OIL AND OIL VARNISHES

by Tim McCall

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Although sometimes viewed as an inferior finish, oils and varnish are among the most versatile in the hand-applied finish category. Unfortunately, there is considerable confusion between the many types of oil and oil varnish finishes available today. Almost all oil based finishes can be divided into three basic groups: straight oil finishes, oil varnishes and combinations of these two.

Oil finishes:

Straight oil finishes are what their name suggests - unmixed oils extracted from plants, nuts and petroleum. If shellac and cellulose lacquer are examples of film forming finishes (building on the surface of the wood), then oils are definitive penetrating finishes, with little or no surface build. Not all oils are suitable as furniture finishes - the dividing factor being the degree to which they will cure out of a liquid state. Linseed and tung oil will both form solids from reaction with oxygen; others, such as mineral oil do not absorb oxygen and consequently never cure at all. Those that are suitable as finishes (basically tung and linseed oil) share similar characteristics: they cure slowly and produce a soft finish, so all excess residues must be wiped off during application. They also cure to a satin finish - attempting to achieve a high gloss is inadvisable as the dry film is soft enough to mark with a fingernail.

Oil varnishes:

These include a variety of types such as alkyd, phenolic and polyurethane varnishes. Historically varnishes were made from natural resins, but today these resins are almost all synthetic; the varnish is made by combining the given resin with oil under a heated reaction, which chemically changes them both to produce the varnish. Oil varnishes cure much faster than oils alone, and produce a thicker, glossier finish which is very resistant to most common damage including scratches, water, stains and moisture vapor

exchange in the wood. They are the most durable category in the hand-applied finish range.

Oil / varnish blends:

Combining oil and varnish produces a finish that takes characteristics from both: the oil content makes the finish cure more slowly and to a lower sheen than straight varnish alone. It also softens the finish, precluding a high film build. The varnish component gives the film more gloss and toughness than a straight oil would. There is considerable variation in different manufacturer's formulations, altering the ratio of oil to varnish and consequently the nature of the final film produced. As a result, many woodworkers resort to making their own blends. These are often referred to as 'Danish' oil: generally linseed oil cut with a substantial amount of mineral spirit and with a small amount of an alkyd resin varnish included.

Just to add to the confusion, many manufacturers label their finishes as 'oil' finishes without specifying the ingredients - as a rule of thumb, most of these will be oil / varnish blends.

Wiping varnish:

A fourth oil-based finish is wiping varnishes - these are regular oil varnishes thinned with enough mineral spirit solvent to allow them to be applied with a rag. They aren't really a distinct finish type in their own right, but they are easier to apply than brushing varnishes and their high solvent content makes them dry faster.

Applying oils:

Linseed and tung oil alone make poor furniture finishes: they provide minimal protection from damage and mark easily. Raw linseed oil can have metallic driers added to speed the drying ('boiled' linseed), but does not improve it's finish qualities. Both these oils will darken over time and provide flexible penetrating finishes. They are best applied slightly warmed, flooded onto the surface and allowed to sink in before wiping off excess material.

Because of the poor performance of straight oils, it is preferable to opt for an oil / varnish blend instead. The prime advantage touted for oil finishes, namely that they are easily repaired, is equally true for oil / varnish blends. These provide somewhat better protection than straight oils against wear, water damage and the like; however their main attraction is ease of application as they allow plenty of working time and give an attractive low-build low-gloss sheen; however, they should be avoided in high wear situations such as table tops.

One problem in applying oil / varnish blends involves bleeding out of the wood pores. This occurs more in large pored woods like oak and is caused by two main factors: (a) solvent (mineral spirit) evaporating and pulling the finish out with it from the pores and (b) the finish expanding out of the pores as the wood heats up from vigorous rubbing or if the wood is moved from a cold room to a warmer one. The dried residues can either be sanded off and top coated again, or the whole removed with proprietary stripper. Remember that mineral spirit will not resolubilize a reactive oil finish once it is dry. This problem tends not to affect wiping varnishes due to their faster cure rate, or straight oils as they typically have a low solvent content.

Oil finishes can offer simple repairs for scratch damage - merely reapplying will saturate the damage and make it less visible (as will any thinly applied finish). However, they can be difficult to repair if water or heat has discolored the wood. Water will tend to raise the grain, which can be smoothed with fine sandpaper or 4/0 wire wool before applying more finish to even out the sheen. Heat and stain damage may need to be sanded to bare wood before refinishing, or in some cases bleached with oxalic or chlorine bleach. Matching the color tones back perfectly is usually problematic.

Wiping varnish:

The next step up in durability is wiping varnishes: these are thinned regular varnishes (usually at a 2:1 ratio of mineral spirit to varnish) which offer greater protection than oil / varnish blends. Although often sold as 'oil' finishes, the fact that the oil and varnish resins have been heated to produce a different chemical product make them very different to oil blend

finishes. Varnishes contain different resins which affect their performance (see below); if a thin build is desired, the particular resin won't matter greatly. However, if you want a thicker build, you might want to thin a specific varnish to tailor your own recipe (this will be considerably cheaper too).

Wiping varnish will build more slowly than brushed varnish due to it's thinness; however, varnish's hardness relative to oils gives it greatly superior resistance to scratches and stains. Wiping varnishes are applied with a rag, removing the excess as with oils, and will cure to a hard cohesive film.

An important safety note with these wiped oil finishes: do not dispose of the used rags in a closed space - the oils can spontaneously combust. Spread the rags out singly to allow adequate ventilation until the oils have sufficiently cured.

It can be very difficult to tell some of these oil and varnish finishes apart, as they tend to look and smell the same. One method is to test for the oil content: apply a small amount on a non-porous (glass) surface - if it wrinkles after it cures, it has a high oil content and will be an oil / varnish blend. A smooth surface indicates a wiping or regular varnish. The oil / varnish blend film will also be much softer than the varnish and will dry much more slowly.

Varnish:

Varnishes are available in a variety of formulations and with different resins depending on the required use. Phenolic resins are used in exterior and marine varnishes; they produce a soft flexible film which can accommodate the movement of wood in the outdoors. Alkyd resin is the most commonly used resin in interior varnishes and is also found in lacquers and oil paints. Polyurethane is available in several forms but is frequently modified with alkyd resins to produce a 'uralkyd' varnish. This is the most durable and scratch-resistant of the three resin forms.

All these varnishes cure by absorption of oxygen; typically this process is accelerated by the addition of metallic driers. As mentioned, varnish is a combination of oil and varnish resins combined with heat. The ratio of oil to resin will affect the final film: high oil content ('long-oil') is found in exterior

varnishes where it adds flexibility. Low oil content ('short/medium-oil') produces a harder film for indoor use.

* Phenolic resins will yellow significantly as they age and are usually combined with tung oil. They can be flexible or, with less oil, can produce a hard high-gloss film suitable for table tops.

* Alkyd resins are not as tough as phenolic, but they are cheaper to produce and won't yellow as much.

* Polyurethanes (in combination with an alkyd) will be the toughest of these three; however, they have a more opaque 'plastic' look, bond very poorly with their cured form (and all other finishes) and will not stand up to sunlight, which makes them peel.

Varnish application:

All varnishes have a strong molecular structure which makes them very resistant to heat, water, solvents and abrasion. They greatly slow water vapor exchange in wood, reducing wood movement. Typically they are applied by brush; their slow cure time (1 hour touch-dry / overnight to recoat) makes them susceptible to dust settling in the drying film, so a clean working environment is necessary. Varnishes have a high solids content, so two or three coatings is usually sufficient. The first seal coat should be thinned 1:1 with white spirit; subsequent coats can be thinned by 10-20 % to improve brushing qualities. Use a good quality badger bristle brush (or a nylon/polyester blend) with flagged tip bristles; initially wet the brush with white spirit to condition the bristles. Dip the brush no more than halfway into the varnish and tap the excess off on the container side (avoid scraping it off on the side of the can).

Apply the varnish in long strokes to deliver a thin even coat. Too thick a layer and the material will not cure properly (varnish cures from the outside in). It is often helpful to apply by brushing first across the grain before leveling out with the grain. Finally, use the 'tipping-off' technique shown to remove excess material. Initial application has the brush held at 45 degrees

or so. Avoid scrubbing the varnish on the surface with the brush as this can foam the finish with air bubbles. Final tipping off should be done with the brush held almost vertically and the tip dragged very lightly with the grain to remove brush marks and blemishes. Take care to prevent building up ridges and runs around edges. To remove them when dry, use a sharp chisel, razor blade or scraper.

Varnish should be scuff sanded between coats with 220 grit sandpaper to give a 'key' between each layer. Take care to remove any bumps and defects - if they are left until the final sanding, you may sand through coats, producing visible ring-like 'witness lines'. Rectifying this requires sanding off the whole top-coat and reapplying. Different varnishes vary, but typically allow 24 hours between coats and a full 72 hours after the final coat before rubbing out. Because varnish cures by chemical reaction, warmer temperatures will speed the drying and cold temperatures can retard it drastically (keep a minimum of 15C.). If the weather is very hot, try thinning the varnish with 15-20% white spirit to retard the drying and allow the brush marks and air bubbles to flow out.

Spraying varnish:

Because varnish takes so long to dry, it is generally regarded as an excellent brushing finish and a terrible one to spray. One reason for this is that atomized particles of varnish can settle into the wet film with obvious results! However, it is possible to spray varnish well by thinning it 50/50 with acetone (a very volatile solvent) and spraying it in light coats. An initial misted 'tie-down' coat on vertical surfaces can help bind subsequent coats and prevent sags. Airless spray systems can work well too, and do not require the varnish to be thinned with solvent.