



The Problem of Excess and Obsolete Inventory Management on the Example of Spare Parts

Katarzyna Grondys

Czestochowa University of Technology, Poland
katarzyna_grondys@vp.pl

Iga Kott

Czestochowa University of Technology, Poland
igakott@interia.pl

Monika Strzelczyk

Czestochowa University of Technology, Poland
monika.strzelczyk@wp.pl

Abstract: The aim of the paper is to characterize the excess and obsolete inventory of spare parts which is kept to maintain the continuity of production of industrial enterprises. Obsolete technical equipment, the necessity of maintaining safety stock or excessive amount of stored goods are often the main reason of the obsolescence of spare parts whose value in use decreases with the passage of time. The structure of spare parts inventory stored in a warehouse at different times has been presented on a practical example with the indication of the main reasons of non-moving stock. In the optimum management it is important to maintain appropriate warehouse management. Therefore, the content of the paper has been extended with the basic indicators of the analysis of excess and obsolete inventory.

Keywords: spare parts inventory, excess and obsolete inventory, indicators of warehouse management

1 Introduction

To maintain the continuity of industrial production, apart from inventory of goods or production materials, spare parts are also important. These elements are gathered in

most of manufacturing companies, and their amount and value are conditioned, above all, by the level of technological development of the utilized equipment [1, 9]. The need for their possession mostly results from aiming at reduction in machinery downtime and avoidance of high costs connected with the above.

1.2 Types of stock

Generally, spare parts inventory can be divided, in accordance with the universal scheme, into:

- current inventory – stock of universal spare parts whose storage is to maintain an efficient production cycle,
- buffer inventory – safety stock which consists of spare parts which are critical for the production process,
- seasonal stock – inventory of spare parts gathered for a short time to implement production of a discontinuous type,
- excess and obsolete inventory – inventory of spare parts which are not suitable for use for a variety of reasons [2].

The most common problems of spare parts inventory management are connected with their significant surplus over the actual demand, obsolescence due to outdated machinery stock and lack of possibility of exchange of parts of a high degree of specification [3, 5].

1.3 The characteristics of spare parts inventory

Excess and obsolete inventory of spare parts, which amounts to the surplus of the amount of a specific spare part unnecessarily gathered in an enterprise, deserves a special attention in generating costs of stocks. It may also be the result of the outdated buffer stock, parts purchased along with equipment or parts which exceeded the warranty period. Particularly, in case of machinery working for more than 10 years there is a high probability of slow-moving stock items which were bought along with the purchase of the object or parts constituting safety stock [4].

The necessity to maintain this kind of inventory in a warehouse even for several years brings about that its usability, only during the process of storage itself, significantly decreases year by year. The costs of maintenance of excess and obsolete stock are generated in the framework of inventory carrying costs and are mainly connected with the cost of dating, which is considered in both physical and economic aspects [8].

To provide efficient spare parts inventory management, it is important:

- to recognize all spare parts possessed in a warehouse,
- to predict the future demand for parts,
- to carry out ratio analysis of stock,
- to develop management strategies for different types of spare parts,
- to expand the control system of spare parts,

- to formulate the tactics concerning capital investment and insurance of spare parts,
- to develop the strategy of exchange or repair of components,
- to regenerate components,
- to control stock,
- to create spare parts bank shared by local enterprises,
- to implement a favorable IT system for spare parts storage [10].

All these activities implemented successively allow to reduce the level of excess and obsolete stock while, at the same time, optimizing the entire spare parts inventory maintained in a warehouse.

2 Indicators of excess and obsolete inventory management

To reduce and properly manage excess and obsolete inventory, it is possible to use some indicators of warehouse management [6]. The first of them, the indicator of non-moving stock, specifies the level of slow-moving stock in a warehouse, which may be treated as excess and obsolete inventory, including the inventory of both obsolete and excessively gathered spare parts. Their analysis allows to indicate the reasons of their occurrence and also the possibilities of utilizing them.

The indicator can be expressed as the difference between the current inventory and the amount of resources coming from the last deliveries until the zero value is obtained and multiplying it by the number of days that have passed since the last delivery. The application of the FIFO method allows to identify the actually slow-moving stock in a warehouse. This indicator is calculated as:

$$ZM = \sum d \cdot I \quad (1)$$

where:

d – number of days of slow-moving resource by FIFO,

I – value or amount of slow-moving resources in a warehouse.

Ultimately, the analysis of excess and obsolete inventory ought to be started with comparing the level of stock with the assumed maximum level and assessing the usability of individual parts whereas, for the purpose of more detailed recognition, it is possible to use economic indicators. One of them is the indicator of completeness of stocks W_{kz} , which determines the level of coverage of standard inventory (in this case – the maximum level) within a specified period by the current inventory:

$$W_{kz} = \frac{Z_f}{N_z} * 100 \quad (2)$$

where:

Z_f – actual inventory,

N_z – the sum of a maximum level of stock of individual maintenance parts.

While considering the way of using excess stock, it is also possible to estimate the indicator of recently created excess and obsolete inventory, developed during a specified period W_{zz} for assessing the efficiency of the activities of the use of excess inventory and the index of the share of excess and obsolete inventory in the whole stock W_{zN} defines the size of excess and obsolete inventory:

$$W_{zz} = \frac{Z_{NN}}{Z_{NZ}} \quad (3)$$

where:

Z_{NN} – value of excess and obsolete inventory created during a specified period

Z_{NZ} – value of excess and obsolete inventory used during a specified period.

$$W_{zN} = \frac{Z_N}{Z_0} \quad (4)$$

where:

Z_N – value of excess and obsolete inventory during a specified period,

Z_0 – value of stock during a specified period.

To carry out an efficient analysis, it seems essential to compare the obtained results of measurements for the analyzed period with the indicators obtained for the previous periods or the commonly accepted norms and standards of using broadly understood production resources.

3 The evaluation of excess and obsolete inventory in the mass production company – case study

The phenomenon of slow-moving stock in case of parts for machinery and equipment, to some extent, allows to assess the level of excess and obsolete inventory which mainly result from the necessity to maintain security stock. The ranges established for observing the movement of a storage item are established individually depending on the needs of an enterprise. An important issue is the possession of machinery stock since, depending on a type and age of the applied production equipment, it is possible to observe diverse movements of stocks. A common division of inventory analysis by the time when spare parts take up storage space in a warehouse, expressed in the number of days when spare parts take up storage space, distinguishes the following periods:

- 1 - 180 days,
- 181 - 360 days,
- 361 - 720 days,
- 721 - 1080 days,
- more than 1080 days.

An exemplary structure of the share of spare parts by the time of taking up storage space is presented in Figure 1.

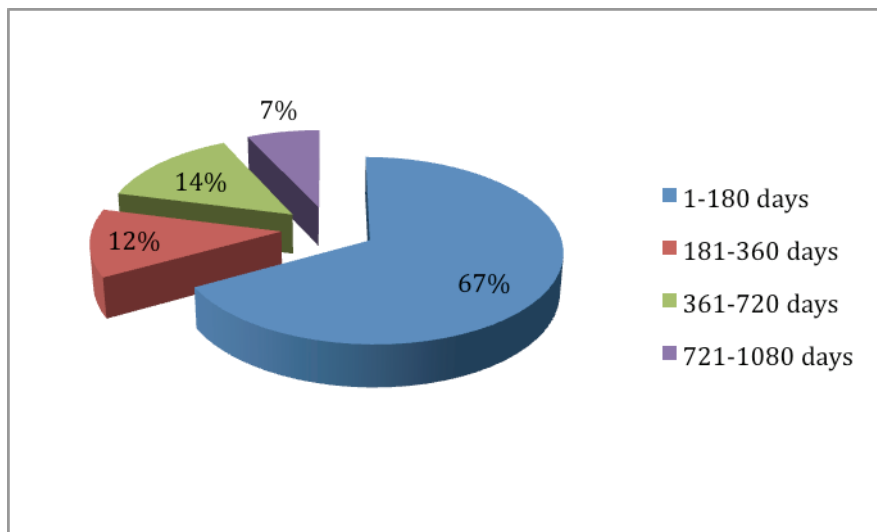


Figure 1.

The structure of non-moving spare parts in a warehouse by the time criterion in the analyzed company.

From among all the remaining goods taking up storage space for 3 years, the majority is in the range up to 6 months, while constituting more than a half, as much as 68% of all

the stocks maintained in the warehouse. While regarding the longest period for non-moving stock items, i.e. the period of more than 1080 days (more than 2 years), there have been registered more than 805 items which have not rotated in the examined industrial company within the last 5 years.

In the analyzed last 5 years more than 3 000 storage stock keeping units have not been issued from the warehouse, which amounts to 566 storage items, i.e. 3.19% of the entire warehouse of the total value of 374 806 PLN. Among them there are:

- 42%, i.e. 239 items of safety stock,
- 62% of the items withdrawn from use and the ones resulting from errors in orders.

These stocks can be recognized as excess and obsolete inventory which requires further analysis consistent with the information on the demand specified on the basis of the possessed equipment. Additionally, it was estimated that the number of parts not rotating for more than 3 years amounted to more than 5000 SKU of the total value of 192 679 PLN. These stocks negatively affect the activity of the entire enterprise since they are excessively gathered. They constitute about 20% of the whole examined stocks, i.e. the significant part of spare parts inventory.

Excessively gathered stocks consist of both obsolete spare parts, which currently are not used in the production activity, and the ones which are excessively gathered, i.e. not adjusted to the level of use. A high level of spare parts inventory maintained in enterprises is frequently not justified economically since spare parts stocks corrode, date or get damaged but, most of all, freeze capital. The main reasons of the occurrence of excess and obsolete inventory result from:

- technological changes in technical equipment (27%),
- changes in the production structure (42%),
- ordering parts at the level exceeding the actual needs for providing service to technical objects (23%),
- errors and mistakes in orders, resulting from differences in technical and construction parameters (8%).

Excess and obsolete inventory gathered in an enterprise ought to be sold, scrapped or used as soon as possible. The appearance of this type of spare parts inventory generates unnecessary costs and freezes capital. It is assumed that for these parts there are no economic and technical grounds for the purposefulness of their storage in a warehouse.

4 Conclusions

Excess and obsolete spare parts inventory constitutes one of the key problems of production management. On the one hand, the enterprise, while aiming at the maintenance of continuity of production, must provide spare parts inventory for machinery, and, on the other, slow moving stock goods may lose usability and value.

An efficient solution in case of standard spare parts, which are rarely picked up from a warehouse and which are applied in many industries, can be establishing cooperation between local users of these parts, i.e. the ones who run the same activity or use similar production equipment. For cooperating enterprises, creating a common warehouse of the selected spare parts would allow to maintain necessary buffer stock to minimize the time of downtime of equipment to reduce the level of occurrence of excess and obsolete inventory.

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