



SPC

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Is 99.9% Defect Free Good Enough?

IN OTHER ACTIVITIES THIS MEANS:

1. 20,000 wrong prescriptions per year
2. Unsafe drinking water one hour per month
3. 2 long/short landings at airports per day
4. 500 incorrect surgical procedures per week
5. 200 lost articles of mail per hour
6. In Micron this means:
 - ▶ 8 hour power outage per year
 - ▶ 100,000 scrap parts per million parts

SPC

1. Statistical

2. Process

3. Control

SPC Exercise

1. Manufacturer of Cards
2. Customer Requirements
 - ▶ Drop Cards
 - ▶ Target = 100 ± 13 "
3. Is the current process capable?

SPC Exercise

1. How can we make the process capable?
2. Engineering came up with 4 processes
 - ▶ Your job is to compare them
 - ▶ Use SPC

SPC Exercise

1. Collect process Data

- ▶ Follow process procedures
- ▶ Take turns
- ▶ Team Leader will help

SPC Exercise

2. Calculate process statistics

- ▶ Average (\bar{x})
- ▶ Range (R)
- ▶ Average of averages ($\bar{\bar{X}}$)
- ▶ Average Range (\bar{R})
- ▶ Standard deviation estimate (s_x)

SPC Exercise

3. Estimate standard deviation

$$s_x = \frac{\bar{R}}{d_2 \sqrt{n}}$$

- ▶ d_2 is a control chart constant

SPC Exercise

4. Calculate Control Limits

- ▶ Upper Control Limit (UCL)

$$UCL = \overline{\overline{X}} + 3s_x$$

- ▶ Lower Control Limit (LCL)

$$LCL = \overline{\overline{X}} - 3s_x$$

Perform SPC Exercise



Two Types of Variation

1. Expected

2. Unexpected

Why SPC?

1. It can help tell us if our process is doing what is expected.
2. It can identify unexpected variation.
3. It is a real-time decision making system.

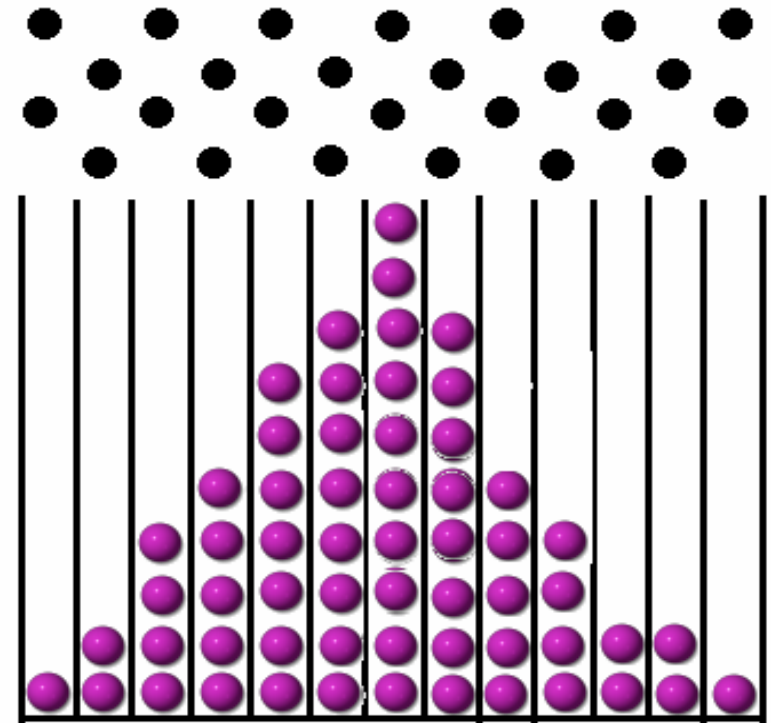
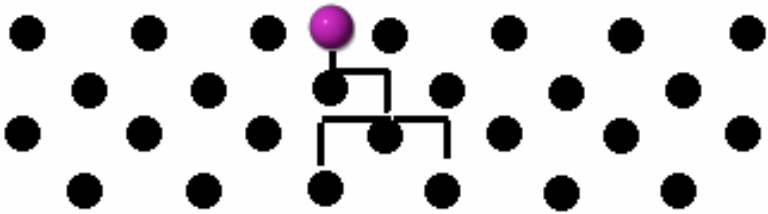
Sources of Variation

The Six M's:

- **Man (People)**
- **Machine**
- **Method**
- **Material**
- **Mother Nature (Environment)**
- **Measurement System**

What does variation look like?

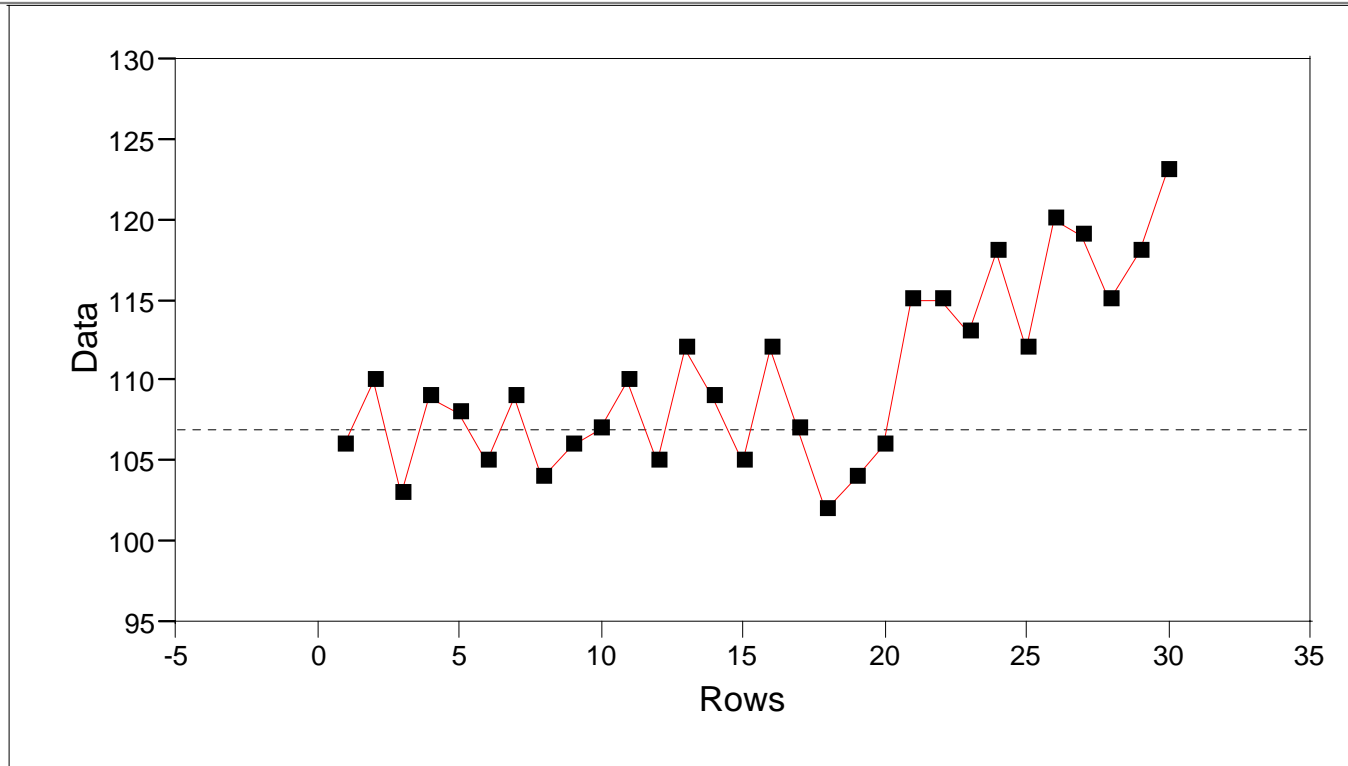
- Expected Variation is Random



Trend Charts

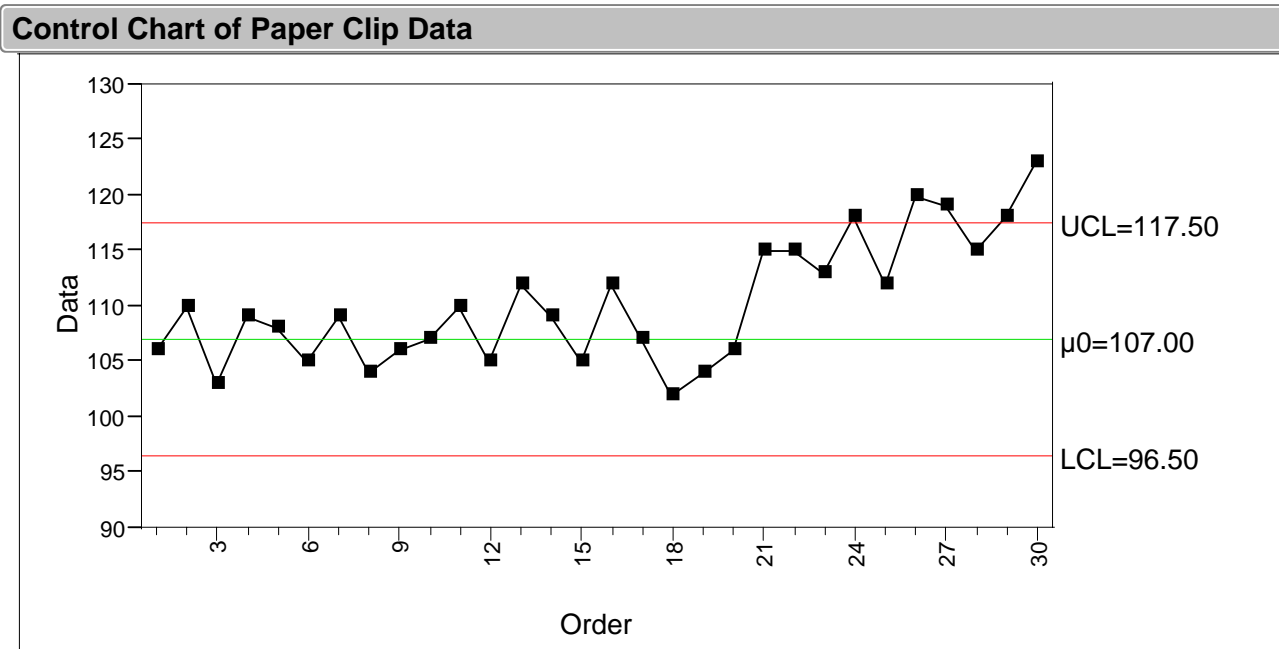
- Trend charts show us if our process is changing over time.

Trend Chart of Paper Clip Data



Control Charts

- Control charts are trend charts with limits of expected variation.
- Control charts show us if unexpected variation has occurred.



Back to the SPC Exercise



SPC Exercise

1. Draw the Control Limits on the Target Sheet
 2. Plot the averages on your Target Sheet
- Is your process in control?
 - Is your process capable of meeting the customer's requirements?

Other Business Factors

- **Costs**
 - Paper clip price = x
 - Small binder clip price = $1.5x$
 - Larger binder clip price = $2.0x$
- **Competitors**
 - Can we meet customer requirements without any weight or added costs?

Brainstorm

*What are we going to do so
we can stay in business?*

The logo features a stylized white 'M' with a white orbital ring around it, followed by the word 'micron' in a white, lowercase, sans-serif font.

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