

Core Concept: Conditioning & Finishing

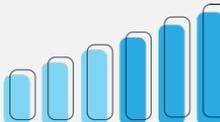
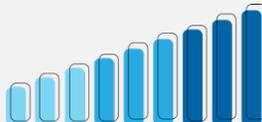
Engineering Literacy Dimension: Engineering Practices

Practice: Material Processing

Overview: *Conditioning* is the process of changing the internal structure of a material to adjust the material's properties to better meet desired criteria. *Finishing*, on the other hand, is the process of beautifying and extending the life of a product through establishing a protective coating on the object. This core concept includes knowledge related to the basic methods of (a) *conditioning internal structures*, (b) *polishing & burnishing*, (c) *surface coat finishing*, and (d) *conversion finishing*. Conditioning/Finishing is important to the practice of Material Processing as materials can be conditioned to enhance their properties in order to better achieve desired results, changed to enhance their attractiveness, and protected to increase their durability. Furthermore, engineering professionals apply an understanding of these processes to inform their decisions when developing a design and performing the related operations to enhance a material's properties, improve a product's appearance, and increase the product's durability.

Performance Goal for High School Learners

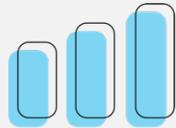
I can successfully use knowledge of conditioning and finishing methods to inform my decisions when developing a design as well as to physically produce a quality end-product.

	 Basic	 Proficient	 Advanced
CONDITIONING INTERNAL STRUCTURES	I can describe how/why the mechanical properties of a material are altered using thermal (i.e. hardening, annealing, tempering, drying, normalizing, and firing), mechanical, and chemical conditioning.	I can determine the internal structure of a material that is necessary to achieve the desired mechanical properties for it to function under specified conditions.	I can select and perform the appropriate conditioning process to change the internal structure of a material to produce the desired mechanical properties.
POLISHING & BURNISHING	I can describe how/why polishing/burnishing processes are appropriate for preparing, protecting, enhancing, and finishing end products.	I can determine how specific materials will be altered when being polished/burnished.	I can select and perform the appropriate polishing/burnishing practices to prepare, protect, enhance, and finish the surface of a material.
SURFACE COAT FINISHING	I can describe how/why surface coat finishing processes, using both organic and inorganic coatings, protect and enhance the surface of a material on an end product.	I can determine the appropriate sequence of operations necessary to prepare and apply a surface coating to a material based on the finishing process selected for a specific product.	I can select, prepare, and apply the appropriate surface coating practices (i.e. brushing, rolling, spraying, dipping, flowing, plating, and metallizing) to produce a surface layer of protective material that adheres to a base material.

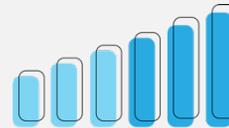
Core Concept: Conditioning & Finishing Cont.

Performance Goal for High School Learners

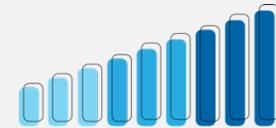
I can successfully use knowledge of conditioning and finishing methods to inform my decisions when developing a design as well as to physically produce a quality end-product.



Basic



Proficient



Advanced

CONVERSION FINISHING

I can describe how/why conversion finishing processes (e.g. anodizing, phosphate conversion, chromate conversion, and oxide conversion) protect and enhance the surface of a material on an end product.

I can determine the appropriate sequence of operations necessary to prepare and convert the surface of a material based on the finishing process selected for a specific product.

I can select, prepare, and apply the appropriate conversion finishing practices to convert the surface of a material into a protective layer.