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How to Improve the Measurement Error Analysis Technique?

The methods of measurement error analysis have long since been widely known, used and carefully described, for example, in the Reference Manual of Measurement System Analysis (MSA). Another liked by many people source of practical advices is the book "EMP III: Evaluating the Measurement Process and Using Imperfect Data" by D. Wheeler. We scrutinized these information sources and came to conclusion that they could be improved significantly. The main problem of MSA approach is that it uses the procedure called Gauge R&R study (GRR), and engineers "never could figure out exactly what the final numbers in a Gauge R&R Study represent. They sound like nonsense because they are interpreted as proportions when they are not proportions" (Wheeler 2006, 227). The gist of the problem is obvious: standard deviations (SD) are not additive. Wheeler in his book (Wheeler 2006) offered to use the Intraclass Correlation Coefficient (ICC) as the index of measurement quality. However, we found out that the limits of quality categories proposed in that book seem to be unacceptable for engineers. For example, a good (according to EMP III) measurement system must have SD approximately equal to 0.45 of an item's SD. Without doubt, no engineer will agree to consider such measurement system to be good. We offer to use the ICC index but with category limits from practice and partly from MSA approach. The underpinnings and examples are given and future directions of action are proposed. Wheeler, D. (2006). EMP III. Using Imperfect Data. SPC Press: Knoxville, TN.

Keywords

Measurement System Analysis, Intraclass Correlation Coefficient, measurement error, control charts

Classification

Mainly application

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