



Unit 1 – Introduction to Design

Preface

This unit is an introduction to different facets of design and will emphasize the following: evolution and history of design, the steps in a design process, the importance of proper sketching techniques, measurement and tools used in design, and the use of those tools and techniques to innovate or invent solutions to problems. You will be introduced to a variety of skill building opportunities that will enhance your design skills and prepare you for the remaining units in this course.

Concepts

1. There are many design processes that guide professionals in developing solutions to problems.
2. A design process most used by engineers includes defining a problem, brainstorming, researching, identifying requirements, exploring possibilities, selecting an approach, developing a design proposal, making a model or prototype, testing, refining, making, and communicating results.
3. Engineers create sketches to quickly record, communicate, and investigate ideas.
4. Engineers apply dimensions to drawings to communicate size information.
5. Statistical analysis of measurements can help verify the quality of a design or process.
6. Engineers use Computer Aided Design modeling systems to quickly generate and annotate working drawings.

Essential Questions

Lesson 1.1 Introduction to a Design Process

1. What is the design process and how is it used?
2. Why is brainstorming important when modifying or improving a product?
3. What is meant by *constraints* and *criteria*?
4. What are common constraints put on a product?
5. What comes to mind when you hear the words *evolution of a product*?
6. What kinds of situations might keep a designer from moving sequentially through a design process?
7. What is an engineer's notebook and how is it used?
8. Why do engineers use graphics to record and communicate information?

Lesson 1.2 Introduction to Technical Sketching and Drawing

9. Why is sketching an important engineering skill?
10. What is the difference between sketching and drawing?
11. What does the term isometric sketch mean?
12. What does the term oblique sketch mean?
13. What is perspective sketching?
14. What advantages do pictorial drawings have over multiview drawings?
15. What are the three main views of a sketch or drawing that are required to depict an object?
16. Why should you not erase construction lines?
17. If you are given an object with an unknown function and told to create a sketch of it, how would you determine what the front view would look like?
18. What is orthographic projection?

Lesson 1.3 Measurement and Statistics

19. Why did our ancestors create measurement standards?
20. Who is responsible for establishing measurement standards that are used by engineers and manufacturers today?
21. What methods do engineers use to communicate an object's dimensional information?
22. What problems could result from incorrectly converting measurements from one system to another?
23. What factors influence the precision of a measuring tool?
24. What information can a designer use from a statistical analysis of a product?

Lesson 1.4 Puzzle Cube

25. Why is a design process so important to follow when creating a solution to a problem?
26. What two-dimensional shapes are most often associated with three-dimensional forms?
27. What is the difference between a geometric constraint and a numeric constraint?
28. Why would you create a prototype of a product before the actual production takes place?

Lessons

Lesson 1.1 Introduction to a Design Process

Lesson 1.2 Introduction to Technical Sketching and Drawing

Lesson 1.3 Measurement and Statistics

Lesson 1.4 Puzzle Cube