

OK, what is an "oil finish"..? Frequently, marketing hype leads us to believe we are applying "oil" when what we are actually applying is varnish, or a blend of oil & varnish. Is this distinction important? Does it make any difference?

## Oil Finishes

### OK, what is an "oil finish"..?



In the first article of this series we took to task several finish manufacturers, and a respected woodworking magazine, for misleading the consumer by advertising and recommending "oil finishes" that are not actually oils. In particular, we pointed out that the so-called "Tung Oil Finishes" on the market: 1) are not oil finishes, and 2) contain absolutely no tung oil. These finishes are either oil/varnish blends (a.k.a. "Danish Oil"), or they are wiping varnish; varnish that has been thinned with mineral spirits so that they can be wiped on rather than applied with a brush. For the most part, the varnish element in all of these finishes is linseed oil based urethane resin varnish, though at least one is a soya oil-based alkyd resin varnish. Following that article a number of you called or came to the store looking for "real tung oil". (Apparently you missed the not so subtle shot that I took at tung oil when I wrote that "...inclusion of the magic words, 'Tung Oil'...(on the label)...has been shown to stimulate sales".

In this, the second article in our series, I will examine the nature of finishes that actually are *oil*; not *based* on oil, but *oil*. We will consider what they are, how they work, their benefits, and their shortcomings. As always, the purpose is to educate and to inform while, at the same time, having a bit of fun.

### What are Oil Finishes?

"Oils" have been around for a very long time. They fall into two categories; oil derived from petroleum, and oil derived from plants. Not all oils are useful as finishes, so let's take a brief look at those that do find a role in finishing wood.

The only petroleum derived oil frequently used as a "finish" is Mineral Oil. Mineral oil is a non-drying oil, which means that it never cures to form a finish film. In use it remains liquid. As such, mineral oil will continue to penetrate into the wood, or it will be wiped from the surface through use (it does not evaporate as some articles have stated). Either which way, over time mineral oil will disappear from the surface and need to be renewed. Eventually, if enough mineral oil were applied, it would be possible to actually fill the cell structure with oil creating a surface that would be wet and oily to touch.

Mineral oil is an excellent *finish* for cutting boards and working wood countertops. It is a particularly good finish when combined with another petroleum distillate, paraffin wax.

Mix one-part melted paraffin wax with 5 to 7 parts warm mineral oil and brush or wipe the liquid over the surface. When the mixture solidifies, scrape away the excess wax. Periodically, as water fails to "bead" on the surface, renew the finish with an application of straight mineral oil, or make another application of the heated oil/wax mixture. This "finish" has the advantage of not forming a cured film so it will not be damaged by cutting. It is also very easy to renew—use the mineral oil from your local grocery or drug store. Do not use the scented stuff, a.k.a. "Baby Oil".

Commercial finishes that are actually mineral oil include the so-called "Butcher-Block Oil Finishes", and a number of the "Teak Oil" products on the market, though some "Teak Oil" is simply boiled linseed oil. (There is no such thing as oil from Teak. Teak is naturally oily, but the oil in teak is not pressed or collected to be sold as a finish.)

Vegetable Oils, more precisely drying vegetable oils, constitute the true "oil finishes". These are linseed oil and tung oil. Linseed oil is pressed from the seeds of the flax plant while tung oil is obtained from the nut of the tung tree. The performance of both oils, as a finish, is virtually identical. Neither oil is very moisture or water resistant, nor is either oil resistant of heat, solvents, household chemicals, or abrasion. Both form very weak finish films.

### **How do oil finishes work?**

The thing that separates vegetable oils that dry from those that do not is the molecular structure of the oil. Vegetable oils are a natural compound called a "triglyceride"—a glycerol molecule with three (tri) fatty acid molecules attached. There are a number different fatty acids. It is affinity of the fatty acid molecules found in a particular vegetable oil to "link" with one another, thus tying the molecules of oil together in a sort of "molecular chain", that determines whether or not that oil will dry (actually, the proper term is "cure"). This process, called "polymerization" is initiated when the oil is exposed to the oxygen in air.

If the fatty acid molecules of an oil do not have the ability to link with the other fatty acid molecules in that oil, then the triglyceride compound in question will not cure. It is a "non-drying oil". For example, olive oil will never cure—it will always remain a liquid since the fatty acids of this triglyceride lack the ability to link; they never "polymerize".

"Semi-drying" oils such as soya (soybean) oil and walnut oil will establish links at one or two points along each fatty acid molecule. The small number of bonds created will cause the oil to thicken, but never really cure. Such oil simply gets "sticky" when applied as a finish.

By comparison, the fatty acid molecules attached to the glycol molecules that make up linseed oil and tung oil will form more than two links along each fatty acid molecule, thus forming multiple molecular chains linking each glycerol molecule in the oil to the others. This level of "polymerization" causes linseed oil and tung oil to fully cure to a weak or soft finish film.

In its natural state, linseed oil will take weeks to fully cure while tung oil, with its molecular ability to form one more link per fatty acid molecule, will cure in a few days. However, by adding a “metallic drier” to linseed oil, which serves as a catalyst to speed the introduction of oxygen, the time to fully cure is dramatically reduced to a few hours. Adding the drier to raw linseed oil creates Boiled Linseed Oil (BLO). BLO is the form of linseed oil used as a finish. Driers are not added to tung oil since the increased absorption of oxygen will cause it to “white spot”. White spotting can also occur if one applies another coat of tung oil over a coat that is not cured, or if varnish is applied over tung oil that is not fully cured, again because varnish contains metallic driers.

### **Application, Benefits, & Shortcomings**

Both BLO and tung oil are easy to apply, though BLO is the easier (and less expensive) of the two to use. Simply wipe, brush, or pour and spread a liberal coat of oil over the surface of the wood and allow it to soak in for 25-30 minutes; then wipe away the excess. Allow the oil to cure before you continue. In the case of BLO the oil will cure sufficiently in 8 to 12 hours. When using tung oil you should wait a few days before you proceed since it cures much slower than BLO. For a proper linseed oil finish one should apply two or three coats, sanding lightly with 400g to 600g between coats. A proper finish with tung oil will take 5 to 7 coats to obtain a uniform finish. Each subsequent coat will somewhat increase the sheen, though oil finishes are always dull to satin. If a greater sheen is desired one will need to use **varnish** or an oil/varnish blend, both of which are covered below.

As already stated, oil finishes lack durability in the face of water, water-vapor, solvents, household chemicals, heat, and abrasion. In addition, over time, they will become quite dull unless regularly renewed by the addition of another coat of oil. This is because the oil molecules crystallize over time, as they are exposed to oxygen. As a result, in time the oil that once formed the finish can actually be wiped from the surface.

One other important point—BLO and tung oil are defined as 100% solids. This means that all of the oil left on the wood will cure to form the finish film. There is no “volatile” component—nothing to evaporate. Therefore these oils should not be thinned before application. Thinning only further weakens the already weak finish film.

While we carry both tung oil and BLO, we recommend only BLO due to its lower cost, its ease of application, the lower risk of failure, and the fact that there is virtually no difference in the finish that results from the application of either oil. (Some, for reasons I will never understand, demand tung oil. For them, we keep a few cans of the stuff around. If someone is determined to pay three-times as much for the same result who am I to stand in their way...).



