Tips for Writing a Technical Document for a Technical Audience

Chemical engineers are often required to write technical documents. Most chemical engineers will become satisfactory writers at some point in their careers, but that process usually happens after graduation. The following are some specific tips in no particular order that I give to students in our capstone class that, if used, help them become satisfactory writers in less time.

Perhaps the biggest key is to learn a general procedure for writing. First, write a first draft. Try to use good style but make sure all thoughts are recorded, even if the style is not good. Go away and forget; typically allow at least a 24-hour period to elapse before returning to edit. Reorganization of your document may be necessary during this first edit, *e.g.*, moving or adding paragraphs is common. Since most writers use too many words in the first draft, you will probably reduce the length during editing. After complete editing of the whole document, again go away for at least 24 hours. Edit the whole document a second time; at this point the organization is probably correct. Edit the whole document 3-5 times with a significant break between each edit. Use software spelling and grammar checking, but only during your last edit. With no more than five or so changes per page (and you are likely sick of looking at the document!), call your task complete.

During editing remember that every sentence has a purpose; eliminate those that have none. Sentences that state facts that the vast majority of readers know should not be included. Statements that are too general and hence don't say anything should not be included. A good test is to write the opposite of a sentence and if the opposite is nonsensical, delete the original sentence. Paragraphs must flow and progress in a logical manner; within a paragraph don't start with one thought then go to a second thought and then return to the first. A document also must flow from beginning to end. The first and last sentences in each paragraph are particularly important because they aide transition from paragraph to paragraph. Other specific writing/editing tips are shown in Tables 1 and 2.

In professional settings, your supervisor will usually edit your document. In other settings, ask someone to edit your document. In both cases the best form of editing is rewriting, which requires significant editorial effort. Ask the editor to use "track changes" and be sure to examine each change critically before accepting the change to determine why such a suggestion was made so that the next time the same mistake will not be made. If the author was diligent, general comments used in editing such as "this part needs work" are useless because if the author knew how to make the document better, then the document would have been better in the first place! From the author's perspective, editorial changes fall in three categories: change is better, don't see the point of the change, and change is worse or the meaning was changed. As a rule, follow the editor's suggestions in the first two cases (but don't be hesitant to do something different than either the original or the change if you come up with something better!). In the third case, discuss openly with the editor why the original phrasing is better or how the desired meaning can be made clearer.

Note: This document consists of tips to writing a good technical document and is not, nor is meant to be, a guide to writing a good technical document. For a good guide, I recommend *Writing Science in Plain English* by Anne Greene.

TABLE 1
Text– Shorter is better if meaning is maintained
Fewer words are better. Shortening by just one word should be done if meaning is maintained and grammar is correct.
If more words are necessary to eliminate ambiguity, then use more words. Ambiguity must be avoided at <u>all</u> costs, even if awkward phrasing results. Since "this" (used as a noun) and "it" are almost always ambiguous, do not use them. "There" (used as a noun) is almost always unnecessary; restructure the sentence.
Don't ever repeat, unless a separate abstract and/or conclusions section exist. "In other words" is okay only in rare circumstances where both thoughts are required to make a concept clear.

TABLE 2
Figures–A picture is worth a thousand words
Graphs and pictures almost always explain better than text.
Don't in the text describe what is in the graph/picture (don't repeat!)
Do in the text draw conclusions from the graph/picture
Make a figure as small as possible while maintaining legibility. Increasing font size on axes, titles, etc. might be necessary to make graphs smaller.
Use figure captions that describe the source of the figure. If conclusions are included in a figure caption don't repeat the same conclusions in the text.
Eliminate significant white space, which typically occurs at the end of a page having a figure on the next page or around a figure; crop the figure if necessary.

—Brian P. Grady, University of Oklahoma

This one-page column presents practical teaching, advising, and diversity tips in sufficient detail that others can adopt the tip. Focus on the teaching method, not content. The column should be maximum 550 words, but subtract 50 words for each figure or table. Submit as a Word file to Phil Wankat <wankat@ecn.purdue.edu>.