Retracted: Scheduling Optimization of the RFID Tagged Explosive Storage Based on Genetic Algorithm

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Abstract. An on-line optimization method for explosives storage scheduling based on genetic algorithm is proposed to make management of explosives storage process more efficient, informative, secure, and intelligent. The information of explosives warehouse is acquired in real time by RFID technology, and an assignment strategy for the location of explosives in warehouse is proposed. The mathematical model of explosives storage optimization is constructed by analyzing operation characteristics of explosives storage and requirements, and the model is solved using the improved genetic algorithm. The simulation results show that the proposed method can improve the utilization rate of warehouse space, optimize the walking path in the process of the explosive delivery, as well as solve the operating problems under some constraints, such as the expire date of explosives.

Keywords: explosives storage, radio frequency identification technology, storage location assignment, genetic algorithm.

1 Introduction

Along with the rapid economic development of China, demands of industrial explosive materials are greatly increased, and so is the quick development of civil explosive industry. The literature [1] pointed out that this industry is under strict management of the regulatory authorities due to the characteristic of the civil explosive industry and other restrictions.

Explosives as a kind of special items need some special requirements in the storage process. There are few researches about the explosive storages. Yu Li [2] presented the application of RFID (Radio Frequency Identification) technology in safety management of the primer. Yuan Chen [3] studied the system model of dangerous goods logistics based on RFID and GPRS (General Packet Radio Service) technology. Explosive storage is a complicated process, in which combinatorial optimization problems need to be solved. The explosives of the same specification and the same production date need to be stored in the same area. To address the above problems, we use RFID technology to get explosive warehouse real-time information first, then
partition the warehouse, finally, solve the optimization model by genetic algorithm and realize the scheduling optimization of explosive storage.

2 Problem Statement

Explosive products need to be temporarily stored in the warehouse in the production, circulation and use process. Many factors need to be considered when explosive products are passed in and out.

1) The expire date problem of the explosive is one of the important factors. In the warehouse explosives cannot be stored too long. If it’s stored more than a certain time, it has to be delivered out of the warehouse first. The explosive products should follow the principle of first in first out;

2) If the production of explosives is more than the inventory capacity, the old explosive products have to be delivered out first, and then new products can be moved into the warehouse afterwards.

3) In order to get it delivered easily, the explosives with high probability to be delivered in and out should be placed close to the entrance.

3 The Calculation Model of Optimization Operation for Explosive Warehouse

Zhang Haijun, et al [4, 5] pointed out that normally there are many kinds of slotting distribution strategies in the explosive warehouse, one of which is the random classification. The characteristic of this distribution strategy is that each kind of goods is assigned to a fixed storage area, while in that specific storage area, goods distribution is random. The advantage is that it improves the slotting efficiency, and the defect is that the ins and outs of inventory and management are difficult. Fig.1 is a sketch of an explosive warehouse.

![Fig. 1. The diagram of warehouse storage](image-url)