Demo: Creating X-bar and R and X-bar and S Charts

In this video, we show how to create X-bar and R and X-bar and S charts using the Control Chart Builder and the Metal Parts example. For this scenario, the thickness of five consecutive parts is produced every hour.

First, we select Control Chart Builder from the Analyze menu under Quality and Process.

We drag the column Thickness into the Y drop zone. An Individual and Moving Range chart is created automatically.

If we don't have a subgroup variable in our data table, we can use the Set Subgroup Size option under the top red triangle.

For this example, the subgroup variable is Hour. We drag and drop Hour over the range chart to create an X-bar and R chart for Thickness.

JMP automatically groups the measurements for each hour into subgroups and plots the subgroup averages and ranges on the two charts.

The grand average and the average range, along with the control chart limits and the subgroup size, are reported in the Limit Summaries table.

There are no points beyond the control limits, but we'll test for special causes. To do this, we right-click on the graph and select Warnings, Tests, and All Tests.

Points for violated tests are circled and are labeled with the test number. Here we see that none of the tests are violated. There aren't any special causes.

To change the chart to an X-bar and S chart, we'll use the options in the control panel.

The options under Points[1] and Limits[1] refer to how the X-bar chart is constructed, and the options under Points[2] and Limits[2] refer to the range chart.

First, we change Sigma for Limits[1] from Range to Standard Deviation. The control limits for the new X-bar chart are now based on subgroup standard deviations instead of subgroup ranges.

Next, under Points[2], we change the statistic from Range to Standard Deviation. This changes both the Points statistic and the Sigma for the bottom chart to Standard Deviation.

The chart is now an X-bar and S chart.

We click the Done button to close the control panel.

Regardless of whether we use an X-bar and R or an X-bar and S chart, we come to the same conclusions regarding the process. The process is stable, and the average thickness is above the target level of 40 hundredths of an inch.

Statistical Thinking for Industrial Problem Solving

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