Sampling methods

Data are gathered in samples to ensure the stability of the process. Sampling methods are preferred and are better established because they are cost-effective, less intrusive, fast, and their destructive testing features. They also let the user frame the sample.

- **Random sampling:** Randomization ensures independence among observations.
- **Systematic samples:** Systematic samples according to time or according to sequence
- **Sampling by Rational Subgroup:** a group of data that is logically homogenous; variation within the data can provide a measure for setting limits on the standard variation between subgroups.

Considerations for Planning for inspection

- The type of sampling
- The personnel who will sample
- The persons for the use in-process inspection sample size
- The critical attributes to be inspected
- The location for the inspection

PROCESS CONTROL CHARTS

Process control chart definition

"A control chart is a statistical tool used to distinguish between variation in a process resulting from common causes and variation resulting from special causes. It presents a graphic display of process stability or instability over time." (Air University)

2 CATEGORIES OF CONTROL CHARTS	
VARIABLE CHARTS	**ATTRIBUTE CHARTS**
Variable data are data that can be measured on a continuous scale. For example, a thermometer, a weighing scale, or a tape rule.	Attribute data are data that are counted, for example, elapsed time, temperature, and radiation dose.

The main purpose of a process control chart is to indicate when production processes might have changed sufficiently to affect product quality. If the chart shows that the quality of the product has deteriorated, it is an indication to take corrective actions.

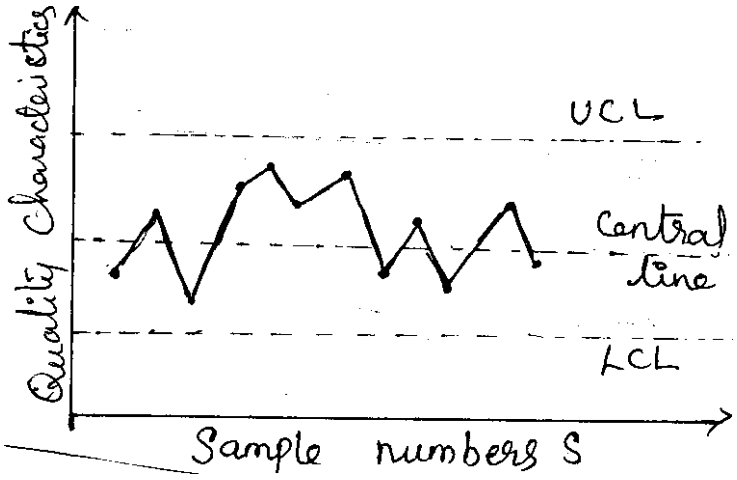
General guidelines for developing process charts

- Identify critical operations in the process where inspection might be needed.
- Identify critical product characteristics.
- Determine whether the critical product aspect is variable or attributable
- Choose the relevant process control chart from the many options available
- Determine and establish control limits and use a chart for ongoing monitoring and improvement.
- When you make changes to the process, update the limits

CONTROL CHART

What is it?

- ***A control chart,*** invented by Walter A. Shewhart, is the most widely used tool instatistical process control (SPC).
- A control chart is a graph that displays data taken over time and the variations of thisdata.
- A histogram gives a static picture of process variability, whereas a control chartillustrates the dynamic performance (i.e., performance over time) of the process.
- The control chart is based on a series of random samples taken at regular intervals.
- The general form of the control chart is shown in Fig. 6.11.



The chart consists of three horizontal lines that remain constant over time: a center a lower control limit (LCL), and on upper control limit (UCL). The center is usually set at the normal design value. The UCL and LCL are generally set at +3 standard deviations of the sample means.

If a sample drawn from the process lies inside these (UCL and LCL) limits, it means ***the process is in control.*** On the other hand, if the sample lies outside these limits, then the process issaid to be out of control. So appropriate corrective action is necessary to eliminate the condition.

Type of Control Charts

The two basic types of control charts are:
Control charts for variables* - for measurable data such as time, length, temperature, weight, pressure, etc.

Control charts for characteristics*- for quantifiable data such as number of defects, typing errorin a report, etc.