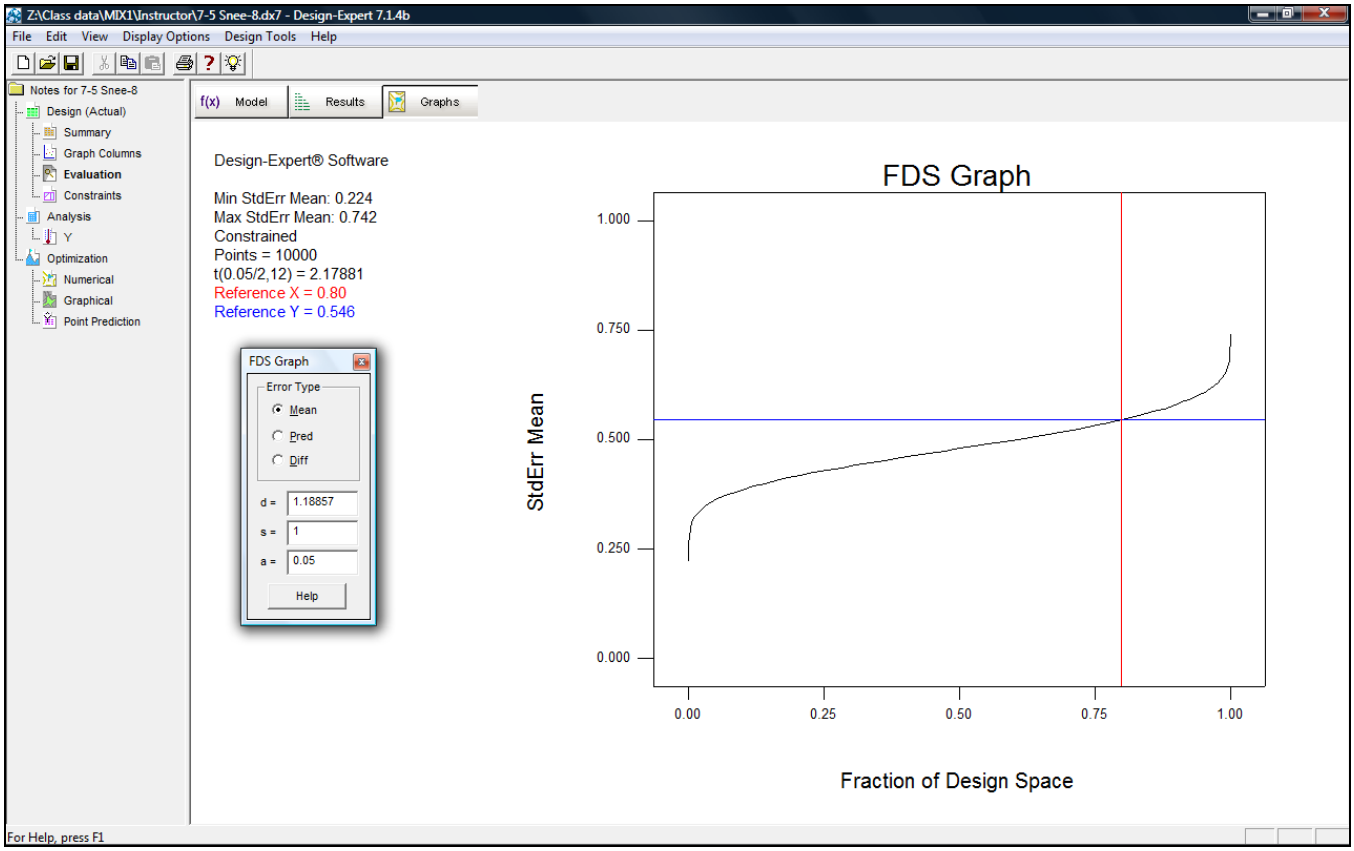
Help for FDS Graph Tool



The **FDS Graph** tool provides options for evaluating the fraction of design space (FDS)* as a function of these three error types:

- **Mean** – the standard error of the expected value – to put it simply, the variance of the average outcome predicted by the chosen model.
- **Pred** – the predicted value (PV) variance – a measure of how much individual results will vary from expected.
- **Diff** – the difference in standard error from a number of random pairs of points picked from within the design space – this provides a substitute for power calculations that may not be readily available due to the nature of the experimental matrix, for example, one that exhibits high variance factors (VIFs).

The **FDS Graph** tool offers two fields for configuring what gets plotted versus the fraction of design space:

- **d = [___]** – delta. This specifies either the half-width of the confidence (for Mean) or prediction (if Pred chosen) interval, or the difference in response that you wish to detect between any two points in your experimental region.

- **s = [___]** – standard deviation. Because the true measure of overall standard deviation cannot be known until the experiment is completed, Stat-Ease software defaults to an **s** of 1. If you can provide an estimate of "s," enter it here. However, it will not create any effect on the plot unless you also enter something in the field for "d."

- **a = [___]** – alpha. This specifies the type 1 risk – 0.05 by default to provide 95 percent confidence.

Example of tool use: In data file "Mix" provided with your software, select the **Diff** option. Assume that you hope to detect a difference **d** of **4** units in response (the "signal"). A repeatability study reveals that the standard deviation **s** of the process is **2** (the "noise"). Entering these values produces coordinate lines on the FDS graph. On the x axis it intersects at 0.84, which indicates that 84 percent of the randomly picked pairs will detect the signal-to-noise ratio of 2 (= 4/2). As a very general rule, a value of 0.8 FDS can be considered acceptable. Thus, this "Mix" design may suffice.

If the FDS comes out very low, such as 0.1 (10 percent), consider lowering your expectations for the difference that can be detected and/or try reducing standard deviation of the process or test (consider doing repeated measures and entering the average, for example) and/or replicate some or all of the design points and/or add more unique design points, preferably ones with high leverage.

*For more details on the FDS graph, press the screen tips button (the one with a light bulb as the icon).