

# 1.4 Engineering Notebooks, Descriptions, and Sketches

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## Summary

Students learn and practice the rules for keeping an engineering notebook. They apply their understanding of engineering descriptions and conceptual sketches.

## Learning Objectives

After this class, students will be able to:

- Demonstrate the correct procedures and rules for keeping an engineering notebook.
- Write a good engineer's description of a process or product.
- Create a good conceptual sketch and include all relevant information.

## Materials

- Bound notebooks for each student (if they do not already have them).

## Time

80 minutes

## Procedure/Pacing

### Engineering Notebooks

1. Draw a large, blank open notebook on the board. Have students, as teams, demonstrate the rules for keeping an engineering notebook on the board. Ask: Why is each rule important?
  - a. Date and number every page.
  - b. Leave no blank sections; draw a slash through any blanks.
  - c. Put an index on the first page.
  - d. Include all data, descriptions, sketches, calculations, notes, etc.
  - e. Write everything in real time.
  - f. Write in ink.
  - g. Cross out any mistakes with a single line and initial. Write corrections close by.
  - h. Document team meetings: date, discussion results, assigned tasks.
  - i. Never tear out a page.

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2. Emphasize that an engineering notebook becomes a legal record, a record the engineer's work for his/her own reference, and a record for another engineer to pick up where he/she left off.

### **Engineer's Description**

1. As a class discuss what a layperson's description of some object might be. Contrast this description with how an engineer would describe the same object. You may use the example below, or choose one of your own.
2. Example: Camping Tent
  - a. Layperson's description: A good camping tent as one that is roomy, lightweight, and water resistant.
  - b. Engineer's description: A camping tent is a collapsible portable shelter constructed of multiple materials (aluminum poles, coated polyester covering, and nylon material base) that weighs no more than 10 pounds when packed, has base dimensions of 8.5 ft. by 7.5 ft. when assembled, and can resist water penetration at a pressure of 2.8 psig.
3. Discuss how each of the descriptors from the layperson (roomy, lightweight, water resistant) is subjective. What may be roomy to one person, may not feel roomy to another. While the engineer uses precise language, units, and numbers with a focus on the materials, energy, motion, and information used and how they benefit the needs of people. These specific pieces of information are related to the Design Constraints and Requirements we will use during the Engineering Design Process.
4. Have students produce their own engineer's description (first part of Assignment 1.4i).

### **Conceptual Sketch**

1. Explain that most engineering drawings begin as a conceptual sketch.
2. Have students recall what is important to show in a conceptual sketch:
  - a. Sketch of the design (may not be to scale), may be multiple views (side, top, front, etc.).
  - b. Words and arrows to show all of the parts of the design.
  - c. Show how parts are connected and related.
  - d. Show how parts work to perform the operation of the entire design.
3. Discuss how these conceptual sketches would later become engineering drawings to scale with measurements.
4. Show examples of engineering drawings (see Resources section). Ask: Why would it be important to have a set of detailed drawings before a product would be manufactured? (Possible answer: So that the

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engineers, machinists, operators, etc. all understand exactly the dimensions, materials, and methods necessary to manufacture the product, so that mistakes are less likely and the final product will be as designed.)

5. Have students produce their own conceptual sketches (second part of Assignment 1.4i).

### **In-Class Assignment**

Assignment 1.4i: Engineer's Description and Sketch

### **Resources**

Engineering drawings:

[https://www.teachengineering.org/collection/cub\\_/activities/cub\\_creative/cub\\_creative\\_activity6\\_engrdrawcomphandout\\_v1\\_tedl\\_dwc.pdf](https://www.teachengineering.org/collection/cub_/activities/cub_creative/cub_creative_activity6_engrdrawcomphandout_v1_tedl_dwc.pdf)

[https://www.teachengineering.org/collection/cub\\_/activities/cub\\_creative/cub\\_creative\\_activity6\\_typesengrdrawhandout\\_v1\\_tedl\\_dwc.pdf](https://www.teachengineering.org/collection/cub_/activities/cub_creative/cub_creative_activity6_typesengrdrawhandout_v1_tedl_dwc.pdf)

### **Homework**

Assignment 1.5h: Teams and Engineering Design Process Part 1 - Understand

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