A measurement system study might begin with the following questions:

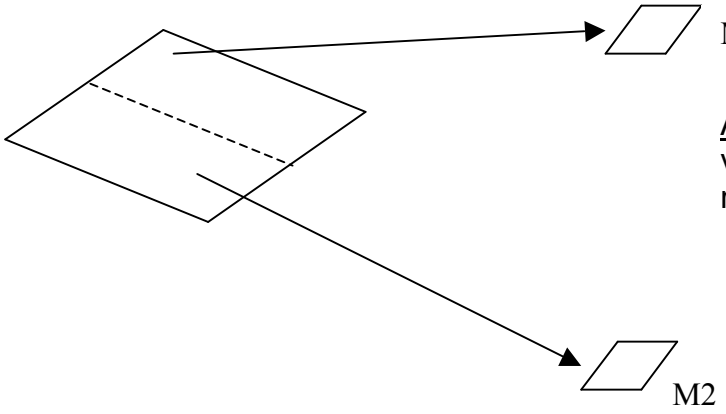
1. What variation do I need my measurement system to detect?
2. Is the measurement system stable and consistent?
3. Does the measurement system demonstrate enough discrimination/resolution to answer question 1 above?
4. Can the measurement system be improved?

Destructive testing poses some unique challenges to measurement system evaluations, 5 options are briefly outlined below. While one can never actually separate product and measurement variation completely there are some ideas that may be helpful.

Option 1: Reduce the component of product variation by changing the sampling of the product.

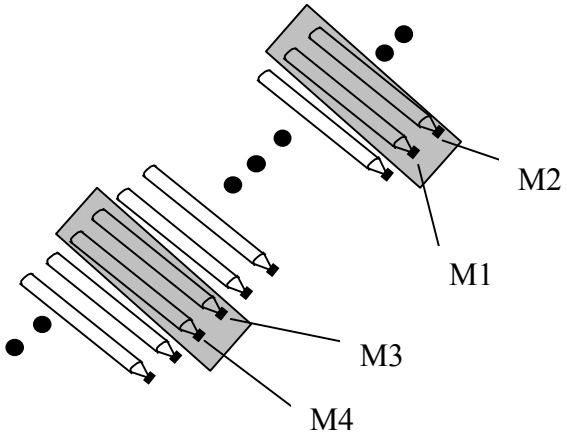
Strategies to reduce the product component of the confounded measurement/product component.

1) Split the sample when you can



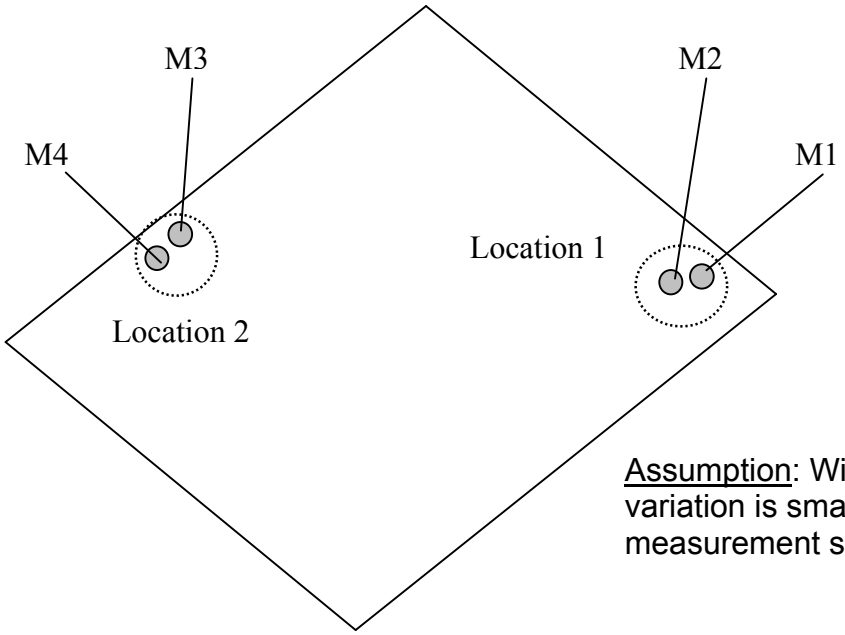
Assumption: within sample variation is smaller than measurement system variation

2) Select samples produced under conditions that are almost identical (perhaps consecutive units…the opportunity for X's to change between product samples is minimized)



Assumption: short term process variation is smaller than measurement system variation

3) Make multiple measurements in a "small" area



Assumption: Within location variation is smaller than the measurement system variation

MSE: Non-Repeatable Tests (e.g., destructive)

Problem: Product variation can not be separated from measurement error.

Measurement system is inadequate

Minimize product variation

Develop alternative Y's & y's (describe phenomena)

Run CoV where samples are selected such that opportunity for X's to change are minimized (e.g, consecutive samples, adjacent locations, split samples)

R chart stable, Y-bar out of control

N

Unacceptable special/common

Process Map Identify X/Ns Experiment

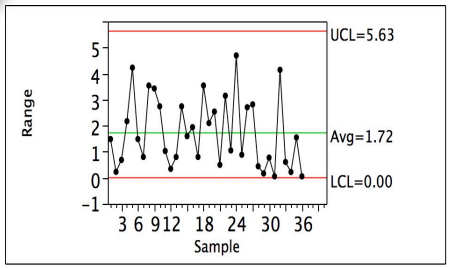
N

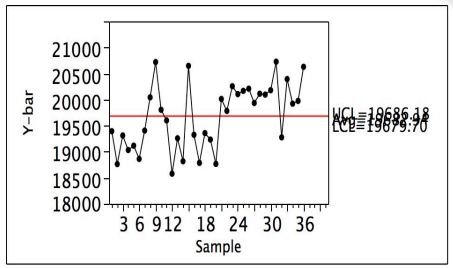
Unacceptable common

Get/create a sample of known value (e.g., standard), measure other characteristics, **use the current process**

Y

Useable for now





Strategy	Description	Assumptions
1	Split Sample	A. Sample can be split without damage B. Within sample variation is smaller than the measurement system variation
2	Nearly identical units	A. Short term variation is smaller than the measurement system variation B. Long term variation is larger than short term variation and measurement system variation
3	Same Location	A. The variation over small distances is smaller than measurement system variation

Option 2: Assess the variation (consistency) of the measurement system using some known value (or a standard). While the inference space is different, you may still achieve some degree of confidence in the measurement system.

Option 3: Assume the measurement system is not adequate. Run experiments on the factors in the measurement system to determine which have an affect on the mean AND on variation. Improve the measurement system with that knowledge.

Option 4. Assume the measurement system is not adequate. Identify or create alternate Y's (and measurement systems) to assess the phenomena of interest.

For example, let's say we are interested in measuring the burst strength of an extruded polymer. Perhaps instead of applying a pressure until the extrusion bursts, we measure the change in physical properties (e.g., OD) of the extrusion when a specified amount of pressure (below the threshold) is applied.

Option 5: Assume the measurement system is adequate.