

# CONTROL CHARTS



A **Control Chart** shows your system's performance over time by measuring variation and determining the reasons behind it. It differs from a run chart with the addition of upper and lower control limits. These calculated control limits are referred to as "the voice of the customer" (VOP).

## **Control Chart Components:**

**Title** – Include what you are measuring, time frame and location of measurements

**X-Axis** – Usually time (e.g. day, week, month) or observation number. This variable will always be put in time order, meaning what came first, second, third, etc.

**Y-Axis** – The dependent variable (unit measured), e.g. minutes, number of observations/defects, etc.

**Center Line** – Center of the chart, representing the mean (average) of the points plotted

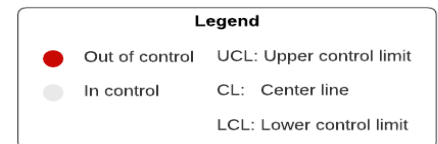
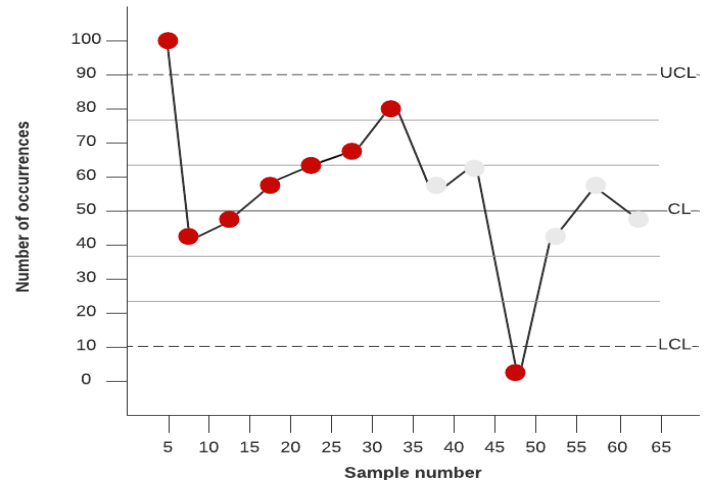
**Points** – Plotted data that has been collected

**Standard Deviation** – The amount of variation from the centerline (mean). Each side of the centerline extends to 3 standard deviations

**Upper/Lower Control Limit (UCL/LCL)** – A calculated line that illustrates if the process falls within or outside the process specifications

**Common Cause Variation**- Slight variations in the process that are expected.

**Special Cause Variation**- Process variations that aren't expected and cannot be explained.



## **"In control" process rules:**

- All points within the control limits
- 68% of the measurements within +/- one standard deviation
- A random pattern of collected data points

## **"Out of control" process rules:**

- One point more than 3 standard deviations from the center line
- Nine or more points in a row on the same side of the center line
- Six or more points in a row continually increasing or decreasing
- Fourteen or more points in a row alternating up and down
- Two out of three points in a row more than 2 standard deviations from the center line
- Four out of five points in a row more than 1 standard deviation from the center line
- Fifteen points in a row all within 1 standard deviation of the center line, on either side of the center line
- Eight points in a row all over 1 standard deviation of the center line, on either side of the center line