CRITICAL ANALYSIS OF THE INDICATORS QUALITY OF MANUFACTURING PROCESSES

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When monitoring parameters of manufacturing processes or inspecting products specifications, it is indispensable to carry out adequate measurements. Based on obtained measures that decisions on approval or disapproval of products are taken. Thus, it is necessary to evaluate the adequacy of the measurement systems used for a required task. Almost all manufacturing organizations calibrate the control instruments used to extract the required data, whereas the measuring instrument is just one component of a measurement system and the technological process as a whole [1, 2]. Thus, the suitability of the measuring instrument (measurement system) alone does not guarantee the correctness of a measurement system. ISO 14253-2 (2011) lists different sources of uncertainty that may affect the quality of measurement results: environment, measurement setup, measuring instrument, appraiser, measuring object, measuring procedure, physical constants, definition of the characteristic, software and calculations [3].

For the successful implementation of actions to continually improve the quality of products or services, it is necessary to monitor the sources of the production process deviations and their stability. In the conditions of competition for producers, not only the price of products or services should be important, but also the costs, that consumers will spend when using products (or services). Therefore, the purpose of any manufacturer should be to continuously reduce the deviations of the production process parameters (ensuring the stability of the production process), and not only compliance with established requirements.

Quantitative evaluation of deviations allows us to make conclusions about the suitability and conformity of the production process to the established requirements. For identification of deviations, the different methods, such as drawing up a flowchart and identifying inputs and outputs of a production process, using a causal diagram, etc. can be used. A number of international standards [4, 5] recommend a variety of statistical methods that can be used to manage, control and improve the production process in order to analyze data and evaluate product quality indicators.

Measurement systems analysis (MSA) [5] manual presents guidelines for assessing the quality of a measurement system primarily used in the industrial world. Three fundamental issues must be addressed when evaluating a measurement system:

- the measurement system must demonstrate adequate resolution to detect changes in product or process variation. Typically, its applied that instrument discrimination should divide the tolerance (or process variation) into ten parts or more;
- the measurement system must be stable. Under repeatability conditions, the

measurement system variation is due to common causes only and not special causes;

- the statistical properties (errors) are consistent over the expected range and adequate for the purpose of measurement (product control or process control).

The location characteristics are defined by Bias (systematic error component of the measurement system), linearity (the change in bias over measuring range) and stability (the change in bias over time). Repeatability and reproducibility are considered for variation characteristics. Gage repeatability and reproducibility (GRR) standard-deviation $\hat{\sigma}$ is the combined estimate of measurement system repeatability and reproducibility. GRR percentile calculation ($\hat{\sigma}$[%]) when compared to the product tolerance (*T*), is calculated according to equation:

References

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ПРОБЛЕМИ КАЛІБРУВАННЯ СКАНЕРІВ МОБІЛЬНИХ МЕРЕЖ

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Проблеми метрологічного забезпечення радіоелектронних систем і підвищення достовірності вимірювань систем мобільного зв'язку наразі мають надзвичайну актуальність. Відмінність калібрування сканерів мобільних мереж від класичних аналізаторів спектру або вимірювальних приймачів НВЧ-діапазону складає в тому, що перевірити реальну чутливість або динамічний діапазон сканера можливо тільки при підключенні до нього вимірювальних сигналів необхідних видів модуляції. В ННЦ «Інститут метрології» вперше в Україні було проведено калібрування сканера TSME6 для сигналів мобільних технологій GSM, WCDMA, CDMA, LTE ,WIMAX тощо. Для формування вимірювальних сигналів