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IMPROVING THE EFFICIENCY OF MEASUREMENT RESULTS IN METROLOGICAL SUPPORT OF PRODUCTION

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Annotation:
The correct choice of measuring instruments increases the efficiency of the required accuracy of the obtained measurement results, which is the basis of metrological support of production.

Keywords: result, production and testing, metrological examination, metrological support of production, error, efficiency

Аннотация: Правильный выбор средств измерений повышает эффективность требуемой точности полученных результатов измерений, что является основой метрологического обеспечения производства.

Ключевые слова: результат, производства и испытания, метрологическая экспертиза, метрологическое обеспечение производства, погрешность, эффективность.

Introduction

The effectiveness and reliability of the obtained measurement results indicates the receipt of accurate values of the studied product indicators, criteria for ensuring metrological support of production. Metrological support deals with the establishment and application of scientific and organizational foundations, technical means, rules and regulations necessary to achieve the unity and required accuracy of measurements. [1]

Metrological support of production mainly includes:

- ensuring the uniformity of measurements in the development, production and testing of products;
- analysis and establishment of a rational nomenclature of measured parameters and optimal standards of measurement accuracy in the control of product quality indicators, process parameters, control of technological equipment characteristics;

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- organization and provision of metrological maintenance of measuring instruments: accounting, storage, verification, calibration, adjustment, adjustment, repair;
- conducting an analysis of the measurement status;
- establishment of a rational nomenclature of measured quantities as well as units of measurement and the use of measuring instruments of appropriate accuracy;
- verification and calibration of measuring instruments;
- development of measurement techniques to ensure the established standards of accuracy;
- carrying out metrological examination of design and technological documentation;
- supervision of control, measuring and testing equipment in real operating conditions, in compliance with established metrological rules and regulations;
- ensuring reliable accounting of the consumption of material, raw materials and fuel and energy resources;
- introduction of modern methods and measuring instruments, automated control and measuring equipment, measuring systems;
- assessment of technical and economic consequences of measurement inaccuracy;
- development and implementation of regulatory documents regulating the issues of metrological support;
- assessment of economic efficiency.[4]

Metrological support of production contributes to the optimization of process control, the efficiency of the choice of measurement, control and testing tools, compliance with the requirements of standards in the production process, thereby maintaining the quality of manufacturing products. The effectiveness of the choice of measuring instruments is ensured by taking into account the totality of an interconnected system of metrological characteristics, operational and economic indicators.

For production measurements, the most significant are the following metrological characteristics of measuring instruments: measuring range; range of readings; accuracy class that determines the errors of measuring instruments and instruments, depending on the purpose. At the same time, a necessary condition for the correct choice of measuring instruments is the compliance of its metrological characteristics with the following conditions: the range of readings of measuring instruments must be larger than the measured size; the maximum measurement error using the selected measuring instruments should be less than the permissible measurement error. [3,2]

Operational indicators include reliability characteristics that determine the qualitative performance of the specified functions by measuring instruments, depending on the operating conditions. The reliability of measuring instruments is understood as the preservation of normalized metrological characteristics of measuring instruments during operation, storage or transportation under specified operating conditions.

The composition of economic indicators includes a whole range of works including the cost of measuring instruments, the time spent on installation, on the measurement process, the duration of their work before repair, the duration of time for re-installation, the cost of training a qualified operator.

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Since measurements are an integral part of most work processes, the cost of providing and carrying out measurements can reach up to 20% of the total cost of production.

For quantitative measurement of product characteristics, it is necessary to: select parameters, characteristics that need to be determined; establish the degree of reliability with which the selected parameters should be determined, set tolerances, accuracy standards; select methods and measuring instruments to achieve the required accuracy; ensure the readiness of measuring instruments to perform their functions by comparison with appropriate standards, exemplary measuring instruments; ensure accounting or creation of the required measurement conditions; provide processing of measurement results and evaluation of error characteristics. [2]

The measurement errors specified in the regulatory documents are the maximum permissible. They include a full range of work performed: selection of measuring instruments, changes in ambient normal measurement conditions, etc.

The possibility of applying the obtained measurement results for the correct and effective solution of any measurement problem is determined by the following three conditions:

– measurement results are expressed in legalized units;
– the values of the accuracy indicators of the measurement results are known with the required specified reliability;
– the values of the accuracy indicators ensure optimal determination of the required measurement results in accordance with the selected standard criteria.

If the measurement results satisfy the first two conditions, then everything is known about them that is necessary to know in order to make an informed decision about the possibility of using them. If the third condition is met for applying the obtained values in various combinations, in various industries, then this means that the unity of measurements is ensured.

The main initial data for the selection of measuring instruments and methods for monitoring product indicators are:

– the nominal value and the difference between the highest and lowest limit values of the measured value specified in the regulatory documentation;
– measurement conditions.
– permissible errors of measuring instruments;
– scale division price;
– sensitivity threshold;
– measurement range, mass, linear dimensions, overall dimensions, workload, etc.

The choice of measuring instruments for accuracy is made by summing up the errors of all the measured parameters included in the system of measures.

Product quality assurance largely depends on the successful solution of issues related to the accuracy of measurements of quality parameters of materials, raw materials and components, maintaining the specified processes of technological modes. The effective functioning of the metrological support

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system of production is based on the requirements of intensive scientific and technological progress reflected in the updated regulatory materials. [1,3]

It follows from this that metrological support is the most important component of the functioning of modern production, that the correct choice of measuring instruments depends on the type of production, the parameters of the product indicators for which measurements will be made, taking into account the measurement conditions and using methods of selecting measuring instruments.

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