

Example PAM Results

Introduction

This document presents example results from the operational asset management optimisation (Predicted Maintenance Interventions) and strategic asset management optimisation (Asset Survival Simulations) modules in **PAM**. These modules and other **PAM** modules can be downloaded from [PAM Modules](#).

Operational Asset Management Optimisation

Table 1 shows the results for the following conditions (the numbers in brackets in the third and fourth columns are multiples of the corresponding values in the last row):

- ◆ 2,250 pumps in waste water pumping stations.
- ◆ A neutral attitude to the risk of pump failure (risk tolerance 3).
- ◆ A maintenance capacity of 60 interventions per month.
- ◆ The costs in the third column are the maintenance costs. The cost of replacement pumps and the consequence costs of pump failure are not included. These costs increase as the number of reactive interventions increases, and so the total cost of pump failure increases rapidly as the number of reactive interventions increases.
- ◆ The third and fourth columns show the results for the next 12 months (totals).

Table 1

No. Proactive Interventions/month	No. Reactive Interventions/month	Maintenance Cost in Next 12 Months (£)	No. Pumps Replaced in Next 12 Months
0	60	95,581 (4.97)	275 (1.51)
10	50	76,249 (3.97)	251 (1.38)
20	40	56,424 (2.94)	234 (1.29)
30	30	47,994 (2.50)	216 (1.19)
40	20	33,500 (1.74)	203 (1.12)
50	10	25,393 (1.32)	190 (1.04)
60	0	19,213 (1.00)	182 (1.00)

Strategic Asset Management Optimisation

Table 2 shows the results for the following conditions:

- ◆ 2,250 pumps in waste water pumping stations.
- ◆ The results for two risk tolerances to pump failure are shown (2 [risk averse] and 4 [risk tolerant]). (The results in Table 1 are for risk tolerance 3 [neutral].)
- ◆ The last column shows the savings in the maintenance costs over a purely reactive policy for the next 5 years.
- ◆ The cost of replacement pumps and the consequence costs of pump failure are not included. These costs increase as the risk tolerance and the number of reactive interventions increase, and so the actual savings over a purely reactive maintenance policy are in practice much greater than those shown in the table.

Table 2

No. Interventions/month	Percent Proactive Interventions	Risk Appetite (2=averse; 4=tolerant)	Saving Over Reactive Maintenance Only (£ million)
20	20	2	1.0
20	20	4	1.0
20	80	2	2.0
20	80	4	2.0
60	20	2	0.7
60	20	4	0.9
60	80	2	1.5
60	80	4	2.2
100	20	2	0.8
100	20	4	1.3
100	80	2	2.2
100	80	4	3.4

For low maintenance capacities (20 interventions per month) and a given percentage of proactive interventions, the savings are independent of the risk tolerance. This is because the maintenance capacity is too low to carry out all the required maintenance. For a given risk tolerance, the savings double as the percentage of proactive interventions quadruples from 20 to 80. These features are not present for the higher maintenance capacities because there is adequate maintenance capacity, particularly for a maintenance capacity of 100 interventions per month.