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SPC METHOD OF STATISTICAL CONTROL OF PROCESSES

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Abstract: In recent decades, the concept of quality has become more and more important. As for the production process, the implementation of quality control allows manufacturing enterprises to develop a high-quality product, which positively affects consumer satisfaction. This article aims to reflect the importance of the method of statistical control of quality processes. In this article, the SPC (Statistical Process Control) method of statistical control of processes, which is one of the effective methods used to prevent inconsistency in technological processes, is explained.

Keywords: quality control, economy, production, statistical method, variability, control card.



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Introduction

The development of quality and control studies using statistical methods is very important for any industry in which products are produced, as it allows to reduce the variability of products and thereby reduce production costs. Through this quality control, it is possible to identify possible defects, take appropriate measures, and propose the final design of the product adapted to production. In addition, the correct implementation of statistical methods allows the certification of quality management systems (ISO standards), which can lead to a number of advantages in front of the market, as it allows to better ensure the image of the products offered by the production enterprises and creates an opportunity to increase the number of consumers or the volume of sales.

Methods

Statistical methods of quality control in production enterprises have been gaining importance over the years. So, just as the importance of quality outweighed the uptime, the same happened with this concept. In addition, these statistical methods of quality control can be adapted to any production enterprise and increase their efficiency. According to his information, the concept of quality consisted of the following four stages:

Quality Control, 1940-1959. At this stage, quality is defined as the approval of specifications, so it is aimed at verifying these product specifications through inspection and control methods in order to prevent incorrect products from reaching consumers, which implies high costs;

From 1960 to 1979, quality was defined as usability. During this period, the peak of production enterprises emphasizes the importance of quality in the global and strong competitive market. This idea encourages manufacturing enterprises to create a quality management system. In this case, quality is no longer a high-cost investment, but a competitive advantage.

During the years 1980-1999, quality was defined by customer satisfaction, known as total quality, which aimed to respond to the quality of products, services and management. Therefore, quality is now not only the responsibility of the quality and production department, but is extended to all departments of the production enterprise.

Business Excellence, 2000 to Present. This is the last period of evolution of the concept of quality. At this stage, quality is defined as customer satisfaction and cost effectiveness. Customer satisfaction is understood as the consumer's appreciation that their needs, wants, or expectations have been met.

Assume that the original manufacturer of the product, while making a product, has removed the non-conforming products while controlling the subsequent ones. In some cases, checks and corrections were made in order to eliminate errors. Both of these situations lead to waste of time in product preparation and service, as well as loss of preparation and packaging materials. Economists and marketers emphasize that the strategy of producing a product without defects and thus paying attention to cost-effectiveness always pays off. This strategy is used by most employees to "get it right the first time!" can be conveyed with the slogan. However, the expected result cannot be achieved by following this slogan alone [1]. Therefore, in this article, we are talking about the SPC (Statistical Process Control) method of statistical control of processes, which is one of the effective methods used to prevent inconsistencies in technological processes.

Results and Discussion

First of all, the RS methodlet's talk about. It was developed in the 1960s by the Automotive Industry Standardization Group (AIAG) and the Automotive Section of the American Society for Quality Control (ASQC).

In 1990, Chrysler, Ford and General MotorsAIAG, in coordination with the supplier certification and quality assessment group, developed the SPC method as a guide and began requiring its suppliers to use it[2]. Clauses 8.1.1 and 8.1.2 of the international (UzDSt ISO/TS 16949:2011) standard of the quality management system in the automotive industry include the following, i.e. [3]:

- that the appropriate statistical methods (SPC) for each process are defined in the future product quality planning and management plan;
- the key concepts of variance, stability management, process capability (Cpk Ppk) and redundancy need to be understood and applied throughout the organization.

The main focus should be on understanding the elements of the statistical process control system:

- work on the process management system (supplier, consumer, 5M, data efficiency, process and product);
- study the impact of variability (common and special causes) on process output;

- correction of variability caused by local (15 percent by participants in the process) and system (85 percent by management);
- managing the process and its repeatability;
- applying the process improvement (PDCA) cycle;
- control card and its application.

Statistical process control tool - the advantage of using a control card:

- the worker (operator) process can control its current state;
- helps the process to work stably, ensures quality and low cost; - the defect is prevented;
- increases quality;
- reduces the cost of a single product;
- increases production productivity;
- a common common language for analyzing the possibility of processes emerges;
- causes of variability are divided into usual and special, they are directed to local or systematic measures.

A control chart is a graphical display tool in a statistical approach and is used to control production processes. The application of the control chart to production processes was first proposed in 1924 by Dr. U. Shukhart. The purpose of the control chart is to identify inconsistent changes in the results of a repetitive process and to find criteria for areas where statistical control has not been established.

The purpose of statistical process control is to maintain and maintain processes in a favorable and stable (steady) state and to guarantee that the product or service meets the requirements. The control card is widely used to record the results of product quality in processes, to monitor progress within the specified limits, to determine the state of statistical control of processes and to maintain this state. Control card application. Before using the control card for quantitative results, the following should be done:

- creating a comfortable environment;
- provision of resources;
- ensure that process (equipment, material, method, environment and human) relationships and effects are understood and understood;

- determining the measurement description, which description should be put on the card, taking into account consumer requirements, existing and possible problems, and correlations between descriptions;

- the measurement system should be defined, the description should be measured during the workflow and the results should be communicated to all interested parties. Display information about measurement and measurement tool;

- minimize variability by considering all effects.

When determining the measurement volume, sample frequency and number of groups for drawing up a control card:

- in determining a sufficient group, one should choose such a group that shows internal variability.

From production, from 4-5 consecutive products in a short period of time, the number of samples should be the same in all groups;

- the sample frequency can be selected for a short period of time until the stable state, and in the stable state it can be extended.

Changes can be in breaks, shifts and material batch exchange, environment, etc.;

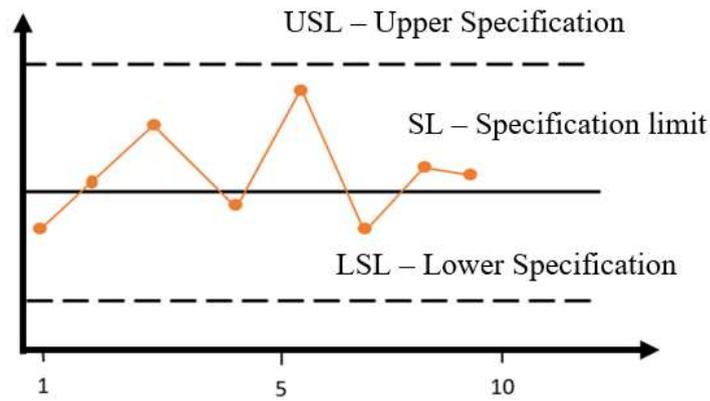
- Determining the size of the groups - it is necessary to select enough groups so that all causes of variability are revealed. There can be 25 or more groups containing more than 100 individual values.

Studying the requirements of the control card mentioned above, a computer program was developed to control the specific specifications given by the "Control Plan" in the company "Oz Dong Won Co" and applied to the alternative results of quantity (1st Fig.) and brought to the state of statistical control of processes [2].

USL – Upper Specification Limit;

SL – Specification limit;

LSL – Lower Specification Limit.



1st Fig. The alternative results of quantity

Quality is a necessary element in any manufacturing enterprise as a key requirement for achieving competitive advantage and achieving a relevant market share. However, manufacturing enterprises are not only looking for product quality. but also need to study the requirements of the customers. Therefore, manufacturing companies focus more on the customer than their products, because if the customer receives a defective product, the manufacturing company loses its authenticity.

Conclusion

In turn, these properties are evaluated according to what are called specifications. The components that make up this product are:

1. required measurements of quality indicators found in small parts;
2. desired values for quality indicators in the final product.

The desired value for a quality characteristic is known as the target or nominal value, the minimum allowable value for this characteristic is called the Lower Specification limit (LSL), and the maximum allowable value is called the Upper Specification limit (Upper Specification limit-USL) [4].

If a product does not meet any of the specifications, it is considered non-conforming, but this does not mean that it is not suitable. Therefore, it is described as a deviation from a quality characteristic with respect to a corresponding value or state.

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