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## Tools

### Histogram

#### *Summarizing Data Over Time*

#### Background

A histogram is a specialized type of bar chart used to summarize data collected over a period of time. Individual data points are grouped to reveal the frequency. High bars indicate more points in the group; low bars fewer points in the group. The tool is used to reveal patterns or to determine a baseline.

#### When to Use

- When analysis of a large amount of data can reveal improvement opportunities
- When analysis can be used to predict future performance

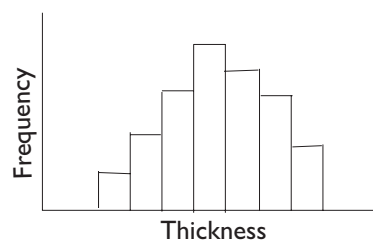
#### How to Use

1. Decide on the measure (e.g., scores).
2. Collect the data points on a process, product, or procedure. (at least 50-100 data points)
3. Count the data points and prepare a frequency table.
4. Determine the range (R) by subtracting the smallest number from the largest number.
5. Determine the number of class intervals (K). Note: roughly the square root of the number of data points.
6. Determine the class width (H) by dividing the range (R) by the calculated number of class intervals (K).
7. Determine the bar boundaries (end points).
8. Construct the histogram chart placing the values for the bars on the horizontal axis and the frequency on the vertical axis.
9. Construct the bar graph.
10. Analyze the findings. Determine centering (where distribution is centered), variation (spread of data), shape (normal bell, positively or negatively skewed, bi- or multi-modal distribution) and process capability (results compared to requirements).

#### Hints

The study of data patterns generates new learning. Collect enough data points to accurately reflect patterns. Collect data over sufficient time to ensure that all options are included.

#### How Does It Look



#### Next Steps

Use the findings to indicate if there has been a process change, to predict future performance, or to determine if requirements have been met.

