Final Control: Influence of the Product Quality Index on the Risks of Making Erroneous Decisions

S.B. Danilevich[1, 2], Novosibirsk Branch of FSAEI FVT Academy for Standardization, Metrology and Certification (Training), Novosibirsk State Technical University (NSTU), Dr., ser-danilevich@yandex.ru
V.V. Tret'yak[3], NSTU, tretyak.94@gmail.com

[1, 2] Professor, Novosibirsk, Russia
[3] Postgraduate Student, Berdsk, Russia

Methods for measuring product quality control should ensure that the risks of making erroneous decisions are small enough. These risks are indicators of the reliability of control. They depend on many factors: measurement accuracy, number of controlled parameters, including product quality. We considered the dependence of these risks on the quality of products entering the control (which is characterized by a quality index). The quality index is determined by the ratio of the tolerance for controlled parameters to the standard deviation of the parameters. The article presents the results of a study of the influence of the quality index of products and measurement uncertainty on the risks of the customer and the manufacturer. It has been shown that with an increase in the quality of products, these risks are significantly reduced, and the likelihood of missing a defective product increases. In the calculations, a measurement error model was used in the form of a uniformly distributed random variable. The study was carried out by the method of simulation (Monte Carlo).

References

1. JCGM 106:2012 Evaluation of measurement data. The role of measurement uncertainty in conformity assessment.
2. GOST R 58771–2019 Risk management. Risk assessment technologies [in Russian].
3. Rubichev N.A., Frumkin V.D. Dostovernost' dopuskovogo kontrolya kachestva [Reliability of tolerance quality control], Moscow, *Izd-vo standartov*, 1990, 172 P. [in Russian].
4. Korovina O.A. Otsenka riskov izgotovitelya i zakazchika pri kontrole pogreshnostey izmeritel'nykh ustroystv v odnoy ili neskol'kikh tochkakh [Risk assessment of the manufacturer and the customer when monitoring the errors of measuring devices at one or more points], *Izmeritel'naya tekhnika,* 2018, no. 5, pp. 14–17.
5. Shcheglov D.M. Primenenie risk-orientirovannogo podkhoda k otsenke vliyaniya pogreshnosti izmereniy parametrov ob'ekta na effektivnost' ego ispytaniya [Application of a risk-based approach to assessing the impact of measurement errors on the effectiveness tests], *Vestnik metrologa*, 2019, no. 2, pp. 15–19.
6. Khayrullin R.Z., Kornev A.S., Kostoglotov A.A. i dr. Matematicheskoe modelirovanie funktsii oshibok prinyatiya resheniy pri dopuskovom kontrole izmeritel'noy tekhniki [Mathematical modeling of functions of decision-making errors during tolerance control of the performance of measuring equipment], *Metrologiya*, 2020, no. 3, pp. 3–15.
7. Danilevich S.B., Tret'yak V.V. Metrologicheskoe obespechenie dostovernosti rezul'tatov kontrolya [Metrological supervision of control results validity], *Kontrol'. Diagnostika,* 2018, no. 7, pp. 56–60. DOI: 10.14489/td.2018.07. pp. 056–060.
8. Savel'kaev S.V., Danilevich S.B. Methods and Tools for Simulation and Quality Control of Design and Production of Microwave Devices. Monograph, *Cambridge Scholars Publishing*, *Lady Stephenson Library*, Newcastle upon Tyne, NE6 2PA, UK, 2020, 264 P.
9. Danilevich S.B., Kolesnikov S.S., Pal'chun Yu.A. Primenenie imitatsionnogo modelirovaniya pri attestatsii metodik kontrolya i ispytaniy [Application of simulation modeling at certification of methods of performance measurements and control], *Izmeritel'naya tekhnika,* 2011, no. 7, pp. 70–73.
10. Danilevich S.B., Tret'yak V.V. Vliyanie vida raspredeleniya pogreshnosti izmereniya na pokazateli dostovernosti kontrolya [Influence of measurement error distribution the accuracy rates of the control], *Kontrol'. Diagnostika,* 2020, no. 7, pp. 48–52. DOI: 10.14489/td.2020.07. pp. 048–052.
11. Danilevich S.B., Tretyak V.V. Riski pri kontrole kachestva seriyno vypuskaemoy produktsii [Risks in quality control of commercially available products], *Kontrol'. Diagnostika,* 2021, no. 3, pp. 60–64. DOI: 10.14489/td.2021.03. pp. 060–064.