ABSTRACT

In statistical process control (SPC) designing of proficient control chart is of constant interest for efficient process monitoring. The process monitoring through control chart become popular practice among all the toolkits of SPC. The control charts are designed with respected to parameter of interest such as location or scale and sensitivity of the process under investigation. The memory based control charting structures designed under simple as well ranked set sampling schemes. The memory based control charts are considered efficient compare to simple Shewhart type control charts. The memory based charts are more sensitive to small shifts in the process parameter.

This study presents a new scheme of double cumulative sum (DCUSUM) charts based on ranked set schemes such as ranked set sampling (RSS), median ranked set sampling (MRSS) and extreme ranked set sampling (ERSS) for the monitoring of process dispersion. This study investigated different robust dispersion estimators such as (SD, R, IQR, MADM, MAD, GM, Tn, Bn, Qn) under different ranked set sampling schemes and at different sample size values under perfect and imperfect ranking. The different DCUSUM charts are designed and extensive comparative study is performed for designed charts under simple as well as ranked set sampling. The Monte Carlo simulations are performed to evaluate the performance of proposed charts on the basis of average run length (ARL), standard deviation of run length (SDRL) and median of run length (MDRL).

The simulation results show that the proposal DCUSUM dispersion control charts based on RSS, MRSS and ERSS techniques are proficient substitute to control charts designed by SRS. We acknowledged that under the ideal normality condition the best introduction is appeared by the SD relative accomplishment of other dispersion estimators with an ascent in sample size (n). Graphical representation is used to inspect the overall efficiency of the different DCUSUM dispersion charts.