

On the End-of-Life Inventory Problem

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Abstract : We consider the so-called end of life inventory problem for the supplier of a product in its final phase of the service life cycle. This phase starts when the production of the items stops and continues until the warranty of the last sold item expires. At the beginning of this phase, the supplier places a final order for spare parts to serve customers coming with defective items. At any time during the final phase, the supplier may also decide to switch to an alternative and more cost-effective policy. This alternative policy may be in the form of replacing a defective item with a substitutable product or offering discounts / rebates on new generation products. In this setup, the objective is to find a final order quantity and also a switching time which will minimize the total expected discounted cost. We study this problem under a general cost structure in a continuous-time framework where arrivals of defective items are given by a non-homogeneous Poisson process. We consider four formulations which differ by the nature of the switching time. These formulations are studied in detail and properties of the objective function are derived in each case. Using these properties, we provide exact algorithms for efficient numerical implementations. Numerical examples are provided illustrating the application of these algorithms. In these examples, we also compare the costs associated with these different formulations.

Keywords : End-of-life inventory control, martingales, optimization, service parts

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