

Solving lot-sizing problem with quantity discount and transportation cost

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## Abstract

Owing to today's increasingly competitive market and ever-changing manufacturing environment, the inventory problem is becoming more complicated to solve. The incorporation of heuristics methods has become a new trend to tackle the complex problem in the past decade. This article considers a lot-sizing problem, and the objective is to minimise total costs, where the costs include ordering, holding, purchase and transportation costs, under the requirement that no inventory shortage is allowed in the system. We first formulate the lot-sizing problem as a mixed integer programming (MIP) model. Next, an efficient genetic algorithm (GA) model is constructed for solving large-scale lot-sizing problems. An illustrative example with two cases in a touch panel manufacturer is used to illustrate the practicality of these models, and a sensitivity analysis is applied to understand the impact of the changes in parameters to the outcomes. The results demonstrate that both the MIP model and the GA model are effective and relatively accurate tools for determining the replenishment for touch panel manufacturing for multi-periods with quantity discount and batch transportation. The contributions of this article are to construct an MIP model to obtain an optimal solution when the problem is not too complicated itself and to present a GA model to find a near-optimal solution efficiently when the problem is complicated.

Keyword : lot-sizing; mixed integer programming; genetic algorithm;  
quantity discount; touch panel