

Written and Oral Communications

Analysis, Synthesis, and Design of Chemical Processes,
Summary of Chapter 22:

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This document is a short summary of how to deal with your written and oral communications. It is determinant as an engineer to have a good way of presenting your findings to colleagues, company management, clients or potential clients, and possibly the general public. Any evaluation of your success as an engineer, then, will be based in whole or in large part on the quality of your written and oral communications.

Audience analysis

In all engineering communication, written or oral reporting is a way to transfer information. It is then crucial to give your audience the information needed with a clarity that avoid misunderstandings. In that way, you should:

- Identify who your intended audience is: Will your report or oral presentation be for engineers, managers, executives, clients, or general public?
- Determine what response you want from your audience: Do you want them to approve or abandon the project? Do you want them to order the correct equipment and materials? Etc...
- Imagine yourself to be one of your audience: After writing the first draft, read the report as if you were one of the people listening or reading your work.
- Redo the analysis after every new draft as many times as needed: Multiple drafts are essential.

Written communication

Before writing your paper, ask yourself about the aims of the work and keep in mind that the most important purposes of putting ideas into writing are:

1. To provide a permanent record
2. To get someone to do something (action writing)
3. To instruct someone (informative writing)

Often in engineering writing, all three purposes apply. What you write is a permanent record of your analysis, your conclusions, and your recommendations. Unlike oral communication, written documents must stand on their own, it is why precise wording is crucial, since decisions will often be made by the reader without any further consultation with the writer. Therefore, it is important not to produce ambiguous words or phrases, gaps in logical developments, and undocumented assumptions that can lead the reader to make a wrong decision.

The format for a design report must be done in assuming that the readers might not read the whole report. Often, management will read only the conclusions or the recommendation. Here is a classical guideline for a written design report:

1. Letter of Transmittal: This is a memorandum that identifies the report. In order to get the reader's attention, several sentences summarizing the bottom line are essential. This part must be signed to be considered official.
2. Title Page: The title page must include names of all contributors to the report, the date the report is finished, and the name and address of the author's organization.
3. Abstract or Executive Summary: An executive summary is an informative summary of the report that focuses on the concerns of management. The conclusions and recommendations are given, but not the details or only if they impact the risk of decisions made by management. On the other hand, the abstract summary is a synopsis of the report and gives an overview of the whole document, so that the reader can decide whether or not to read the full document.
4. Table of Contents: Only long reports need a table of contents. All pages of your report should be numbered, preferably at the top right corner.
5. Introduction: You should include a definition of the problem, the background, the key constraints on the solution, and how the problem was attacked.
6. Results: All the result of your work should be presented in this part. It is highly recommended to show the data in tables or figures. Always mention the name and the unit of the variable in a graph.
7. Discussion: Here you discuss the results more in details and present the reasons for making choices and the reasons for discarding alternatives.
8. Conclusion: No new results are presented in this section. Rather, you should present your important conclusions based on your analysis. These conclusions are also summarized in the abstract or the executive summary.
9. Recommendations: It includes recommendations for further action or further study.
10. References: A method is to cite the reference by the author and year of publication.
11. Appendix: The appendix is the place for your detailed calculations, computer programs, and so on
12. Equations: All equations are centered, with right justified numbers in parentheses.

The goal of these early reports is to present the data required for decisions that are quite difficult to make. In fact, the audience needs enough information to be reasonably confident that their decision is the right one. The audience requires:

- A careful analysis of a base case with sufficient detail to provide a context
- Evidence that the most reasonable options have been considered
- A careful analysis of these options
- A statement of and justification for any significant assumptions made
- A finite number of options with a clear analysis of the advantages and disadvantages
- An estimate of the accuracy of the analysis

Oral communication

The key to effective oral communication is, as it is for written communication, audience analysis. Include visuals that focus the audience attention on the areas of the project analysis that both you and the audience feel are important. Be sure that the audience receives the information required for making the right decision, and be sure not to bore the audience.

Public speaking can be scary at first, but oral communication is crucial in engineering design activities. To be self-confident during your presentation, it is important to be well prepared and to avoid last minute problem. In this regard, give your practice talk far enough in advances that you can make corrections. Make sure that your slides are loaded correctly.

When presenting an oral report, it is important to realize that the audience cannot digest material in the same way they can when reading a report. There will be no time for them to reread a sentence or paragraph, or to study a table or figure. Therefore, it is incumbent upon the speaker to emphasize the important points. Slides or transparencies are usually used, and you should prepare a hard copy set of these for each audience member.

Here is a classical guideline for an oral presentation:

1. Title Page:
2. Overview of the Problem and Your Solution:
3. Outline:
4. Results:
5. Discussion:
6. Conclusions:
7. Recommendations:

In order to be comfortable with your presentation, you will choose between transparencies and slides. Transparencies are more flexible, you can write over it, whereas slides seem more professional, more formal. Do not put too much on a slide or transparency. Short, concise statements of a few words are sufficient to convey your points. Make sure that the audience in the back row will be able to read your slides.

During the presentation, do not read the slides and be sure to face the audience. Try to avoid any nervous habits and approach the oral report with confidence and a firm belief in your abilities and your work. Speak clearly, enunciate carefully and avoid audible pauses. Do whatever that will make you most comfortable and in control. In order to be more confident, you can use notes to help you to remember what to say during the speech.

Let the people know when they are allowed to ask questions. Usually, the questions will be asked at the end. Admit it when you do not know the answer, but try to give any relevant partial answer that you have. When you prepare the presentation, try to imagine what questions you will be asked and make sure you can respond to them.

References

Turton R., Bailie R. C., Whiting W. B., Shaeiwitz J. A.: Analysis, Synthesis, and Design of Chemical Processes. 1998