

Capital investment in setup cost reduction for a lot-size, reorder point model

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Abstract

This paper extends the Hadley and Whitin's lot-size, reorder point model to consider the deteriorating production system that can go "out-of-control" while producing items. Once the production system is out of control, a proportionally greater number of defective units will be produced than when the system is in control. Therefore, in order to operate this production process economically, periodic inspection and maintenance actions are needed. The option of capital investment in setup cost reduction introduced by Porteus is also included in our model. A mathematical model is used to determine the optimal policy that minimizes the expected total annual cost by obtaining optimal production lot size, reordering point, and investment in setup cost reduction. Explicit solutions are presented for two specific demand distributions, uniform and exponential, during lead time. A numerical example shows that lowering the setup cost will result in great benefit to a firm.

Keywords : Inventory, deteriorating production systems, maintenance, quality.

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