TIME OF REPETITION OF THE ORDER FOR SPARE PARTS AND MATERIALS IN THE AUTO SERVICE STOREHOUSE

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Abstract. The aim to store the spare parts and materials is to ensure that the definite spare part or operational material is available to the client in the storehouse in the necessary time and amount. The article discusses the general methods of determination of the repetition time of the order of spare parts and materials. The methods and correlations have been elaborated for calculation of this repetition time of the order of spare parts in storehouses as well as the order and delivery scheme has been developed.

Key words: repetition of the order, spare parts, storehouse, order, time, demand.

Introduction

The aim of storage of spare parts and materials is to ensure that the definite spare part or operational material is available to the client at the storehouse in the necessary time and amount. In turn, the task for the managers of the storage is to find the optimal correlation in the storage between the stored amount of the goods and insurance of the availability of it.

Of course, the formation of the stored goods is related to costs; nevertheless, at the same time with an optimal reservation of spare parts it is possible to promote the economic activities of the service station improving the increasing range of clients and getting a stable profit.

At the same time we should consider that the amount and the assortment of automobile service spare parts and materials in the storehouses is essentially influenced by the specific conditions in Latvia:

- large amount of automobiles of different brands and models with a large range of production years;
- a small automobile spare part and material market with its main location in Riga and also 3-4 bigger cities;
- definitely expressed buying potential of the inhabitants, especially between the cities and the countryside.

Theoretical aspects of organization of the order

Servicing of clients is an important part of the marketing strategy of the enterprise. The order of a new series of spare parts is one of the basic elements of client servicing that can be unnoticed by the buyer in the practice but of which the quality and the speed of servicing is dependent.

The repetition time of the order characterizes the minimal amount of the spare parts in the storehouse when the new order has to be made. The ordering time in different enterprises and for different suppliers differs and depending on co-operation partners and the geographical situation, it usually is from a few days to a month. In case if the delivery time of the order is long, it is essential to order the definite spare part in due time because in the opposite case the spare parts of this group can lack and the process of production can be delayed or stopped [1].

Planning the purchase, it is necessary to determine:

- the necessary assortment of the goods;
- the number of every class of goods;
- the time when the goods are in the storehouse;
- the possibilities of the suppliers in the field of delivery terms, quality etc.;
- the costs of the delivery.

There can be different kinds of storage at the storehouse. There are distinctions between *production storage* – the parts that are in the storehouse for insurance of a continuous production process (spare parts for insurance of the operation of power vehicles) [2]. There can be also *storages of goods* – reservations for production spare parts and units that can be used for the present trade (selling in the shop of spare parts and units).

The amount of the optimal order from the management theory of material reserves can be determined using the Vilson formula. The point when this order should be prepared will be determined by the accumulation of the spare parts, that is the number of them in the storehouse that should be enough until the new order.

The minimal amount of the spare parts at the storehouse or the time for order is determined by:

$$N_{r, \min} = t_{pas} n_{pat} + n_{dr},$$ (1)

where t_{pas} – time of the order in days;
n_{pat} – average consumption of the definite part in a day;
n_{dr} – safety reserve.

The time of fulfilling the order in this respect is meant as a moment of time from ordering of the spare parts to implementation of it. The accessity of formation of the safety reservation can be best seen in the graph of utilization of the spare parts (Fig. 1).
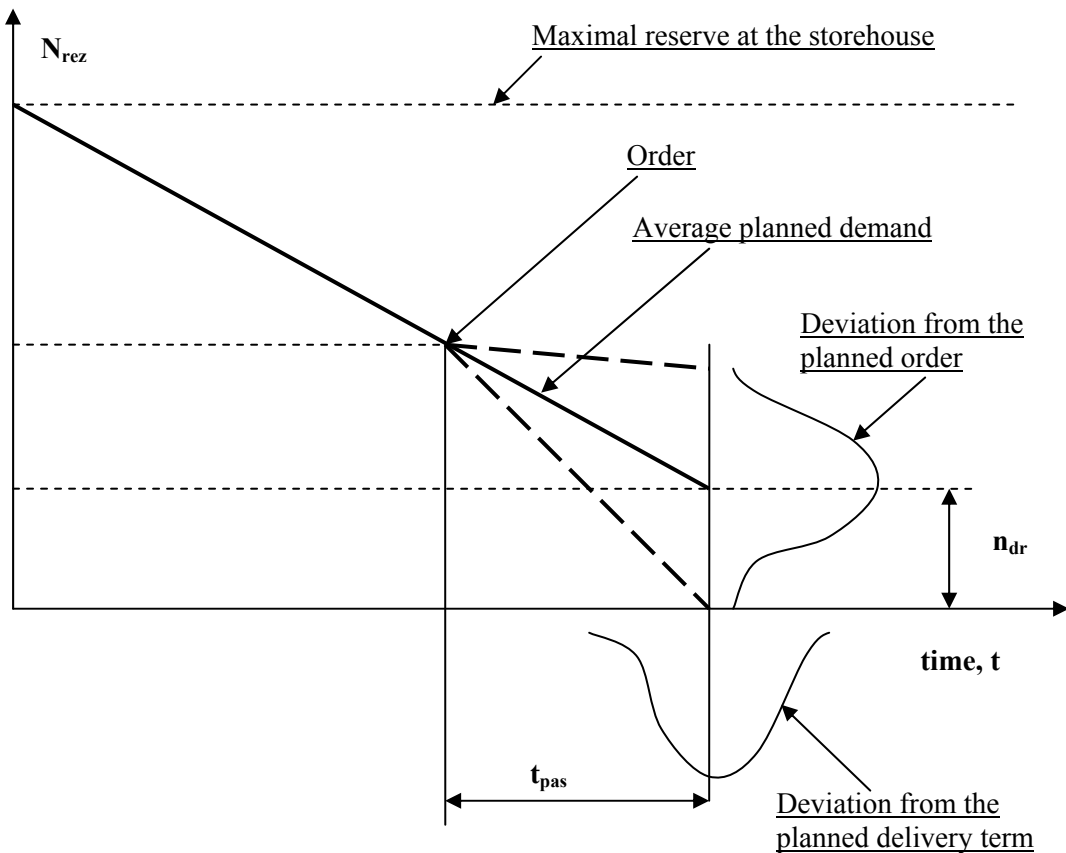

Fig. 1. **The scheme of order and delivery of spare parts**

The guaranteed or safety reservation of spare parts in the store house can be determined according to the dynamics of application of the appropriate spare part for a longer period of time:

$$n_{dr} = \sigma_i \delta,$$ (2)

where σ_i – average quadrangle deviation of the (usage) demand for a spare part;
δ – coefficient determining the probability of fulfillment of the demand (for instance, 80% or 100%).

So, the most attention should be paid to the control of the spare parts that are in a minimal amount in the storehouse and are used in technical service of automobiles. The control of the spare parts of this group is made easier by the fact that usage of these parts is strictly periodical. The periodicity of replacement of these spare parts is in the range from 10 to 60 thousand kilometers of coverage. The repetition point of the order depends on this periodicity.

The consumption of the spare parts depends also on the amount of the target customers that are using cars of the corresponding brand with the corresponding spare part.

The clients can be classified in two groups:

- clients servicing their cars in the service center;
- clients buying spare parts in spare part shops.

It is relatively easy to trace the clients of the first group as usually information on these clients and their automobiles is available electronically. The regularity of purchases by the clients of the second group has more probable character. If our storehouse is at a dealer enterprise, we can try to trace all the automobiles of the same brand in Latvia, nevertheless, these data may be inadequate as some of these clients can use corresponding non-original spare parts and do purchases at some other place.

It is especially important to supply the clients with the technical servicing spare parts during the guarantee time of the automobiles because the owner of the new automobile will not be able "to understand" the fact why during the regular servicing, for example, the oil filter has not been replaced in his automobile.

Based on the above analysis the average consumption of a spare part per year can be calculated:

$$n_g = \frac{A_n n_a l_g}{l_a}, \tag{3}$$

where A_n – number of automobiles where the corresponding spare part is used;
n_a – number of the corresponding spare parts on the automobile;
l_g – yearly coverage of the automobile;
l_a – coverage of the automobile in between servicing (for spare parts used in technical service) or average coverage of the spare part until replacement, km.

The average consumption of the corresponding spare part per day:

$$n_{pat} = \frac{n_g}{d_d} = \frac{A_n n_a l_g}{l_a d_d}, \tag{4}$$

where d_d – number of working days of the storage enterprise per year.

Placing formula 4 into formula 1 we get the enlarged expression of the repetition point of order:

$$N_{r,\min} = \frac{t_{pas} A_n n_a l_g}{l_a d_d} + n_{dr} = \frac{t_{pas} A_n n_a l_g}{l_a d_d} + \sigma_{dr} \delta. \tag{5}$$

Calculation of the repetition point of order for every spare part is a very time consuming task, nevertheless, it would be useful to do this calculation at least for the spare parts that are used in technical servicing of automobiles and for most often used current repair spare parts. Besides, if a new automobile model appears, the total number of these automobiles gradually increases. The spare part storage should be periodically informed about the increase of this number, and then the calculation of the repetition point of order will be more precise.

Besides, the control of the minimal spare parts is hindered by the factor that precise and relatively big intervals of order of spare parts occur, for instance, the spare parts are ordered every Wednesday but they are received on Tuesday. In this ease it must be taken into account and probably also those spare parts should be ordered that have only approached the repetition point of order as they can run out until the time when the next order is received (almost after two weeks).

In the era of today's technologies the calculation of the repetition point of order can be automated, besides, it is possible also to automate the correction of the number of the serviced automobiles.

Conclusions

1. The repetition point of order is one of the most essential parameters for ordering of automobile spare parts and its determination should be done as precise as possible.

2. The correction or recalculation of the repetition point of order depending on the increase of the corresponding modification of the automobile market part should be done not less than 2-3 times per year.
3. The elaborated method of calculation of the repetition point of order for the automobile spare part storehouse should be approbated in practice and substantiated safety reserve n_{dr} values should be elaborated.
4. The safety reserve changes depending on the group of spare parts. A higher safety reserve value is for the spare parts used in the technical service.
5. If the repetition point of order is determined precisely, it is possible to decrease the size of the storage that is scientifically substantiated and to supply the clients with the most demanded spare parts.
6. To do precise calculation of the repetition point of order a careful marketing analysis has to be carried out, the number of target clients and the yearly coverage of the automobiles of the corresponding brand should be determined or another kind of calculation should be done.

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