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Demo: Calculating the Sample Size for Two or More Sample Means

In this video, you learn how to calculate the sample size for a two-sample t test and ANOVA. To do this, we select Sample Size and Power from the DOE menu under Design Diagnostics.

To calculate the sample size for a two-sample t test, we select Two Sample Means.

In this scenario, the process characteristic is the breaking strength of two materials, measured in ksi (kilopounds per square inch). We'd like to determine the sample size required to detect a minimum difference between the two materials of 10 ksi with a power of 0.9.

We'll use a significance level for the test, alpha, of 0.05.

We enter a conservative estimate of the standard deviation, 18 ksi.

We'll enter the difference to detect, 10, and the power, 0.90, and click Continue.

The sample size reported is 139. This is split between the two materials, so we round up to 140.

Given the standard deviation and significance level, we'd need to measure a random selection of 70 parts from each material in order to have a high probability of detecting the difference.

What if we could live with a power of 0.80? In this case, the total sample size is 104. We'd require 52 observations per material to detect a 10 ksi difference with a power of 0.80.

Now let's consider a different scenario. Instead of comparing two materials, suppose that we want to compare the breaking strength of three materials.

The analysis method that we'd use is one-way analysis of variance, or ANOVA.

To compute the sample size, we click the Back button, or relaunch the Sample Size and Power platform from the DOE menu under Design Diagnostics. Then we select k Sample Means.

We enter the same estimate of the standard deviation, 18 ksi.

Suppose that the difference that we'd like to detect between any two means is 20 ksi. We enter 0 in the first cell and 20 in the second cell. For the third cell, we set it to the middle value, 10.

We enter a power of 0.90, and click Continue.

To detect the specified differences between the means, with a power of 0.9, we need a total of 65 observations.

We have three groups, so we round this up to 66.

We need 22 observations per material in order to detect a difference in mean breaking strength of 20 ksi between any of the two materials.

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