Unit: Technological Design Process	Concept: Troubleshooting Flawed Systems

Standard
- 3.5.9-12 MM Troubleshoot and improve a flawed system embedded within a larger technological, social, or environmental system.

Key Learning
- (LTTG) Students will be able to analyze a problem in its entirety while recognizing the subcomponents interacting with human-made and natural environments.

Unit Essential Question
- How can I analyze a problem in its entirety while recognizing the subcomponents interacting with human-made and natural environments?

Essential Question
- How do system components work together to achieve a desired goal?

Key Vocabulary
- Troubleshoot, Embed, Improve, System, Technological, Social, Environmental, Investigate, and Flaw

Learning Experience
- Students who demonstrate understanding can troubleshoot and improve a flawed system embedded within a larger technological, social, or environmental system.
- Clarifying Statement: Systems are made up of components (i.e., subsystems). A food processor is only one component in a larger food preparation system that, in turn, is a component in a larger home system. Troubleshooting a flawed system or product allows students to identify possible areas for improvement. For example, a recycling program at their school might have very low participation rates by students and staff members. Investigating the components of the program (system) will help students identify ways to improve it.

(Big Idea) Technology & Engineering Curriculum Framework Big Ideas
- A system is a group of interrelated components designed collectively to achieve a desired goal.

(SEP) Science and Engineering Practices
- Asking Questions and Defining Problems - Define a design problem that can be solved through the development of an object, tool, process or system and includes multiple criteria and constraints, including scientific knowledge that may limit possible solutions.

(DCI) Disciplinary Core Ideas
- NAEP D.12.17 - Analyze a system malfunction using logical reasoning (such as a fault tree) and appropriate diagnostic tools and instruments. Devise strategies and recommend tools for fixing the problem.
- ISTE 1D - Students understand the fundamental concepts of technology operations, demonstrate the ability to choose, use and troubleshoot current technologies and are able to transfer their knowledge to explore emerging technologies.

(TEP) Technology and Engineering Practices
- Making and Doing - Demonstrates the ability to regulate and improve making and doing skills.
- Systems Thinking - Designs and troubleshoots technological systems in ways that consider the multiple components of the system.
- Optimism - Shows persistence in addressing technological problems and finding solutions to those problems.

Terms
- (ETS) Engineering, Technology, and Applications of Science – Standards applicable across the Science, Environmental Literacy & Sustainability, and Technology & Engineering content areas.
- (LTTG) PDE Technology & Engineering Long Term Transfer Goals
- (Learning Experience) A learning experience refers to any interaction, activity, or other experience in which students acquire new understanding, knowledge, behaviors, or skills.
- (Big Idea #) PDE Technology & Engineering Curriculum Framework Big Ideas
- (SEP) PDE Science and Engineering Practices
- (DCI) PDE Disciplinary Core Ideas
- (TEP) PDE Technology and Engineering Practices