

1.9 Prototyping

Summary

Students will understand the importance of prototyping in the engineering design process. They will prototype their solution to their selected design problem.

Learning Objectives

After this class, students will be able to:

- Define a prototype.
- Describe the importance of prototyping in the design process.
- Determine questions that a prototype should answer.

Materials

Make the following available for students to prototype their design.

- Playdoh
- Pipe cleaners
- File folders
- Tape
- Markers
- Cardboard
- Card stock
- String
- Scissors
- Straws
- Popsicle stick

Time

80 minutes

Procedure/Pacing

Prototypes

1. Ask students to define a prototype. Answers should be something like:
A prototype is an experimental or incomplete design that can be built quickly and is made from inexpensive materials.
2. Ask students what the purpose of prototyping is. Some answers could include:
 - Learning: answering questions about how the design will work, if the design is reasonably achievable, or what might not work well and could be improved. (This type of prototype is likely to be less sophisticated and is like a proof-of-concept model.)

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- Communication: demonstrating the product to potential users or customers to get their feedback. (These prototypes may be 3D models and have working features.)
3. You may want to relate stories from the Business Insider article in the Resources section to help students believe that a prototype made from simple materials can be useful.
 4. Explain to students that they will be prototyping their Engineer-Your-Life design. Tell or show students the materials they will have available as they construct their prototype.
 5. Allow students to meet in their groups to determine what questions they want to answer with their prototype. These questions should be turned in at the end of class. Have students focus on the Design Requirements and Constraints they have written. They will use their prototype to see if their design will meet these requirements and constraints. Some questions may include:
 - Is the size of my design right? Should it be larger or smaller?
 - Are the features all useful? Could some be eliminated? Should some be added?
 - Is the layout or look of the design appealing? Is it user-friendly or easy for users to figure out?
 - Does it solve the problem when it works?
 - Is it practical to use? Will it be easy to use?
 6. When their question list is complete, let students begin to prototype their design.

In-Class Assignment

Assignment 1.9i: Prototyping Questions

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Resources

Prototyping <http://home.howstuffworks.com/product-prototyping-process.htm>

Purpose of Prototyping: <http://www.engr.mun.ca/~adfisher/7936-06/Lectures/Prototyping-HO.pdf>

Background article: *Business Insider*, “Engineering Professor: Here's How To 'MacGyver' A Prototype For Your Invention And Get Funding”
<http://www.businessinsider.com/how-to-macgyver-a-prototype-of-your-invention-2013-9>

31 Questions Every Designer Should Ask When Testing Prototypes
<http://www.usertesting.com/blog/2015/05/13/31-questions-every-designer-should-ask-when-testing-prototypes/>

Homework

Assignment 1.10h: Engineering Design Process Part 4 - Reflect

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