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Economic production order quantity and quality

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Abstract

The purpose of this study is to integrate a conventional production-inventory management approach and a process-quality design approach so as to promote quality and reduce costs. Because the integration of these two approaches into a single system is conducted under the influence of a deterioration process, estimated costs of production must be modified. Only then can these various costs be presented as a total cost for the present integrated system. This total cost includes: a setup cost for production reordering and process resetting, quality-related costs stemming from the loss of product quality along with a tolerance-related production process cost and a failure cost for product defects, backorder costs for production shortage, carrying costs generated by the storing and handling of inventory, and material costs for determining the process mean. The Taguchi quality loss function is introduced to assess quality loss in the system. The decision variables include the initial setting (process mean), process

tolerance, and production order quantity. These variables need to be determined simultaneously to minimise the average total cost for a cycle time. An example is presented to demonstrate the proposed approach.

Keywords:

initial setting | process tolerance | production order quantity | quality | cost | deterioration process | optimisation

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