GRAPHS

Sometimes the only practical way to present experimental results is through the use of graphs and tables. For instance, your reader can locate for the information he/she needs in a large table of data much more quickly and easily than could ever be done by reading through the text of the report. The same is true of drawings and graphs where you can convey much more information than you would ever want to try to convey using text alone. Not only does the use of graphs and tables make the information more accessible to the reader but makes the job of writing the report much easier. In fact, many people find that a paper is much easier to write once they have the graphs and tables ready. A common practice is to lay all the graphs and tables out in some logical order, as if preparing a slide show, and then pick out the ones which are most important and would be most useful to the reader. Once this is done the job of writing the report becomes much easier.

While there are many ways to present your data graphically or in tables, there are a few basic rules one should follow. The main ones are:

- The graph/table should deal with only one idea. In many ways a graph is a like a paragraph in that it elaborates on and supports the claim made in the topic sentence. In the case of graphs and tables the topic sentence is usually given in the graph's caption.

- The graph/table should be a self-contained entity within the report. An informed reader should not have to read the text of the report to be able to understand basic idea in the graph/table. The graph's caption is very useful in this case as it will tell the reader what information is being presented and may elaborate a bit as to the source of the data. Sometimes it is a good idea to include a few notes, such as key experimental parameters, in the graph itself.

- Keep the graph/table as simple as possible. It is very easy to make a graph so complex that the reader becomes confused, frustrated and sleepy.

- Neatness counts, as does being very systematic in the way the information in the graph/table is presented.

- Use a consistent style for the graphs, tables and drawings, including their numbering and captions.

The following are a few examples of different ways to present your results in the form of conventional xy graphs. The first is the most basic type of xy graph. The ones that follow show how one can make even more effective presentations using graphs.

Figure 1 shows a very basic, generic, xy graph. The x and y axes are defined, their units given and the scaling is appropriate in that all of the data is shown and fills the graph pane well. Note how the data is shown using symbols with a line connecting each. This connect-the-dots style is not useful and even suggests that the author either did not see an obvious trend or wasn't interested in informing the reader of this trend. By drawing a trend line through the data you are telling you reader both how you interpret the data and how you want them to see the data. In this case the data appears to fall in straight line so drawing a best-fit straight line would have been much better. Also, being picky, a uniform format for numbering each axis should be used.

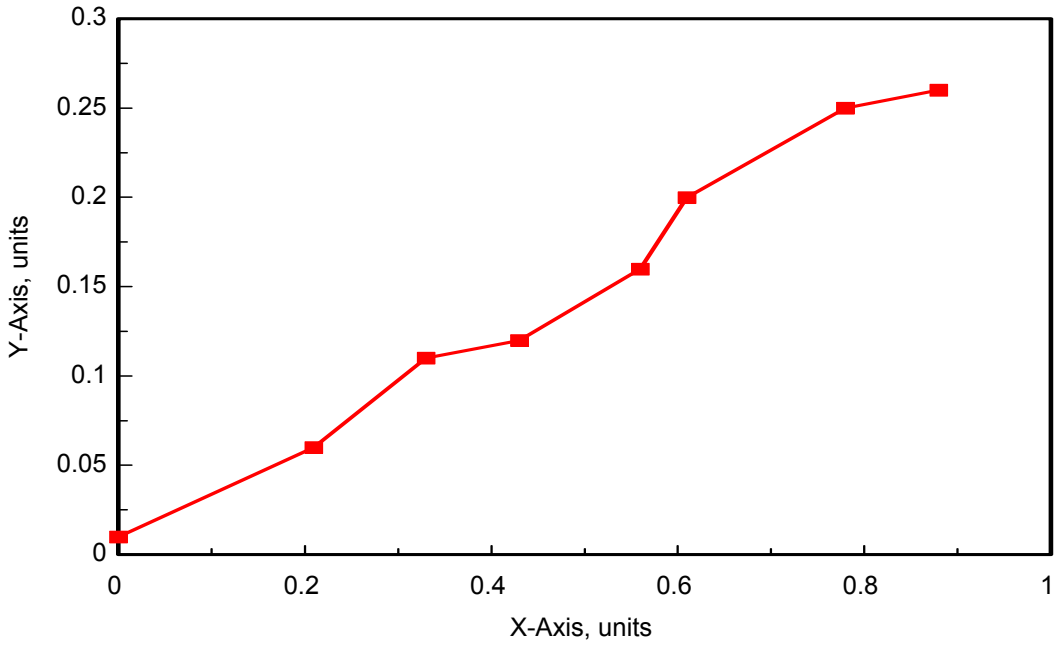

Figure 1. A basic xy graph.

Figure 2 is an improvement over figure 1. The criticism regarding the numbering of the axes has been taken care of and the line drawn through the symbols is a best-fit line. Also, two sets of data are plotted here and a legend is used to identify each. Finally, in the top left corner of the graph pane is a note indicating the value of a key parameter.

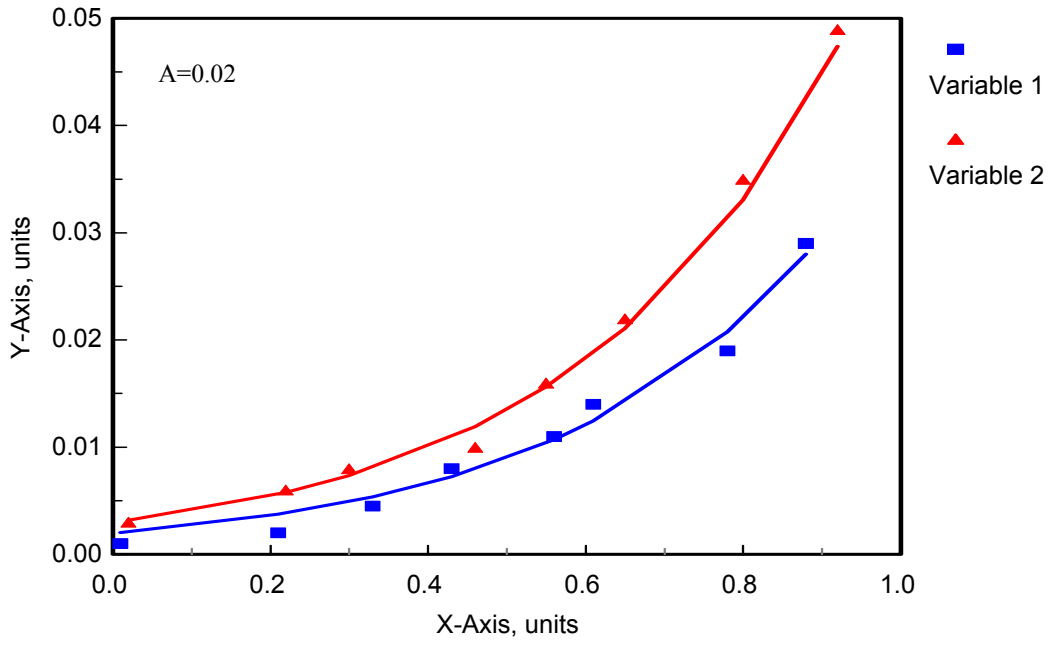

Figure 2. An improvement over figure 1, showing two sets of data and best-fit lines to show the trend and how the author interprets the data.

Figure 3 shows how one can plot two different measurements in a single graph. This is a good way to illustrate the relationships two dependent variables have to a common independent variable.

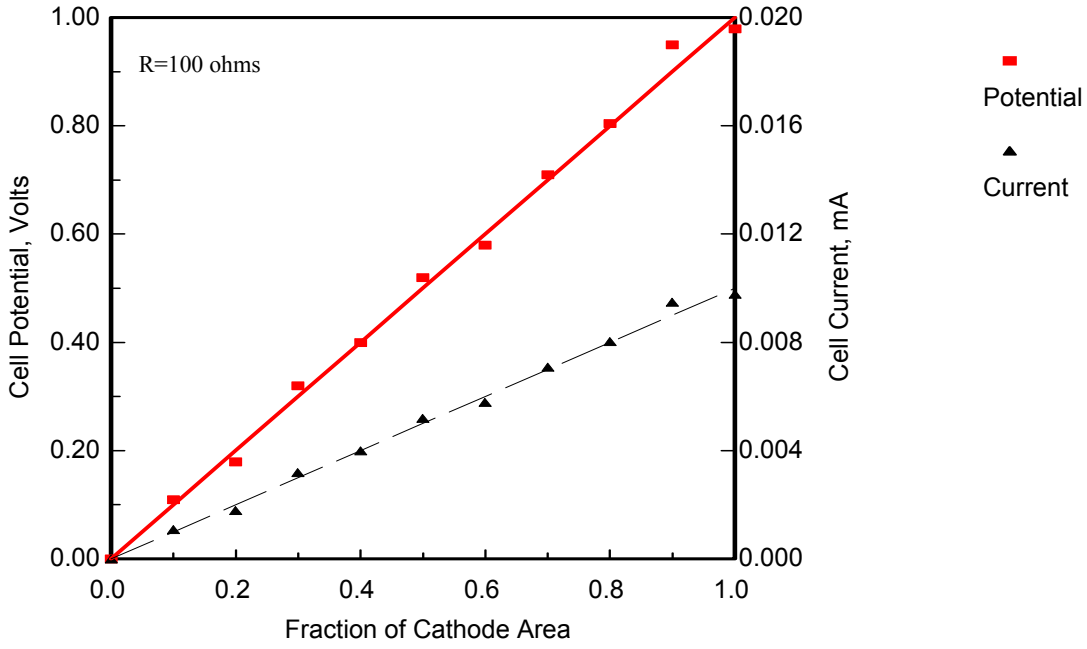

Figure 3. An x-y-y graph showing how both voltage and current are influenced by cathode area.

Figure 4 shows how plotting each measurement, rather than just the average of a number of measurements, can give a clearer picture of the experimental results. The line, computer-hand-drawn, shows the trend.

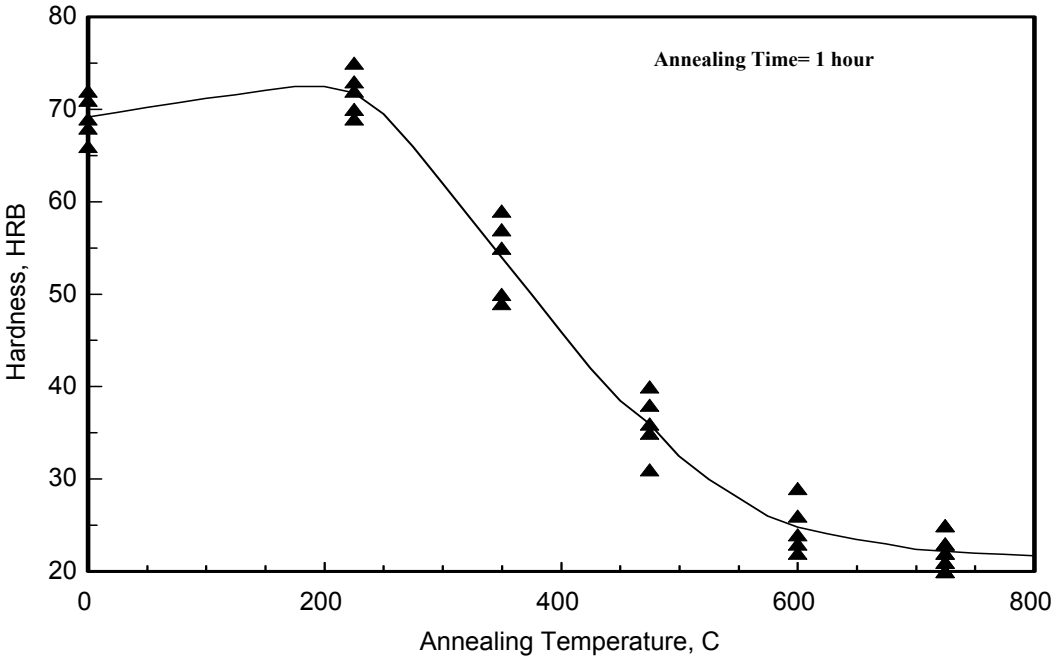

Figure 4. A graph which shows the actual scatter in the data. The line follows the average values at each temperature.

Figure 5 is actually a set of three figures, labeled a, b and c, which together tell a single story. In this study three things were measured from each specimen. Therefore, the three graphs are shown here arranged one above the other using the same scaling for the x axes.

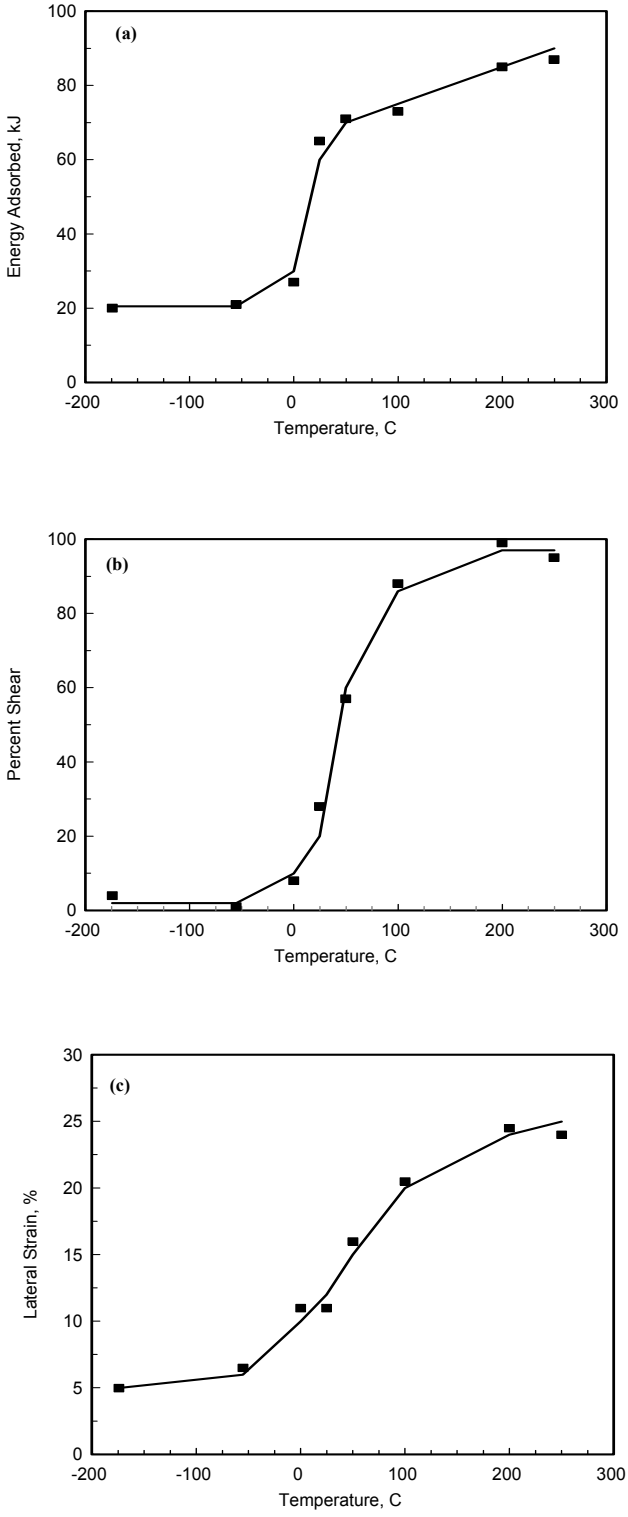

Figure 5. Results of Charpy impact tests conducted on cold-finished 1045 steel: a. energy adsorbed, b. percent shear, c. percent lateral strain.