Formal Lab Reports

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The formal report documents the experiment that was performed and provides a detailed discussion of the results obtained and how those are important. It organizes and clarifies the information that can be found in a good lab notebook, adding background material and a more detailed discussion of the results. From such a report, a peer group of engineers (or engineering students) who are familiar with the same general subject matter should be able to reproduce the experiment and perform their own analysis, such that they could either verify or dispute your conclusions. Reports generally have three goals: 1) to justify the reasons for performing the experiment; 2) to record the results of the experiment; and 3) to allow others to evaluate the results.

You should consider your audience to be familiar with the general engineering background associated with your experiment, but none of the specifics. For instance, your target audience has a general background in heat transfer but only very limited or no specific knowledge of boiling. As the informal report, the formal report must incorporate grammatically correct sentences, correct spelling, and be structured in a clear and concise manner. In addition, it should contain publication-ready, professional graphics and illustrations.

Formal reports should contain the following components:

- Title Page
- Abstract
- Table of Contents
- Introduction and Background
- Experimental Apparatus and Procedure
- Results and Discussion
- Conclusions and Recommendations
- References
- Appendices

The parts given in black have been discussed in the informal report manual. More details on the new parts in red are given below:

Abstract:

One or two paragraphs which clearly and concisely present an overview of the report. Complete sentences must be used, not phrases. Nine out of ten readers will read only the abstract of an
engineering report- therefore, it is imperative that clear, concise, to-the-point information be used. Include information on

- What was done.
- Key results.
- Key conclusions.

Introduction and Background:

This section is written to provide the reader with all the background needed to appreciate why you did the experiment and to understand your results and conclusions. To accomplish this, you may need to provide a brief review of previous work or of relevant theoretical material, including appropriate references. The introduction should provide:

- The objective of the experiment.
- Relevant background information.
- An indication of the importance of the work.
- A brief preview of what will be described.

References:

Cite complete references for any information that you draw on.

Appendices:

Appendices in the formal report are even more important than in the informal report. Appendices contain detailed information which is not necessary for the understanding of the key points in the body of the report, provided that the reader believes you when you state that "The details can be found in Appendix XXX." Of the 1 in 10 readers who actually read your report, fewer still will actually go through the Appendices; yet that is where you must provide detailed documentation which is important to the experiment but too cumbersome for the general text. You should include Appendices on the following:

- Raw data table (or disk, if the length is overwhelming).
- Sample calculations (see informal report handout).
- Computer programs.
- Etc.

Important note on figures:

Different from the informal report, figures in the formal reports must be included in the text. This enhances the readability of long reports and avoids that the reader constantly has to flip pages.
Each figure has to be carefully labeled and be accompanied by an informative caption. Figures must be referenced in the text by their number.

**Length of the report:**

There is no strict guideline for the length of the report. However, if it is significantly shorter than 10-15 pages it might not need the requirements for a writing-intensive course. If it is significantly longer than 20 pages, chances are that it is too wordy. Check if you can write it more concise. In general, length will not have an influence on grade of the report. Avoid duplicate information unless absolutely necessary. Do not use cut and paste if the experimental procedure in part X was the same as in part Y. Rather refer back to the procedure used earlier.