Unit 3: Engineering Design

Content Area: **Technology**
Course(s): **Engineering Design 1**
Time Period: **November**
Length: **9 blocks**
Status: **Published**

Transfer Skills

Engineering design is a creative and iterative process for identifying and solving problems in the face of various constraints.

Enduring Understandings

1. Society can shape technology, and technology can shape society.

2. Engineering design is a creative and iterative process for identifying and solving problems in the face of various constraints.

3. There are often many possible solutions to a problem.

4. The design process is often called the "design loop" because there is no beginning middle or end but an iterative process of design, testing, and redesign.

5. There are many different fields/disciplines of engineering.

6. Being an effective engineer requires the application of technical, communication and interpersonal skills.

7. Safety is an important part of the prototyping process in an engineering lab.

Essential Questions

1. What is technology?

2. How are science, technology and engineering interrelated?

3. How does society influence technology and vice versa?

4. Why is the design process used in engineering?

5. Why does a technological product change over time?

6. What role does prototype testing play in the design process?

7. What information is needed to make a proper evaluation of a design?

8. What kind of safety considerations are there during the prototyping process?

9. How does rapid prototyping influence engineering design?

Content

Vocabulary:

Design brief, Scientific method, Iteration, Mockup, Analysis, Technology, Design process, Proof of concept, Science, Engineering, Hypothesis, Innovation, Project map, Brainstorming, Experiment, Specifications, Possible solution, Prototype, Evaluation, Invention, Rapid Prototyping, 3D printer, Laser cutter

Skills

1. Formulate a design brief to an engineering problem and identify project specifications given background information.

2. Create brainstorming sketches of solutions to an engineering problem.

3. Develop possible solutions to an engineering problem.

4. Design and build a solution to an engineering design problem.

5. Document the design process through the use of an engineering portfolio.

6. Present a design to peers for review.

7. Incorporate the use of a 2D and/or 3D CAD system and rapid prototyping to develop a solution to an engineering design problem.

Resources

Engineering drawing tools (various)

Engineering drawing paper

Calipers

Physical objects to be measured

Teacher presentation device

Document camera

Desktop computers

Research database access

2D & 3D CAD systems

3D printer

Laser cutter

Color laser printers

Large format printer

Prototyping equipment (hand-held and power tools)

Prototyping materials

Prototyping furniture

Presentation device

Standards

TECH.8.1.12.A.CS2	Select and use applications effectively and productively.
TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
TECH.8.1.12.B.CS2	Create original works as a means of personal or group expression.
TECH.8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
TECH.8.1.12.C.CS2	Communicate information and ideas to multiple audiences using a variety of media and formats.
TECH.8.1.12.C.CS4	Contribute to project teams to produce original works or solve problems.
TECH.8.2.12.A.1	Propose an innovation to meet future demands supported by an analysis of the potential full costs, benefits, trade-offs and risks, related to the use of the innovation.
TECH.8.2.12.A.3	Research and present information on an existing technological product that has been repurposed for a different function.
TECH.8.2.12.C.5	Create scaled engineering drawings of products both manually and digitally with materials and measurements labeled.
TECH.8.2.12.D.1	Design and create a prototype to solve a real world problem using a design process, identify constraints addressed during the creation of the prototype, identify trade-offs made, and present the solution for peer review.
TECH.8.2.12.D.3	Determine and use the appropriate resources (e.g., CNC (Computer Numerical Control) equipment, 3D printers, CAD software) in the design, development and creation of a technological product or system.