Abstract

Modern industries have to deliver products and services admist the highly competitive and uncertain environment. Two major problems that are faced on day-to-day basis are the requirement of adequate inventory to tide over uncertain demand, and ensuring that the vital machinery is kept in proper working order at all the times. Further, the above two objectives have to be met with the minimum input of limited financial resources. In this study, inventory models were developed that could ensure adequate availability of raw material in situations, where demand is uncertain. The inventory model was then combined with preventive maintenance model and joint optimization of the same was carried out using non-traditional optimization tools like Genetic Algorithms (GAs) and Particle Swarm Optimization (PSO) algorithm. The models and optimization techniques were applied to real-life industrial situations, and it was seen that considerable savings could be made by implementing the suggested strategies.

Keywords: Inventory model; Backordering; Variable demand; Fuzzy economic order quantity; Sequential imperfect preventive maintenance; Gaussian distribution; Weibull distribution; Hazard rate; Optimization; Genetic Algorithms; Particle Swarm Optimization algorithm.