

Design Project Instructions

Please complete the following steps:

1. The first step after completing review of the resource materials for this unit and choosing a design problem is to brainstorm about possible solutions to your project problem. Do not discount any ideas; write them all down. At this stage, you may find it necessary to refine your problem definition or redefine it entirely in order to address difficulties that you foresee in problem solution. For this and other steps in your design project, you may wish to refer to the reading from subunit 4.1 (Industry Initiatives for Science and Math Education's "Engineering [Design Process](#)" by Seyyed Khandani).
2. Next, interview five people that you respect and describe your problem definition to them. Ask them for possible solutions; encourage creative ideas. Write down all of their ideas. Accumulate all of these ideas into one list and add any additional ideas that you may have at that stage.
3. Rank the ideas. You may wish at this stage to consider factors like complexity, reliability, cost, safety, effectiveness, materials availability, maintenance and sustainability, environmental factors, and many others in your ranking. This will likely be a difficult process. Throughout this process and those following, you may wish to refer to sections 2.1-2.3 of this course for assistance with ethical and related considerations.
4. Finally, choose at least two of the best candidates and complete a conceptual design for each option in which you specify factors like sizes, shapes, and materials. At this stage, you should complete an engineering sketch (or

several - - see

<http://www.me.umn.edu/courses/me2011/handouts/drawing/blanco-tutorial.html> for advice) if appropriate. These sketches may be done by hand. You may learn about Computer-Aided Design in the Saylor Foundation's [ME104: Computer-Aided Design \(CAD\)](#). Still, it may be preferable for some thinkers to sketch early design drawings by hand.

5. Revisit your interviewees and share with them your design choices. Ask them to be critical with regard to safety, reliability, cost, functionality, and any other factors on which they care to comment. Write down all of their comments. Revise and/or defend your designs in response to criticism.
6. Summarize your project in a short document encompassing the following:
 - A. Summary—a brief paragraph describing the problem addressed, the design process and the final designs;
 - B. Introduction including problem definition—a detailed discussion of the problem definition including discussion of the need for a solution and its potential economic and environmental impacts;
 - C. Review of brainstorming process and ranking processes – a discussion of the brainstorming process, a list of potential solutions considered, and a description of the ranking process and design criteria used;
 - D. Presentation of final designs – a comparison of the final solutions considered; specifications and design drawings of the final solutions; ethical, economic, maintenance, and environmental considerations; and

recommendations for future study.

You should consult section 2.4.7 of this course for help with formatting and organizing the document.