

Production/Inventory Systems with Preventive Maintenance

Hyo-Seong Lee

Dept. of Industrial Engineering, Kyung Hee University

Abstract

In this paper, we introduce an operating control policy for a production facility which is subject to breakdowns. The facility produces items for which demand occurs according to a Poisson process, and the time required to produce an item follows an arbitrary distribution. The facility is assumed to deteriorate while it is in operation, with an increasing failure rate. A preventive maintenance overhaul of the facility is, however, assumed to restore it to its original condition. We consider the following control policy for operating the facility: as soon as the inventory level is raised up to a certain prespecified value, S , a preventive maintenance operation is initiated. Following the preventive maintenance operation, production resumes as soon as the inventory level drops down to or below another prespecified value, s , and the facility continues to produce items until the inventory level is raised back to S . If the facility breaks down during operation, it is minimally repaired and put back into commission.

Under a cost structure which includes a preventive maintenance cost, a minimal repair cost, a setup cost, a holding cost and a backorder cost, an expression for the expected cost per unit time is obtained for a given policy. Then some properties of the cost functions are developed to characterize the optimal policy. Based on these properties, an efficient algorithm to find the optimal policy is presented.