

# Woodworking Finishes

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# Three Primary Types of Finishes

Oil Finishes – Usually derived from fatty acids contained in nuts and seeds.

Varnishes – Natural or synthetic resins suspended in a solvent.

Waxes – Originally derived from animal fats but modern waxes can also be petroleum based.

# Curing Processes

- Oil finishes cure by absorbing oxygen which bonds with the fatty acids in the oil, causing the oils to solidify.
- Varnishes cure by having the solvents evaporate when exposed to oxygen, leaving the resins to form a film on the surface of the wood.
- Waxes cure in a similar manner as oils, by absorbing oxygen which bonds with the (different kind of) fatty-acids in the wax, causing the wax to harden somewhat.

# Drying Time vs. Curing Time

- “Drying” is complete when the surface is dry to the touch, which occurs when the surface elements of the finish have pretty much “cured”.
  - Once a coat of finish has “dried”, another coat OF THAT SAME FINISH can be applied.
- “Curing” is complete when the entire volume of finish has fully hardened and stabilized.
  - Any finish should be fully cured before a different finish is applied over it.

# Oil Finishes

- Generally derived from nuts and seeds of plants.
- Oil finishes penetrate into the grain of the wood, usually highlighting the contrast in grain density (i.e. “popping the grain”)
- Oil finishes offer little to no protection to wood surface
  - Very common to apply a varnish or wax “top coat” over an oil finish to provide more surface protection.
  - Oils finishes are NOT suitable as a top coat over another finish.

# Drying Oils vs. Non-Drying Oils

- “Drying oils” are derived from nuts & seeds. They will eventually harden after application to give a durable, stable finish.
  - Examples: Linseed oil, tung oil, walnut oil
- Other plant-based oils are “non-drying”, meaning they will not cure and will eventually turn rancid.
  - Examples: Canola oil, corn oil, vegetable oil
- Mineral oil is a non-drying petroleum-based oil sometimes used for cutting boards & food bowls. Being inorganic, it won't turn rancid but it never fully cures.

# Oil Finishes Applications

- Mostly used to enhance & highlight the natural beauty of the wood grain.
- Oil finishes do help preserve the wood by inhibiting the surfaces from drying out.
- Easy to apply with brush or cloth.
  - Just cover the surface, let sit for 5 – 30 minutes, then wipe off any excess.
- If no top coat is used, oil finishes may need to be re-applied every six months or so.

# Common Oil Finishes

- **Boiled Linseed Oil:** Derived from flax seeds
  - Not really boiled. “Polymerized” by blowing hot air through it to reduce drying/curing time.
  - Drying time = 24-72 hrs
  - Curing time = 4 days – 2 weeks
- **Tung Oil:** Derived from the nut of the tung tree
  - Drying time = 72-96 hrs
  - Curing time = 2 - 4 weeks
- **Walrus Oil:** Proprietary blend of natural oil finishes
  - Drying time = 24 - 48 hrs
  - Curing time = 1 – 4 weeks



Unfinished



BLO

# Varnishes

- Consist of natural or synthetic resins suspended in a solvent.
- Varnishes sit on top of the surface of the wood, forming a durable, hardened film coating that seals the surface of the wood.
- Provide more protection to the wood surface than oils or waxes.

# Varnish Applications

- Varnishes provide the most protection to wood surfaces.
- Oil-based varnishes may provide some grain penetration that enhances the contrast in grain density, but not as much as pure oil finishes do.
- Multiple coats are usually required to achieve good protection.
- Can be “rubbed” out to provide high-gloss finishes (e.g. French Polish effect).
- Generally more difficult to apply than oil finishes.
  - Need to apply in thin coats
  - Often best applied by spraying to avoid streaking

# Common Varnishes

- **Polyurethane:** Made of plastic resins suspended in a solvent
  - Water-based = water is used as the solvent
    - Drying time = 2 – 4 hrs    Curing time = 24 – 72 hrs
  - Oil-based = a petroleum product (ex: toluene) is used as the solvent
    - Drying time = 6 – 8 hrs    Curing time = 3 – 7 days
  - Offers the most surface protection of any varnish
- **Shellac:** Made of secreted resin of the “lac bug” suspended in alcohol
  - Drying time = 1 – 2 hrs    Curing time = 3 – 7 days
- **Lacquer:** Originally made from resins from the Chinese lacquer tree, most lacquers today use synthetic resins suspended in a petroleum-based solvent (e.g. lacquer thinner)
  - Drying time = 10 – 15 mins    Curing time = 24 – 48 hrs

Unfinished



WB-Poly



WB/OM Poly



OB-Poly



# Waxes

Generally made from animal fats (e.g. tallow, beeswax, spermaceti) but often include petroleum-based (e.g, paraffin, paste wax) and/or plant-based (e.g. carnauba wax) waxes .

- Examples: Briwax, Minwax Paste Finishing Wax, Odie's Wax
- Waxes sit on top of the surface of the wood, forming a soft, non-durable, non-sealing film coating
- Provide minimal protection to the wood surface but can easily be re-applied at anytime.
- Suitable ONLY as a topcoat. CANNOT apply a different finish over a wax finish.

# Oil & Varnish Blends

- Mixtures of oils and varnishes can be used to get the combined effects of the two types of finishes.
  - Commercial blends usually have only 3% - 5% of oil in the blended finish.
- Oil molecules will still penetrate into the grain while the varnish resins will still form a protective surface film, but both effects will be muted compared to normal effects of the unblended components
- Drying & curing times fall somewhere in between the longer times for oils and shorter times for varnishes
- Common examples: Danish Oil, Teak Oil, Minwax Antique Oil Finish
  - Note: Many products sold as “Tung Oil” (ex: Formby’s Tung Oil Finish) are actually an oil & varnish blend. Check for “Pure Tung Oil” on the label if you don’t want a blended product.

# Hard Wax Oils

- Mixtures of oils and waxes that provide a durable, penetrating finish with excellent water repelling properties.
- Originally developed for use as flooring finishes, have lately become very popular as furniture finishes as well.
- Very easy to apply and repair.
- Low toxicity, low VOCs
- Examples: Rubio Monocoat, Osmo PolyX-Oil



Unfinished



Rubio  
Monocoat

# Sample Materials

- One each sample of cherry and white oak for each finish used
- Each sample piece re-sawn from same 12/4 slab
- Only one coat of finish applied to each sample
  - Exception: Three coats used for spray lacquer
- Each sample sanded as follows:
  - Hardwax Oil finishes => 120 grit (per instructions)
  - Oil finishes => 180 grit
  - Oil/Varnish blends => 180 grit
  - Varnishes => 220 grit
  - Wax finishes => 220 grit
- No post-finish surface sanding/denibbing performed
- Pay attention to:
  - Color & grain enhancement (or lack thereof) of each finish
  - Surface texture of each finish

# Finishes Used

- Unfinished (sanded to 120 grit)
- Briwax Original Furniture Wax (Clear)
  - Solvent-based mixture of beeswax & carnauba wax)
- General Finishes High Performance Finish
  - Water-based polyurethane
- General Finishes Armor Seal
  - Oil-based Polyurethane
- Minwax Water-based Oil-Modified Polyurethane
- Zinser Bullseye De-waxed Shellac
  - Diluted to 1lb cut
- Deft Spray Lacquer
- Furniture Clinic Boiled Linseed Oil
- Walrus Oil
  - Commercial blend of natural oil finishes
- Watco Danish Oil
  - Oil & Varnish blend
- Rubio Monocoat 2C Pure Hardwax Oil
- Osmo PolyX-Oil Hardwax Oil