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# Demo: Estimating Capability for Nonnormal Data

In this video, we show how to compute capability indices for nonnormal data using the Impurity data and the Distribution platform in JMP .

To start, we select Distribution from the Analyze menu.

We select Impurity for Y, Columns, and click OK.

The distribution appears to be right skewed. Before conducting the capability analysis, we check to see whether the underlying distribution is approximately normal.

We select Normal Quantile Plot from the red triangle for Impurity. There is a curve in the plot, indicating that the data don't follow a normal distribution.

To identify the underlying distribution, we select Continuous Fit, then Fit All, from the red triangle for Impurity.

This automatically fits and compares several continuous probability distributions. In this case, the lognormal distribution is selected as the best fit.

JMP reports parameter estimates for the lognormal distribution. To evaluate the fit of this distribution, we select Diagnostic Plots from the red triangle next to Fitted LogNormal Distribution, then QQ Plot.

This provides a QQ, or quantile-quantile plot. This is similar to a normal quantile plot but is based on the lognormal distribution. Because the data follow a straight line, we conclude that the lognormal distribution is a good fit.

Now, we estimate capability using the lognormal distribution.

To conduct the capability analysis, we select Process Capability from the red triangle for Fitted LogNormal Distribution.

Our target is 3, and the upper spec is 7. There isn't a lower spec for this example, so we'll leave this blank.

We click OK to run the analysis.

Notice the note for the analysis. This indicates that JMP uses the percentiles, or quantiles, of the lognormal distribution to calculate the capability indices and estimate the percent out of spec.

The $P_{pk}$ is 0.164, indicating that the process is off target. You can see this in the histogram.

There isn't a lower spec, so $P_p$ isn't calculated.

An estimated 25.2% of the measurements will be above the upper spec limit. This means that approximately 25 out of 100 batches will fail to meet the upper spec for impurity.

In this example, JMP reported $P_{pk}$. If you want to display $C_{pk}$ labeling in the Distribution platform, you can set a platform preference.

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