

ABSTRACT

tion of how costs can be minimized as a basis for
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Management at all levels within an organization
must be concerned with decision making, a process which
accentuates the need to convert raw data into decision
support information. For this research project,
decision support in the domain of equipment maintenance
within a bauxite industry is considered. Specifically,
it examines how condition monitoring of locomotive
diesel engine lubricant may be used to provide
maintenance decision support.

The probabilistic changes in certain measurable
physical lubricant parameters have been used to develop
a mathematical model of the physicochemical
deterioration process taking place in the engine
crankcase. A seven-state Markov chain was formulated
with actual data taken from the year 1985. Statistical
inference analysis was used to establish that the chain
was of the first order and that it was applicable
across the fleet of locomotives in the study.

Primarily, the Markov model is shown to have the
twin advantages of enhancing one's understanding of the
deterioration process and of providing a means for
predicting future changes. There is also an illustra-

tion of how costs can be incorporated as a basis for choosing among alternative lubricant condition management policies. A proposal for using a knowledge-based expert system to generate the state space and analyze the peculiar pathologies is included. Finally, the model lends itself to the specification of input data since, very often, the lack of appropriate historical data has served to retard the application of mathematical modelling to maintenance problems.

I would like to single out from the Guyana Mining Enterprise Limited Mr. D. Barrow and Mr. S. V. Jones for the encouragement and tangible support they gave, both prior to and during the research. To Mr. N. Arumugadassan, my supervisor, I owe an incalculable debt for his patient guidance and inspiration. I also wish to acknowledge the support and encouragement given by Professor C. V. Narayan, in various ways.

Lastly, but by no means least, I would like to recognize the contribution of one of my former sub-professional members of staff, Mrs. M. Lymerick. He very dutifully searched the archives and unearthed the 1985 records used herein. His is a considered view, which I share, that the insights gleaned from this research project often lay unexplored, buried amongst masses of data in many organizations.