**Parts of a Creating a Good Experiment**

1. *Randomization*
2. *Blocking*
3. *Replication*
4.*Range of test variables is reasonable*
5. *Increment between variable levels is realistic*

**Randomization** is the running of test parts in random order. It is the opposite of running tests systematically. The running of tests randomly prevents the confounding of effects that can happen when tests are run in a standard order.

For example, if temperature is a controlled design variable, it would be best **not** to run all the temperatures at a given level at the same time. If all test points at a given temperature are run at the same time, the effects of time can be confounded *(mixed up)* with the effects of temperature. Using randomization is like taking out an insurance policy against effects of extraneous variables such as time.

**Blocking** is the deliberate screening out of the effects of variables thought to have an influence on the test results. For example it may be thought that test instruments have an effect on the test results. If so then we may want to conduct the test using several test instruments to reduce and quantify the effects test instruments.

**Replication** is the running of one or more test parts under the same conditions. That is we repeat some of the test parts in the test design. Repeat testing builds confidence in the results and enables you to get a more reliable idea of the true variability and thus do a better job of computing the statistical significance of test results. This again should be done over time. NOTE: Running several test parts on the same day at the same time can lead to confounding as well.

**It is of utmost importance that the ranges of controlled design variables be reasonable**. These ranges should be in line with the experimental objectives. This means that it is important to look at both the total range of variability AND the range of standards (ROS), as you do your pre-trials. Multiply your ROS by two. Compare this to the total range. Ask yourself if you will get anything to be “significant” based on the test that we use.

Remember, the increment between levels of test variables should be realistic. Increments can be too wide or too narrow. If increments are too wide, you may miss finding information between the levels. If increments are too narrow, you may not get a good reading of the variables. This means that you should consider expanding or decreasing the increment levels of your experiment after you do your pre trials.

This is an important part of your research and should not be overlooked. Or skipped.

Of course it follows that this process should be repeated when doing your actual trials. It might be the case that you will need to tweak your experiment based on these numbers.