WRITING ABSTRACTS

Abstracts are the last part of the report to be written and are the first part to be read, after the title. It is also the most useful part of the report, both to you and your reader, since it is usually the one part of the report which determines whether or not the rest will ever be read. Unfortunately it is often the most difficult part of the report to write. This section offers some simple guidelines for writing an abstract and examples of abstracts students tend to write.

Guidelines for Writing Abstracts

Everyone eventually develops their own method of writing an abstract but for those who are just starting out might find the following procedure useful:

- Extract the one or two main facts or ideas from each section of your report.
- Enclose each fact or idea in a brief sentence.
- Arrange these sentences in the same order as the ideas were presented in the report.
- Rework this collection of sentences so that it becomes a coherent paragraph.
- Revise it as you feel is necessary so that this paragraph represents both the factual aspects of the report and your particular style of writing.
- If space permits it is usually a good idea to include a comment about the value of the work and the significance of the results.

Two common problems found in many abstracts are long, complex, tedious and run-on sentences and an excess of mundane detail. Sometimes the first problem is a result for trying to keep the abstract short, as if two 100-word sentences can really say more that 4 to 8 shorter sentences. It also is an indication that the author has not had the chance to put things into perspective and piles everything into one sentence as if each fact or idea was of equal, even urgent, importance. The reporting of details, by which I mean numerical values of experimental parameters and results, is important but should not taken so far that they make the abstract difficult to read. Key details should be reported in the abstract but it may be better to leave all others in the body of the report.

Finally, in writing an abstract you are not simply trying to cram everything into one or two short paragraphs, as if the abstract will be taking the place of the report. Instead, you want these short paragraphs to represent the whole work while offering those details you feel the reader will be most interested in. If the abstract is good and the subject interests the reader then he/she will probably read the rest of the report.

Sample Abstracts

The four abstracts below illustrate a number of the good and bad points of abstracts written by students of this course. The instructions given to the authors submitting these abstracts was to limit the them to a maximum of 200 words and to use a specified format for listing the title, author and

the author's affiliation. While each author complied with the requirements for the format they all did not all do a good job in summarizing their work.

Abstract 1

> **X-Ray Diffraction Measurements of the Residual Stress in a Steel Spring, *author*, University of California, Davis, CA:** In this experiment the residual stress was measured. X-ray diffraction was used the measure the stress. We found the answer to be 435 MPA which is close to what we expected.

The first abstract is useless and it makes the author look really bad. It is vague, incoherent, contains typos and clearly shows that the author is either not aware of or doesn't care about the needs of the reader. It even suggests that the author probably didn't even understand the experiment. The only way the reader will learn anything from this report is to try to read the whole report, but, given the quality of the abstract will probably not bother. The one thing the author does do correctly is report the value of the stress which was measured, but even this is useless since the abstract does not tell use anything about the material investigated. This type of abstract is typical of reports where the author treated the assignment as a simple homework assignment.

Abstract 2

> **X-Ray Diffraction Measurements of the Residual Stress in a Steel Spring, *author*, University of California, Davis, CA:** A section of steel spring was examined using x-ray diffraction to determine the residual stress in an arbitrary direction on the surface of the spring due to forming. The residual stress was determined to be -368.5 MPA, with a standard deviation of 139.6. The same data was used to calculate the stress by hand, and hte result was -389 MPa, in good agreement with the software value.

This abstract is fair, but it is lacking. It describes the goal of the experiment, the material examined and the main procedure and gives the major results. The final phrase about doing the analysis by hand, however, is odd, suggesting that either the author did not trust the software or feels that hand calculations are more reliable than computer calculations. Or perhaps another goal of the experiment was to evaluate the software. In any case, the reader will probably feel that while the work may have been done correctly the author seems to be inexperienced and is probably not being supervised properly. Also, something other than the term "software value" should have been used. Finally, given that there was a 200 word limit the author could have taken the opportunity to elaborate a bit on either the specimen, the technique, or the importance of this work.

Abstract 3

> **X-Ray Diffraction Measurements of the Residual Stress in a Steel Spring, *author*, University of California, Davis, CA:** Residual stresses are those which remain in the lattice after the applied stress is removed. It is a common occurrence in metals and alloys and is a byproduct of many processing techniques. And it can be a problem. Failure in hip implants and accelerated corrosion in aqueous environments has been linked to residual stresses. However, in some cases this aspect of these failures can be minimized by measuring the residual stresses using the appropriate x-ray diffraction technique. In this experiment we will demonstrate this method by measuring the residual stress in a flat spring.

This abstract contains little actual information on the experiment which was done. In fact, it reads like the first paragraph of an introduction with a final sentence stating the objective tacked on to the end. This problem often shows up when the author writes the abstract before writing the report.

Abstract 4

X-Ray Diffraction Measurements of the Residual Stress in a Steel Spring, *author*, University of California, Davis, CA: The residual stress in a section of a steel spring was examined using x-ray diffraction. These measurements were made using $Cu_{k\alpha}$ radiation, a germanium solid state detector and a 32-2 goniometer. A total of 13 scans of the (211) peak was performed using a range of ±30° R incremented in steps of $\sin^2 R$. The mean stress was found to be -505 MPa and the standard deviation was 31.9 MPa. This is very close to the mean stress which was measured by Sanchez and coworkers.

This is a good abstract in terms of both its technical content and the writing. It contains all of the technical information the reader should expect to see in the abstract, enough in fact that a reader who has experience with this subject would be able to repeat these experiments based on the information given in the abstract alone. It might seem that too much detail was presented but for one familiar with the subject the level of detail is just right and was not reported in a way that makes the abstract difficult to read. Also, the final sentence mentioning the agreement with the results of similar work does a lot to convince the reader that these results are reliable, that the author has some experience with the subject and understands the importance of independent corroboration of experimental results and even tells where the reader can go to get additional information on this subject. However, the author could have used the allotted space (200 words) to mention the reason for doing these experiments and to comment on the significance of the results.