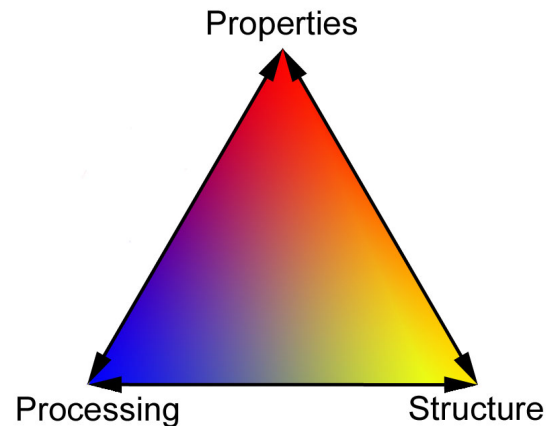


PREPARATION FOR THE RECOVERY, RECRYSTALLIZATION, AND GRAIN GROWTH EXPERIMENT

This experiment brings together the three major elements of materials science – structure, properties and processing. Using your skills in hardness and tensile testing and your knowledge of mechanical properties you will be testing annealed samples of cartridge brass (C26000, 70/30 Cu/Zn). Afterwards, you will examine the microstructures of these materials to try to determine which heat treatments caused recovery, recrystallization and grain growth, and how changes in the microstructure correlated with changes in mechanical properties.



The Assignment

In this assignment you will look at published data for the C26000 alloy and create a line plot that will illustrate how heat treating effects several mechanical properties. Once you have completed this assignment you will be familiar with the range of strength and ductility that this alloy can exhibit, something that will be very useful when you do the actual hardness and tensile tests. You will also be able to see how materials processing and materials selection often involve compromises. For example, high-strength materials tend to have low ductility.

Print out your completed spreadsheet, scaled so that it all fits on one page. This printout is due at the beginning of the laboratory session.

The Spreadsheet

Building this spreadsheet involves simply looking the data for this alloy, entering it into the tables you create, and then plotting this data. Both the table's and the graph's attributes will then be adjusted so that they are both use a good technical or engineering style.

Figure 1 shows what your spreadsheet might look like. The major sections of this spreadsheet are described below. Your spreadsheet should contain each of these sections.

Header Include the file name, your name, date and similar information at the top of the spreadsheet. This information is very helpful in managing your work, and it is standard practice in many engineering activities, for instance, on design drawings.

Table of Data Set up a table that lists, in separate columns, heat treatment, yield strength, tensile strength, elongation and modulus of toughness. Enter the data for the C26000 alloy found in the appendix of your laboratory manual and estimate the modulus of toughness by multiplying the average of the yield and tensile strengths by the

elongation. Include appropriate labels and any other text, such as units, that make it easier to understand what is being done.

Line Chart Create a new line chart that illustrates the data in your table. (A line chart is not the same thing as an xy chart.) Use the names of the heat treatments as labels for the x axis and use a second y axis to plot the elongation. Add a legend to your chart and adjust the scaling and other attributes so that your uses a good engineering style.

Questions

1. What does the data, and your chart tell you about the range of strengths and ductilities possible in this alloy?
2. What does it tell you about the relationship between the different mechanical properties?

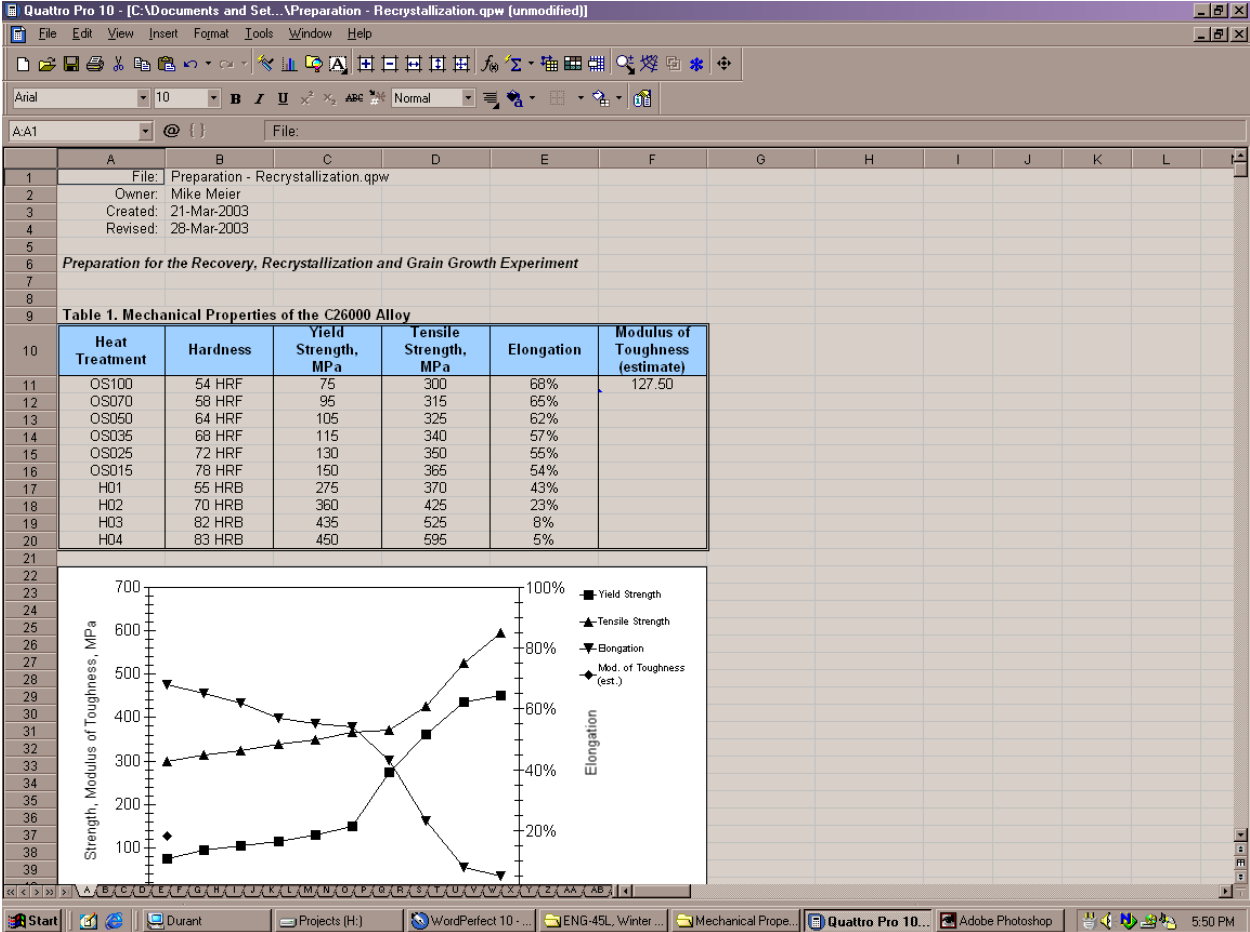


Figure 1 Screen shot of the spreadsheet produced in this exercise.