Lecture #20

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Cylinder Boring Case Study
Figure 6.13 Initial X and R Charts for Cylinder Boring Example
Figure 6.15 Second Revision, $\bar{X}$ and $R$ Charts for the Cylinder Boring Example
Figure 6.16 Classical Control System View of SPC Implementation
Figure 6.17  General Structure for a Scatter Diagram
Figure 6.18  Examples of No Correlation (a) and Positive Correlation (b)
Figure 6.19 Scatter Diagram for Surface Roughness Versus Tool Condition
Figure 6.20  Pareto Diagram of Molding Defects
Figure 6.21 Pareto Diagram of Defects Occurring in an Accounts Payable Department
Figure 6.22 Structure of the Cause-and-Effect Diagram
Figure 6.23 Fully Developed Cause-and-Effect Diagram for the Black-Spot Symptom
Figure 6.24 Cause-and-Effect Diagram for the Accounts Payable Case Study
Chapter 7

Rational Sampling

Want to collect our samples so that the differences between individuals within a subgroup is attributable only to a constant system of common causes.

Maximize opportunity for measurements within a subgroup to be similar.

Maximize chance for special causes to occur between subgroups.
Rational Subgroup Selection

- How big should the sample size be??
- How frequently should we collect samples??
- What method should be employed for subgroup selection??

Common Cause
variation only

Special causes occur
between subgroups

Time
Sample Size Considerations

What sample size should we use??

- Subgroups should be subject to common-cause variation

- Subgroups should ensure that sample means are normal

- Subgroups should ensure good sensitivity to detection of special causes

- Subgroups small enough to be economically viable
Sampling Frequency

How frequently should we collect samples??

- Must consider the general nature of the process stability.
- Must consider frequency of process events
- Cost of sampling??