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Conference Paper

Problems of Evaluation and Optimization of Spare Parts Units to Ensure Continuous Operation of Enterprises

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Abstract

The article raises the problem of increasing the competitiveness of enterprises through the introduction of automatic calculations of supplied elements. Also, the features of providing enterprises with a sufficient number of spare parts, tools, accessories, and materials are considered. For correct and General understanding the basic concepts are introduced. The main problems of non-constant supply and calculation of elements to ensure continuous operation of enterprises are formulated. The model of delivery based on a manual inspection of all elements and calculate the right amount for your next purchase. Analytical solutions are given that allow for a more accurate calculation, based on constant observation, which tracks the full life cycle of the element of interest, and the early prediction that the system may fail.

Keywords: manufacturer, supplier, spare parts, tools, accessories, system sufficiency index, replenishment strategy, Internet of things.

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1. Introduction

Increased demands for stable and efficient operations have led to the need for better ways to improve the competitiveness and sustainability of enterprises [1].

Therefore, in modern conditions, the problem of ensuring the constant functioning of the supplier enterprise acquires special relevance and importance. Stable functioning is achieved as a result of carrying out measures to maintain the competitiveness of the enterprise and its products, namely, increasing the level of organization of production, the development of the scientific and technical base [1].

One of the indicators of quality of functioning of the enterprise-supplier is its reliability [2]. In turn, in the list of properties of technical means determining the reliability of work, an important role is assigned to the fitness of the supplier to maintain and restore the

working condition of the products [3] by timely delivery of the necessary elements from the manufacturers for maintenance and repair.

The possible shortage of spare parts increases the duration of replacement of the failed element with a serviceable spare, which can significantly affect the recovery time of the produced products. In this regard, the analysis of the sufficiency of spare parts at the supplier enterprises is important in improving the reliability of the enterprise itself [3].

Therefore, identification of features of calculation of elements of spare parts for ensuring continuity of work of the enterprise by means of the information system is a problem for this article.

2. Basic Concept

Spare parts, tools, and accessories are designed to constantly maintain the performance of products during operation [3].

The manufacturer is the manufacturer of any product. A supplier enterprise is an individual that supplies goods to customers.

Any organization listed below is responsible for the customers of the products.

Figure 1 shows the scheme of delivery of spare parts from the manufacturer to the warehouses of the supplier for further work with the products.

3. The Essence of the Problem of Calculation of Spare Parts to Ensure Continuous Operation of the Enterprise

While the new equipment is on warranty service, suppliers have formed reserves of spare parts, which allows for repairs in a short time and minimizes downtime [4].

In [4] considered the whole process of identifying the needs and supply of spare parts, which is divided into three stages and allows you to get certain benefits for all market participants. In this example, it was possible to create a similar ideal spare parts delivery plan, suitable for any relationship between the manufacturer, the supplier and any organization. (Fig.2)

The first stage includes inspection of the product after the completion of the techno- logical cycle of its use. Specialists participate in the inspection. According to its results, a statement is drawn up, which indicates the list of working units or parts of the product in which defects are identified and their possible life before replacement is established.
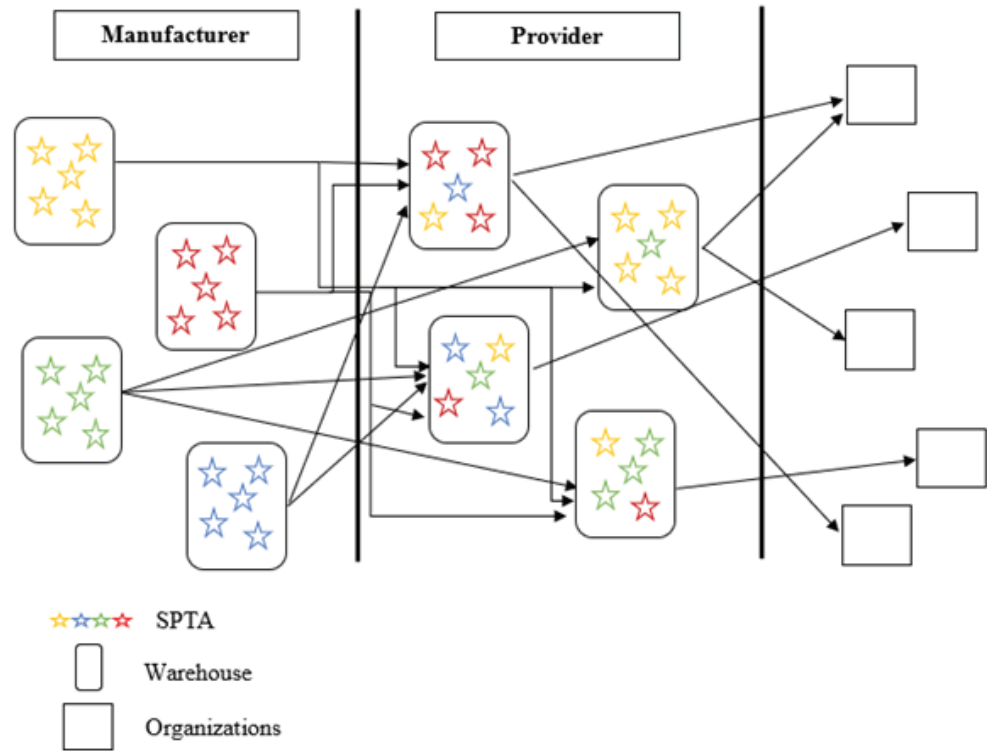
Figure 1: Scheme of the interaction of enterprises and organizations.

Together with the head of the organization the periods and volumes of deliveries of spare parts, tools and accessories are coordinated, proceeding from the plan of carrying out repair and preparatory works in the forthcoming year.

At the last stage delivery to warehouses of the enterprise-supplier is carried out and acceptance control of the quality of spare parts is carried out. After the full calculation, the customer (organization) delivered his order.

But now most often spare parts of a product are ordered directly at breakage that essentially complicates the process of planning of their delivery from the manufacturer to factory-supplier and, directly, to the client.

The customer requires to replace the faulty element of the system, but the organization that is engaged in the supply of goods may refuse due to lack of spare parts in warehouses calculated according to the requirements of this standard [5]. This is due to the initially incorrect calculation of the necessary spare parts, tools, and accessories, which are supplied either in short supply or in excess, which leads to obsolescence and further uselessness of these spare parts.
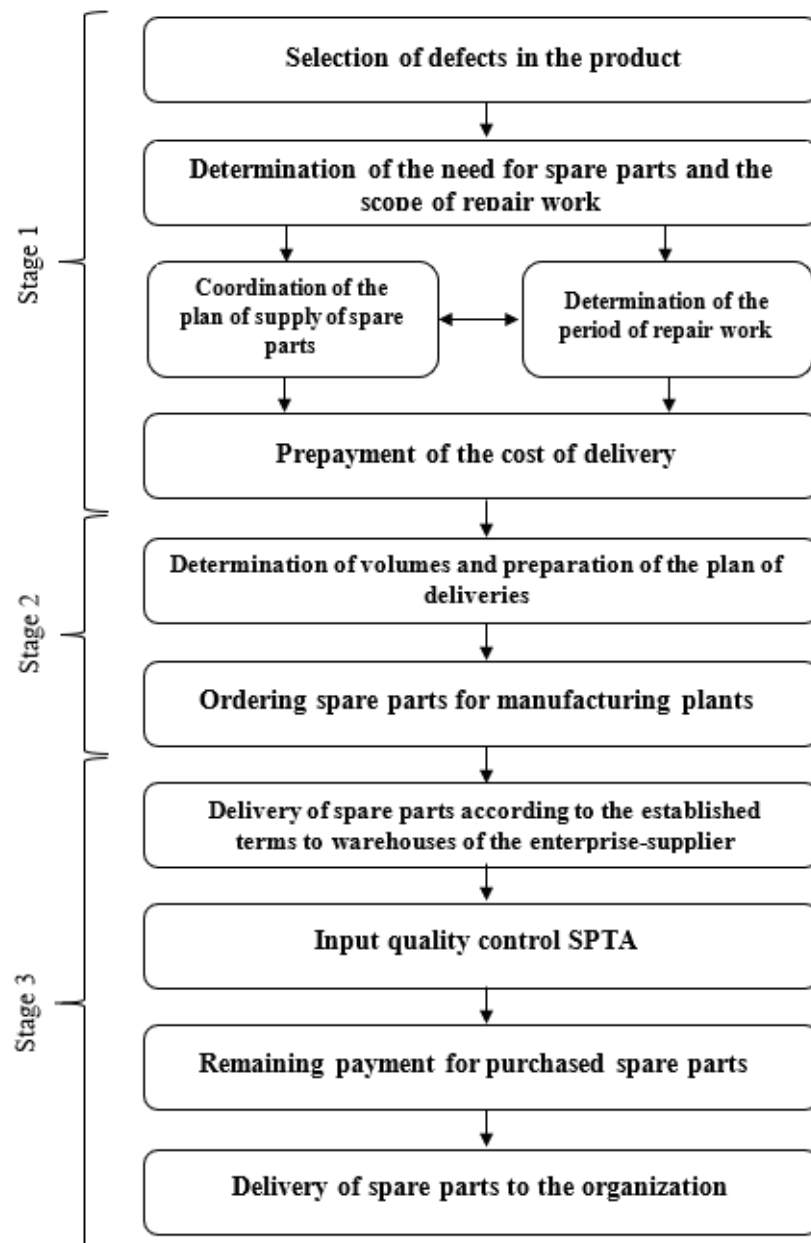
Figure 2: The delivery process of spare parts.

4. Problem Solution

Since not every organization can be ideal calculations with the help of schemes and compliance with the permanent plan presented as an example above, it is therefore proposed to develop an information system for automatic calculation of spare parts to ensure continuously (due to lack of spare parts, for example) the work of the enterprise. This information system will independently calculate the required number of spare parts,

tools, and accessories, based on constant monitoring which monitors the full life cycle of purchased products required for delivery from the manufacturer to the supplier, to eliminate and avoid shortages or excessive supply of products to warehouses. It can also be (recommended) used with the Internet of things to predict in advance that the system may fail, and it is time to recalculate for the supply of new items. Problems of evaluation and optimization of spare parts composition to ensure continuous operation of enterprises.

In automated planning the supply of spare parts within aftermarket products it is advisable to use the likely analytical model which allows to predict the dynamics of changes in the number of CC in the warehouse of the customer and provide budget planning to maintain a given level of health operated products [6].

5. Conclusion

Further development of the presented solution is to build and develop algorithms and mathematical models to create an optimal information system to reduce threats risks achieving the goals of this work.

In the proposed work, the proposed approach to solving the problem is quite universal, which suggests the possibility of its application to solve the problems of cost management and not only the life cycle of products in various systems of the organization [6].

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