Print

Control Charts with Phases

Remember that, within the context of problem solving, control charts can be used for a number of reasons throughout the life of a project: to determine whether a process is stable, to establish a baseline level of performance, to explore and analyze patterns of variation in a process, and to identify potential problems within a process. They can also be used to determine whether the process has improved, and to determine whether improvements are maintained, or sustained, over time.

Recall the Metal Parts example. Your team has been working on improving the dimensional conformance of a small metal part. You're focused on bringing the thickness to target and reducing variability. The target is 40 plus or minus 5 hundredths of an inch.

You collected some baseline data and constructed a control chart to study process variation.

You learned that the process is stable but that the process average is off target.

You use problem-solving tools, data, and statistical methods to identify critical input variables and develop an understanding of cause and effect. You identify and test process improvements, and you implement these changes.

You collect more data, and you can see that the process mean appears closer to the target after implementing the changes.

However, the variability (the spread in the box plot) does not appear to have changed.

You want to see whether the process is stable over time, so you plot the data on a control chart. Because the process has changed, you include a phase (Before and After) variable in the analysis to calculate the grand mean and control limits for the new data.

The new process appears to be stable. And you're happy to see that the new process mean is much closer to the target.

Note that you can also use phase variables with control charts as an exploratory tool to find potential root causes. For example, consider the White Polymer Crisis Team data.

Earlier, we created an I and MR chart for MFI. Our goal was to understand whether the process was stable and to establish a baseline. We learned that the process, in fact, is not stable. There are several special causes to be investigated.

Let's look at this another way. The data were collected in time order, on four shifts. If you use Shift as a phase variable, you get separate control limits and means for each shift.

In this example, the means between the four shifts are quite similar. However, it appears that some shifts (A and D) are less variable than the others.

In this video, you learned about potential uses of control charts for a problem-solving team. You saw how to use control charts after implementing changes to determine whether the process has improved. In an exercise, you use a control chart to determine whether these improvements have been sustained over time.

You also learned that control charts can be used as an exploratory data analysis tool.

You learned about formal methods for testing differences in the Decision Making with Data module.

In the next video, you see how to add phase variables to a control chart in JMP.

Statistical Thinking for Industrial Problem Solving

Close