

# IE 361 Module 22

Simple Principles of Process and Engineering Data Collection

Reading: Section 1.4 *Statistical Methods for Quality Assurance*

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# The Habitual Collection and Display of Process Data

Step #3 in the 6-Step Process-Oriented Quality Assurance Cycle of Table 1.1 of *SMQA* urges the regular collection and summarization of data on process performance. Data from a single period serve to give one a snapshot of process performance. Comparison of data sets from multiple periods allows one to see and act on trends in process performance. In this module we make some observations about real world data collection and then in the next note how effective some of the simplest tools of statistical graphics can be in giving one a quick picture of the main features of a process performance data set.

# Simple Principles of Engineering and Quality Assurance

## Data Collection

Useful and informative data don't just magically appear in a data file or on a data collection form. They must be gathered by real humans (or "automatic" data collection systems designed and implemented by humans) and are only as useful as the wisdom, care, and genuine good will that go into their collection. There are technical matters that impact the usefulness of QA data (like exact sample size choices and particular choices of structure for a data collection plan). But whether data are to be used to monitor process stability/performance or to guide changes aimed at process improvement, there are also some simple qualitative guidelines that are relevant. Among these are the following:

- There must be usable operational definitions of the quantities on which data are to be gathered. Where measurements are to be taken, the measurement equipment itself must be stable/well-calibrated. Technicians must be properly trained in the meaning of the definitions and the use of any equipment involved.

# Simple Principles of Engineering and Quality Assurance

## Data Collection

- A small or moderate amount of carefully collected and immediately used data will almost always be worth much more than even a huge amount of thoughtlessly collected or never used data.
- It is the absolute size (rather than the relative size) of a sample and the basic process/population variability that determine the information content of a sample. (For example, a blanket "take a 10% sample" rule will sometimes over-sample and sometimes under-sample.)
- The closer that data are taken (in time and space) to an operation whose performance they are meant to reflect, the better. (The ideal is probably data collection by well-trained process workers who have adequate time for the task.)

# Simple Principles of Engineering and Quality Assurance

## Data Collection

- Routine data collection should be made as convenient as possible, and where feasible, any form used for data collection should make them immediately useful (without transfer, e.g., to another form or medium). The point is to get data used, not to make presentation quality displays.
- In order to be useful in indicating sources of variation in a data set, care needs to be taken to keep track of conditions surrounding each observation (e.g. machine number, operator, etc.).
- One must take into account psychology and politics when assigning data collection tasks. He or she who is to collect data should be convinced that their production is a help rather than a threat, and that faithful representation of a situation (rather than "good numbers") is the goal.