

The Engineering Design Notebook

(Information synthesized from courses at University of Wisconsin-Madison and Colorado State University)

Engineers maintain a design notebook. If working on a team, there may be one notebook for the entire team. However, in college each student may be required to keep their own notebook so the professor can determine each person's contribution to the effort.

Use a bound notebook rather than a 3-ring binder. Binders are too messy and are not accepted by the courts as evidence, should what you are working on ever result in a patent.

What should you put in your design notebook? The final report documents your design, but your notebook tells how you got there. Your design notebook is a record of **everything** you have done in developing your design. Use it as a diary to record how you spent your hours on the project.

Try to think visually with regard to your notebooks. It should include thumbnail sketches of ideas, free-body diagrams, design process and the like.

Organize the notebook chronologically and be sure to date each entry. Dating is very important if you want to follow up on a phone call or if the Patent Office wants evidence on exactly when you came up with your wonderful invention.

Number the pages. That way you can write cross-referencing notes like, "See page 23 for other info on cylinders".

Don't erase anything. If you don't like what you have, cross it out with a large X that will let you see what's underneath. This is important because you may wish to refer back to idea in the future. It will also allow to see your mistakes and not make them twice. Use lots of white space to separate entries. This will make it much easier to scan it for information later.

Write everything in the notebook rather than on separate slips of paper. However, if you do end up with calculations or notes on scraps of paper, tape the scrap right in the notebook. Keep your notebook with you at all times so you can record that brilliant idea on the spot. Some of your best thinking may happen in the middle of the night or during the American Idol. Architects and artists always carry a sketchpad with them and are sketching throughout the day. Engineers would do well to mimic them.

Periodically include an assessment of the current state of your project. A well-defined statement or diagram can significantly improve the documentation of the design process.

Write your name, phone number and e-mail address (and any other identifying information you wish to include) inside the front cover of your notebook. If it is ever lost you will want it returned as quickly as possible.

Keep your notebook neat. Do not use it as a coaster or to set your pizza on. Assume that your boss is going to read it to determine how big a raise you get. Finally, remember that what you include in your notebook is not just for you, but for others as well.

Good vs. Bad Notebooks

A good project notebook is useful to the researcher. If scientists/engineers record enough detail about the on-going project, they can not only complete progress and final reports with the data and ideas collected in the notebook, but they can also hand a project to a new researcher assigned to the project if that should ever be necessary.

A bad notebook might be less useful because it doesn't include enough detail to help write reports or recreate the way the project developed because it doesn't keep entries ordered for quick access.

Content

The first entry after your table of contents should be your problem statement and working criteria.

For each class or session the first notebook entry should be a goal for that session or class.

The last entry for each class or session should be a reflection on how well the goal was met.

The list below presents possible topics for your notebook entries. Each entry you write will usually include more than one of the following:

- Reviews of Literature/journal articles (includes reference citations & gaps/successes of previous research)
- Conference/meeting notes
- Information gathering phone calls w/date, the name of the person, his or her title and company and the telephone number.
- Plans for gathering data
- Experiments run (includes detailed methods/measurements)
- Report of field work
- Progress reports
- Questions for advisors/mentors/bosses/other professionals
- Problematic experiments
- Problematic data
- Possible solutions of problems
- Equipment and material requirements/ Parts lists/Model numbers of all competing parts that you could use in your design.
- Scheduling considerations
- Budget considerations
- Staff considerations
- Interesting quotations (includes source)
- Tangential thoughts/inspirations
- Possibilities of future work
- Relationships to other projects/problems
- Comments/criticisms from colleagues/advisors
- Process analyses
- Drafts of introductions, methods, results, solutions, abstracts
- Questions for discussion
- Sketches/charts
- Formulas/statistics/functions/calculations
- Limitations of research
- Dead ends (problems that didn't get solved)
- Successes (detailed accounts of solutions)
- Cross-referencing with own notes/previous readings/previous work
- Legal/ethical issues
- Implications/applications of work
- Links to cause and effect-how can they be strengthened
- Flaws in project design
- Lists of variables
- Copies of bureaucratic forms/permissions/communications that relate to the project
- Testing procedures