Core Concept: Material Classification

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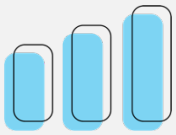
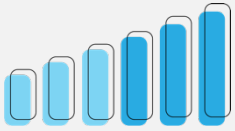
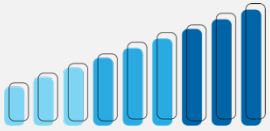
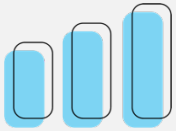
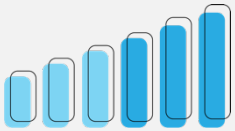
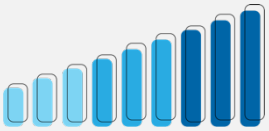
Engineering Literacy Dimension: Engineering Practices
Practice: Material Processing
Overview: *Material Classification* is the process of cataloging solid materials by their atomic and molecular characteristics and properties to aid in the selection of a suitable material for a particular application as well as the processes necessary for manipulating the materials in a suitable manner. This core concept includes knowledge related to the micro and macro-structures of the four main divisions of the material class system which are (a) *metals/alloys*, (b) *polymers*, (c) *ceramics*, and (d) *composites*. Material Classification is important to the practice of Material Processing as engineering professionals must consider material properties in order to make informed decisions when selecting and applying the most appropriate materials for the production of technological products and systems. Material selection is based on fabrication requirements, such as the material's machinability, castability, and weldability as well as its intended final shape, required mechanical properties, service necessities, tolerances, availability, and the cost.

Performance Goal for High School Learners
I can successfully distinguish between different materials in terms of their structures and properties and determine how to apply the materials to design/create quality products in a suitable and safe manner.

	 Basic	 Proficient	 Advanced
METALS & ALLOYS	I can describe fundamental structures and properties of metals and alloys.	I can analyze the appropriate use of metals and alloys for a specific design criteria or constraint.	I can make a decision on and justify the use of metals and alloys in producing my product.
POLYMERS	I can describe fundamental structures and properties of polymers.	I can analyze the appropriate use of polymers for a specific design criteria or constraint.	I can make a decision on and justify the use of polymers in producing my product.
CERAMICS	I can describe fundamental structures and properties of ceramics.	I can analyze the appropriate use of ceramics for a specific design criteria or constraint.	I can make a decision on and justify the use of ceramics in producing my product.

Core Concept: Material Classification Cont.

Performance Goal for High School Learners
I can successfully distinguish between different materials in terms of their structures and properties and determine how to apply the materials to design/create quality products in a suitable and safe manner.

	 Basic	 Proficient	 Advanced
COMPOSITES	I can describe fundamental structures and properties of composites.	I can analyze the appropriate use of composites for a specific design criteria or constraint.	I can make a decision on and justify the use of composites in producing my product.