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Gauges Manufacture Process Planning Automated Control System at an Industrial Enterprise

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Abstract

The results of the research of the Department of Automated Mechanical Engineering in the improvement of the existing process of planning the manufacture of gauges based on its automation and the use of high quality management technologies at the industrial enterprises are presented. The necessity to optimize the management of material stocks during the delivery is substantiated along with the creation of functioning logistical networks of the minimum necessary stock volume providing for the proper functioning of the enterprise, manufacturing, advancement, and sales of finished products at all levels (from suppliers of raw materials to final product users). The results of the analysis of basic approaches for the solution of the problem of storekeeping at the enterprise, marketing researches, the ABC XYZ analysis and stock normalization based on the method "Kanban" are given. The possibility of using modern software to solve the problems of storekeeping optimization and determination of stock norms is shown.

The results of the stock normalization process automation, creation and introduction of the report and instructions for users of the "Electronic Kanban" are presented. The results of the work were tested and introduced in the industrial enterprise. They allow reducing the volumes of accessories purchased for the products assemblage, reducing the expenses connected with the storage of accessories and finished products in storehouses; cutting the costs associated salary of the staff producing unrequired products, and with the recheck of products being in stock for more than a year.

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1. Introduction

In modern conditions of the national economy with sharp deficiency of free money funds at accounts of separate companies and enterprises, of great importance is the problem of management optimization of material stocks in delivery chains, that is the creation at all levels of logistical networks of the Russian Federation (from suppliers of raw materials to final users of products) of the minimum necessary volume of stocks for the appropriate work of enterprises manufacturing, advancing and sailing finished products. Some researches reflect domestic and foreign experience of the theoretical, applied and methodical work in resource management areas, mainly in material resources. However, some questions are still debatable and need further studying [1].

The aim of the research and of the project realization which was carried out by the Department of Technology of Automated Mechanical Engineering of the South Ural State University (SUSU) was to improve the existing process of planning the manufacture of gauges on the basis of automation of the development of high technologies of quality management in the NPK "TEKO" Joint-Stock Company.

Nomenclature

Q	the number of starting in a month
t_{min}	time of manufacturing of the minimum lot
P_{sd}	average daily requirement
H_{min}	minimum lot of the starting
TS_{max}	demanded maximum stocks
P_{min}	the minimum lot of the starting
TS_{sd}	average stocks
TS_{min}	minimum stocks
Q_{start}	the quantity of products in manufacture
$W_{remainder\,sgp}$	remainders in a storehouse
$Q_{start}^{/}$	the quantity of started products for the replenishment

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2. Urgency and research hypothesis

The NPK "TEKO" Joint-Stock Company develops and produces gauges for the automation of technological processes, safety and control systems. They include inductive gauges, optical gauges, capacitor gauges, magnetic-susceptible gauges, touch buttons, etc.

The urgency of the research and of the project realization was proved by the analysis of existing problems of the enterprise, such as:

- Absence of marketing researches;
- Low level of customers` satisfaction connected with the promised date (below 60 %);
- Non fulfillment of planned terms of the products` output (23 days instead of the declared 14);
- Packaging of storehouses with finished products, including non-liquid or requiring a recheck (23 %), and with accessories (for several months a year);
- Absence of statistics, including dynamics of available stocks (for months, seasons, changes during realization and other data);
- Instability of the formation of the suppliers` list (frequent changes of suppliers due to the delivery of inappropriate accessories, etc.);
- Absence of the VIP-clients` list and the information about the required products.