ONTARIO COUNCIL FOR TECHNOLOGY EDUCATION

Technology and the Skilled Trades:
Auto Body
Grade 9/TAS 1O1
2025

Students will apply the Engineering Design Process to design and build a car door panel using everyday materials to demonstrate their understanding of form, function, and aesthetics.

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Introduction

This lesson has been designed using the following Grade 9 curriculum Technology and the Skilled Trades (gov.on.ca).

Overall Expectations

A1. Initiating and Planning - demonstrate an understanding of fundamental technological concepts and related skills by initiating and planning projects

Specific Expectations

A1.2 apply an understanding of fundamental technological concepts, design considerations, and science, technology, engineering, and mathematics (STEM) concepts as appropriate in developing projects involving the creation of products and/or services.

A1.4 communicate design ideas for various purposes and audiences, using appropriate industry terminology.

Overall Expectations

A2. Designing and Performing - develop projects that involve creating products and/or services, using a variety of resources and techniques, and record the development of their projects

Specific Expectations

A2.1 use project management skills to develop a process to create a product and/or service

A2.2 identify factors that could impact the development of their projects and apply appropriate strategies to increase the probability of a positive outcome.

A2.3 describe properties and characteristics, including sustainability, of materials, and justify the selection of the materials and other resources they are using in the creation of products and/or services

A2.5 use a variety of industry-related documents to guide the creation of products and/or the delivery of services as part of their projects

A2.6 create products and/or deliver services, documenting their development process using appropriate industry terminology

A2.7 select appropriate units of measure and tools to make accurate measurements using relevant measurement systems, such as the metric and imperial systems

Overall Expectations

A3. Analyzing and Refining - evaluate and refine processes, products, and/or services

Specific Expectations

A3.1 identify challenges they encounter in the process of developing their projects and apply critical thinking skills to address these challenges.

A3.2 analyze the performance of products and/or service delivery using appropriate criteria

A3.3 identify potential refinements to the design of products and/or services based on an analysis of data collected throughout the development process.

A3.4 communicate project-related challenges, performance analyses, and proposals for refinements for a specific audience, using appropriate formats and terminology.

Overall Expectations

A4. Following Health and Safety Practices - apply an understanding of health and safety practices and procedures when using materials, tools, and equipment.

Specific Expectations

A4.3 use tools and equipment safely, including using personal protective equipment and safety devices as appropriate

A4.4 follow practices that support physical and mental health and well-being

A4.6 demonstrate a safety mindset by making safety a priority at all times and by engaging in industry-specific safety procedures

Overall Expectations

B2. Impacts of Technology - analyze impacts of various technologies on individuals, society, the economy, and the environment

Specific Expectations

B2.3 evaluate how positive and negative impacts of various technologies can influence technological evolution, including emerging technologies

Design and Build a Car Door Panel Model

Objective:

Students will apply the engineering design process to design and create a model of a car door panel using simple materials, demonstrating their understanding of form, function, and aesthetics.

Learning outcomes:

1. Students will understand and apply the engineering design process to a real-world problem.

2. They will develop creative thinking and problem-solving skills within the context of Auto Body.
3. Students will improve their ability to work collaboratively and communicate their ideas effectively.

Materials:

- Cardboard or foam board
- Scissors
- Glue or tape
- Markers or colored pencils (for decoration)
- Ruler
- Pencil and paper (for sketching)
- Small buttons or beads (for handles, buttons, or other details)
- Stamps or printed images for texture (optional)
- Ruler
- Timer

Process:

Step 1: Introduce the project and review the Engineering Design Process with Students.

1. Understand the problem/challenge: Ask questions to clearly define the design challenge and constraints. Research similar products to gain understanding and knowledge. Ask questions to people who might use the product or service to understand their needs.
2. Generate potential solutions: Create a variety of possible solutions to meet the outlined constraints and fundamental concepts. Analyze the solutions to choose the most appropriate one to develop further by using the end-users' needs as consideration.
3. Plan the prototype details: Add details such as; parts list, materials and tools required, process, overall dimensions, and safety considerations. Create a schedule to manage each activity and your time for success.
4. Create a prototype: Build a prototype of your solution to make your ideas real and to validate the concept. Record any issues or changes necessary.
5. Test & analyze the prototype: Evaluate by testing and get end-user feedback. Assess if the criteria were met. Record all data, observations, and feedback.
6. Refine & improve: Review feedback and analyze data to make improvements. Iterate your first chosen solution to incorporate the observations and evidence gathered.

Explain that the students' task is to design and build a car door model using everyday materials.

Step 2: Identify the problem.

Ask students: "How would you design a car door panel that is both functional and aesthetically pleasing?" Introduce the concept of the door panel as a key component of a car's interior. Discuss its function: it holds the window controls, handles, and storage areas, while also contributing to the car's overall look.

Step 3: Research and brainstorm.

Allow students to do some research (they can use the internet or textbooks if available). If you do not have access to the internet or textbooks, have a class discussion about what car door panels typically look like and what features they have. Encourage brainstorming about what materials they can use to represent the different parts of the door panel.

Step 4: Define criteria and constraints.

Criteria: The door panel must have a handle, at least one button or control panel, and a decorative element (like a design or pattern).

Constraints: Students must complete the project within 45 minutes using only the materials provided.

Step 5: Generate ideas.

Have students sketch a few ideas for their car door panel on paper, showing where each component (handle, button, decorative element, etc.) will go. They should also think about how to make the door panel structurally sound (using cardboard or foam board for support).

Step 6: Select a solution and build the prototype.

Students should pick the design that they feel is the most functional and visually appealing, ensuring that it meets the design criteria set. Students will then cut and assemble their door panels using the materials provided.
Encourage them to think about details such as how they will securely attach the handle, how the buttons will be positioned, and any details that may make their car door panel look realistic.

Step 7: Test and evaluate the car door panel models.

Once finished, students will present their designs to the class, explaining their choices of materials, design, and functionality. Evaluate whether the door panel design would function well in a real car and how effectively materials were used, including how much waste/scrap was left.

Step 8: Reflection

Students are to complete a short written reflection on their models. Encourage them to consider things like what their biggest challenge was, what improvements they would make given additional materials or extra time, and how using the engineering design process helped them to complete this project.