# SELECTING AND USING FINISHES FOR WOODTURNING

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This is the first pass at the skills night notes for finishing. Links for further information are scattered throughout – just click on them to open the web site pages.

Will be updated after the meeting to add questions raised and better ideas generated. - and to correct any errors you may find.

Second document which holds the text of all the finishing articles from the WGO newsletter issues over the years is also available on our web site, click on the newsletter archive link, home page.

## General

Your project's success or failure to impress depends equally on the design, quality of your workmanship and the appearance, quality and durability of the finish. If you make a wide range of turnings, it may require a shelf full of different finishes.

Regardless of what you make, there is always more than one, sometimes several, different finishes which will be 'just right' for the desired look and durability.

There is no such thing as the 'only finish' for any project! It can be frustrating to choose between several different finishes that all appear to be the best for your turning.

For some detailed description on finishes and how they cure / react with links to each type of finish details read:

http://en.wikipedia.org/wiki/Wood_finishing

Yes, I will link to you to other Wikipedia pages as we go. This allows me to keep this how to short and to the point. When any additional detail is desired – just click on the links.

Regardless of what I have put in each type of finish for 'how to apply', do read the instructions that came with the finish that you purchased. There could be brand specific details that could mean the difference between a great looking finish and a disappointment.

## Selecting a Finish

There are several finish categories: waxes, oils, shellacs, varnishes (both acrylic and water based), lacquers, epoxies, cyanoacrylates (CA), and the hardest to achieve – nothing.

Each group has it's strengths and weaknesses, depending on the application. Choosing one out of two or more that fit your needs can depend on which one is familiar more than which is the best. Understanding what is involved in applying each type of finish and how it will perform makes the selection decision much easier.

One thing that I choose to do: I always pick the highest gloss product as it's easy to 'cut back' the shine. Trying to shine a semi-gloss finish is like pushing a limp rope.

## Types of Finishes

**WAXES** Carnauba and Beeswax are described, other waxes are available, but not described here.

**Carnauba:** (read more at: http://en.wikipedia.org/wiki/Carnauba_wax)also called Brazil wax and palm wax, is a wax of the leaves of the palm Copernicia prunifera, a plant native to Northeastern Brazilian states. In its pure state, usually comes in the form of hard yellow-brown flakes. In it's pure form, it is hypoallergenic and eatable (in small amounts). It is insoluble in water and has a melting point much higher than Beeswax. Most products sold as 'Carnauba was' also contain either other waxes or solvents.

**How to apply:** Assuming you are using a commercial product that is not 'hard', simply apply a thin coat and polish. The shine will dull over time and wear off with use. Reapply to restore the finish. Carnauba wax can also be polished over other finishes such as varnish, shellac or lacquer.

Beeswax: (read more at: http://en.wikipedia.org/wiki/Beeswax) a natural wax produced by bees to make cells to store honey.

**How to apply:** Beeswax is a poor single component finish. Commercial 'beeswax' furniture polishes are applied simply by wiping on, followed by polishing. Not a 'permanent' finish as it must be reapplied regularly. A more permanent finish can be produced by dissolving beeswax in turpentine or blended with linseed oil or tung oil. This can also be used as a friction polish, applied on the lathe, while the workpiece is turning.

**DRYING OILS** Oil finishes which penetrate to some degree and cure to a hard finish.

**Safety warning: Tung and Linseed oil soaked cloths, if piled together can generate enough heat to burst into flame. To prevent this from happening spread the cloths out on a concrete floor, or hang individually on a line until the oil cures, then discard.**

**Tung Oil:** (read more at: http://en.wikipedia.org/wiki/Tung_oil) Tung oil or China wood oil is a drying oil obtained by pressing the seed from the nut of the tung tree (Vernicia fordii). As a drying oil, tung oil hardens (dries) upon exposure to air. In use for a wood finish since about 400 B.C. What is sold as raw tung oil has usually been heated to prevent it's drying to a 'crackle' finish. The 'raw' oil takes some time to cure – up to 14 days at lower temperatures. 'Polymerized' tung oil has been 'cooked' to aid in faster curing. All tung oil variations have an odour that does not dissipate for some time. Tung oil can be difficult to store. It can prematurely begin to cure at elevated temperatures or exposure to sun or fluorescent lighting. Tung oil is waterproof (if the surface is maintained), resistant to alcohol and fruit acids. Tung oil does impart an amber colour.

**How to apply:** Really simple, rub finish on the wood, leave for a few minutes, then rub off the excess with a lint free cloth. Thin the first coat with turpentine for better penetration. Allow the oil to fully cure before adding a second or third coat. Going beyond three coats does not significantly add any benefits. Tung oil can be combined with beeswax and used as a friction polish. Polishing cured tung oil, after two or three coats will produce a medium gloss finish.

If the finish begins to wear, simply sand lightly with 400 grit sandpaper and apply another coat.

**Linseed Oil:** (read more at: http://en.wikipedia.org/wiki/Linseed_oil) Linseed oil, also known as flax seed oil is a colourless to yellowish oil obtained

from the dried, ripened seeds of the flax plant (Linum usitatissimum). Linseed oil soaks into wood deeper than Tung oil, particularly if thinned with solvent(s). It is not a fully waterproof finish, but it is resistant to alcohol and fruit acids. This oil does fill the wood pores which can strengthen thin pieces. Linseed oil does impart an amber colour.

Linseed oil is often combined with varnish to produce a finish that not only penetrates, but also produces a high gloss film finish.

**How to apply:** Really simple, rub finish on the wood, leave for a few minutes, then rub off the excess with a lint free cloth. Thin the first coat with turpentine (can also use alcohol) for better penetration. Allow the oil to fully cure before adding a second or third coat. Going beyond three coats does not significantly add any benefits. Some 'polymerized' Linseed oil finishes fully cure in 24 hours (at 25ºC), penetrate wood quite deeply and can be polished to a high gloss.

If the finish begins to wear, simply sand lightly with 400 grit sandpaper and apply another coat.

**NON DRYING OIL** These are not really a 'finish', more like a treatment.

Types include mineral oil, some nut oils and vegetable oils. Apply as much as will soak into the wood. Wipe dry. Reapply as necessary when the surface dries out. Not recommended for any purpose other than cutting boards and wooden utensils.

**SHELLAC** (Read more at: http://en.wikipedia.org/wiki/Shellac). A resin from the female lac bug – sold as dry flakes or dissolved in ethanol to make liquid shellac. It works well as a tough 'natural' primer, sanding sealer, tannin blocker, stain and high gloss finish. For woodturning, shellac is most useful as a sanding sealer or as a final finish for items which will not be handled to any significant degree.

Shellac can be dissolved in ethanol. Concentrations are described in 'pound cuts' e.g. A 1 lb cut is one pound of shellac flakes in a gallon of alcohol. Note: use ethanol – not methyl hydrate or isopropyl alcohol for best results. Luthiers (guitars etc) use non denatured alcohol. This 'pure' 95%, 'drinkable' ethyl alcohol is available in Ontario at the LCBO liquour stores. Shellac comes in a range of amber colours, from a very light blonde (for minimal wood colour change) to a very dark brown, with many varieties of brown, yellow, orange and red in between these two.

**How to apply:** For use as a sanding sealer or fast finish, quickly wipe the wood using a cloth wrapped around a cotton ball soaked lightly with shellac. Additional coats can be applied as soon as the alcohol has evaporated - a couple of minutes at the most. Note that wiping on additional coats will partially remove the previously applied shellac as the alcohol in the new coat will dissolve some of the shellac on the surface. Can be polished to a high gloss – but requires a gentle touch to prevent 'melting' the shellac.

Note: thinned shellac is a great wood sealer, almost any finish can be applied over it. It's especially good at sealing end grain. How much to thin it? It depends on the wood, wood species like Ash and Oak need less thinning than species like Maple, Birch or Cherry.

Shellac can be applied as above, but with some polymerized tung or linseed oil added. This method is usually referred to as "French Polish", a wood finishing technique that results in a very high gloss surface, with a deep colour. The method consists of applying many thin coats of shellac dissolved in ethanol using a rubbing pad (called a 'fad') lubricated with oil. The rubbing pad is made of absorbent cotton or wool cloth wadding inside a square piece of fabric (usually soft cotton cloth). For a detailed procedure see:

Brief introduction: http://en.wikipedia.org/wiki/French_polish

Detailed: https://www.shellac.net/Shellac-FrenchPolish.html

**LACQUER** (Read more at: http://en.wikipedia.org/wiki/Lacquer for lacquer painting: http://en.wikipedia.org/wiki/Lacquer_painting). The original compounds called 'lacquer' are normally not what you see for sale today. Modern lacquers fall into three categories; Nitrocellulose, Acrylic and Water based.

**Nitrocellulose Lacquers:** This finishing material is made of nitrocellulose combined with other resins (to promote flexibility, durability, etc.) dissolved in lacquer thinner solvent. The lacquer film forms and cures as the solvent evaporates. Lacquer thinner is a volatile, "hot", solvent containing a combination of hydrocarbon and chemical solvents - including naphtha, xylene, toluene, acetone, various ketones, and others. This type of lacquer is very difficult to find as water based lacquers are becoming the 'norm'.

The main drawback of lacquer thinner solvent based finishing is the hazardous nature of the evaporating solvent itself. Intermittent exposure to the lacquer thinner vapors is a potential health risk, so it is necessary to wear a vapor mask, and to avoid skin and eye contact as well, when working with lacquer or lacquer thinner.

**FOR ALL LACQUER PRODUCTS:**

Different brands have different details in how to apply, so; READ THE INSTRUCTIONS that come with the product!

Common to all is the prep. Work; all surfaces must be sanded smooth and scratch-free - Sand to a scratch-free 220grit on hardwoods, then remove all sanding dust. 'Wash' the piece with lacquer thinner to raise wood grain, then sand the grain roughness with 320 grit paper. Some manufacturers recommend a wash coat of thinned Vinyl Sealer, followed by a light sanding. At this point, a pore filler can be applied, then sealed again – process then repeated. Inspect at this point to check for any scratches – remove scratches and fill etc over those areas. To build a clear lacquer finish requires patience and many coats. To start, spray four THIN coats on the piece, allowing the lacquer to 'cure' between coats (see mfr's instructions for timing). Wet sand lightly with 400 grit paper. Repeat this process (spray/sand) at least twice more, until there are no shiny spots on the wood – shiny spots indicate that there are small depressions that will 'pop' in illuminating light after the surface

is polished. Now you can spray on the final 4 coats – allow to fully cure (can be 4 to 14 days, depending on coat thickness). Now, wet sand three times, first with 600 grit, then with 1200 grit and finally with 2000 grit. .Buff with a fine polishing compound to gloss desired. Buff carefully, do not overheat the finish as it can be 'melted'. Using a super fine polishing compound, hand polish all surfaces again to a 'mirror' finish. If you short cut any of the above steps, you will not end up with a totally smooth finish that reflects light evenly.

In addition to the 'normal' off lathe use, lacquer (brush on type) can be applied on the lathe with a lint free cloth. Do practise first! It takes some skill to get the process just right.

**Acrylic Lacquers:** Lacquers using acrylic resin, a synthetic polymer, were developed in the 1950s. Acrylic resin is colourless, transparent thermoplastic, obtained by the polymerization of derivatives of acrylic acid. Acrylic lacquers are compatible with NC lacquers – at least that's what I have been told.... Best source for this product is the automotive paints isle. You can purchase anything from a clear finish to any colour any manufacturer's car was painted in the last few years. Note that Acrylic lacquers 'yellow' less than NC lacquers.

**How to apply:** Spray it on! Available in aerosol cans for small jobs, like most of a woodturner's work. To repair NC lacquer finishes, use lacquer thinner to remove even cured finish and reapply. To apply NC lacquer properly, I would recommend taking some instruction from an 'expert'. Lacquer is likely the easiest film finish to apply, but the most difficult to do well. Do not apply any lacquer finish when the relative humidity is high. In my experience, 'high' is anything over 50%.

This is the type of lacquer sold at most building centres etc. Note that Deft has a 'brushing' lacquer that is applied with a brush (duh!). Brushing lacquer requires more work between coats as it does not 'apply' as smoothly as spraying.

**Water-based Lacquers:** Due to health risks and environmental considerations involved in the use of solvent-based lacquers, much work has gone into the development of water-based lacquers. Such lacquers are considerably less toxic and more environmentally friendly, and in many cases, produce acceptable results. More and more water-based coloured lacquers are replacing solvent-based clear and coloured lacquers in underhood and interior applications in the automobile and other similar industrial applications. Water based lacquers are used extensively in wood furniture finishing as well.

Details for 'General' water-based acrylic lacquer: https://generalfinishes.com/professional-products/water-base-topcoats-and-sanding-sealers/enduro-water-base-lacquer#.VOEFJS6Wat8

Details for “Aqua Coat” water-based acrylic lacquer: http://aquacoat.com/collections/products/products/aqua-coat-clear-topcoat

Details for Target Coatings: http://targetcoatings.com/

**How to apply:** “Spray it on” is the best method. Each manufacturer has different instructions, so this is a true case of “read the instructions” before opening the container.

One of the major issues with water-based lacquer is that it can make darker woods, or stains, appear washed out. Some manufacturer's are providing amber coloured finishes to align themselves with the solvent based products. Can add a touch of yellow or amber colour to the finish and get the same look.

A more detailed 'how to' available at: http://www.woodcentral.com/russ/finish11.shtml

**ALKYD VARNISH:** My personal opinion is to use polyurethane varnishes, so I have not expanded this section.

**POLYURETHANE:** Essentially a plastic in the form of a liquid until it dries, polyurethane is available in both water- and oil-based options, and comes in varieties from satin to glossy. Not my favourite compound for finishing as it tends to give woodturning a 'plastic' look. I feel it's best use is for floors, wood trim and cabinetry.

**How to apply:** Most can be sprayed or brushed on. Some are formulated to be applied with a pad i.e. 'wipe on' finishing technique. Choose brands that are 'self leveling', as this will somewhat lessen the need for sanding between coats.

**WATER BASED ACRYLIC:** This is popular because of its low odor and low toxicity. It goes on clear without adding a slight color or yellowing over time that oil-based versions can, and it dries much faster. As with shellac, water-based 'polyurethane' won't hold up as well as polyurethane to heat and chemicals, but is an excellent finish for woodturning articles that are not heavily handled.

Minwax Polycrylic (http://www.minwax.ca/wood-products/onestep-stain-finishes/minwax-polycrylic-protective-finish) available in liquid and spray can form. The only water-based varnish I like to use. It's a fortified polyurethane which is 'tougher' than most water-based finishes. It also can go over oil-based finishes and can be applied using synthetic-bristle brushes, a foam roller or a rag, as can other water-based polyurethanes. Water-based oil-modified polyurethane is a relatively new product that combines the durability of an oil base with the cleanup of a water base. It does not add any amber hue to wood, so if you want this look, add a little dye to the varnish. Can be mixed with acrylic paint for added colour.

**How to apply:** Apply with spray gun, synthetic-bristle brush, or even a lint free cloth (practise first). Recoating can be done after 2 hours (at 20$^{O}$C). Wet sand between coats with 400 or 600 grit paper. Repeat until the sanded finish does not have any 'shiny' spots. Then, add another coat – or two if thin and then sand to at least 1200 grit before buffing. Note: as with all water based finishes, the use of steel wool is not recommended. Steel wool will leave minute particles behind, these will be discoloured by the water-based finish and show. If you want to cover over dyed or stained wood, test first. There may be some unwanted reactions.

**OIL – VARNISH BLENDS:** I have never tried this and, from what I've seen for results not really my cup of tea. You are on your own on this one..... General Finishes “Salad Bowl Finish is in this category. Many turners like this product, and I have to admit – it is easy to use and does make a nice finish.

**EPOXY RESIN:** (Read more here: http://www.westsystem.com/ss/epoxy-chemistry/ ). Epoxy resins, aka polyepoxides are reactive prepolymers that cure with a catalyst or a co-reactant.

Mixing epoxy resin and hardener begins a chemical reaction that transforms the combined liquid ingredients to a solid. The time it takes for this transformation is the cure time. As it cures, the epoxy passes from the liquid state, through a gel state, before it reaches a solid state. Open time (also working time or wet lay-up time) is the portion of the cure time, after mixing, that the resin/hardener mixture remains a liquid and is workable and suitable for application. The mixture passes into an initial cure phase (also called the green stage) when it begins to gel or "kick-off." The epoxy is no longer workable and will progress from a tacky, gel consistency to the firmness of hard rubber, which you will be dent with your thumbnail. Because the mixture is only partially cured, a new application of epoxy will still chemically link with it, so the surface may still be bonded to or recoated without special preparation. However, this ability diminishes as the mixture approaches final cure. The epoxy mixture has cured to a solid state and can be dry sanded and shaped. You should not be able to dent it with your thumbnail. At this point the epoxy has reached about 90% of its ultimate strength, so clamps can be removed. It will continue to cure over the next several days at room temperature. A new application of epoxy will no longer chemically link to it, so the surface of the epoxy must be properly prepared and sanded before recoating to achieve a good mechanical, secondary bond.

Keeping it simple: I choose to use only one brand of epoxy resin for finishing, glueing, casting and filling. There are other types, usually available from industrial suppliers. These will sometimes sell smaller quantities to individuals.

West System Epoxy Resins: 105 resin, 205 fast hardener, 206 slow hardener, 209 extra slow hardener, 207 'clear' hardener.

http://www.westsystem.com/ss/epoxy-resins-and-hardeners/
Available from Lee Valley Tools and most marine services and boat stores/shops.

**How to apply:** Detailed instructions and user guides available at: (http://www.westsystem.com/ss/use-guides/) Epoxy can be used directly as a surface finish as well as an adhesive. You must measure the two parts accurately. Mixing the two parts fully together is very important. It takes at least two minutes of mixing to achieve this! Mixing will introduce air bubbles. To remove all trapped air bubbles can be frustrating. The best way is to mix the compound in a container that is at least 10 times the size of the mixture, then placed it in a container that the air can be removed with a vacuum pump. If used as a finish – the action of spreading the compound over the surface will remove most of the air bubbles. The few remaining bubbles on the surface can be 'popped' using a hair drier – note that this will also reduce the cure time~. As noted above, before applying a second coat to a cured coat i.e. more than 50% time past the quoted hardening time, the finish must be first cleaned off with acetone, wiped well before the solvent evaporates, then sanded before applying another coat.

Additives: Lots of choices to colour, thicken, fill and change texture. Custom additives from the manufacturer are available. Epoxy can be coloured or filled with most powdered or alcohol based dyes, artists acrylic paints and almost any kind of solid (e.g. Shavings, sawdust, metal filings / dust, stone dust etc etc).

Regardless of listed cure time, epoxy resins (yes, including the '5 minute' kind) achieve full cure only after several days at room temperature. Cure time can be accelerated by increasing the ambient temperature. A 10 hour cure time epoxy resin can be cured in 30 minutes if heated to temperatures above 60$^{O}$C.

**CYANOACRYLATE (CA):** Read more at: (http://en.wikipedia.org/wiki/Cyanoacrylate)

Cyanoacrylate glue is actually an acrylic resin, not a traditional adhesive in the mold of water-based school glues. Usually an acrylic resin consists of two separate liquids, one for pouring into the mold and another used sparingly as a hardener. In the case of CA glue, the hardener is contact with alkaline materials. Weak alkaline materials such as water will cause curing to start. CA glues come in various viscosities; super thin, thin, medium-thin, medium, thick etc. Most woodturners have two types on the shelf; thin and medium-thin. You may wish to experiment with CA surface primers and cleaners – I've never used these so can't comment.

**Care and feeding:** CA glues have a relatively short shelf life, normal guarantees are 12 months. Refrigerate UNOPENED containers in a freezer to extend shelf life indefinitely. After opening, keep it in your work area as moving the container from a cold to warm location can cause condensation inside the bottle from the moisture in the air that was allowed inside after initial opening.

Thin CA glue has application in woodworking. It can be used as a fast-drying, glossy finish. The use of oil (such as boiled linseed oil) may be used to control the rate at which the CA cures. CA glue is also used in combination with sawdust (from a saw or sanding) to fill voids and cracks. Lately, penmakers have started to use medium-thin CA glues for finishing as it is somewhat easier to work with. Since there are a wide variety of manufacturers that all make a quality product, your best bet is to go to your local woodturning 'store' for supplies.

**WARNING:** Cotton, leather or wool (cotton swabs, cotton balls, and certain yarns or fabrics) in contact with CA glue results in a powerful, rapid exothermic reaction. The heat released may cause serious burns, ignite the material, or release irritating white smoke. Users should not to wear cotton or wool gloves, when applying or handling cyanoacrylates. The fumes from CA are a vapourized form of the CA monomer that irritates sensitive membranes in the eyes, nose and throat. They are immediately polymerized by the moisture in the membranes and become inert. Some become sensitized after repeated exposure resulting in flu-like symptoms or allergic skin reaction.

**How to apply:** First; CA is low elasticity (brittle), has poor UV resistance, pungent odour ('medical' grade does not), poor resistance to moisture and will yellow with age. It does bond extremely well, cures quickly and, when used as a finish, polishes easily to a high gloss.

Accelerators can aid in curing CA glue quickly. Most useful for medium-thin or thicker CA glues. Note; when gluing together or finishing items which do not contain any moisture, add a very small amount of accelerator on surfaces before applying the CA glue. Excessive hardener (includes too much moisture) will make small polymer chains which decreases the mechanical properties, lower adhesion and cloud the finish. Solvent: Acetone will clean up uncured CA glue and soften cured glue. Commercial debonders are available.

For finishing wood; If humidity is above 75%, simply apply medium-thin or medium CA with a folded piece of paper towel to the workpiece while the lathe is turning. Curing time may be a bit long for some, but the finish will look better than if accelerator is used. Low humdity air in your workshop may require adding a **very small** amount of accelerator prior to applying the CA. Some like to add the accelerator after applying the CA – danger, if too much is applied over the surface, CA will cure with poor properties and could also be cloudy in appearance.

Can add oil to the mix; Soak some polymerized Linseed or Tung oil into a small folded paper towel – add CA over top, then apply to the workpiece. The oil will extend cure time and make it easier to smooth and 'level' the finish.

**NO FINISH ADDED:** Well . . . that is if you consider sanding to at least 5,000 grit no finish!

Always perform the last sanding of each grit in the direction of the grain. Cross grain scratches are difficult to remove without extra sanding and will show through.

Start with the finest grade (grit) of sandpaper that allows you to get the job done effectively. Starting too coarse only means extra sanding steps to achieve an acceptable finish. Determine your starting grade for sanding by testing to see if that grit size effectively removes the surface defects left by your tool work. If it doesn't, then use the next coarsest grit in the grade sequence and start again.

Sand uniformly, with the first grit (80 if tool marks are deep, or 240 if you are proud of your cutting) to remove any traces of tool marks. Clean all surfaces, after each grit, to remove wood dust and any trapped grit left behind.

For larger areas, use a drill with a 3” or larger disc sander pad attached. Sanding pad should have a soft foam backing so you can follow curves. Some technique is required, so practise on you work before you make the final shaping cuts.

Sand the entire surface of the workpiece. Do not sand only the area that may have contained a small surface defect as it will remove more material in 'soft' areas which will be felt later.

Sand with successively finer grades of sandpaper, do not skip grades. Do not skip more than one grade between sanding steps.

If you move up one grit size and find that it exposes some scratches that do not remove easily, drop back TWO grit sizes and start again. Trying to remove scratches left behind with too fine a paper does not work well – and takes forever.

Clean all surfaces carefully with a tack cloth or soft bristle (varnish) brush, as you did between each grit change. At this point you can polish your work, and admire.

**BUFFING AND POLISHING:** aka 'finishing the finish'. The last thing to do to your display pieces before showing off your work!

Before you start to polish, the finish MUST already be smooth. Polishing should not start until you have reached an 800 grit finish. Trying to polish out 400grit scratches (or worse), orange peel or a lumpy surface will either be unsuccessful or take way more time than you are willing to spend.

There are almost as many polishing methods as there are woodturners! Some involve using three or more polishing compounds, multiple buffing wheels and complex setups. Obviously, as in all things, there is more than one way to skin a cat.

I use only two compounds: Tripoli and White Diamond. I do not use any waxes on top of my finishing as this makes the surface 'sticky' when my hand slides over the piece – and I don't like that. I prefer to have a finish that is smooth enough for my hand to 'glide' over. Why do you need to add wax when the surface already has a solid finish? Well there are some who like to use wax as the only finish. Quick to apply, but must be reapplied almost every time the piece is handled!

Tripoli is a medium brown colour so can leave a bit of residue. This residue can be cleaned off with a solvent that does not harm your finish. Denatured ethyl alcohol, or methyl hydrate will work well, if used sparingly for most finishes. Do not use if you finished with Shellac as any alcohol will dissolve the finish.

If you have a good 800 grit sanded finish, you can skip the Tripoli (my stick is still 90% there after 15 years. . . . ) and use a White Diamond stick to load your buffing wheel (half way through my second stick after 15 years).

Now, how it's done:

- Polishing/buffing wheel for each compound – must only use one compound on each wheel. Size of wheel depends on the size of your project(s). I find that a 6” (150mm) or 8” (200mm) wheel is suitable to polish the outside of just about any project. Key word “outside”. Polishing the inside of any work is tricky when using a wheel, particularly if the wheel is larger than half the workpiece inside diameter.

- 'Ball' end polishing/buffing mops to polish the inside, one for each compound. These are best used mounted in a hand drill, dremel type tool or die grinder.

- Loading the compound is easy, pass the 'stick' across the rotating wheel lightly a couple of times and you are ready to go.

- Don't get impatient and think that turning up the speed will make polishing faster. 1500 RPM is a good speed.

- When polishing; hold the piece firmly, touch the workpiece lightly against the wheel, apply the piece ONLY below the centre of rotation and keep the wood moving against the

spinning wheel – staying in one place too long can generate heat that may damage the finish.

- Periodically recharge the wheel with additional compound.

It's that simple! You only need to practise a bit on non critical pieces to get enough experience to make your work shine.

Buffing wheels can be mounted on your lathe, using various methods. I prefer to use 1” or larger flat washer on one side of the wheel and pass a 1 1/2” long, 3/8” bold through the washer and wheel to a 1” diameter, 3” (or longer) hard wood block that has a threaded hole in the middle. Make the block yourself; mount a 4” long blank in a chuck and drill an 11/32” diameter hole at least 2” deep. Tip; first drill a 1/8” hole, then enlarge to 1/4” then enlarge to 11/32” - will result in a much cleaner hole. Turn the block round, somewhere near 1” in diameter. Clean up the end and ensure that it is very flat. Part off near the chuck face. Mount the finished piece in the chuck and mark the block's position relative to the chuck jaws (I always place a mark between jaws 1 and 4 so I don't have to remember more than one thing). Now, put the washer on the bolt, the bolt through the buffing wheel and 'thread' the bolt into the 11/32” hole. It may take a bit of effort to get it started. Keeping the buffing wheel centred, tighten the bolt until the wheel is firmly held. You now have a buffing wheel that is far enough away from the chuck to make it useful. Repeat for any other wheels you need. Buffing 'mops' normally come with a shaft, so are easily mounted in a drill.

FRENCH POLISHING: This is a method of applying a shellac / oil finish that's labour intensive, but makes a great finish that's durable (except against alcohol) and easy to repair when the inevitable accident happens.

Here is what I do, I follow the instructions by Brad Sears as follows: (full info on his web site at: http://aroundthewood.blogspot.ca/2010/06/french-polishing-on-wood-lathe.html )

While friction polishing can produce a pretty good finish, there are times, like with this walnut platter, when something even better is desired. At times like that, I turn to the time-honored technique known as "french polishing." Please note that I called french polish a "technique" - not a "product." That's because, contrary to its name, french polishing relies on the gradual buildup of hundreds - if not thousands - of micro-coats of shellac, oil and other products to obtain what is widely considered the most beautiful way to finish highly figured wood.

The basic technique, which was more-or-less settled by the 18th century, is accomplished by using a wadded cloth pad called a "rubber" to hand rub the micro-coats of shellac and other materials into the wood surface. This is done in continuous circular and figure-8 patterns. Any resulting streaks are then "spirited off" with a fine application of alcohol - also applied with the rubber. The process is repeated - in various forms - 12 to 15 times over a period of two weeks to a month until the final finish at last emerges. (Fair warning: french polishing is anything but easy - and it sure ain't fast. Ask a luthier to french polish your custom guitar and you just added $1,500 - $2,000 to the tab and another month to your wait time.)

As we will see, the classic process is indeed labor intensive. The basic process works like this: the workpiece is first sanded to at least 600 - 800 grit to remove all toolmarks and all but the finest micro-scratches. Such fine sanding is needed because the french polish will magnify even the smallest defect(!) Next, we use our rubber to build-up a base coat shellac over 6 - 8 "bodying sessions" where we apply 2 lb cut shellac using continuous, overlapping circular and figure-8 motions. We can do 2 - 3 of these "bodying sessions" a day allowing 3 - 4 hours for the previous coat to dry and harden. (We should note that shellac takes weeks - if not months - to fully "harden." But 3 - 4 hours is sufficient for our purposes at this stage of the game.) After 3 - 4 days, having built up a reasonable shellac base, we fill the wood grain by rubbing the piece down as before, except now we add a drop of oil (I prefer walnut because I believe it gives a slightly harder final finish) and a dab of 4F pumice. (You can actually hear the pumice working with the shellac and wood fibers to fill the grain. Kinda neat, really.) We then set the piece aside for 2 - 3 days to harden-up.

Now the real work begins. Using our rubber and an equal amount of 2 lb shellac, (for me) grain alcohol, and a drop of walnut oil, we do the actual french polishing. This consists of another 6 - 8 sessions (at 2 sessions a day separated by 4 - 6 hours.) After each session, we "spirit-off" any streaks with our rubber moistened with a few drops of our grain alcohol. By the 3rd or 4th day, our workpiece shows some minor unevenness, which we level off with 800-grit sandpaper soaked in walnut oil. After another "spiriting-off," we follow-up with another 3 - 4 french-polishing sessions - this time with a 1 lb cut of shellac. (Almost done.) By now, we set our workpiece aside for another 3 - 4 days to allow the finish to stabilize and harden before a final sanding at 1200 - 1800 grit (again with walnut oil lubricant.) One more spiriting-off and we set the piece aside for 1 - 2 WEEKS to really harden. As a last step, I give the piece a final polishing with my home-brewed walnut oil/beeswax/rottenstone polish. E voila'! (I know of one artisan who uses a high-grade automobile polish - but since it ain't eco-friendly, I don't. No worries - to each his own....)

Fortunately, we woodturners can make things a little easier by using the lathe, rather than hand-power, at most stages of the game. One well-respected turner also advocates using thin CA glue as a base/grain-filling coat instead of shellac. (I have no experience with that technique, but it sounds promising.) In practice, I've found using the lathe makes each session easier, at least through the "rough-leveling." But it still leaves an uneven finish that must be rough-leveled by hand, as described above. (One could try power buffing, but I'm not crazy about it on a shellac finish.) I also find I get best results by doing the last french polishing sessions, with 1 lb shellac, by hand - with the final hand beeswax/walnut oil/rottenstone rubdown.

**Addendum:**

Excerpts from an article by Jeff Jewitt:

All finishes are nontoxic when fully cured, despite what you may have read or heard. Once the solvents have evaporated, any cured film is safe for contact with food. This does not mean that the finish itself is safe to gobble up. It means simply that additives such as heavy-metal driers and plasticizers are encapsulated well enough that they do not migrate into your food. Wax and shellac (apples and candy are coated with these) are the only edible finishes that I'm aware of, besides mineral oil, which is sold as a laxative.

**Varnishes --** Varnish is made of tough and durable synthetic resins that have been modified with drying oils. Labels on cans of varnish will list resins such as alkyd, phenolic and urethane, and the oils used are tung and linseed, as well as other semidrying oils such as soybean and safflower. Varnish cures by the same process as true oils -- polymerization -- but the resins make this finish more durable than oil. In fact, oil-based varnish is the most durable finish that can be easily applied by the average woodworker. Varnish surpasses most other finishes in its resistance to water, heat, solvents and other chemicals.

Varnishes that contain a high percentage of oil are called long-oil varnishes. These include marine, spar or exterior varnishes and some interior varnishes for sale on the retail market. Long-oil varnishes are more elastic and softer than medium- and short-oil varnishes that contain a lower percentage of oil. Medium-oil varnishes comprise most interior varnishes on the market. Short-oil varnishes (also known as heat-set varnishes and baking enamels) require extremely high temperatures to dry, so they're used only in industrial applications.

Varnish is typically applied with a brush, although a highly thinned and gelled version, called wiping varnish, can be applied with a rag.

Oil and varnish blends -- These mixtures, mostly oil with some varnish added, offer some of the best attributes of both ingredients: the easy application of true oils and the protective qualities of varnish. (Watco-brand Danish oil, teak oil and a number of other finishes fall into this category.) It's difficult to ascribe accurate protective qualities to these products because manufacturers don't usually disclose the ratio of oil to varnish. Oil and varnish blends will dry a bit harder than true oils, and the finishes will build quicker with fewer applications.