УДК: 006

Yusupov A.R.,
Candidate of Technical Sciences, Associate Professor
Ferghana Polytechnic Institute. Uzbekistan, Ferghana

THE PERMISSIBLE ERROR OF THE MEASURING DEVICE AND THE RULES FOR CHOOSING THE MEASURING INSTRUMENT

Annotation: the marginal allowable error of a measuring instrument is the greatest error that a measuring instrument can be considered fit and allowed to use. When choosing measuring instruments, the following rules are followed: the accuracy parameter of the measuring instrument must be sufficiently higher than the accuracy of preparation of the object being measured. The labor requirement and cost of measurements should be small enough to ensure as high productivity as possible as well as savings.

Keywords: physical size, measuring instrument, measurement accuracy, selection

Yusupoy A.R.,
texnika fanlari nomzodi, dotsent
Farg'ona politexnika instituti. O'zbekiston, Farg'on

O`LCHASH VOSITASINING RUXSAT ETILGAN XATOLIK CHEGARASI VA O`LCHOV VOSTASINI TANLASH QOIDASI

Annotatsiya: o`lchash vositasining chegaraviy ruxsat etilgan xatoligii o`lchash vositasi yaroqli hisoblanib, ishlatishga ruxsat berilishi mumkin bo`lgan eng katta xatolikdir. O`lchash vositalarini tanlashda quyidagi qoidalarga amal qilinadi: o`lchash vositasining aniqligi parametri o`lchanayotgan buyumning tayyorlanish aniqligidan yetarlicha yuqori bo`lishi kerak. O`lchashlarning mehnat talabligi va tannarxi, imkoni boricha yuqori ish unumdorligini hamda tejamkorlikni ta'minlaydigan darajada oz bo`lishi kerak.

Kalit so'zlar: fizik kattalik, o`lchash vositasi, o'lchash aniqligi, tanlash

Introduction

When analyzing the results of measurements, the actual quantities of physical quantities are compared with the results of the measurement [1,2]. The difference between the measurement result (X) and the actual amount (Q) of the magnitude being measured is called the error of measurement of the moment.

$$\Delta = X - Q \qquad (1)$$

The measurement results and the quality level indicating how close the actual quantity of the magnitude being measured are called the accuracy of the measurements.

Materials and methods

This includes empirical methods such as modeling, fact, experiment, description and observation, as well as theoretical methods such as logical and historical methods, abstraction, deduction, induction, synthesis and analysis. The research materials are: scientific facts, the results of previous observations, surveys, experiments and tests; means of idealization and rationalization of the scientific approach.

Measurements classify errors according to the causes and type of formation. In terms of the reasons for formation, size errors are decomposed into the following compositions.

The method error is the result of the imperfection of the measurement method. The style error is also structural and consists of a set of errors, such as some organizers: the display error of the instrument, the error associated with changes in tempe The count error is the result of not getting a sufficiently accurate count from the measurement results, and depends on the personal characteristics of the count taker.

Tool error is the measurement tool error applied. The measurement tools error is divided into basic and additional errors. As the main error, errors characteristic of measuring instruments used under normal (regulatory) conditions are acceptable. An additional error is made up of the error caused by the measurement exchanger error and deviations from regulatory conditions. With fixed error limit setting, the errors of measuring instruments are normalized.

The marginal allowable error of a measuring instrument is the greatest error that a measuring instrument can be considered fit and allowed to use.

When choosing measuring instruments, the following rules are followed:

The accuracy parameter of the meter must be sufficiently high as the accuracy of preparation of the object being measured.

The labor requirement and cost of measurements should be small enough to ensure as high productivity as possible as well as savings.

Insufficient accuracy of measurements leads to the release of part of the suitable product into the defect, at the same time to the acceptance of the defect as a suitable product. The excessive accuracy of measurements is usually the cause of excessive labor demands and costs that go to control the quality of products.

Results and discussion:

When choosing measuring instruments, the organizational, technical conditions of the implementation of the control or measurement process, the specific aspects of the controlled details in the system, the accuracy of preparation, as well as the effectiveness of the use of measuring instruments and a number of other factors affecting Metrological indicators are considered.

The main factors to follow when choosing measuring instruments:

type of production;

structural features and dimensions of controlled details;

the error of measurements allowed by standards.

The most fundamental factor in the choice of measuring instruments is the permissible error of measurement served by the Met of the moment.

the amount of met depends on the input of the preparation of the detail, t, which in turn is related to the nominal size and the quotient.

The fixed measurement error of the nut must be smaller than the controlled insertion T of the met object.

The basic principle of the choice of measuring instruments is based on the cross-comparison of the measurement error allowed by the marginal (most likely) correspondence of the dimension (the moment of the moment). Often the allowable measurement error (e.g. met) is found with respect to the preparation position (T) of the detail by the formula:

$$\Delta_{met} = (0{,}2 - 0{,}35)T \qquad (2)$$

Thus, when choosing a measuring instrument (instrument), its marginal error is compared to the permissible measurement error (a MeT of a circuit). In this case, the fulfillment of the following relationship is checked:

$$\Delta_{lim} \leq \Delta_{met} \qquad (3)$$

At the expense of measurement errors, the separately measured X size is not calculated in general as the actual amount of this size. It is necessary to make several measurements to assess the accuracy of the measurement and determine the amount of the magnitude being measured at a certain probability. In this case, instead of the actual amount of the magnitude X being measured, its average arithmetic amount is assumed to be:

$$\overline{\chi} = \frac{1}{N}\sum_{i=1}^{N} x_i \qquad (4)$$

where N is the number of measurements; xi is the result of a separate measurement:

So that we have to X let's have a causal equality, to assess the accuracy of his probable infallibility to know the moment, i.e. $\overline{x}$-eβ<x< $\overline{x}$+ eβ

Conclusion:

Using the styudent distribution, here: TG is the coefficient of probability of reliability it is the probability of reliability and the degree of freedom depends; s is the value of the average arithmetic deviation of the measured magnitude x [5]:r the amount of probable error can be estimated by the reliability of the output, or vice versa, through the given reliability of:

It is possible to evaluate the reliability of the result by means of a given amount of probable error by a given amount of error, or vice versa, the probability error by a given reliability of the result is found in the cell of a given error:

$$e\beta = tg\beta S/\sqrt{N} \qquad (5)$$

where: TG is the smoothness coefficient u reliability probability depends on the degree of freedom of the moment and the degree of freedom of the moment; s is the value of the arithmetic mean deviation of the measured magnitude x [5]:

$$S = \sqrt{\sum_{i=1}^{N}(x_i - x)^2 / (N-1)} \qquad (6)$$

As a degree of freedom (K), the quantity reduced by the number of observations (N) equal to the number of details(1) being determined is accepted (K=N-1). At a certain degree of freedom in K, one finds the Styudent coefficient by giving reliability:

$$tg\beta = e\beta/\sigma_x = e\beta\sqrt{N/\sigma}, \qquad (7)$$

($\sigma_x = \sigma/\sqrt{N}$). where the mean square error for a set consisting of quantities σ_x - N mean is, ($\sigma_x = \sigma/\sqrt{N}$).

You tgβ and σ_x the value of x is known, then $e\beta = tg\beta\cdot\sigma_x$, σ_x can also determine the interval for greater reliability. Then the measurement result can be written as follows [6]:

$$x = \bar{x} \pm e\beta . \qquad (8)$$

References:

1. O`zbekiston Respublikasi Prezidentining 2021 yil 2 iyunь PF-624-sonli “Texnik jihatdan tartibga solish sohasida davlat boshqaruvini tubdan takomillashtirish to`g`risida” Farmoni

2. O`zbekiston Respublikasi Prezidentining 2021 yil 2 iyunь PQ 5133-sonli “O`zbekiston Respublikasi Investitsiyalar va tashqi savdo vazirligi huzuridagi O`zbekiston texnik jihatdan tartibga solish agentligi faoliyatini tashkil etish chora-tadbirlari to`g`risida” Qarori

3. Tojiyev R.J., Yusupov A.R., Rajabova N.R. Qurilishda metrologiya, standartlash va sertifikatlashtirish [Matn]: darslik / R.J. Tojiyev, A.R. Yusupov, N.R. Rajabova. – Toshkent: «Yosh avlod matbaa», 2022 – 464 b.

4. Tojiyev R.J., Yusupov A.R.. Metrologiya, standartlashtirish va sifat nazorati. O`quv qo`llanma. Farg`ona.: FarPI,«Texnika» noshirlik bo`limi. 2003-328 bet

5. Sergeyev A.G., Kroxin V.V.. Metrologiya. Uchebnoye posobiye. M.: Logos, 2001. -408 s.: il.

6. O‘z RH 51-095:2000*. Методические указания по составлению карты технического уровня и качества продукции.