

# It is Finished.

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Deconvoluting Wood Finishing  
~as well as other odds and sods~

# How to Finish My Project?

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- There is no perfect answer.
  - Finishes vary by protection/durability, ease of application, repairability and aesthetics and safety.
  - Your choice will depend on your project and the trade-offs you are willing to make.
- General categories:
  - Oils
  - Varnishes
  - Shellacs
  - Waxes
  - Lacquers
  - Other stuff



## Oil Based Finishes

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Woodturners often turn to oil finishes first:

- Oil makes wood look good! Makes grain pop; wood looks natural, moisturized and darker
- Very forgiving
- Can usually apply at least a few coats on the lathe

But:

- Adds some water resistance, but doesn't come close to varnish or lacquer
- There are a lot of different types – can get confusing.

# Types of Oil Finishes

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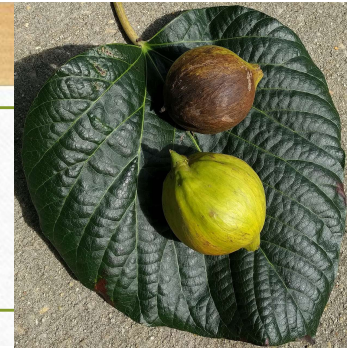


**Raw oils** – good as basic materials, but take too long to dry

**Thinned oils** – thinning linseed, tung or walnut with a solvent allows for a brush on finish that cures quicker and allows for multiple coats. First coat can be applied on the lathe; heat speeds curing.

**Boiled linseed oil** – not as common anymore. Metallic driers are added to enhance curing rate. Still a really soft finish at the end though.

**Polymerized oil** – Raw oil heated to polymerize the oil – behaves more like varnish than oil. Cures quickly. Can be thinned. Builds a surface film. E.g., Mahoney's utility finish; Lee Valley polymerized tung oil.

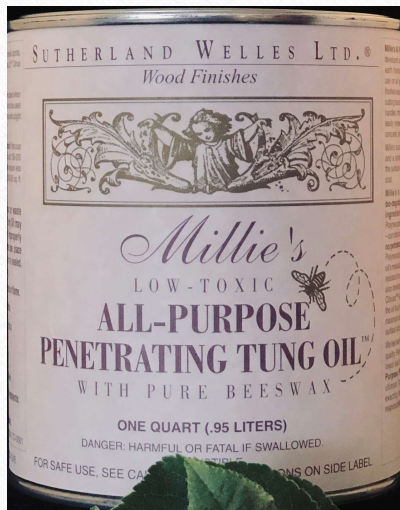


# Types of Oils (Raw)

Non-Curing Oils	Semi-Curing Oils	Curing Oils
<p>Mineral (petroleum by-product)</p> <p>Peanut<sup>a</sup></p> <p>Olive<sup>a</sup></p> <p>Walnut<sup>b</sup></p>	<p>Corn</p> <p>Sesame</p> <p>Soybean</p> <p>Safflower</p> <p>Walnut<sup>b</sup></p>	<p>Linseed – (from flax!) yellow tone, no water resistance</p> <p>Tung – less yellow, some water resistance after 6 coats e.g., Millie’s</p> <p>Walnut - non yellowing, less water resistance</p>
<p>Prohibit other finishes</p> <p><sup>a</sup>Can turn rancid</p> <p>No physical protection</p>	<p>Drying agents, thinners, resins, heat often added to speed curing.</p> <p><sup>b</sup>Grocery store walnut oil contains additives that prevent curing. Also, different growing conditions affect curing ability.</p>	<p>Produce a matte finish</p> <p>Relatively soft compared to other finishes.</p> <p>Raw oils typically not used because they take too long to cure.</p>

# Millie's: an Amended Raw Oil

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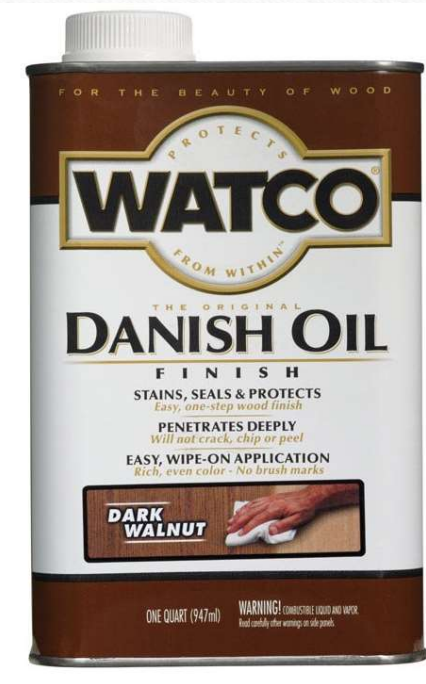


Millie's = tung oil + citrus oil + beeswax

- Great non-toxic finish for butcher's blocks/salad bowls
  - Tung oil is more water resistant than mineral oil but does smell a bit
  - Penetrates deeper than raw tung oil due to the thinner
  - Beeswax helps to seal things further
- Make your own! Mix 1:1 tung and citrus oil (+ melted beeswax as a bonus, I'm guessing 1:1:1 by volume).
  - Barrie's "Millie's" Recipe: 5:1 tung oil:walnut oil, <1/4 cup beeswax
  - Tim S. heats Millie's in a double boiler to help it penetrate into the wood. A boat shop in Anacortes sells something similar and cheaper. Check it out at: [https://shop.skinboats.com/Organic-Oils-Solvents-Waxes-Resins\\_c9.htm](https://shop.skinboats.com/Organic-Oils-Solvents-Waxes-Resins_c9.htm)

# Danish Oil = oil + varnish + (some nasty) stuff

- Danish oil is a general term for a wipe on finish usually made of tung oil or polymerized linseed oil
  - Post WWII export from Scandanavia
  - Easy to use – fast, wipe on, not “fussy”, good for interior furniture
- It is a “hard drying oil” (i.e., doesn’t remain oily) that produces a satin, water-resistant finish. It is usually comprised of mixture of oil and other stuff, with components varying dramatically:
  - Oils: Mineral oil, tung oil, linseed oil, vegetable oil
  - Solvents: mineral spirits (LD<sub>50</sub> 4,900 mg/kg), aromatic petroleum distillates, stoddard solvent (LD<sub>50</sub> 4,900 mg/kg), naptha, dipropylene glycol monomethyl ether (LD<sub>50</sub> 5,3500 mg/kg)
  - Man-made and/or Natural Resins / Varnishes
  - Dryers: Japanese, cobalt and heavy metal dryers
  - Commercial blends sometimes have as little as 25% solids





## Danish Oil: Buyer beware

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- To make Danish oil cheaper and faster, the amount of oil has been reduced and the amount of other (often toxic) stuff has increased.
- Some have less than 10% drying oil, and higher percentages of VOCs. Ingredients are proprietary. From SDS:
  - Tried and True Danish Oil – FDA approved for food contact
  - Watco – “OK” for children’s toys once fully cured, but not food contact. Wait, what is that baby thinking?!
- BTW, you can also make your own with a 1:1:1 mix of mineral spirits (solvent), tung oil and polyurethane (but remember that this is still not food safe).



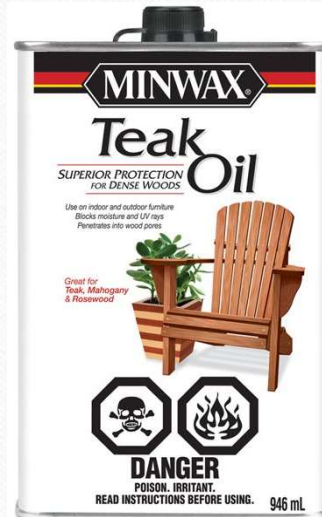
# Oil + Varnish Blends



Polymerized linseed  
Proprietary natural resin(s)  
Beeswax  
(Interior)



Boiled linseed oil  
Varnish  
(Interior)



Oil blend (no teak!)  
Thinners (↑ penetration)  
Varnish, UV Protectors  
(Exterior)



Polymerized linseed  
Pine resin  
(Interior)

**How the finish affects the wood.**

**Cherry**



**Oak**



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**Boiled linseed oil**

**Raw tung oil**

**Polymerized tung oil**

**Blended oil  
Liberon Finishing Oil**

**Blended oil  
Tried and True Varnish**

## Hard Wax Oils: Floors & Furniture



Add a bit more protection and still show the grain.

- Easy to apply.
- Easy to fix, no hard film
- Not as durable as polyurethane
- Not all have low VOCs
- Wax doesn't allow another topcoat

Shown here

- Rubio Oil Plus 2C
- Oli-Natura Hardwachsöl
- Osmo Polyx Oil 3043
- Saicos 3200NA

# Home Reading

	Oli-Natura	Osmo Polyx-Oil 3043	Rubio Oil Plus 2C	SAICOS 3200NA
Company	<a href="http://Oli-lacke.de">Oli-lacke.de</a>	<a href="http://Osmo.de">Osmo.de</a>	<a href="http://Rubiomonocoat.com">Rubiomonocoat.com</a>	<a href="http://Saicos.de">Saicos.de</a>
Canadian distributor	<a href="http://WestWindHardwood.com">WestWindHardwood.com</a>	<a href="http://Osmo.ca">Osmo.ca</a>	<a href="http://RubioMonocoatCanada.com">RubioMonocoatCanada.com</a>	<a href="http://RaincoastAlternatives.com">RaincoastAlternatives.com</a>
Price	\$51/1L	\$64.95/0.75L	\$209.95/1.3L	\$52/0.75L
Coverage	215 sq. ft./L	260 sq. ft./L	500 sq. ft./L	150 sq. ft./L
Cost/sq. ft.	.24¢	.33¢	.32¢	.46¢
Sheen	Silk-matte gloss	Satin	Matte	Satin matte
Preparation	Shake	Stir	Mix and stir	Stir
Coats	1	2-3	1	2
Dries in	1-2 hours	8-10 hours	24-36 hours	3-5 hours
Cures in	2-3 days	10 days	7 days	4-5 days
VOC status	495 g/L	< 450 g/L	0	299 g/L
Sprayable	Yes	No	Yes	No
Shelf life (unopened)	2 years	5 years+	1-2 years	5 years
Shelf life (opened)	1 year	3 years	1 year	1-2 months

## Oil Wax Finishes for Butcher Blocks / Bowls

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- Must be reapplied often
- Primarily intended for items that come into contact with food
  - Beeswax / carnauba wax
  - Food safe oil
- Make your own!
  - 1:8 ratio of wax to oil by volume
    - Food safe mineral oil
    - Beeswax / carnauba wax
    - Use a double boiler to melt together

# Tips and Tricks for Oil Finishes

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- Watch out for woods that contain antioxidants that prevent oil from curing
  - Aromatic cedar, any dalbergia (rosewood, cocobolo, tulipwood)
- Guild Feedback:
  - Good experience with BriWax – wipe on, hard clear finish. Polishes nice but might be carcinogenic
  - Phil C. likes Osmo Top Oil – a mix of waxes and oil. Tested for food safety. Available at Lee Valley and Wood to Works
  - Hornby's tung oil finish has no tung oil!
  - Town Talk Polish – available at Lee Valley, has a nice orange smell and contains oil and beeswax
  - Millie's sells for @25-30/pint at [www.sutherlandwells.com](http://www.sutherlandwells.com).

# Waxes

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# Waxes



- Usually sold in
  - Liquid/paste – contains a solvent. Wipe on, wait for wax to “cure” and then buff to shine
  - Solid stick – usually applied while spinning on the lathe or the buffing system
  - Spray – aka “Pledge” – naphtha is the solvent (also contains butane, propane, etc)
- Derived from a variety of mineral, vegetable and animal sources. Carnauba is the most common – hardest wax
- Sits on top of the wood and doesn’t change the colour – looks like shiny unfinished wood
  - You can apply wax over other finishes but not under them.
- Very little protection against scratches, wear, heat, etc. A teacup will leave a ring.
- **Tip:** Waxes dissolve in mineral spirits or naphtha – handy if you need to remove it



## Conservator's Wax – something slightly different



*CONSERVATOR'S WAX is a blend of highly refined **microcrystalline waxes of fossil origin** (petrochemical based) based on a formula which has become the standard material used in museums and art galleries and by professional conservators and restorers the world over. This high performance, crystal clear wax may be used on wood, metal, ceramics, ivory, marble, polished stones, leather, plastics, gilding, cast resins, photographs, and like materials offering excellent moisture resistance and **protection against heat and finger marks**. Its application on exterior surfaces enhances weather resistance. Apply it with a soft cloth to gently **remove built-up dirt and grime and old wax, then buff when dry to polish to a soft sheen.***

# Yorkshire Grit + Hampshire Sheen



Yorkshire Grit = abrasive powder + mineral oil + beeswax

- Abrasive paste applied on the lathe that provides a surface similar to sanding with 1000 grit plus a subtle finish (“liquid sandpaper”)
- Grinding powder = Tripoli powder (rotten stone) and pumice
- Make your own! 32 oz mineral oil + 8 oz beeswax + 8 oz food grade diatomaceous earth (white DE powder made from shells)



Hampshire Sheen = Danish Oil + Carnauba/Microcrystalline Wax

- Adds a bit more shine and protection to the turned piece
- Also applied while the lathe is turning

## EEE – Ultra Shine Friction Polish



EEE = high temperature wax + **shellac** + Tripoli abrasive (rotten stone)

- Sealant + polishing compound
- Abrasive powder breaks down to smaller and smaller grit – claims ~2000 grit equivalent.

## Your thoughts on Waxes?

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- Can buy Yorkshire Grit and Hampshire Sheen from [WoodsleeSummerCraft.com](http://WoodsleeSummerCraft.com). They also sell a liming wax and a Yorkshire microgrit that takes the surface to 2000 grit equivalent.
- As per Steve W, Triple EEE dries out quickly (6-8 months) but gives an equivalent finish to Yorkshire grit. Others have found that Yorkshire grit is a bit easier to use
- Smell of EEE is not that great and tends to linger.
- Make sure to use a double boiler for wax to avoid fires. Do not melt wax with solvent for the same reason.

# Shellac

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Nature's Most Versatile Finish

# Shellac – what is it good for?

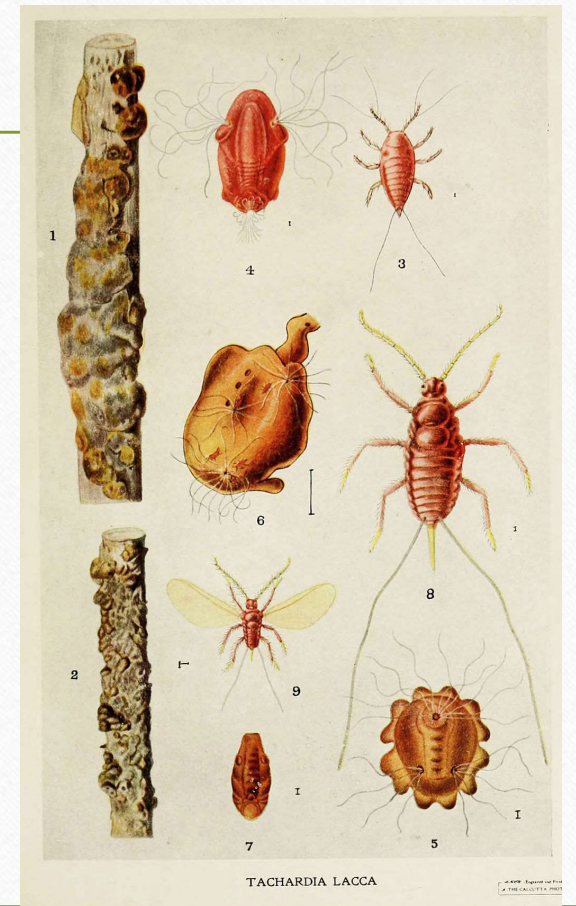
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- Natural primer and sealer that blocks sap, tannins, odours
- Universal and environmentally friendly finish
  - Can go over or under any finish
  - Good for bridging between two incompatible finishes (e.g., oil and water based)
  - Topcoat for French polish – high gloss but labour intensive, scratches easier and less water-resistant than polyurethane
  - Does not “layer” – next coat partially solvates previous coat; no “witness lines”
    - Unlike polyurethane, shellac is touched up easily
- You have probably also eaten some!



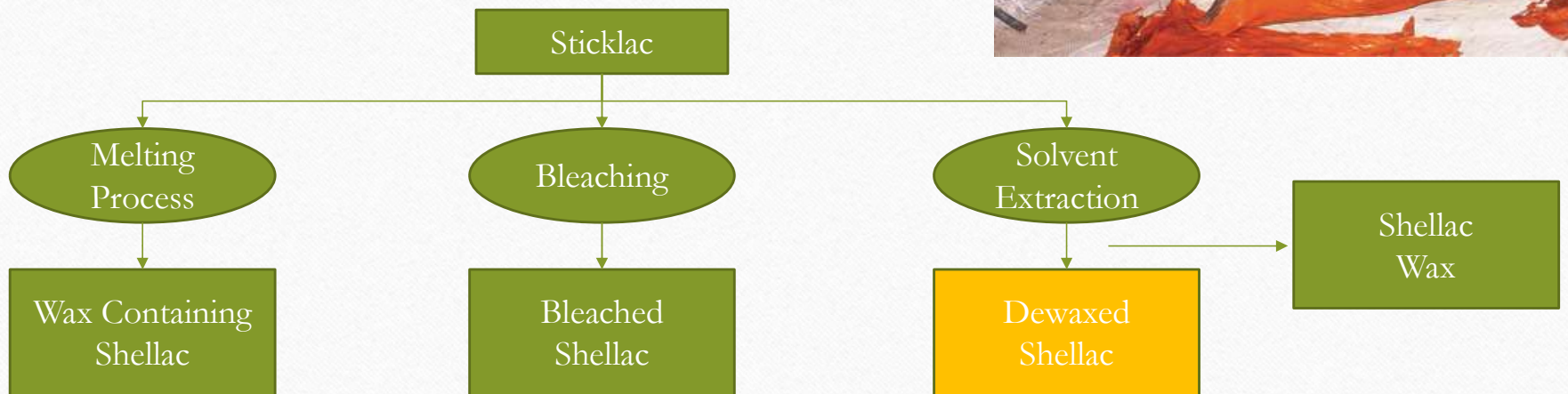
# Shellac: it literally grows on trees

- A resin secreted by a female lac bug (*Kerria lacca*) on forests of India and Thailand.
- Lac females suck sap from tender twigs and secrete “sticklac” into tubes called cells
- It takes 50,000-300,000 bugs to make 1kg shellac



# How is it made?

- Scraped from the branch
- Heated inside a canvas tube to get rid of flotsam
- Further processed to get the right attributes





## Different Grades of Shellac



- Fine furniture usually uses dewaxed shellac
- The colour of shellac depends upon the tree species and the environmental conditions.
- “Kusumi” shellac is pale golden and the most expensive
- Can also be purchased coloured with dyes

# Preparation

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- Shellac comes as flakes and premixed with ethyl alcohol
  - Flakes have a shelf life  $\approx$  1 year (forms insoluble polymers); 6 months once dissolved
  - Premixed shellac has a shelf life of up to 3 years (but the preservative can interfere with French polish)
- The dilution of shellac (shellac cut) is measured in pounds:
  - 2 lbs shellac in 1 gallon denatured alcohol (or isopropyl) = 2 lb cut
    - Most canned varnishes are 2 lb cut
    - Final coats are usually thinner (1lb cut) – you can dilute canned varnish

# What you'll find



Unwaxed  
2# cut  
For 1#: mix 1:2/3 denatured  
alcohol or 99% isopropyl



Waxed – could cause adhesion problems  
3# cut  
For 1#: mix 1:1.5 dna



Unwaxed  
Dilution ?? (water-based)  
Doesn't cause wood grain to  
"pop" like alcohol-based

## What you'll find: Friction Polish



- Yes = shellac + wax (and alcohol)
- Made as a quick, final, friction finish on bare wood
- Brings out chatoyance
- Wax will prevent adhesion of other finishes
- Good for use on **small** objects.
- Endgrain in larger pieces will cause a blotchy finish
  - Tips:[www.ubeaut.com.au/swinfo.html](http://www.ubeaut.com.au/swinfo.html)
- Mylands Friction Polish = linseed + shellac + denatured alcohol

# What You'll Find

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Lacquer sticks:

- Not “laquer” per say
  - Shellac + resin
- Hot knife technique to repair scratches and dents



# Guild Thoughts on Shellac

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- OB Shine Juice (by Cap'n Eddie Castelin)– 1:1:1 boiled linseed (or tung), dewaxed shellac and denatured alcohol. More coats = shinier so you can tailor the sheen. Sometimes called Turner's Polish
- Denatured alcohol (ethanol) works better than isopropyl for solvating shellac flakes.
- Shellac flakes can be bought at Lee Valley.
- When using Shellawax, turn the lathe on full speed to heat the shellac (helps to make a smoother finish). Turning in reverse will keep the liquid from flicking on your face
- Phil C likes to use Hutt Crystal Coat. It's an emulsion of alcohol, petroleum distillates, shellac and 'natural' waxes. A friction finish, it dries quickly on the lathe, and is compatible with felt-tip alcohol based or acrylic colours applied over it. Phil seals in the colours with conservator's wax. Hutt CC costs about \$23 for a 6 oz bottle at KMS. This amount will give a bright finish to many small pieces, like tops, which he sands with 500x only. There seems to be some longevity to the finish
- One person mentioned that you should not use shellac under polyurethane (?)

# Varnishes

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# Varnish – a more protective synthetic finish

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- Varnish = combines the features of synthetic resins + drying oils
  - Synthetic resins = alkyd, phenolic and urethane
  - Drying oils = tung and linseed, semidrying oils = soybean and safflower
  - Is it varnish? If it thins with mineral spirits and dries hard, it is a varnish
- Due to the synthetic resins, varnishes are generally **very resistant** to water, heat, solvents and other chemicals. The resin determines the characteristics of the finish:
  - Alkyd varnish (i.e., “traditional varnish”) is the standard all-purpose interior variety with decent protective qualities. Best for **indoor use**.
  - Phenolic varnish – phenolic resin + tung oil, is predominantly for **exterior use**.
  - Urethane varnish, also called polyurethane, offers a better resistance to heat, solvents and abrasions than any other varnish. It is a **type of plastic**.



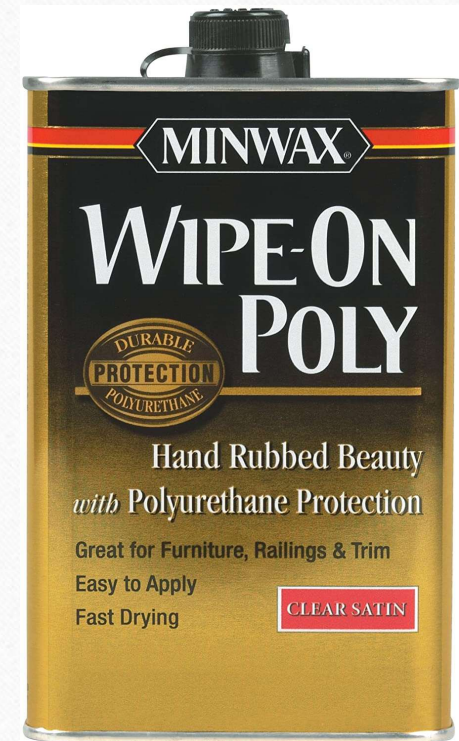
## Varnish isn't always called varnish

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- Polyurethane – very durable = alkyd + urethane (plastic) resins + soybean oil
- Spar varnish – better for exterior use as it has a **higher oil content** and can **withstand more wood movement**
- Marine (boat) varnish = spar varnish + **UV protectors**
- Wood conditioner – a **stain controller** made from alkyd/soybean-oil varnish thinned with about two parts mineral spirits to one part varnish.
- Gel varnish – a thicker, wipe on varnish using alkyd/poly resin
- Wiping varnish (sold under many different names) = thinned alkyd or poly varnish (e.g., Wipe On Poly)

# Homemade Wiping Varnish

- Making your own wiping varnish is very easy.
- 1:1 mineral spirits + oil-based polyurethane
  - Much cheaper (less than ¼ the price)
  - Can tailor the mix to fit your needs. Some people will use less mineral spirits.
- **Tip for application: Less is more.**
  - Guild comment: Should be called Wipe Off Poly
  - People get success from different techniques, but usually the key is to build up in thin layers.



# Water vs Oil Based Polyurethane

Water Based		Oil Based
<ul style="list-style-type: none"><li>• Milky but dries and stays clear</li><li>• Finish doesn't look as "wood-like"</li><li>• <b>Harder (more scratches)</b></li><li>• Dries fast</li><li>• Not smelly</li><li>• Can't apply over oil</li> <li>• Good for wood floors</li></ul>		<ul style="list-style-type: none"><li>• Slight amber hue that darkens over time</li><li>• Looks better</li><li>• <b>Softer (more dents)</b></li><li>• 24 hours between coats</li><li>• Smelly</li><li>• Can apply over oil</li> <li>• Good for woodworking</li></ul>

# Lacquers

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# Lacquer



- Solvent-based product that is made by dissolving nitrocellulose together with plasticizers and pigments in a mixture of volatile solvents.
  - Nothing really environmentally friendly
  - Usually sprayed, but also brush on versions
- Hard, durable, high gloss finish.
  - More hard wearing than varnish or shellac
  - Can be glossier than varnish – often needs only 1 coat
  - Replaced shellac on furniture after 1920s

## Guild Tips & Tricks for Varnish and Lacquer

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- Get rid of sags by letting them cure and then using a razor blade.
- Krylon is better than Watco for lacquer. Mohawk lacquer works well.
- Stay upwind of lacquer – smells.
- One Fraser Valley Wood Turner has very good success with laquer. Keys to getting a good finish are 1) a power turning table, 2) keeping the cans warm, 3) using a hot air gun at the same time you are spraying to “bake” the finish and prevent sags and 4) using an up/down spraying pattern instead of around. He usually puts two coats of sanding sealer under two coats of laquer for best results.

Oh...and CA Glue

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# Krazy Glue as a Finish

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- Good for small objects (pens, bottle stoppers)
- Hard, crystal clear and waterproof
  - Reversible with the right solvent
  - Thicker versions can gap fill
- Strong fumes – good ventilation required
  - Less odiferous stuff available @ 2x\$
- Lots of different application techniques (see YouTube)



# CA Glue Tips

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- Don't use CA Glue to fix small wounds. It is a mistake and **will burn you**. Might be better if you use the Dollar Store Crazy Glue knock off
- Steve W. usually will put oil on first, wipe dry and quickly put on a coat of CA glue. Can take many many (many) coats.
- A much better gap filler than sawdust + CA is Lee Valley Chair Doctor Glue plus sawdust.
- CA Glue Debonder can be used to unstick you. Acetone will work too.
- Cover your hands in PR80 and it will help keep you from sticking to CA glue.
- CA Glue will catch fire....watch out if you have it and shop towel stuck to your finger.
- **CA has a shelf life of about a year.** After that it does not cure well. Buy in small quantities.
- You can use water to quickly wipe up CA glue spill
- Lyle Jamieson says you can leave the cap off and it doesn't harden. Whaaa????
- CA Glue does not stick to the food handling gloves in the Dollar store.
- If CA glue is kept too cold it will become inert.

# Comparing Finishes

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# Before

Gel Polyurethane

Spray Lacquer

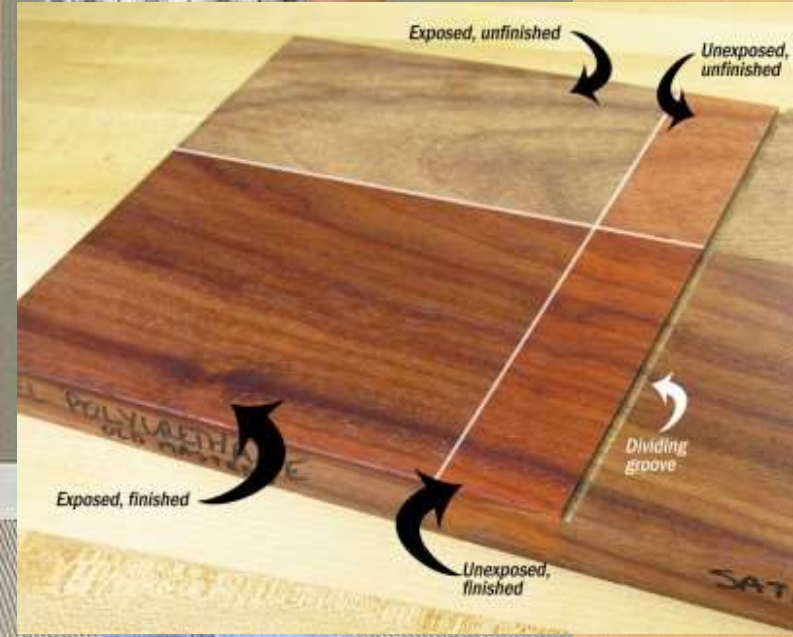
Waterborne Acrylic

Tung Oil

Boiled Linseed Oil

Shellac

# After



# Clear as Mud?

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What is your favourite?