,000/yr



Recommended intervals by relay type

CLIENT COMMENTS

This study formed part of a wider assessment of MACRO software, of which APT-INSPECTION is a part, by the client, a major UK power supplier. Comments from the company's study team included:

“Worth doing,” “little effort for big effect,” “increases confidence in work plans.”

The studies identified a total potential cost saving of £600,000 per year from the small number of unprioritised projects that were analysed.

DEMONSTRATES

- The use of APT-INSPECTION as part of an analysis to cater for the maintenance variances between assets with the same function.
- Substantial potential cost savings available when using APT-INSPECTION decision-making software instead of subjective judgement.
- The ability to reach viable decisions based on incomplete data combining traditional FMEA techniques with advanced analytical software
- Risk justification of condition-based decisions to demonstrate regulatory compliance

DETAILS

The study team, consisting of executives from the power supply company and external consultants classified the company's population of 33kV protection relay units into four groups according to their type: Poor, consisting of 300 items, Electro-mechanical, 4,500 items, Electronic, 800 items and Distance of which there is an unspecified quantity.

A Failure Modes & Effects Analysis (FMEA) was conducted on the first three groups and identified that of these, preventive maintenance had been

undertaken on 179 within the previous eight months. The team estimated that this followed a maintenance interval of approximately five years. Of this group, 21 relays, including 15 in the Electro-mechanical grouping, were found to have faults that could have led to loss of supply.

The client planned to introduce an annual maintenance policy for the Poor and Electro-mechanical groups and a three-yearly interval for the remainder, including the Distance group.

ANALYSIS

The findings of the FMEA study formed the basis for a risk-based inspection study using APT-INSPECTION. The software was used to calculate the risk exposures and costs of alternative inspection and testing strategies. It recommended an optimum interval for each of the principal groups of relays together with the associated cost/risk improvements compared to the intended policy.

APT-INSPECTION was assessed as the most suitable match for the client's assets and working requirements because most of its maintenance is inspection or testing. This software provides the risk justification for condition-based decisions, which is particularly important to the company for demonstrating regulatory compliance.

ABOUT APT-INSPECTION

APT-INSPECTION is a flexible software tool that helps asset managers plan optimum inspection strategies for all types of assets. It provides solutions based on fact and scientific calculation rather than subjective judgement. 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 the optimum and provide a financial measure of the Total Business Impact of each strategy. During this

process it will highlight the often vast disparity in costs between optimum strategies based on calculation and existing policies based on subjective judgement 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 addresses the cost/risk assessment of engineering and management decisions.

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