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.

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