Lesson 3 of 8

Product Design

Created: 03/2025 by the National FFA Organization

Description of Lesson Series: There are a wide range of careers available in the Power, Structural, and Technical Systems pathway. Students might not even be aware of many of these careers. This lesson series will dive into the multitude of careers that are needed to take a precision agriculture product from idea to finished product and beyond. These lessons are designed to be used in order.

Student Learning Objectives:

After completing these activities, students will …

1. Identify careers in product design and their roles in creating agricultural equipment.
2. Create a blueprint for a new product.
3. Use peer feedback to refine and improve the product design.

Suggested Grade Level:

Grades 9 and 10 (This lesson is written so instructors can scale up or down based on class needs.)

Suggested Time: 60 minutes (*Time requirements may vary based upon student understanding and class schedule.)

Resources/References:

1. Video: “What EXACTLY Is Product Design?” https://youtu.be/LckQ4VVjHDs?feature=shared

Related Resources:

1. “Power Up” Your Future With John Deere, https://FFA.box.com/s/rmzz3a341ei4f0te2hasrch2ep2tqme1
2. We Are John Deere Series, https://FFA.box.com/s/3fjke9572nl1zt298rx5oo0k65m8horv

Equipment and Supplies Needed:

1. A copy of the “Product Design” worksheet for each student
2. Graph paper to sketch designs

Vocabulary:

1. Evaluation
2. Product design
3. Sketch

Cross-Curricular Connections:

English/Language Arts	Engineering
• Evaluate a design and provide feedback.	• Sketch a precision agriculture product.

Name: _____

SAE and FFA Connections

1. Agricultural Technology and Mechanical Systems CDE, FFA.org/participate/cdes/agricultural-technology/

Student Activity Sheets:

Direct access to student activity sheets without lesson plan or answer key for easy upload to a learning management system or printing for classwork.

https://ffa.box.com/s/ffbaecjcecpocg9l0p1celazf3coc1pp (Word)
https://ffa.box.com/s/m5dotgvn7axqgy6xp45pg6r43cd92mvg (PDF)
https://docs.google.com/document/d/11EaVYU3F1o0_7fc6jtkyrYF5Q-sKJLc_ktxkfOjoQgc/copy (Google)

These Activities Are Aligned to the Following Standards:

FFA Precept

- FFA.PL-A.Action: Assume responsibility and take the necessary steps to achieve the desired results, no matter what the goal or task at hand.
- FFA.PL-C.Vision: Visualize the future and how to get there.
- FFA.PL-E.Awareness: Understand personal vision, mission and goals.
- FFA.PL-F.Continuous Improvement: Accept responsibility for learning and personal growth.
- FFA.PG-I.Professional Growth: Assume responsibility for attaining and improving upon the skills needed for career success.
- FFA.PG-J.Mental Growth: Embrace cognitive and intellectual development relative to reasoning, thinking and coping.
- FFA.CS-M.Communication: Effectively interact with others in personal and professional settings.
- FFA.CS-N.Decision Making: Analyze a situation and execute an appropriate course of action.

AFNR Cluster Skills

- CS.05. Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources career pathways.

Common Core – Speaking and Listening

- CCSS.ELA-Literacy.SL.9-10.1 Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with diverse partners on grades 9-10 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.
- CCSS.ELA-Literacy.SL.9-10.2 Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, orally) evaluating the credibility and accuracy of each source.

Common Core – Science & Technical Subjects

- AG5 Describe career opportunities and means to achieve those opportunities in each of the Agriculture, Food & Natural Resources Career Pathways.

AFNR Career Ready Practices

- CRP.04. Communicate clearly, effectively, and with reason. Career-ready individuals communicate thoughts, ideas and action plans with clarity, whether using written, verbal and/or visual methods.
- CRP.07. Employ valid and reliable research strategies. Career-ready individuals are discerning in accepting and using new information to make decisions, change practices or inform strategies.
- CRP.08. Utilize critical thinking to make sense of problems and persevere in solving them. Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem.
- CRP.10. Plan education and career path aligned to personal goals. Career-ready individuals take personal ownership of their own educational and career goals, and they regularly act on a plan to attain these goals.

Partnership for 21st Century Skills

- Communication
- Critical Thinking and Problem Solving
- Initiative and Self-direction
- Leadership and Responsibility

Name: _____

Lesson Plan:

1. **Bell Ringer:** How do you think the design of a product impacts its success in the market?

2. **Introduction:** *Product design is where ideas take shape. Careers in design, such as CAD technicians and mechanical engineers, play a vital role in creating the tools and machines farmers rely on. This lesson will introduce you to the design process, emphasizing how companies like John Deere use technology and creativity to develop cutting-edge agricultural equipment. Through this lesson you will create a blueprint for your precision agriculture product, learning how design decisions impact usability and efficiency.*

3. **Activity:** Each student needs a copy of the worksheet "Product Design."

a. **Part 1:** Students will watch the video "What EXACTLY Is Product Design?" up until 5:03 and will answer the questions as they watch.

b. **Part 2:** Students will join their groups from the previous days and will start to sketch out their designs for their new products. They will answer discussion questions about the process. The project assignment sheet is available at https://FFA.box.com/s/x5dbmz2by3nybphtwdtmm380sdyegtkj.

c. **Part 3:** Students will conduct peer reviews on another group's sketch and will give feedback. Upon receiving this feedback, groups will resketch their product and answer questions about the feedback they received.

4. **Follow-up:** Have a class discussion about why peer review is needed in product design.

5. **Optional – Extended Learning Opportunities (Not factored into time requirement):**
    a. Have students create a short survey (digital or paper) about their product design to gather feedback from family or friends. Have students analyze responses and decide on potential design changes.

6. **Exit Ticket:** What is one skill needed in a career as a product designer? Why is that skill vital to the process?

Name: _____

Aligned to the following standards:
CS.05; CCSS.SL.9-10.1; CCSS.SL.9-10.2; AG5; CRP.04; CRP.07; CRP.08; CRP.10

Product Design

Part 1

Directions:

Watch the video "What EXACTLY Is Product Design?" While you watch, answer the questions below. The video can be found at https://www.youtube.com/watch?v=LckQ4VVjHDs.

The video topic is ...

What exactly is product design in your own words?

What is an example the video shows of bad design?

Design is not simply how something

_____; it's how it _____.

What is an example of product design discussed in the video?

Summarize the video in one word.

What is an example of product design in your everyday life?

A product designer determines how a product should work based on:

1.

2.

What are three careers in the Power, Structural and Technical Systems sector that would be needed for product design?

1.

2.

3.

The information in the video is important to me because ...

Name: _____

Part 2

Directions:

Join your group from yesterday. In your group, on sketch paper, sketch out your product design. When done, answer the questions below.

1. What inspired your group's initial design concept?

2. How did you incorporate the customer's needs and challenges into your design?

3. Did everyone agree on the direction of the design? How were differing opinions handled?

4. Are there any aspects of your design that still need improvement or further discussion?

5. Would your product be appealing to the target audience? Why or why not?

6. What careers do you think are needed for designing products in the PST sector?

Name: _____

Part 3

Directions:

1. Swap product sketches with another group.
2. In your group, fill out the evaluation form below.
3. When done, return the sketch and the feedback form to the group you evaluated.
4. Make changes to your sketch based on their feedback and answer the discussion questions below.

Discussion Questions:

1. What feedback from the evaluation form was most helpful?

2. Did any feedback surprise you? Why or why not?

3. What changes did your group make to the design based on the feedback?

4. How do you think these changes improve your product?

5. How did your group work together to respond to the feedback?

6. Were there any disagreements? If so, how were they resolved?

7. How does your revised design better meet the needs of the customer scenario?

Name: _____

Product Design Sketch Evaluation Form

Group Evaluating:
Group Being Evaluated:

Evaluation Criteria:

1. **Problem-Solving**
    - Does the design address the customer's problem effectively?
        - ☐ Yes
        - ☐ No
    - Comments:
2. **Target Audience**
    - Is the product well-suited for the intended target audience?
        - ☐ Yes
        - ☐ No
    - Comments:
3. **Features and Functionality**
    - Are the key features clear and functional?
        - ☐ Yes
        - ☐ No
    - Comments:
4. **Innovation**
    - Is the design creative or unique compared to existing solutions?
        - ☐ Yes
        - ☐ No
    - Comments:
5. **Clarity of Sketch**
    - Is the sketch clear and easy to understand?
        - ☐ Yes
        - ☐ No
    - Comments:
6. **Suggestions for Improvement**
    - List one or two suggestions for improving the design.
        -
        -

Name: _____

KEY: Product Design

Part 1

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The video topic is ...

Product design

What exactly is product design in your own words?

Answers will vary.

What is an example the video shows of bad design?

A door that looks like you pull, but you need to push it to open

Design is not simply how something

looks; it's how it works.

What is an example of product design discussed in the video?

Uber

Summarize the video in one word.

Answers will vary.

What is an example of product design in your everyday life?

Answers will vary.

A product designer determines how a product should work based on:

1. Business goals.
2. A great user experience.

What are three careers in the Power, Structural and Technical Systems sector that would be needed for product design?

1. Answers will vary.
2. Answers will vary.
3. Answers will vary.

The information in the video is important to me because ...

Answers will vary.

Name: _____

Part 2

Directions:

Join your group from yesterday. In your group, on sketch paper, sketch out your product design. When done, answer the questions below.

1. What inspired your group's initial design concept?

   Answers will vary.

2. How did you incorporate the customer's needs and challenges into your design?

   Answers will vary.

3. Did everyone agree on the direction of the design? How were differing opinions handled?

   Answers will vary.

4. Are there any aspects of your design that still need improvement or further discussion?

   Answers will vary.

5. Would your product be appealing to the target audience? Why or why not?

   Answers will vary.

6. What careers do you think are needed for designing products in the PST sector?

   Answers will vary.

Name: _____

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   Answers will vary.

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Name: _____

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