

Core Concept: Fabrication

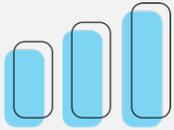
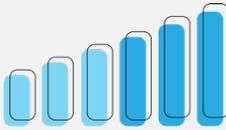
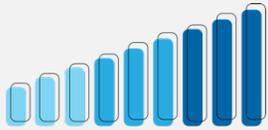
Engineering Literacy Dimension: Engineering Practices

Practice: Material Processing

Overview: *Fabrication* is the process of making a product or the parts of a product to be assembled into a final product. Sophistication in this process requires knowledge related to (a) *tool selection*, (b) *product assembly*, (c) *hand tools*, (d) *equipment and machine tools*, and (e) *quality and reliability*. This core concept is important to the practice of Material Processing as engineering professionals are required to use appropriate processes, tools, and equipment to produce technological products and systems that are of reliable quality.

Performance Goal for High School Learners

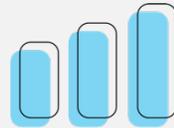
I can successfully choose the appropriate tools, processes, techniques, equipment, and/or machinery to make a quality and reliable product/system based on a plan, or workable approach, to meet the specified design criteria of a customer in accordance with engineering standards.

| |  Basic |  Proficient |  Advanced |
|------------------|--|---|---|
| TOOL SELECTION | I can identify basic power/hand tools, processes, techniques, and equipment used to perform practical tasks (e.g. cutting, shaping, joining, and finishing) in the fabrication of a physical product/system. | I can select and use the appropriate power/hand tools, processes, techniques, and equipment to precisely fabricate a physical product/system based on a plan or workable approach. | I can evaluate the application of power/hand tools, processes, techniques, and equipment to identify ways in which to enhance or optimize the fabrication of a physical product/system. |
| PRODUCT ASSEMBLY | I can identify the individual components and materials of a product. | I can analyze the assembling process of a product through decomposing its parts and describing the process of assembling each part. | I can evaluate and improve my product design in terms of feasibility and efficiency of the assembling process. |
| HAND TOOLS | I can explain the specific role of a wide range of hand tools (e.g. wrenches, hammers, pliers, screwdrivers, clamps, vices, saws, snips, knives, files, cutters, and soldering irons). | I can demonstrate the safe and appropriate use of a wide range of hand tools (e.g. wrenches, hammers, pliers, screwdrivers, clamps, vices, saws, snips, knives, files, cutters, and soldering irons). | I can properly fabricate a physical model/prototype or product based on a plan or workable approach, using a variety of hand tools. |

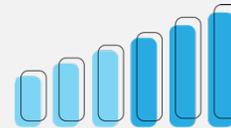
Core Concept: Fabrication Cont.

Performance Goal for High School Learners

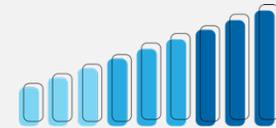
I can successfully choose the appropriate tools, processes, techniques, equipment, and/or machinery to make a quality and reliable product/system based on a plan, or workable approach, to meet the specified design criteria of a customer in accordance with engineering standards.



Basic



Proficient



Advanced

EQUIPMENT & MACHINES

I can describe the characteristics of machine tools including the method of cutting (single or multiple point), series of motion for feeding and cutting material (linear, rotary, and reciprocating), and the support for the cutting tool and the material being machined.

I can identify the appropriate type of machine tool (e.g. turning, sawing, drilling, shaping, planing, or grinding) needed for specific applications.

I can properly fabricate a physical model/prototype or product based on a plan or workable approach using a variety of machine tools.

QUALITY & RELIABILITY

I can describe how the process of quality control involves measuring and analyzing the inputs, processes, and outputs of a production process to ensure that customer needs and engineering standards are met.

I can develop specifications to monitor and evaluate throughout the production process in order to recommend and carry-out any necessary corrective actions that ensure the production of functional, appealing products.

I can embed computing and electronic systems within the production process to respond to inputs (e.g. sensors) and control outputs (e.g. actuators), using programmable components to enhance the quality and reliability of product fabrication.