

2.3 Presentation Approaches

Presentation and display of data resulting from measuring and monitoring a process or product involves more than just drawing graphs. Effective data presentation includes understanding the type of data to be utilized, who the intended audience is, and how the information will be used. This section provides ideas to consider using when determining the most effective method to present your information.

Effective Data Presentation

Before actually presenting any information, it is beneficial to evaluate and understand a few key areas:

- Who is the audience?
- What is the intended use of the data? Will it be used to support decisions and take actions or is it just to monitor performance?
- What is the basic message you want to communicate (here is where we are and how we are doing)?
- What is the presentation format (report, brochure, oral presentation, etc.)?
- What is the underlying nature of the data and any assumptions?

A key point to keep in mind is that decisions should not be made based on graphs alone. No graph can tell you everything you need to know. The purpose of presenting the data graphically is to provide information to assist in decision making and to monitor activities or progress. Combine graphs with narrative discussions to help the reader understand the data in the proper perspective related to operations. Consider including the following:

- Explain what the values mean for your organization.
- Relate to historical performance.
- Identify influencing factors (nature of operations, seasonal changes, significant management initiatives).
- Relate to management performance goals.
- Explain significant increases or decreases.

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Use the data to try to answer the following questions for the reader:

- Is there a trend over time?
- Should I take any action? What kind of action?
- What contributes the most to the total (focus on the vital few)?
- Are we focusing on the highest priority actions?

Figures 2.5 through 2.10 demonstrate how the chart type you choose can influence the message you are trying to convey.

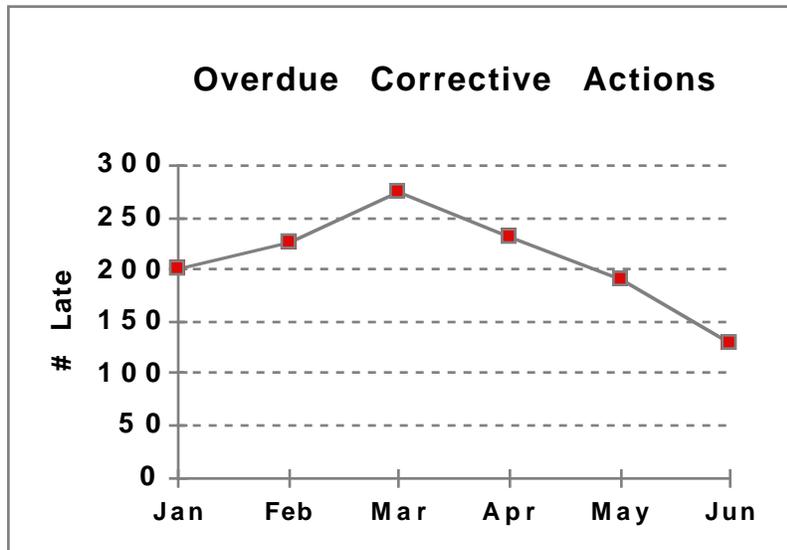


Figure 2.5
Is there a trend over time?
A commonly used approach

We often look at information to determine if there is a trend over time. Figure 2.5 shows an example of a graph commonly used to present data over a period of time. However, looking only at the total late items over time provides limited information. A more meaningful approach might be to look at the overdue rate, which allows you to factor in changes in both the number of open actions and the number that are late. This could be represented by the number of late corrective actions divided by the total number of open corrective actions, such as in Figure 2.6.

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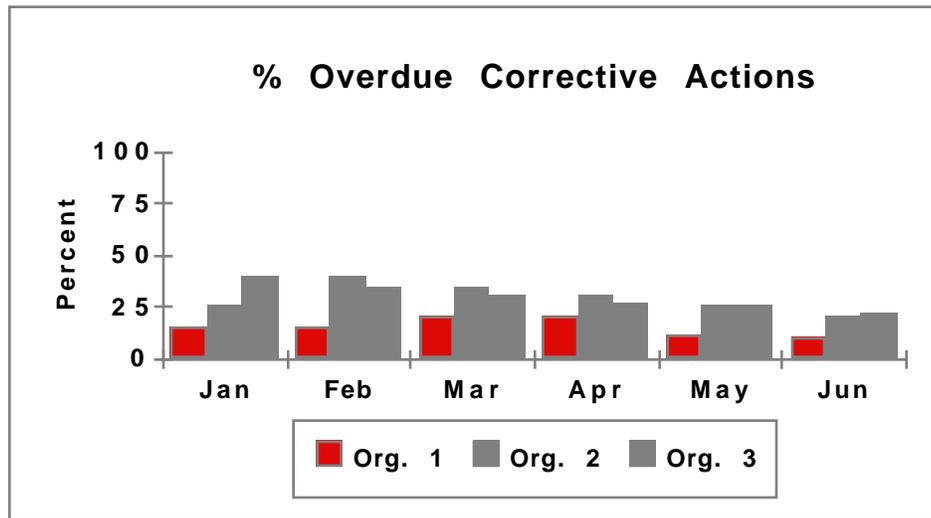


Figure 2.6
Is there a trend over time?
Same data, more information

Figure 2.6 uses the same data as Fig. 2.5, but provides more information by presenting the data differently. The combination graph shows both trends in the overall rate and the individual organizations' rates over time. Apply statistical analysis techniques to determine the presence and significance of any trends. Evaluate individual components of the rate (numerator and denominator) to determine which organization is influencing the overall rate the most.

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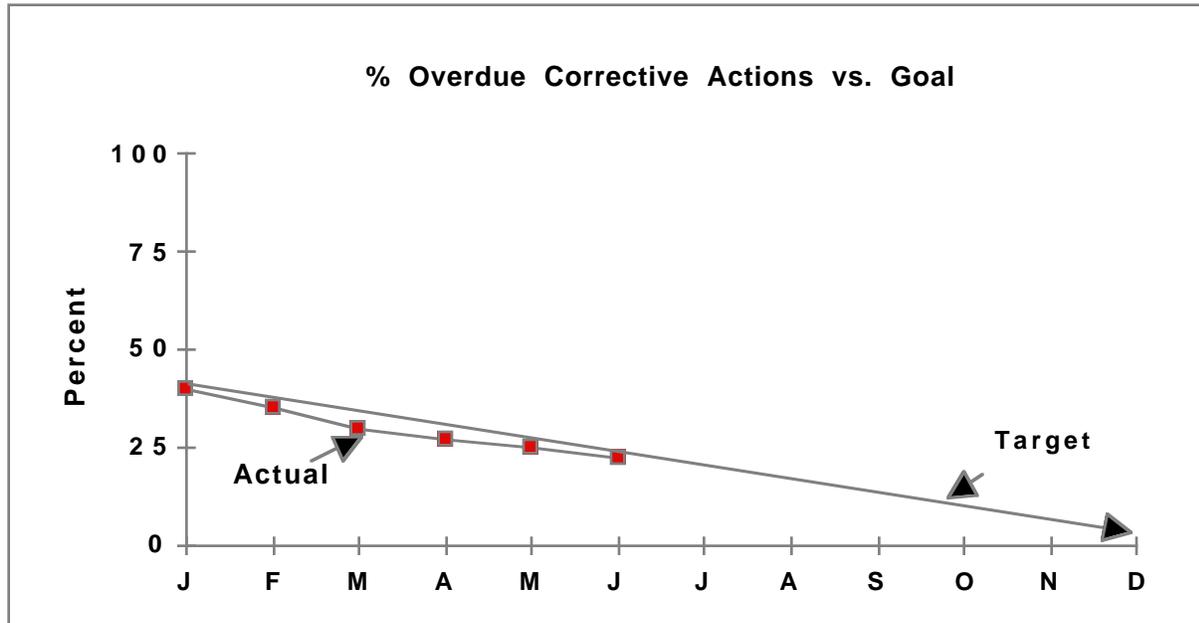


Figure 2.7
Progress toward a defined target

If targets are used, they should be realistic and achievable. The graph shown by itself in Figure 2.7 infers that the target will be met.

A control chart, as shown in Figure 2.8 for example, may lead you to question the assumption that the defined target will be met. Different types of actions are needed to influence the overall totals for systems in control versus systems out of control.

Notice how axis scale selection can significantly influence the impression given. Additionally, horizontal grid lines can make control lines difficult to read.

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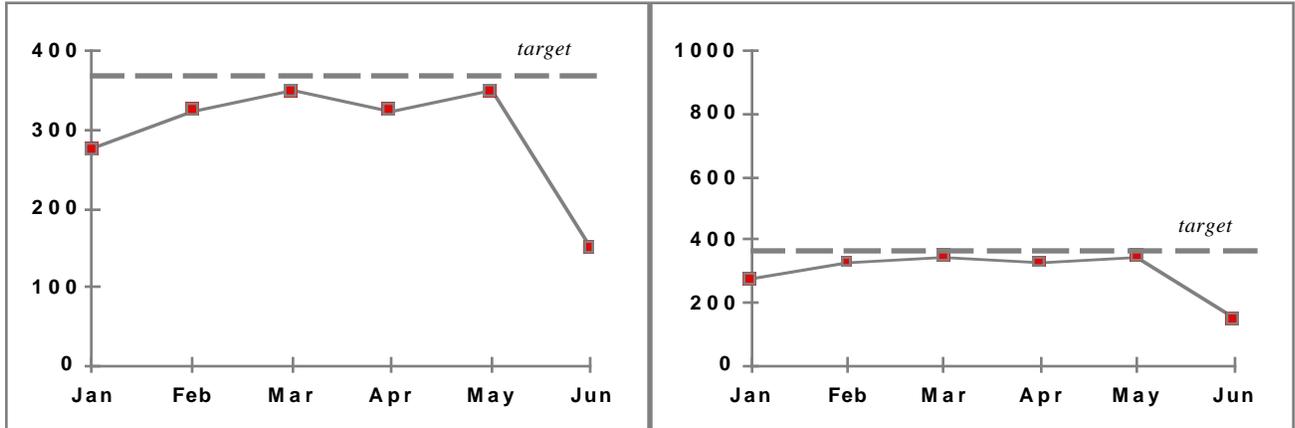


Figure 2.8
Should I take any action??
What kind of action?
System stability must be considered

A chart such as the one shown in Figure 2.9 will help you determine where to focus attention to have the most impact on the overall rate. In this chart, consideration is given to both components of the overall rate to determine what contributes the most to the total.

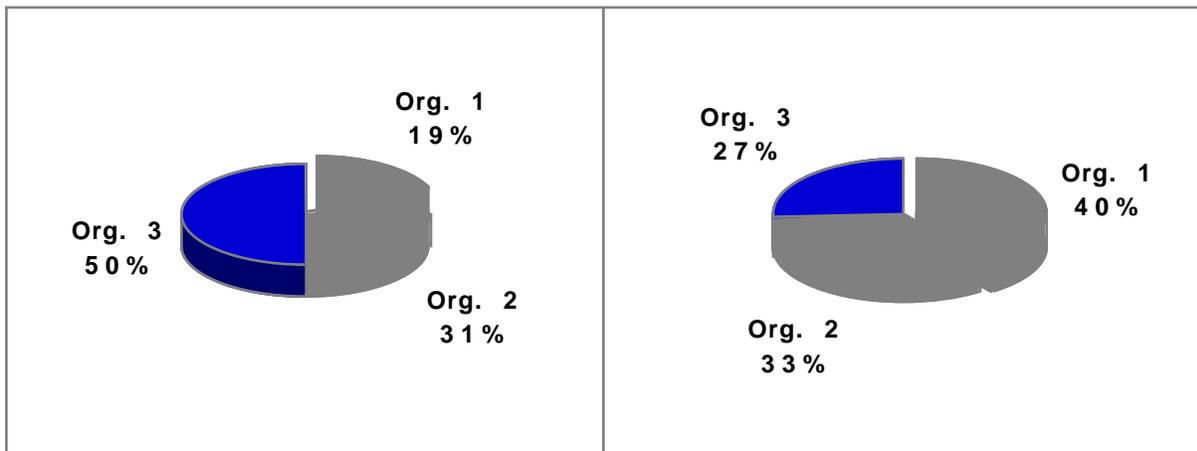


Figure 2.9
What contributes the most to the total?
Focus on the vital few

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The graph shown in Figure 2.10 tells you whether high and/or medium priority actions are dominating the overdue items. It also shows historical trends for overdue items for each priority level and for the total overdue. If your presentation is in color, you can choose traditional colors to indicate priority levels (red showing danger for high priority overdue items, yellow showing warning for medium priority, and green indicating low priority).

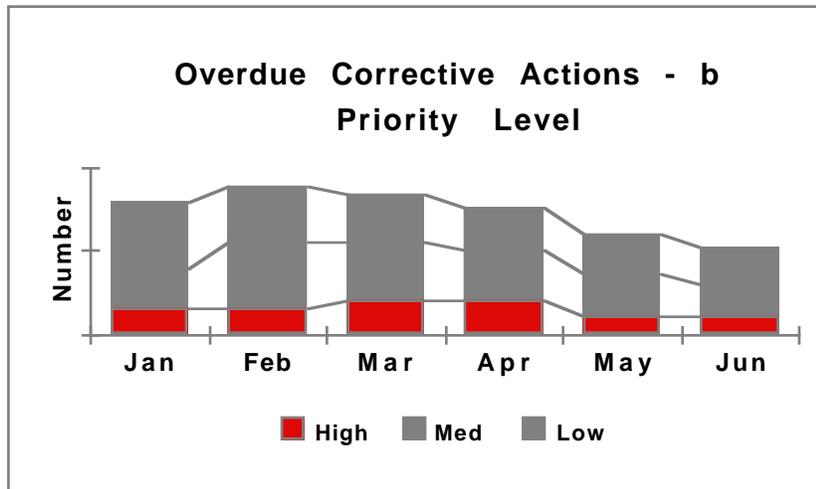


Figure 2.10

Are we focusing on the highest priority actions?
Focus on the critical areas

Choosing the Right Chart Type

There are a few universal rules about which chart type best portrays any given set of data, and in many cases the same data set can be shown many different ways. The hard part is determining which chart type emphasizes the point you are trying to make or puts the right "spin" on the data. The following provides some general comments on different chart types.

Vertical bar chart: Vertical bar charts are used to show how values change over time. They are typically used for a limited time series (i.e., just a few years, quarters, months, or whatever time period you are working with). Vertical bar charts are good for handling multiple series for comparison purposes.

Stacked vertical bar chart: Stacked vertical bar charts convey the same information as ordinary vertical bar charts, but allow you to display subelements which contribute to the overall bar. This may be helpful in understanding changes from one period to another.

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Vertical line chart: Vertical line charts are best for showing changes in a group of values over longer periods of time. They are also recommended if you are displaying several groups of data simultaneously. Control limits are often included in vertical line charts to evaluate variability.

Horizontal bar chart: Horizontal bar charts are best for simple comparisons of different individual values at one time. A vertical bar, line, area or 3-D riser chart would be more beneficial if you want to evaluate change over time.

Pie chart: Pie charts are often the best way to portray the contribution of parts to a whole. They are used to show a “snap-shot” at a specific time.

Scatter chart: Scatter charts show the correlation of two sets of numbers by plotting where the variables intersect. Scatter charts are useful when the coordinates on the horizontal scale, often time intervals, are irregular.

Histogram: Histograms show the frequency of the values in a set of data. Data is plotted in increasing or decreasing order based on the frequency count for each data value.

Chart Design: A Few Tips and Hints

The charting area is the focal point of the chart. The graphical, dramatic representation of numbers as bars, risers, lines, pies, and the like is what makes a chart so powerful. So make your charting area as prominent as possible without squeezing other chart elements off the page. If you can still get your point across without footnotes, axis titles, or legends, do so to make the charting area bigger. However, remember that the document needs to communicate enough information to be a stand-alone document. The following is a list of tips to keep in mind when designing your chart.

- ***Less is more:*** Do not try to put too many series in a chart. Line charts are especially intolerant of overcrowding. More than three or four lines, particularly if the lines follow much the same direction, is visually confusing. The only exception to this rule is creating a line chart of several series that people would not expect to be similar.
- ***Group bars to show relationships:*** Group bars together tightly if you are trying to suggest that they belong together. If you are showing a group of bars over a series of years, for example, it makes sense to cluster the bars for each year and leave a little extra space between years. If there is no need to do this with your chart data, put more space between your bars and make them a little wider so they are easier to see.
- ***Add definition with black outlines:*** Give the bars in bar charts, the slices in pie charts, and the risers in 3-D charts a little definition by making their outlines black, or a dark, brilliant color. If you are making your chart into a slide, the people at the back of the room will appreciate being able to distinguish the elements.

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- **Use grids in moderation:** When using grid lines in your charting area, use only as many as are needed to get an approximate idea of the value of any given data point in the chart. Too many grid lines create visual clutter. Balance horizontal and vertical grid lines so that the rectangles they create are not too long and narrow or tall and narrow. Use soft colors, such as gray, for grid lines. Once you have defined the color and weight of the grid lines, make sure the chart frame (the frame around the charting area) is black or a dark, brilliant color and heavier than the grid lines.
- **Choose colors carefully:** When choosing colors, use your company's corporate colors where possible and appropriate. Failing that, you can use software-supplied templates or color wheels. Also consider where your chart will appear. If it is going to be part of a computer screen show or a slide presentation in a large room, use strong, coordinating colors that attract attention and help the people at the back of the room distinguish the individual series. However, if it is going in a publication where it will be examined at close range, keep the colors softer so you do not overwhelm the reader.
- **Limit use of typefaces:** Use one typeface, or at most two, on each chart, and use the same size and weight for similar elements such as the axes and legend text. A recommended setting for these is in 12 to 18 points and bold. If you use the bold and italic fonts in a typeface, as well as different sizes, you can generate enough typographic variety without going outside that type family.
- **Choose legible typefaces:** Pick a typeface that looks clear in smaller sizes and in bold, especially if your chart is to be printed in a small size in a publication, or if it will be viewed by a large audience in a big room. If your title is big enough, you can use just about any typeface for it, and it will be legible. However, for legend text, axes, footnotes and the like, take more care. Use faces that are neither too light nor too heavy.
- **Set type against an appropriate background:** Be careful about the background behind your type. Some color combinations, such as pink or violet type and a medium or dark blue background, could make your audience feel a little dizzy. If you are using a dark background color, your type must be bright enough to be readable; it should not look as if the background is trying to "swallow it up." If you are using light type on a dark background, use a bold weight, especially with smaller type sizes. Complex fill patterns in the background can also make type hard to read, particularly smaller items like legend text and axis scales.
- **Use pattern fills with moderation:** Many charting software packages can create just about any kind of color combination or fill pattern you can imagine. But do not become carried away with color and patterns without thinking about your output device. Sophisticated fill patterns take up more disk space and take longer to print on color printers.

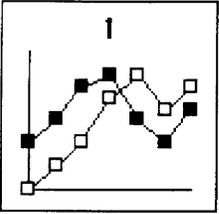
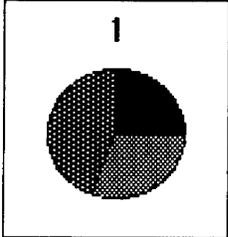
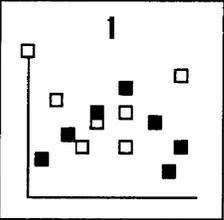
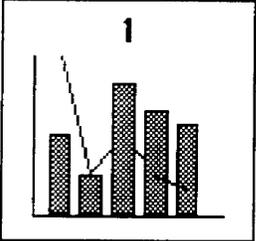
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Sample Charts

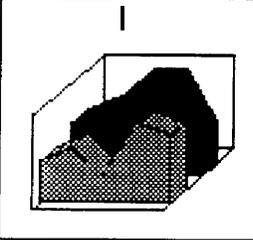
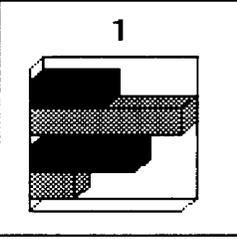
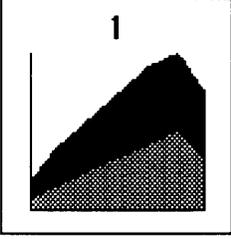
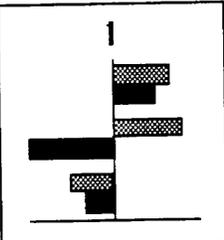
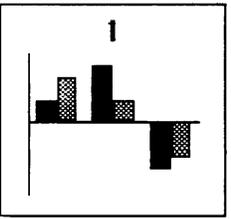
Table 2.1 provides sample charts that may be helpful when choosing the appropriate chart type for your presentation.

Table 2.1 Sample Charts

	<p><u>LINE</u></p> <p>Shows trends or changes in data over a period of time; similar to an area chart, but emphasizes time flow and rate of change, rather than amount of change.</p>
	<p><u>PIE</u></p> <p>Shows the relationship or proportions of parts to a whole (always contains just one data series); good for highlighting a significant element.</p>
	<p><u>XY (Scatter)</u></p> <p>Shows the relationship or degree of relationship between the numeric values in different groups of data; useful for finding patterns or trends and for determining whether variables are dependent upon or affect one another.</p>
	<p><u>COMBINATION</u></p> <p>Shows related data that are measured in different units (up to four axes can be used in a combination chart); combines different data to show comparisons and relationships that might not otherwise be recognized.</p>

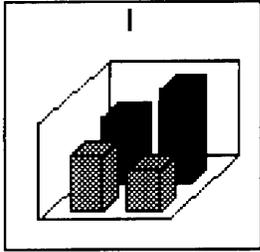
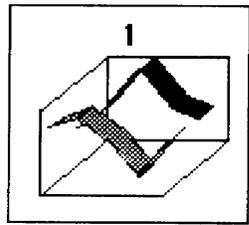
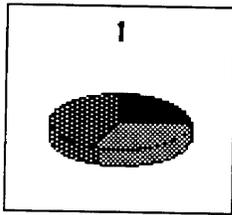
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 A 3-D area chart showing two data series as overlapping surfaces. The surfaces are shaded to show depth. A small '1' is in the top left corner of the plot area.	<p><u>3-D AREA</u></p> <p>Shows a 3-D view of an area chart, emphasizes the sum of plotted values, and separates data series into distinct rows to show differences between the series.</p>
 A 3-D bar chart with horizontal bars. The bars are arranged vertically, and their lengths represent values. A small '1' is in the top left corner of the plot area.	<p><u>3-D BAR</u></p> <p>Shows a 3-D view of a bar chart; similar to a column chart, but categories are organized vertically instead of horizontally.</p>
 A 2-D area chart showing a single data series as a shaded area under a line. The area is filled with a stippled pattern. A small '1' is in the top left corner of the plot area.	<p><u>AREA</u></p> <p>Shows the relative importance of values over a period of time; similar to a line chart, but emphasizes the amount of change (magnitude of values) rather than the rate of change.</p>
 A 2-D bar chart with horizontal bars. The bars are arranged vertically, and their lengths represent values. A small '1' is in the top left corner of the plot area.	<p><u>BAR</u></p> <p>Shows individual figures at a specific time or draws comparisons between items, but not to a whole; similar to a column chart, but categories are organized vertically instead of horizontally, placing less emphasis on time flow.</p>
 A 2-D column chart with vertical bars. The bars are arranged horizontally, and their heights represent values. A small '1' is in the top left corner of the plot area.	<p><u>COLUMN</u></p> <p>Shows variation over a period of time or draws comparison between items, but not to a whole; horizontal orientation suggests time flow more than a bar chart.</p>

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 A 3-D column chart showing three vertical bars of increasing height from left to right, set within a 3-D perspective box. A small '1' is centered above the chart.	<p><u>3-D COLUMN</u></p> <p>Shows a 3-D view of a column chart; emphasizes comparison of data points along two axes - a category axis and a data series axis - so that you can compare data within a data series more easily and still view data by category.</p>
 A 3-D line chart showing two lines as 3-D ribbons, one solid and one shaded, set within a 3-D perspective box. A small '1' is centered above the chart.	<p><u>3-D LINE</u></p> <p>Shows lines in a line chart as 3-D ribbons; makes individual lines easier to view, particularly when they cross, while still showing all data series in one chart for comparison.</p>
 A 3-D pie chart with three slices of different heights, set within a 3-D perspective box. A small '1' is centered above the chart.	<p><u>3-D PIE</u></p> <p>Shows a pie chart with height to the slices; places additional emphasis on data values that are in front.</p>

Simplified Graph/Report Generation

Spreadsheet and database software can be used to generate pareto charts, bar charts, pie charts, and scatter diagrams. The choice of which software to use is often based on personal preference or company policy.

However, software for more complex analyses and presentation beyond that performed by common spreadsheet and database software packages can be difficult to find. A comprehensive list of software used for data acquisition, data presentation, statistical analysis, and other subjects related to quality assurance and quality control is provided in the annual Quality Progress Software Directory produced by the American Society for Quality Control (ASQC). The 1995 report, published in March 1995, listed over 500 software packages. There are two parts to the annual Quality Progress Software Directory:

- A two-dimensional matrix lists each software package and indicates its applicability across 19 categories, such as calibration, data acquisition, and management.

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- An index of each of the software packages (alphabetical by company) that includes a brief description of the software, hardware requirements, and price. Included in the description are company telephone and fax numbers and addresses, so the company can be contacted directly for more information.

The annual ASQC Quality Progress Software Directory can be obtained by writing to: ASQC Quality Press, P.O. Box 3005, Milwaukee, WI 53201-9488; or by telephoning 1-800-248-1946.