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An integrated hierarchical production and maintenance planning model

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Abstract

We provide an integrated production and maintenance planning model in capacitated production systems subject to progressive deterioration. We assume Weibull failure rates for each machine and minimal repairs by both preventive and corrective maintenance actions. We model the integrated maintenance and production planning in a hierarchical planning environment for multi stage production systems. In the aggregate level, we propose a general policy of preventive maintenance where maintenance periods do not necessarily fall at equally distant epoch. The corrective maintenance actions are tackled in the detailed level while disaggregating family productions into item productions.

Key words: Production, Maintenance, Integration, Hierarchical Planning

1 Introduction

For decades, the importance of a good maintenance planning has been addressed widely. However, its application is not yet fully integrated with other functions, such as production planning. The production lot sizing problem subject to machine breakdowns is studied in Groenevelt *et al.* (1992a) and Groenevelt *et al.* (1992b). They specifically study the effect of machine breakdowns and corrective maintenance on economic lot sizing decisions. They propose and evaluate two policies, i.e. No-Resumption policy and Abort/Resume policy. Lin & Kroll (2006) study the economic lot sizing assuming that the production run is aborted when a breakdown occurs (no resumption model) which requires immediate corrective actions. The production run is resumed only after all hand on inventory is depleted. The approximation procedure is proposed and tested on some numerical examples with both linear deterioration and exponential deterioration model. Recently, Chakraborty *et al.* (2008) model the production lot sizing problem when production systems deteriorates and may ultimately breakdown afterwards. A preventive maintenance is performed at the end of a production run and corrective maintenance is executed when a machine

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