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On a Comparison of the Efficacy of Various Approximations of the Critical Values for Tests on the Process Capability Indices CPL, CPU, and C_{pk}

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ABSTRACT

In this article several formulae for the approximation of the critical values for tests on the actual values of the process capability indices CPL, CPU, and C_{pk} are provided. These formulae are based on different approximations of the percentiles of the noncentral t distribution and their performance is evaluated by comparing the values assessed through them from the exact critical values, for several significance levels, test values, and sample sizes. As supported by the obtained results, some of the presented techniques constitute valuable tools in situations where the exact critical values of the tests are not available, since one may approximate them readily and rather accurately through them.

Key Words: Process capability indices; Tests of hypotheses; Noncentral t distribution; Approximation; Critical value; Percentage point.