Unit 7: Mechanical System Design

Technology
Engineering Design 1
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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.