Auxiliary Concept: Mechanical Design

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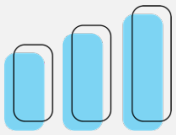
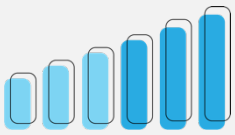
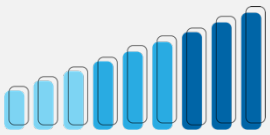
Engineering Literacy Dimension: Engineering Knowledge
Domain: Engineering Technical Applications
Overview: *Mechanical Design* is the process of developing the mechanisms/machines necessary to convert energy into useful mechanical forms and transform resources into a desired output. This includes determining what factors influence the design of a mechanical system, how the factors relate with each other throughout the design process, and how to configure the factors to meet design criteria and constraints. This concept is important to Engineering Literacy as it encompasses the knowledge necessary to analyze, design, and manufacture mechanical devices and systems. For example, mechanical design principles enable one to incorporate the analysis of items such as gears, shafts, fasteners, and gearboxes in regards to the fatigue and heating effects resulting from working stresses and repeated loadings in the creation of a mechanical system.

Performance Goal for High School Learners
I can, when appropriate, draw upon the knowledge of Mechanical Design content and practices, such as (a) *machine elements/mechanisms*, (b) *manufacturing processes*, and (c) *machine control*, to forecast and validate the design performance of a mechanism or machinery component in order to solve problems in a manner that is analytical, predictive, repeatable, and practical.

	 Basic	 Proficient	 Advanced
MACHINE ELEMENTS	I can list and define different machine elements (e.g. springs, pressure vessels, beams, piping, cams and gears, threads and fasteners, power transmission, electromechanical components, etc.).	I can explain the features and applications of different machine elements.	I can analyze and choose which machine elements are needed for a given mechanical design.
MANUFACTURING PROCESSES	I can describe the process and variables involved in any manufacturing process (e.g. Casting, imaging and coating, molding, forming, machining, joining, additive manufacturing).	I can evaluate a given manufacturing process for a given mechanical system design.	I can implement and assess a manufacturing process for a given mechanical design.
MACHINE CONTROL	I can describe the basic functions and applications of machine control systems.	I can explain the basic components and structures of machine control systems.	I can analyze and evaluate the design of a machine control system.