
**ADVANCED QUALITY MODELS AND CONTROL TOOLS FOR
INDUSTRIAL PRODUCTION PROCESSES**

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Annotation

This article presents the main principles and methods of development of quality models and the creation of quality management tools in order to optimize production processes and improve product quality in industrial enterprises. The issues of using qualimetric models in the production process, the introduction of statistical and automated tools for quality control are analyzed.

Keywords: quality control, qualimetric modeling, metrology, innovative technologies.

Introduction

Modern industrial enterprises in the face of global market requirements and competition require effective production management and continuous improvement of product quality. To achieve this goal, it is important to develop and apply qualitarian models and quality management tools. Qualimetric models rely on mathematical and statistical foundations that make it possible to measure and control product quality. At the same time, quality management tools include modern technologies and methods for quality assurance at all stages of the production process.

Development of qualimetric models

Quantitative models are one of the main tools for analyzing production processes and evaluating product quality. These models are developed in the following steps:

1.1 Determining the parameters

Identifying the factors that affect product quality is an important step in improving the efficiency of the production process. These parameters include:

- Quality of raw materials.
- Stability of the process.
- Parameters of technological processes.
- 1.2 Establishment of evaluation criteria

Quality criteria are defined for each parameter. For example, physicochemical properties are evaluated as dimension accuracy or aesthetic indicators.

1.3 Mathematical modeling

Through mathematical and statistical methods, the correlation of product quality and production parameters is determined. For this purpose, regression analysis and multi-criteria estimation models are used.

1.4 Model testing and optimization

Through practical application, the effectiveness of the model is tested and adapted to production conditions.

Approaches to creating quality management tools

Quality management tools serve to ensure quality at all stages of the production process. These tools are divided into the following types:

2.1 Statistical control tools

- Statistical Process Control (SPC): Used for continuous monitoring and analysis of product quality.
- Pareto diagrams: Used to identify the main factors that affect quality.
- Seabab-Aftermath Diagrams: Used to analyze the causes of problems.

2.2 Automated control systems

- IoT technologies: Real-time monitoring and management of the process using sensors.
- Machine Learning Algorithms: Predict quality through data analysis.

2.3 Integrated management systems

- management of all stages of production processes in a single system, by integrating quality management modules into ERP systems.
- Implementation of quality management systems in accordance with ISO 9001 standards.

Practical Theology

The implementation of qualitarian models and quality control tools in the industrial enterprises is carried out through the following steps:

1. Process analysis: Identify current conditions and problems in production.
2. Introduction of technological changes: Introduction of modern tools and methods.
3. Staff training: Training of qualified personnel for work with quality management systems.
4. Monitoring and Optimization: Continuously monitor and improve process results.

Conclusion

The use of qualimetric models and quality management tools in the production and development allows the industrial enterprises to improve product quality, ensure production efficiency and strengthen their competitiveness. By combining approaches such as statistical control, IoT technologies, and automated control systems, manufacturing processes can be optimized. In this direction, the exchange of research and practical experience plays an important role.

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