Unit 7: Mechanical System Design

Content Area: **Technology**
Course(s): **Engineering Design 1**
Time Period: **April**
Length: **8 blocks**
Status: **Published**

Enduring Understandings

1. Many mechanical systems require structures to be built that can withstand the mechanical force exerted by the system.

2. Mechanisms follow Newton's three laws of motion.

3. Mechanisms lose efficiency through friction.

Essential Questions

1. How can Newton's laws of motion be used to develop mechanical systems?

2. How are the concepts of mechanical advantage used when solving a mechanical engineering problem?

3. How are forces, motion and energy concepts connected?

4. How does friction affect the design of a mechanical system?

Content

Vocabulary:

Dynamics, Wedge, Momentum, Screw, Mechanism, Class 3 lever, Links, Inclined plane, Rotary motion, Torque, Cam & follower, Linear motion, Work, Crown gear, Mechanical advantage, Oscillating motion, Rack & pinion, Gear, Kinematics, Machine, Reciprocal motion, Wheel & axle, Pulley, Class 2 lever, Crank & slider, Worm gear, Lever, Power, Force, Class 1 lever, Statics, Bevel gear, Intermittent motion

Skills

1. Formulate a design brief and identify specifications for a mechanical engineering problem.

2. Apply the design process to design a mechanism that meets instructor created specifications.

3. Construct physical mechanisms that perform specific tasks.

4. Calculate the mechanical advantage of a physical mechanism.

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

Resources

Various simple machine demonstration devices

Mechanisms prototyping componets.

Various prototyping tools (hand-held and/or power)

Various prototyping materials

Standards

TECH.8.1.12.B.CS1	Apply existing knowledge to generate new ideas, products, or processes.
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.8.1.12.F.CS2	Plan and manage activities to develop a solution or complete a project.
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.
TECH.8.2.12.D.CS1	Apply the design process.