MASTER QUALITY TOOLS

HISTOGRAMS

CELEBRATING ASQ WORLD QUALITY MONTH

WHAT IS A HISTOGRAM?

A frequency distribution shows how often each different value in a set of data occurs. A histogram is the most commonly used graph to show frequency distributions. It looks very much like a bar chart, but there are important differences between them. This helpful data collection and analysis tool is considered one of the seven basic quality tools.

WHEN TO USE A HISTOGRAM

- The data are numerical
- You want to see the shape of the data's distribution, especially when determining whether the output of a process is distributed approximately normally
- Analyzing whether a process can meet the customer's requirements
- Analyzing what the output from a supplier's process looks like
- Seeing whether a process change has occurred from one time period to another
- Determining whether the outputs of two or more processes are different
- You wish to communicate the distribution of data quickly and easily to others

HOW TO CREATE A HISTOGRAM

- Collect at least 50 consecutive data points from a process.
- Use a histogram worksheet to set up the histogram. It will help you determine the number of bars, the range of numbers that go into each bar, and the labels for the bar edges. After calculating W in Step 2 of the worksheet, use your judgment to adjust it to a convenient number. For example, you might decide to round 0.9 to an even 1.0. The value for W must not have more decimal places than the numbers you will be graphing.
- Draw x- and y-axes on graph paper. Mark and label the y-axis for counting data values. Mark and label the x-axis with the L values from the worksheet. The spaces between these numbers will be the bars of the histogram. Do not allow for spaces between bars.
- For each data point, mark off one count above the appropriate bar with an X or by shading that portion of the bar.

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Before drawing any conclusions from your histogram, be sure that the process was operating normally during the time period being studied. If any unusual events affected the process during the time period of the histogram, your analysis of the histogram shape likely cannot be generalized to all time periods. Analyze the meaning of your histogram's shape. Here are the typical histogram distribution shapes.

NORMAL
Points are as likely to occur on one side of the average as on the other.



SKEWED
Asymmetrical because a natural limit prevents outcomes on one side.



DOUBLE-PEAKED OR BIMODAL
Outcomes of two processes with different distributions are combined in one set of data.



PLATEAU OR MULTIMODAL
Several processes with normal distributions are combined.



EDGE PEAK
A large peak at one tail is usually caused by faulty construction of the histogram.



COMB
Often results from rounded-off data and/or an incorrectly constructed histogram



TRUNCATED OR HEART-CUT
Removes out-of-spec units, leaving only the 'heart' of in-spec results.



DOG FOOD
The odds and ends 'leftovers' of a truncated distribution.



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