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PROCESSING MEASUREMENT RESULTS

Annotation: many productions, whose technological process involves perfected control operations, use highly efficient mechanized and automated measurement and nnazorat tools. The main factor in choosing a measuring instrument in production is the permissible Metrological error of the instrument (Δmet).

Keywords: error, random, systematic, rough, measurements, dosing, production, metrological error of the device

Introduction

During any measurement process, errors of different appearance occur. The measurement results cannot be considered reliable without evaluating their impact on the results of the measurement, without studying the causes of origin, without identifying ways to eliminate them [1] .

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.

When a random error is called a maboyne measuring only one magnitude over and over again, a random variable is understood to be a measurement error. These errors are caused by unexpected causes (changes in the frequency and voltage of the current,shrinking collisions of sensitive elements of the sensors, instrument vibration, variability of the measurement force and x.) is due to dressing.there are laws that relate to the extimoli of the occurrence of random errors. They refer to random values as taximization laws. Random errors, the occurrence of which is due to a large number of reasons (but none of these reasons do not have the right to know), are subject to this law [2].

Results and discussion:

The random error value is then estimated by the mean quadratic error (t).

$$\sigma=\sqrt{\frac{(x_1-\bar{x})^2-(x_2-\bar{x})^2+\ldots+-(x_i-\bar{x})^2}{n-1}}=\sqrt{\frac{1}{n-1}\sum_{i=1}^{n}(x_i-\bar{x})^2} \quad (1)$$

where n is the number of observations (measurements);

1, x2, x3,...xi-observations (measurements) result;

- the arithmetic mean of the results of observations.

The smaller the average quadratic error the higher the measurement is taken.

For example: in the taksimulation of a random error by normal law, the confidence interval is from -35 to +3σ, while the reliable exttimality is not taken into account when processing measurement results when one of the random errors is greater than 3σ in its absolute identity and considering it a multiple error [3].

When assessing measurement accuracy, an extreme error is used. For this,

the following formula is used:

$$\sigma_{\bar{x}}=\frac{\sigma}{\sqrt{n}}=\sqrt{\frac{1}{n(n-1)}\sum_{i=1}^{n}(xi-\bar{x})^2}$$

In most literature,the reliable interval is denoted by the letter Z, and the relationship between Z and the reliable extimo, llik P, is given in Table 1.

Table 1.

P	0	0	0	0	0	0

	,683	,90	,95	,98	,99	,997
Z	1 ,0	1 ,645	1 ,96	2 ,33	2 ,58	3 ,00

When assessing measurement accuracy, an extreme error is used. For this, the following formula is used: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \sqrt{\frac{1}{n(n-1)} \sum_{i=1}^{n} (xi - \bar{x})^2}$ (2)

Example. The temperature has been measured several times to increase measurement accuracy. The measurement results were as follows:

Table 2

№	Temperature, ^{0}S	№	Temperature, ^{0}S
1	31	6	31
2	32	7	32
3	34	8	33
4	33	9	35
5	31	10	34

Undo. 1. The arithmetic mean of the measurement results is:

$$\bar{x} = \frac{1}{n}\sum_{i=1}^{n} xi = \frac{31+32+\ldots+34}{10} = 32,6^0 C. \qquad (3)$$

Mean quadratic error:

$$\sigma = \sqrt{\frac{\sum_{i=1}^{n}(xi-\bar{x})^2}{n-1}} = \sqrt{\frac{\sum_{i=1}^{n} 18.4}{10-1}} = 1.42^0 C;$$

$$\sigma_{\bar{x}} = \sqrt{\frac{\sigma}{n}} = \frac{1.42}{\sqrt{10 = 0.45}} \qquad (4)$$

we can assume that the true value of the temperature is reached i.e. 32.6 ^{0} C. To estimate the reliability of this value, taking the reliability of the extimol to be R=0.997 from the table we ask z=3.00.

We find the value Z σ

$$Z\sigma_{\bar{x}} = 3 \cdot 0,45 = 1,35^0 C$$

x_u = 32,6 ± 1,35 ^{0}S

When measuring dimensions with universal measuring instruments, errors are taxed based on the law of normal taximation. Accordingly, Metrological characteristic is used when assessing measurement accuracy-i.e. measuring instruments-ng chakka error (Δ ℓim) [4]: Δℓim=3σ.

The result measured once with Universal measuring instruments, such as the val diameter measurement, skates as follows: d = du ± Δℓim.

With multiple repeated measurements, the ultimate arithmetic dimension is first calculated, and then the measurement result is written as follows.

$$d=\bar{d}\pm\frac{\Delta\ell im}{\sqrt{N}} \qquad (5)$$

In the presence of regular and tusodifical errors, the cumulative error is determined as follows: $\Delta_{\ell im}=\sum \Delta_{\ell imмун}\pm\sqrt{\Delta^{2}+\Delta^{2}+\ldots+\Delta_{\ell im_{n1}}}$

In this $\sum_{\ell imмун}$ - muntazam xatoliklarni algebraik yigindisi. $\Delta_{\ell im_1}$, $\Delta_{\ell im_2}$,… gross random errors.

The standards of instrument display are called the greatest error of the road. for measuring instruments given in the Kurin of errors in which the limits of the underlying errors to be avoided are given a class of precision derived from the following number series.. (1; 1,5; 2,0; 2,5; 3; 4; 5; 6;)·10^n, n=1.0; -1; -2 …

the accuracy class of the measuring instrument is equal to the greatest error calculated in percentages. $\delta=K=\pm\frac{\Delta x_{\max}}{x_{н}}\cdot 100,\%$ (6)

where δ is the quoted error;

K-tool precision class;

Δxmax-the largest absolute key of the instrument;

x_n is a measure of the instrument.

For example. As a result of grading a logometer (a device that measures temperature), the scale of which consists of 0-1000s, the absolute basic error received the following values.

Scale sign:	^{0}S… 0	20	40	60	80	100
Absolute error:	^{0}S….0,4	1,6	1,0	0,4	0	-0,6

Here is the quoted error of the logometer

$$\delta = \frac{\Delta x_{\max}}{x_N} = \frac{1.6}{100} 100\% = 1.6\% \qquad (7)$$

according to the above data, we take the accuracy class as equal to 2.0 (the rounding is carried out at the expense of magnification).

Many productions, whose technological process involves perfected control operations, use highly efficient mechanized and automated measuring and nnazorat tools.

Conclusion:

The main factor in choosing a measuring instrument in production is the permissible Metrological error of the instrument (Δmet). In accurate measurement, Δmet=0.25 (where T is the permissible of the detail), while in measurements where the accuracy is not so great, Δmet=0.2 T is obtained [5].

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