

Intermediate Wood Finishing

Woodcraft, Richmond, VA (804-355-3945)

Instructor: Bert Elchinger, Ph.D.

3.5 hours

Description: Take finishing to the next level. Through a combination of hands-on experience, demonstration and discussion, you will learn more about uniform staining, a variety of top coats with various application methods, rubbed out finishes, dealing with difficult grain and much more. It will incorporate time-honored techniques and address carvings and turnings as well as traditional furniture. Basic finishing is a prerequisite for this class.

Summary of Topics

- Staining (60 min.)
 - Preparation of the wood
 - Types of stains
 - Staining the wood versus staining the top coat
- Top coats (70 min.)
 - Effect of surface preparation on unsealed wood
 - Oily woods and non-oil based top coats
 - Properties, application, tinting, and uses of:
 - Shellac
 - Lacquer
- Finishing the finish (30 min.)
- Finishes for carvings and turnings (20 min.)
- Compatibilities (10 min.)
- Wrap up and discussion (20 min.)

Staining

- Remind difference between pigment and dye stains (5 min.)
 - Pigment remains on surface and partially hides the grain (easier to apply uniformly; brush or wipe on is best; use for more uniform coloring)
 - Dye penetrates and often highlights the grain (difficult to apply uniformly; spray in best; use to accentuate grain, and for special colors)
- Effect of wood surface preparation on staining (15 min.)
 - Show the effect using completed board: show the poplar board used in the shop with gel stain (100 grit, 150 grit, 220 grit, planed, scraped)
 - Type of stain matters; gel stains don't penetrate as much as penetrating stains, so surface preparation is not as important
 - **Demonstration:** use poplar board prepared the same way as the demo board above, but use penetrating stain in class to show effect of surface preparation on finish
- Eliminating blotching (20 min.)
 - Blotching occurs because of changes in grain direction; similar to edge versus end grain
 - Reduce or eliminate by filling the pores prior to staining
 - Popular methods include:
 - Filling temporarily with paint thinner or appropriate stain solvent (e.g. water); problem: never know how much to use
 - Filling with a clear universal top coat, such as shellac; problem: can be put on too thick or too thin
 - Seal with thinned oil (e.g. tung or linseed) and let cure

- Blotching depends on how far the stain penetrates; another method of controlling blotching is to use a stain that penetrates slowly (i.e., gel stain)
- **Activity:** provide sanded poplar boards, gloves, penetrating stain, shellac, alcohol, mixing cups, rags, and paint thinner; instruct students to stain a small part of the board as a base, then try to control blotching using the thinner and the shellac; allow 5 minutes for shellac drying
- Coloring the wood versus coloring the top coat (10 min.)
 - Advantages: provides very uniform coloring
 - Disadvantages: color changes if the top coat is damaged, and very difficult to repair
 - Show violin as example of colored shellac
 - **Demonstration:** make water soluble aniline dye dissolve in alcohol based shellac by first mixing with water, then with alcohol, then with shellac
- Special stains (10 min.)
 - **Demonstration:** At the beginning of the session, put the red and white oak pieces into the can of ammonia; at this time, withdraw the pieces to show the color change (apply tape the white oak for comparison); show the color change using urethane or other top coat; show example piece that was stained
 - **Demonstration:** Show the effect of potassium dichromate on various woods to show its ability to stain selectively (for marquetry, banding, etc)

Top Coats

- Effect of surface preparation on the finish coat (unsealed wood) (10 min.)
 - Greatest effect when using oil and oil-based finishes
 - **Demonstration:** Show the effect using completed board: bring in two boards (cherry and maple) that have been sanded with only 80 grit with the grain, and finished with shellac, urethane oil varnish, and tung oil; show that shellac only shows streaks, while oil-based finishes show dark lines.
- Effect of oily woods on non-oil based finishes (5 min.)
 - Oily woods can cause non-oil based finishes to fisheye
 - Solution is to clean the surface with acetone prior to finishing
 - Show prepared board using shellac on cleaned and natural surfaces
- Shellac (40 min., including demos and activity)
 - Excretion from the lac bug, collected from trees, natural version contains wax
 - Properties:
 - Negatives: hard, brittle, easily scratched, dissolves in alcohol, waxed version susceptible to water damage and blushing when sprayed in humid environment, dries quickly upon application, so it is difficult to apply a streak free coat without sanding/rubbing out, sensitive to heat, has a finite shelf life after mixing (don't buy cans that are older than several months – lasts less than a year), because bottom coats absorb the alcohol from the freshly deposited coat, thorough drying takes days.
 - Positives: dries quickly so can apply many coats in a day, easily rubbed to desired luster, occurs naturally in various colors and can be easily tinted, de-waxed version is impervious to water at room temperature, is compatible with common top coats so can be used as a sealer base, penetrates and brings out deep grain figure, can be applied with brush, pad, or spray, completely food safe when dry, good adhesion with subsequent layers, more easily repaired than urethanes
 - When to use

- To reproduce finishes on 18th and some 19th century furniture
 - To obtain a soft, high luster finish with good feel and some color
 - To seal wood pores prior to staining
 - To seal in natural wood oils
 - To isolate layers of finish that may not be compatible (lacquer from grain fillers, for example)
 - To prevent fisheye in lacquer caused by silicone contaminating the wood
 - Use your imagination!
 - Preparing from flakes
 - “Weight” or “cut” is defined as pounds of dried shellac per gallon of alcohol (denatured alcohol or ethanol)
 - Can take days to completely dissolve at room temperature
 - 2# cut is typically used for fine furniture, since it goes on thin; 10 or more coats are typical, sanding between every two or three
 - 1# cut or less is used to seal wood for staining
 - obtain 2# cut from 3# source by mixing 2 parts of the source with 1 part of alcohol (prove this for the class)
 - Colors
 - Blonde (bleached), seed lac, button lac, orange
 - Applying shellac (30 min.)
 - **Demonstration:** applying shellac using different brushes to show effects of quality of brush
 - Padding and French polish
 - **Activity:** provide walnut or cherry boards, de-waxed shellac, rags for pads, linseed oil
 - Re-apply several coats, as time permits
 - **Demonstration:** spraying (demonstration using hobby sprayer, and discussion)
- Lacquer (15 min.)
 - properties as a finish
 - invented as a replacement for shellac that would be more durable and dries as quickly but doesn’t require as long to cure
 - types: nitrocellulose, CAB (cellulose-acetate-butyrates), acrylic, and with and w/o catalyzers (pre-catalyzed and two part)
 - Positives
 - moderately abrasion resistant
 - doesn’t yellow
 - water resistant
 - dries very quickly, so several layers can be applied in a day
 - sands easily, doesn’t clog sand paper
 - Negatives
 - not resistant to alcohol
 - not resistant to heat
 - vapors are extremely flammable and toxic, and working with it requires a vapor mask
 - when to use
 - when the article will be used indoors, and for light to moderate use
 - when a very smooth, highly polished surface is desired, that can be applied in a short time

- applying lacquer
 - spraying (thinners are designed for this method)
 - brushing (buy brushing lacquer or add butyl alcohol to slow evaporation)
 - padding (use same lacquer as for brushing)
- special issues applying lacquer (discussion only)
 - can apply with brush or spray (the oil lubricant required for padding hurts the drying process)
 - lacquer can trap moisture is applied in high humidity, resulting in milky appearance
 - lacquer dries very quickly, so must either use a drying retarder or plan to sand and rub the surface to a smooth finish
 - spraying requires good ventilation and a fire proof environment
- tinting: lacquer can be tinted the same as shellac

Note: lacquer vapors are too dangerous to allow students to work with it without using activated charcoal filter mask and room exhaust.

Finishing the finish

- rubbing out (20 min.)
 - use a series of abrasives, starting with the smallest grit size that represents a compromise between increasing the chance of cutting through and taking forever to level the surface, and ending with the grit that will bring the finish to the desired luster
 - use a suitable lubricant (soapy water, oil, mineral spirits, etc.)
 - use the right shaped pad (rigid flat for flat surfaces, and padded or your fingers and hand for curves)
 - specific abrasives include
 - wet/dry sand paper (usually from 220 to over 1000 grit)
 - steel wool (0000 grade)
 - synthetic abrasive pads
 - automobile scratch and dirt remover
 - pumice and limestone (rottenstone)
 - specific types depend on the surface flatness and the desired luster; several are used in succession
 - **Activity:** rub out a lacquer top coat
- Waxing (10 min.)
 - difference in waxes
 - bees wax (soft but polishes easily)
 - carnauba (hard but difficult to polish)
 - paraffin (softest; used to make others easier to polish, and reduce the cost)
 - use to give wood a higher luster, but doesn't protect the wood; doesn't color the wood
 - great as a final coat over a top coat to hide minor scratches, improve the luster, and give a little protection against abrasion
 - **Activity:** apply wax to the board that the student rubbed out

Finishes for carvings and turnings

- Carvings (10 min.)
 - Best finishes are not shiny or glossy – they show all of the cut marks
 - Oil and/or wax finishes are used because they are easy to apply on uneven surfaces and provide some protection

- Original finishes included boiled linseed oil and beeswax, diluted with mineral spirits to help the mixture soak into the wood (Tried and True has a similar finish)
- Apply mixture with a brush, let penetrate, and remove excess with a clean brush and cloth (wipe excess from the brush often to maintain its ability to absorb the excess oil from corners and crevasses; polish the surface with a clean cotton cloth)
- If used outdoors or a durable finish is needed, spray the finish and use a satin sheen
- Turnings (10 min.)
 - Easiest to finish on the lathe
 - Shellac and wax
 - Many shellac and wax finishes on the market
 - Easy and fast to apply layers
 - Seal the wood first, then apply this finish
 - Creates a soft finish that will dull with use
 - Lacquer – fast and longer lasting, but needs to be sanded between coats
 - Waxes
 - Proprietary waxes can be applied directly to the turning, and will leave a smooth glossy finish
 - Example: HUT products; see product for claims
 - CA glues
 - Fast and provides a very durable coating
 - Creates a deep finish
 - Must be sanded between coats to flatten the finish
 - Can be polished with “micro-mesh” or plastic polishing compound
 - Difficult to apply to large turnings
 - Can be finished off the lathe like other wood projects
 - Beal Buff system (*Demonstration*, if possible)

Compatibilities (10 min.)

- Most finishes (oil- and water-based) are mutually compatible when fully dried
- Oily woods – can be waxed and oiled directly, but must clean first with acetone before applying varnishes, lacquers, shellac
- Shellac is compatible with all common finishes, oil- and water-based; however, be sure by checking with the manufacturer before using shellac
- Lacquer is not compatible with oil-based fillers and stains that are not completely dry
- Varnishes may not be compatible with natural wood oils (seal with shellac)
- Water-based finishes (stains, top coats) are not compatible with natural wood oils

Wrap up and discussion (20 min.)