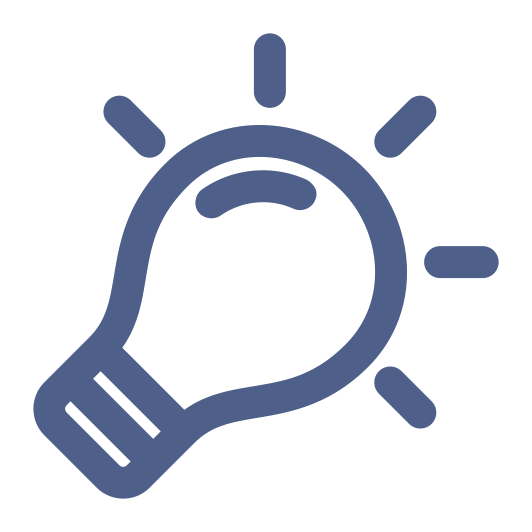
**Virtual Product Dissection Educational Module**

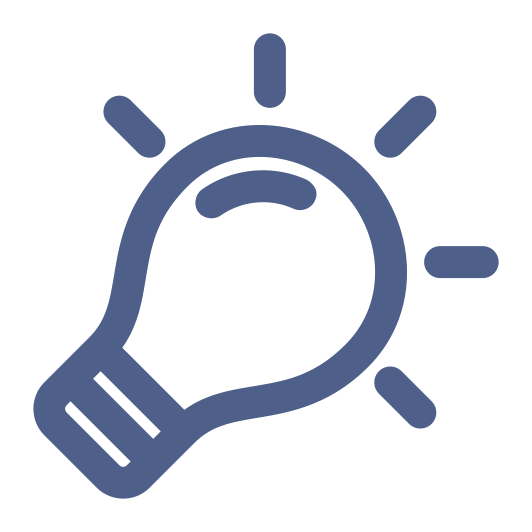
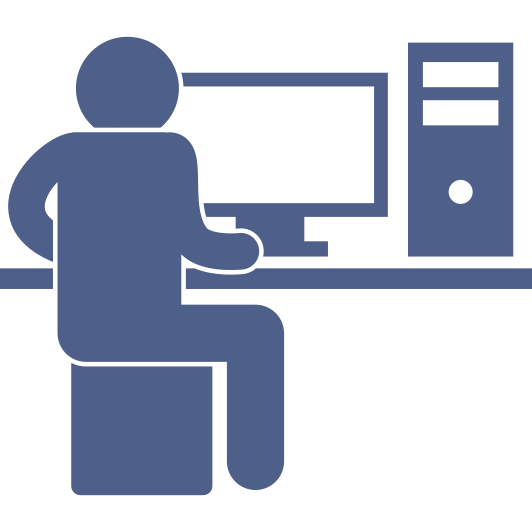
This product dissection module was developed to introduce students to the use of product dissection as a means to inspire creativity in engineering design and provide a framework for application in their own design projects. The materials presented here are based on empirical studies on how to use product dissection as a tool for learning about how products work and as a tool for design inspiration. The material is presented through a variety of hands-on activities. See the timeline below for an overview of the time required for each of the activities.



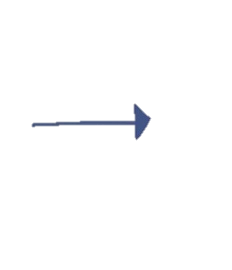
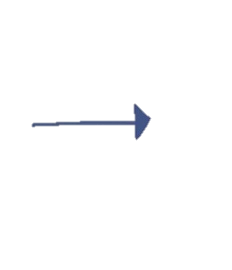
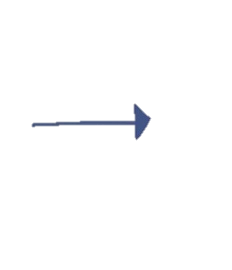
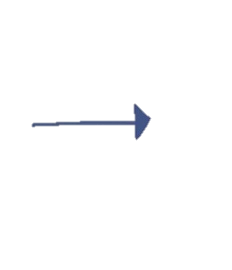
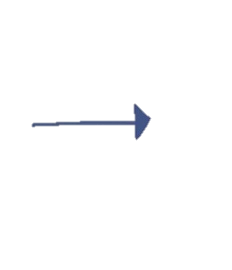
**Design**



**Dissect**



**Discuss**



20 Min Design Discussion

10 Min Idea Generation

10 Min Idea Generation

15 Min Dissection Discussion

15 Min Dissection

20 Min Activity Discussion

## Learning Objectives

* Encourage a creative learning environment through energizing activities
* Introduce students to the concept of creativity in engineering design
* Introduce students to product dissection
* Discuss the benefits of product dissection for idea generation

## Supplies Needed

* A sheet of paper for each student for energizer activity
* Idea Sheets ([Download a template](https://psu.instructure.com/courses/1983661/files/101460441/download?wrap=1) or, e.g., post-it notes, half sheets of paper, etc.)
* Computers with access to the internet and to the program [SolidWorks eDrawings](https://www.solidworks.com/sw/support/edrawings/e2_register.htm)
* [Product dissection activity handout](https://psu.instructure.com/courses/1983661/files/101481828/download?wrap=1)
* [PowerPoint slide deck](https://psu.instructure.com/courses/1983661/files/101481827/download?wrap=1)

# Pre-module

Prior to starting the module, the students should be provided with a design prompt/ design challenge/ design project.

**Note: All materials were created with the Water Toy as the design prompt. If you plan to use a different prompt edit the PowerPoint slides and the Handout. All Materials can be found at www.engr.psu.edu/ProductDissection**

# Introduction and discussion about creativity during ideation (20 minutes)

The purpose of this introduction and discussion is to help students recognize the importance of creativity in engineering design and get them in the creative mindset. To start this section, the PowerPoint slides should be used to facilitate a discussion on the design process and idea generation. During the PowerPoint, students will watch a video. The purpose of this video is to provide students with a foundation of what it means to be creative during the idea generation process and what barriers exist to being creative. Ask everyone to take out a piece of paper and a pencil to compete the activity in the video.

After watching the video, students will take part in an energizing activity to get them into the creative spirit (and hopefully laughing while they do it). Students generally really enjoy these activities. Since this activity takes place in a computer classroom, where space is limited, this energizer does not require students to get up and move.

## Paper Clip Energizer

* Ask everyone to take out a piece of paper and a pencil
* Tell them to write down as many ways to use a paper clip as possible, give them a reasonable time limit (2 minutes)
* After the timer has gone off, ask students to count up how many ideas they had
* Ask for hands up for who had more than 5 ideas, then for 10+, then 15+, etc. At some point there should be only one student, ask them to read their list. (As they are the winner, feel free to give them a prize, such as a paper clip.)
* After the student has read their list, ask if anyone had any ideas that were not listed. Keep gathering ideas. Ask if any one came up with new ideas after people have read from their last.
* The goal is to get them in the creative mindset, and also let them know that working together can help spawn more ideas.

After completing the energizer an overview of different idea generation methods should be given, as laid out in the slides.

# First idea generation session - Individual brainstorming (10 minutes)

The goal of this activity is to get students to put all of their current ideas down on paper. This session helps students to move on with new ideas in the next session and to identify how their ideas changed after the dissection activity. Students should perform this brainstorming session individually and should be introduced to the rules of brainstorming:

No (self) judgement • Encourage wild ideas • Stay focused on the topic • Be visual • Go for quantity • Combine & improve ideas

# Product dissection discussion (15 minutes)

The goal of this activities is to introduce students to product dissection as an idea generation method. Product dissection is often done in industry and academia to uncover opportunities for re-design and inspire new design ideas. The purpose of this activity is to allow students to take apart and analyze all components of a product to understand its structure and properties, and thus, find ways to improve the product and/or be inspired for new design ideas. This activity can help to improve the functionality, maintainability, and reliability of a product through the examination, study, capture, and modification of existing products. It can also help serve to inspire new design ideas by drawing inspiration from products in different design domains. Therefore, it is ideal that students dissect products outside of the area they are designing. Ex. If the task is to design a new electronic toothbrush, have the student dissect any product that is not a toothbrush! Students should take part in a discussion about product dissection and watch the short video on the website under the video tab

# Product dissection activity (15 minutes)

After the discussion students should choose which products to dissect. At this point they should be given the product dissection handout. Deciding which product to dissect should be done in project groups, and each student should dissect something different from their teammates. The  available  product models can be found on the website under product models

After students have chosen their products, students should watch the tutorial video for SolidWorks eDrawings

# Second idea generation session (10 minutes)

This second idea generation session is intended to help students to build on ideas from their product dissection. Students should draw out specific design ideas on idea generation sheets. These ideas may stem from the application opportunity box from the previous activity or be completely new. Remind students that they should write out all ideas that are not currently on their idea generation sheets. Students should perform this idea generation session individually and should be reminded of the rules of brainstorming

# Reflection (10 minutes)

* In what way did the product dissection activity help you develop ideas?
  + Hopefully they were able to think about the problem differently because of the product they dissected, or they were able to transfer concepts from the product they dissected to a new design domain
* Did the product you dissected impact the ideas you developed?
  + Dissection of analogically different products (ideas different than the product they are currently designing) has been found to increase novelty and quality of generated ideas
* Do you think it is (or would be) useful to dissect different products when working in a group?
  + Gaining different experiences can help you to uncover more opportunities for redesign of a product so this can be useful to group projects