

Notes on wood finishes by Gary Guenther

Whole books can be and have been written about finishing. The amount of information available online is staggering. It's veracity ranges the full gauntlet from fact to fiction. Only use opinions from people you trust. If you have the time and interest, one of the best resources that you can absolutely trust is the set of articles on WoodCentral on the "Russ's Corner" tab. Russ Fairfield definitely knew what he was talking about. Read and believe at <http://www.woodcentral.com/russ/russindex.shtml> If you trust me, keep reading. I'll try to break it down into a simple but well-organized primer and summarize what I think I know, based largely on my own personal experiences and a tad of research.

There are two basic classes of wood finishes – those that mostly soak into the wood and those that mostly sit on the surface of the wood as a "film". Many commercial so-called "finishes" (an extremely generic term that carries virtually no requirement for legal veracity) are a blend of these two, along with a solvent, and probably a chemical "drier" (generally metallic compounds).

A commercial product with the word "finish" in the name can be named anything, regardless of what's in it. For example, a "Tung Oil Finish" need not have any tung oil in it. This is common – a classic case of *caveat emptor*. The secret list is not required on the can or in the advertising. If you care to know the ingredients, you can go online and search for what used to be called the MSDS (material safety data sheet). Here is two gateways: <http://hazard.com/index.php> and www.ilpi.com/msds/#Internet Now they are just called Safety Data Sheets (SDS). Same difference.

The finishes that soak in are generally oils. Oils can be created from a wide variety of natural products by heating and/or squeezing them. Because oils soak into the wood, they do not provide a particularly glossy surface unless you use a lot of coats. Mostly, you just see the wood, possibly with a light satin sheen. When you oil wood, you wipe any residual (not soaked in) off before it cures (oils don't "dry" by evaporation, they polymerize with oxygen contact). If you oil a piece of wood with a drying oil and leave it wet, when it cures, you'll have a gummy mess on the surface. This is not a good plan for a surface finish. To get a decent sheen from a pure oil finish, you must apply and wipe off numerous coats before sanding to a very fine grit (say something on the order of P4000).

A wide array of chemicals can be used as "surface" or "film" finishes, such as shellac, lacquers, various resins and plastics (so-called "varnishes"), and epoxy. Some finishes, such as shellac and solvent-based lacquer actually "dry" fairly quickly by evaporation of solvents, but oils and many varnish resins, polymerize (cure) more slowly in contact with oxygen. Because these materials sit on the surface, when dry or cured, they can be polished to anything from a satin appearance to a very shiny mirror. The latter case generally makes the wood look like plastic, for better or worse.

For all finishes, there is a big difference between “dry to the touch” and “cured” (a slightly different use of that term). Depending on the material, the former may happen within minutes or hours. The latter generally takes days to weeks. If you try to buff a “dry” but uncured finish, you’ll learn the difference very quickly.

There is a large and ongoing friendly disagreement about what “food safe” means and what products are actually food safe and what products you may want to use on a product you sell to the public even if you think it is food safe. If it gets into the realm of lawyers, you don’t want to go there. The majority consensus is that virtually all finishing products are food safe after they are fully cured. That may or may not be true because some of them contain metallic driers that may be carried into residue that flakes off if a bowl is used improperly. Whether or not the metal ion is bio-available or not is a question for the lawyers – again, you don’t want to go there.

For totally practical reasons, for a bowl that is to be used, as opposed to just viewed, you generally want an oil finish that has soaked into the wood, not a film finish that sits on top of the wood and can and will be chipped off in use. One notable exception is the use of a heavy epoxy finish for vessels holding liquids, such as a mug or cup or “glass” to be actually used for a beverage. People do that with apparent success; I have no experience with it.

Every piece you turn should be carefully and thoughtfully evaluated before you apply *any* kind of finish at all. If you begin with the wrong one, you’re likely screwed. Every piece of wood is unique, and your goals for a particular type of wood may not always be the same, depending on the natural characteristics of that particular piece and your application. Understand what’s going to happen, and why, before you commit to a general type of finish and a particular finishing product, or succession thereof.

Oils

Let’s begin with oils, which are easy to use and generally provide good results if you don’t want a glossy shine, if they are correct for the application, and if you pick the right one.

The beauty of oils is that they soak into the wood and accentuate (pop”) the grain patterns visually. This is usually desirable. If used on punky or heavily spalted woods, however, it may sink in and leave a blotchy appearance. There are always tradeoffs to be concerned about. It may be desirable to put on a first coat of a somewhat-thinned oil so it really soaks in deeply, followed by coats with less or no solvent.

All oils darken and yellow woods to a greater or lesser extent, so if you want to keep a wood light or white, do not use an oil. There are alternatives (later).

Oil finishes are very easy to apply. Wipe them on; wipe them off. There are never brushstrokes or orange peel to worry about. OTOH, a wood surface finished only with a

pure oil may look dull and lifeless unless many, many coats are applied successively, over a period of time, to build up a nice luster.

You can do coats “wet on wet” or let them “dry” for a day between coats. You may think you’re getting there more quickly with the former, and you may be, depending on how thirsty the wood is, but it’s not a given. If you let the first coat set for a day, the following coats probably won’t soak in as much, and you’ll get where you’re going more quickly. The jury is still out for me on this one. It depends on the wood. Do what feels good at the time.

After initially wiping down a freshly oiled wood surface, you do have to be concerned about “weeping”. If you oil an open-pored wood (say oak or walnut, and many more), and wipe it down so there is no oil residue on the surface, if you come back an hour later, you may see little tiny beads of the oil coming back out of the pores. If so, you must wipe it down again, and keep doing so until it stops weeping, or you’re going to create an undesirable situation.

You can use oils for wet sanding. One such application would be if you want to fill the pores on an open-pored wood such as oak or walnut. On the other hand, a lot of the charm of such woods is the pattern of the pores, so if you fill them, you’re hiding them and destroying the natural character of the wood. It’s a personal choice.

Oils are exothermic when they cure (polymerize). That means they give off heat. If you make a pile of oily rags, you will probably get a fire from what is called “spontaneous” combustion by those who don’t understand the very real chemical process. You don’t want that to happen. (Ask King Tut!) When you set aside or discard oily rags or paper towels, spread them out on a concrete floor or put them in a metal trash can of the type you would use for fireplace coals. This is no joke. Be safe.

There are two types or categories of oils – drying oils and non-drying oils. Non-drying oils *never* cure (unless artificially augmented by chemical driers). There are applications for both. In my experience, some “drying” oils may not dry; that can be frustrating. Driers may have been added to some commercial “oil” products, so you’re never quite sure what you’re getting unless you see the word “pure” on the label – and, in truth, not even then, if you’re not familiar with the brand, and if it hasn’t been bought out and the formula changed – which they don’t generally advertise. Up-to-date experience, yours or your friends’, counts a lot.

If you use a non-drying oil, make sure it is of a type that doesn’t get rancid! Yes, they will get rotten and smell bad, and maybe mold, just like they do in your pantry. Do not use cooking oils! [See below for comments about walnut oils (plural).]

The safest and most commonly used non-drying oil is mineral oil. It is also guaranteed food safe. (In some labels, it’s called “baby oil”. Small amounts are safe for human consumption -- we won’t go there.) The combination of mineral oil and beeswax may be the favorite and most-widely used finish for “food-safe” bowls. This finish does not last!

After use, such bowls can be gently swiped out with a soapy sponge, but they will need to have the finish frequently reapplied by the customer.

In some circles, walnut oil is popular. Its use is not a simple matter from a couple points of view. Consider: You may think that walnut oil is food safe, because it is sold in grocery stores for use on salads. But some people are allergic to nuts, and walnut shavings can kill horses. Let the user or seller beware. Consider: Some sellers, and some turners, claim that walnut oil is a drying oil. Others may disagree, based on personal experience. So, for the sake of argument, let's say that pure walnut oil is a drying oil, even if it takes a long time to polymerize. So where do you think you would get the purist walnut oil? Well, in the grocery store, of course! NOT! Many or all companies that sell walnut oil for consumption (salads, etc.) put in a chemical to stop it from curing so it doesn't turn into a bottle of Walnut Jello in your pantry. For this reason, it is inadvisable to use a food walnut oil for finishing unless you understand that 1) it will never cure, and 2) it will go rancid. You can buy walnut oils that are labeled for use as a wood finish. They may or may not cure (IMO, it's always a toss up), but hopefully they won't go rancid.

Now let's talk about "drying" oils. By far the most "famous" and widely respected drying oil for wood finishing (to the extent that its name is badly abused) is tung oil. [Sorry, Mark St. Leger, but, no, it doesn't come from licking things!] Tung oil (a.k.a. "China wood oil") comes from the nuts of the tung tree (*Vernicia fordii*) – seriously! As far as any oil is concerned, this one, in most peoples' opinions, has the most desirable properties. It's more expensive than many others, but when you consider all the hours you have in a piece, don't you want the best possible finish on it? I certainly do. I really like "100% pure tung oil" as a product; I use Behlen's brand. It doesn't cure as quickly as I would prefer, but I like the way it looks. Tung oil does not darken woods as much as many others, and it does not darken further with age. If you want to know more about tung oil in general, just go here: https://en.wikipedia.org/wiki/Tung_oil

The most widely-used drying oil, in one form or another, is linseed oil. It comes from flax. It is technically a drying oil, but only very, very slowly, to the extent that it is rarely used in its natural fashion. As a natural product, it is food safe (I eat flax seeds), but not after being processed for use as a wood finish. This is where the commercial product "boiled linseed oil" (BLO) comes in. It is no longer heated – rather, chemical (metallic, poisonous) driers are added to cause it to cure more quickly. It is a strongly yellowing oil. The wood will appear yellower immediately, AND it will darken still more with age, whether you want it to or not. This is one of those products you either love or love to hate. It is the oil of choice in almost all commercial, mixed/blended "finishing" products because it is cheap.

I tried the "TY" oil sold by Mike Sorge. It is food safe, has no VOCs, etc. Unfortunately, it did not dry for me.

There are others, but we have to move on.

Surface (“film”) finishes

Shellac is a very useful and common wood finish. It comes from bugs. It is generally considered to be a surface finish, but it can be (and is) diluted to various levels of viscosity with alcohol. Very thin “cuts” will soak into the wood almost like a diluted oil. Shellac has a lot of desirable properties and some undesirable ones. It is inexpensive, fairly easy to apply with a brush or a paper towel or a spray can. Because of the alcohol solvent, it dries pretty quickly (a matter of minutes for a thin coat). It can be safely applied underneath or on top of virtually any other finish, for added effect. (This is not always true of some other finishes.) It can be dried and shined up right on the lathe as one component of a finishing product when combined with an oil or a wax. So-called “French polish” is one such form of the former, and “friction polish” the latter (“Shellawax” being one brand thereof).

On the not so great side, when dry, shellac easily waterspots and fingerprints. It provides virtually no protection to the wood in use. It is definitely not for bowls that will be used. If you buy it in liquid form, watch the “use-by” date if it has one, or mark your date of purchase on the can. Old shellac will go on just fine, but it won’t dry, and you’ll end up with a horrible, sticky mess that you’ll have to strip back off. DAMHIK! If you don’t mind the extra bother, you can buy “flakes” and dissolve them in alcohol to make your own fresh batch, as needed. Apparently Bulls Eye, a large maker, has found some way to extend the shelf life of unopened cans. Some shellacs are darker than others. If you want to minimize yellowing, go for the “blonde” or “super blonde” kind (I guess they’re bleached?). You can also buy it “dewaxed”, which is probably a good idea if you’re not going to add wax to it anyway. As I understand it, dewaxed has a longer shelf life.

The main uses for a surface finish are to provide protection and sheen. As seen above, shellac provides the latter, but not the former. Other than shellac, the film finish most widely used is probably lacquer. Lacquers are resins emulsified in solvents. Many coats are generally used. Solvent-based lacquer actually “dries” when the solvent evaporates, so it dries much more quickly than a varnish whose components have to polymerize (cure) by being exposed to oxygen in the air. As a result, lacquer “melts” itself between coats, so after building up many coats, you actually end up with one thick coat, not a lot of thin ones that can peel and separate. While it can be brushed or rubbed on for small projects, it is generally sprayed on. It can be a tricky challenge to apply without brushstrokes, runs, orange peel, white blush, and other undesirable effects. The solvent fumes are deadly, and appropriate ventilation and breathing protection is important. In addition to the original solvent-based forms, there are now newer water-based forms being forced on industry because the solvent VOCs are really bad with the original. I don’t know anything about them. If you want a clear coating on the surface of the wood that will not darken its color, lacquer is one of the primary choices. The major drawback is that it does not really soak into the wood and does not “pop” the grain. I wasted a pretty piece of curly maple this way. A well-known, high-quality brand of lacquer is “Deft”. Thinned lacquer is also used as one form of a so-called “sanding sealer” to reduce the penetration of following finishes.

There are many, many film finishes out there called “varnishes”. They are composed of various resins and plastics such as urethanes, polyurethanes, acrylics, and more. Many brands and products are well known within our woodturning community. Some of these are now available as solvent based or water based. Some of the early water-based versions imparted a nasty bluish tint that was highly undesirable. It depends on the brand. Maybe they have fixed it now – I don’t know.

Wipe-on Poly is a very popular product available in various brands. It’s just a highly-thinned version of a polyurethane (plastic) varnish that you can wipe on in a thin coat, without brushstrokes or, hopefully, runs. They polymerize and do not “melt” between coats, so you end up with slow drying and a series of separate thin films barely adhered to each other. Where, with lacquer, you may sand between coats to get rid of dust nibs, as needed, with varnishes, you also have to sand between coats to get better adhesion between layers. I’m not a big fan of pure varnishes; I don’t use them often or know much about them, so I’ll just leave it at that.

Here’s the answer to a frequently asked question: Finishes that do not change the color of the wood (and simultaneously, for the same reason do not pop the grain or accent figure) are lacquer, acrylic, water-based poly, and print “fixatives” (secret compositions unknown but may be acrylics or something similar). A corollary is that you cannot pop the grain or emphasize curl or figure without darkening and, at least to a certain extent, yellowing the wood. Similarly, a clear surface finish like lacquer does not pop grain or emphasize figure to any significant extent – certainly nowhere near as much as an oil.

Blends

This is often where the rubber meets the road in the wood finishing industry. There are numerous brands that sell countless different products with more-or-less catchy names. They sometimes go under the name of “finishes”, which, as noted before, means they don’t have to have in them what the name says, like tung oil. Most, if not all “tung oil finishes” have BLO and no tung oil in them. Don’t believe anything in the name of a product if it includes the word “finish”. These products are secret, proprietary blends of some oil(s), some varnish(es), some solvent(s), some drier(s), and anything else they want to throw in. The contents are not listed on the can, and it takes an (M)SDS search to even get close. The formulations change at the whim of the maker and definitely when the company changes hands or is eaten by a larger fish; and none of these changes in content are announced to the public.

I’m sure you use some of these products. The one I have used fairly extensively is “Watco Danish Oil”. (Note that Watco is not the only maker of a “Danish Oil”, and Danish Oil is not the only product that the company Watco makes.) It may be from Watco, but it’s not from Denmark, and it’s not an oil. Oh, yes, there’s a lot of BLO in it, but also resins, driers, solvents, etc. It doesn’t have a lot of resin because it takes 4-5 coats to get any surface “build”. One good thing about it is that it doesn’t generally gel in the can, unlike Waterlox! I now prefer “Bush Oil”, which is not the oil of the bush plant,

but another “finish” blend similar to the Watco Danish Oil. What I like about it is that it has a lot more resin and builds much more quickly, to the extent that I can sometimes stop at only two coats.

These products are desirable because the oils soak in and pop the grain while the resins sit on the surface and can be buffed to a desirable level of sheen, be it satin or gloss or somewhere in the middle. I prefer what I get at Abralon 4000, but now I’ve digressed to sanding, and that’s another topic altogether. They dry reasonably quickly because the solvents evaporate, and they also have metallic driers to promote polymerization. Because most use BLO (it’s cheap), they do darken and yellow the wood, and the result will darken and yellow still more with time.

Do I have to buy these things, you ask? They can be expensive. The simple answer is NO! Many turners mix their own to good effect. All you need is one part your favorite oil, one part your favorite varnish, and one part a compatible solvent. Voila. Mix it up fresh, only what you need for each use, and you won’t have any problem with the remainder gelling. This can be a lot less expensive than buying the commercial products – and you probably already have the ingredients sitting on your workshop shelves.

Waxes

I’m going to go out on a limb here with an outside-the-box opinion, based on some experience. Yours may differ. It has become standard practice for many turners to apply a coat of some kind of wax as a last “finish”. There are several reasons for this, but IMO, they generally all come down to not doing a good job of finishing with your real finish – namely, the final sanding. The wax is a cheat for finer sanding because it fills in some micro scratches and so adds a little shine. It might (or might not) help prevent fingerprinting. I quit using Ren wax (below) on my glossy pens because they didn’t need it off the lathe, and it seemed to make them fingerprint worse.

Waxes can be soft or hard or microcrystalline. Renaissance Wax is one of the latter and is supposed to be archival, whatever that means. At an absurdly high price, it claims to be “protective”, but I think that’s baloney. Waxes are permeable to water and oils and solvents, so I don’t believe that they add any protection of any kind. If I need to use a wax to bail me out for a bad job of final sanding, I use an old can of Simoniz car wax, which is at least partly carnauba – a very hard wax that lasts longer than others. Even so, wax finishes have to be periodically restored because they “oxidize” and deteriorate. I prefer not to use them (unless I have to).

Conclusions

I have tried to provide mostly hard facts, and hope I haven’t made any gross errors. Let me know if you find any. Inevitably some personal thoughts, ideas, and preferences have also come across, as needs be. Everybody has their own favorite finishes, reasons for using them, and methods of using them. That’s what makes things

interesting. I look forward to hearing your alternate ideas and experiences from what I've written.

Finishes are extremely important to the appearance of the final product, and, as a result, I think that everyone should tell what finish they used when they present a piece at Show, Tell & Ask.

OK, I'm finished.