European Network for Business and
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Attribute-Variable Alternating Inspection (AVAI): The use of $np_x - S^2$ mixed control chart in monitoring the process variance

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The presence of variation is an undesirable (but natural) factor in processes. Quality improvement practitioners search constantly for efficient ways to monitor it, a primary requirement in SPC. Generally, inspections by attributes are cheaper and simpler than inspections by variables, although they present poor performance in comparison. The S^2 chart is widely applied in monitoring process variance, facing the need for more economical strategies that provide good performance is the motivation of this work. Many practitioners use four to six units to build the S^2 chart, the reduction of sample size decreases their power to detect changes in process variance. This work proposes the application of alternating inspections (by attributes and variables) using sequentially samples of size n_a and n_b ($n_a > n_b$). The items of sample of size n_a are classified according to the np_x chart procedure, using a GO / NO GO gauge and counting the number of non-approved items (Y_{n_a}). The items of sample of size n_b are measured and calculated its sample variance $S^2_{n_b}$. If $Y_{n_a} > UCL_{n_a}$ or $S^2_{n_b} > UCL_{n_b}$ the process is judged out of control. The inspection always restarts with sample size n_a (using the np_x chart), otherwise, the process continues. The parameters of the proposed chart are optimized by an intensive search, in order to outperform the S^2 chart (in terms of ARL_1, for a fixed ARL_0), restricted to have average sample size closer to the sample used for S^2, from their results was possible to reduce about 10% in ARL_1.

Keywords

Quality Control, Attribute and Variable Control Charts, Discriminant Limits

Special/invited session

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