

SPC control charts and anomaly detection: same question, different language

Control charts have watched process drift for decades. Before proposing a machine learning model, look at what this simple method says.

In short

- A point beyond Shewhart limits is an inspection flag that the process may be outside its known variability, not a fault diagnosis.
- Control limits should be set from a period known to be stable, because limits set inside a drift make the drift look normal.
- CUSUM and EWMA charts are designed for small, persistent shifts that a Shewhart limit catches late.

01 / What a control chart shows

A Shewhart chart draws a centre line and, typically, upper and lower control limits three standard deviations from it. A point outside the limits suggests the process may be outside its known variability. That is an inspection flag, not a fault diagnosis.

02 / Which data to compute limits from

Control limits should be computed from a period in which you know the process was stable. If you compute limits from inside the drift, the drift becomes normal. The principle of separating training from evaluation applies here too: the data that sets the limit and the data you test on should be different.

03 / Different tools for small shifts

A Shewhart limit catches small but persistent shifts in the mean late. Cumulative-sum (CUSUM) and exponentially weighted moving-average (EWMA) charts are designed for such small shifts. Autocorrelated data violates the assumptions of classic charts; monitoring residuals may then be necessary.

04 / Compare against machine learning

Before proposing an anomaly model, build a robust control chart on the same data and record its false-alarm count. If the proposed model cannot beat this baseline in a way an engineer can understand, its complexity cannot be justified. This is a suggested evaluation approach; exact limit settings depend on the process and risk tolerance.

Try it

In Lab, choose the median/MAD method and vary the threshold between 3 and 5, comparing the numbers of false alarms and missed spikes.

References and online guide

[Open the online guide](#)

[NIST/SEMATECH e-Handbook: control charts](#)

Proposed pilot steps do not claim field accuracy. Synthetic examples are not measurements from a production site.