Economic optimization for an imperfect process with inspection errors, inspection time and minimal repair

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Abstract

This paper extends an integrated model of production lot-sizing, maintenance and quality to consider the possibilities of inspection errors, inspection time and minimal repair for an imperfect process. These generalizations are importation because inspection might demand a considerable amount of time and there might be inspection errors due to human or technological limitations in the process of inspection. The production process is in either the in-control state or the out-of-control state. If the production process is judged in the in-control state, then when preventive maintenance is performed, system age and the level of maintenance performed will be related. If the production process is judged in the outof-control state, there might have two types. The first type is a relatively mild production process shift, where minimal repair can restore the process to the in-control state. The second type is a more serious shift, where it interrupts the production cycle and the production has to be completely stopped. In this article, we derive the optimal solutions for the inspection interval, the number of inspections and the production lot-sizing with two types of out-ofcontrol states and inspection errors. We use numerical examples to illustrate the effects of inspection errors, inspection time and minimal repair on the cost of production.

Keywords: production lot-sizing, imperfect process, preventive maintenance, inspection errors

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