So, you're going to apply a "sealer". Why? What is a sealer...what dose a sealer do?

Sealers

A gentleman recently came into Hardwood Lumber & More… looking for a "sealer". I asked him to describe the finish he wanted to apply. His replay was that he didn't want to apply a finish; he just wanted to apply a *sealer*. Having never been one to miss an opportunity to have a little fun, and hopefully find a teaching moment in the process, I asked if he wanted to seal something *in* or seal something *out*. This garnered a long pause punctuated by a puzzled look followed by the statement that he didn't know; he had just finished his first woodworking project, a small table, and a friend had told him that he would have to "apply a sealer" to the wood. Obviously, the man was simply looking for an appropriate finish that would protect and beautify his first woodworking project. But his search for a "sealer" gives us an opportunity to delve into the all-too-common use of this most misunderstood and misapplied term.

What is a *sealer*? What, if anything, does a *sealer* do and how does a product labeled "sealer", particularly a "sanding sealer" impact your finish? Let's begin by understanding that the first coat of *any* film forming finish; shellac, lacquer, varnish, water-borne acrylic, *even* boiled linseed oil (BLO) and tung oil is a "sealer"! The first liquid coat of *any* of these products penetrates into the grain structure of the wood and, when dry or cured, *seals* the pores so that <u>all</u> subsequent liquid coats build on top of the first coat (the "sealer coat"). With the exception of oils (BLO and Tung), which form a very weak film finish, there is no further "penetration" of finish into the grain structure of the wood through the first coat. Therefore, <u>all</u> finishes are "sealers". All finishes *seal* the wood so that future coats build atop the *sealer coat*.

OK, that's all well and good, you say; but why are so many products specifically marketed as "sealers". Good question: one of our best selling and most frequently recommended varnishes is Waterlox Original *Sealer*/Finish*. Zinsser, for reasons that escape me, is marketing its two-pound cut de-waxed blonde shellac (SealCoat®) as "Sanding Sealer". We also frequently recommend the application of Mohawk Vinyl *Sealer* ahead of their pre-

catalyzed lacquer. So, if the first coat of all film forming finishes *seals* the wood, is there ever a reason to purchase a finish labeled as a "sealer"? Are these just examples of marketing, or are these products somehow unique because they are sold as "sealers"? Again, good questions; the answer to both is yes! Frequently the word "sealer" on the label is just another example of marketing hype, communicating nothing of value to the consumer and intended only to separate you from your hard-earned dollars. But sometimes these products perform a specific and useful function. The purpose of this article is to help you make that distinction. To begin, let's consider four problems encountered in finishing wood that *might* give the finisher sufficient reason to apply a first coat (a *sealer* coat) that is different from all subsequent coats. Then let's consider the value of products intended to address these problems.

We may want to:

- **Make the first coat easier to sand.**
- **Apply a barrier coat to seal contaminants into the wood.**
- **Prevent raised grain.**
- **Facilitate the application of two-part (catalyzed) finishes.**

Varnish and lacquer can be difficult to sand; lacquer because it is so hard and varnish because its long cure time can result in clogging of the sandpaper if sanded too soon after application. To address this problem, manufacturers produce a product called "sanding sealer". Sanding sealers are simply thinned versions of varnish or lacquer in which the manufacturer has replaced much of the volume of finish solids (the varnish and lacquer resins) with a soft, soap like mineral called zinc stearate. Zinc stearate contributes nothing to the finish film; instead, it is simply suspended in and held in place by the reduced solids finish film that remains. Since most of the liquid volume is thinner (which flashes off within minutes) the reduced resin volume "dries" quickly so the finish can be sanded much sooner. When sanded great volumes of soft, white powdery zinc stearate are removed producing a deceptively smooth surface (deceptively smooth because the pores of the wood are filled with soft zinc stearate, not finish solids). The result is a smooth, flat surface to which the next coat of lacquer or varnish is applied. So, sanding sealer is a good idea, right? Not so fast! This easy sanding with great quantities of white powder comes at a price.

Sanding sealers, precisely because of the soft soap-like zinc stearate, significantly reduce the moisture resistance of your finish. Zinc stearate actually absorbs moisture (water-vapor) that passes through the finish with seasonal and local changes in relative humidity. In addition, zinc stearate "bruises" easily on impact from a blunt object. For example, a dropped dish, bowl, candle stand, etc. that by itself would do no damage to the finish will produce a white "bruise" beneath the finish. This bruise can only be repaired by stripping and refinishing. Sanding sealers that contain zinc stearate should be avoided; they will contribute best to your finish if they are left on the retailer's shelf.

So, what *is* the solution to the problem? The first coat of varnish and lacquer are still difficult to sand. A risk-free "sanding sealer" for both varnish and lacquer can be made right in your own shop by simply applying a low-solids first coat free of zinc stearate. And what is a "low-solids" first coat? It is simply a coat that <u>you</u> have thinned 25% to 30% with the appropriate thinner, paint thinner/mineral spirits or lacquer thinner. By adding thinner in a given volume of finish you will be lowering the volume of solids. Lower solids mean that the finish will cure or dry faster and that sanding will be easier. You already have the thinner, so why buy a can of sanding sealer, the application of which yields nothing of benefit and can lead to big problems with your finish?

A second, and arguably better alternative would be a coat of shellac mixed in a one-pound cut. The fast-drying properties of shellac are well known. Perhaps not a well understood is the superior moisture excluding properties of shellac. Unlike sanding sealers that contain zinc stearate and function as a moisture magnet, shellac beneath your topcoat will actually improve the moisture resistance of your finish. I prefer shellac freshly mixed from flakes because freshly mixed shellac offers superior moisture resistance, and I can control the color from super blonde to garnet for even greater versatility. But Zinsser SealCoat thinned 50/50 with denatured alcohol will also work well.

Before we leave the subject of sanding sealers let me suggest that you never apply any sanding sealer containing zinc stearate beneath *polyoneverythane* or beneath a water-borne acrylic finish. To the problems already mentioned (soft finish, moisture absorption and "bruising"), add the problem of greatly reduced adhesion. Varnish that contains urethane resin does not adhere well to begin with. When applied over sanding sealers that contain zinc stearate the adhesion problem can completely negate the abrasion resisting properties of poly, rendering the finish film easy to scratch. An object slid across the finish that would

have created no damage without the zinc stearate foundation may well result in the finish film being easily scratched from the surface.

Apply a barrier coat to seal contaminants into the wood.

One of the finishing problems most often reported by our customers is *fisheye* when refinishing previously finished furniture. This problem stems from surface contaminants, usually silicone residue from furniture care products such as Pledge. It will also appear on furniture to which one of the so-called "finish restorers" has been used prior to the decision to strip and refinish the piece (both of these products should be avoided). Even the use of a chemical stripper to remove the old finish will not ensure that these adhesion compromising contaminants will be removed. Adhesion issues can also arise when finishing wood species that contain an abundance of natural oils, exotic species like teak and domestic species like aromatic cedar. Problems can also occur with purpleheart, Padauk and a number of other *exotics*.

The best way to deal with this problem is to apply a "barrier coat" of shellac prior to applying your chosen finish. Among the many other attributes of shellac is its ability to adhere tenaciously to virtually any surface, even surfaces known to contain contaminants that will prevent other finishes from adhering. A refinisher friend of mine is fond of saying that "shellac will stick to peanut butter". While this may be a bit of an overstatement, shellac will most certainly stick to the silicone residue left behind by Pledge and other popular furniture care products. It will also provide a stable foundation on which varnish can be applied when finishing teak, aromatic cedar and other wood species known to produce adhesion problems. As a general rule we recommend the inclusion of a shellac "barrier coat" in any furniture refinishing project. If for no other reason than, like chicken soup…it can't hurt.

Shellac offers yet another benefit as a "barrier coat" when applying oil-based finishes to wood species that will darken dramatically when subjected to oils. For example, the bright purple color so prized when working with purpleheart is often lost under an oil-based finish; the purple color darkens and loses it natural bright purple look. But, if a coat of super blonde shellac mixed in a two-pound cut is applied ahead of the varnish, the shellac will block the oil-based finish from coming into direct contact with the wood so it cannot penetrate the grain structure of the purpleheart and diminish its prized natural color. The

same benefit can be had with finishing Padauk, bloodwood, canary wood, yellow heart and a number of other naturally colorful exotic species.

In the same way, shellac applied as a "tie coat" or "binder coat" will dramatically warm the look of water-borne finishes. The reason for this is that the pre-cured micro-droplets of finish suspended in the mixture of water and glycol ether that comprise the carrier in a water-borne acrylic finish are too large to freely penetrate the cell structure of many wood species. Therefore, the first coat of finish (the coat that would be the *sealer* coat) tends to build on the surface and not penetrate into the cell structure (the pores) of the wood. This results in minute trapped air packets or air bubbles within the finish film where other finishes would have filled the pores of the wood. An initial coat of shellac easily fills these structures and provides a smooth foundation on which the water-borne acrylic can build. A quick test finish in your own shop will demonstrate the difference that a coat of shellac can make in the look of your water-borne finish.

Prevent raised grain.

The whole issue of dealing with raised grain, either by preventing its occurrence or by removing it once it has occurred, is one of those on-going irrelevancies in the world of finishing that seems to have developed a life of its own. We have a separate article dealing with raised grain that you can read by clicking *this link*. If you believe that your pre-finishing routine must contain a step to deal with raised grain, I encourage you to conduct the finishing comparison described in this article. The first coat of *any* film forming finish will firmly lock the "raised grain" fibers in place so they can be cut away by a light sanding. Be sure, however, that you do not apply anything to the surface to prevent raised grain if you intend to color with dye. Dyes must freely penetrate the cell structure of the wood if they are to color the wood effectively and uniformly. Any finish you apply (even if the label on the can leads you to believe it is a "conditioner" and not a finish) will "seal" the wood and prevent free penetration of the dye.

Facilitate the application of two-part (catalyzed) finishes.

Two-part finishes are generally defined as those to which a catalyst is added to bring about curing. Some of these finishes are defined as "self-sealing" which means that the finish can be applied to virtually any substrate, without thinning and the first coat will serve as the "sealer coat" (all subsequent coats will build on the surface of the "sealer coat"). However,

some of these finishes are not *self-sealing*, or are not self-sealing over all substrates. For example, naturally oily species or certain previously finishes surfaces may require the use of a sealer. Surfaces to which other finishing products that are defined as incompatible, such as stains, glazes and toners may also require a sealer. If a sealer coat is to be applied the manufacturer will specify a specific product (not surprisingly a product made by that manufacturer).

As an aside, these finishes can be either *pre*-catalyzed or *post*-catalyzed depending on when and by whom the catalyst is added. On the surface it would seem apparent that pre-catalyzed finishes are those that come to the finisher with the catalyst already added and post-catalyzed products to which the finisher adds the catalyst at the time of use. In most cases this is an accurate distinction; *but*, in a few cases the vendor will add the catalyst at the time of sale. When that occurs, even though the finisher takes possession of the finish *after* the catalyst is added, it is actually still defined as a post-catalyzed finish since the catalyst is added after the manufacturer puts the finish in the can. Whenever purchasing a catalyzed finish be sure to inquire about both the shelf-life and the pot-life of the finish. Shelf-life refers to how long the finish will remain usable on the shelf after the date of manufacturer. Pot-life refers to how long the finisher has to spray the finish after it has been transferred to the spray gun pot. Among post-catalyzed finishes pot life can be quite short, sometimes measured in hours.

Conclusion

In common usage the term “sealer” usually doesn’t convey much meaning. In most cases "sealer" is simply a synonym for the word “finish”. For example, at the beginning of this article we mentioned Waterlox Original Sealer/Finish is one of our most popular varnish products. Waterlox would have you apply their Sealer/Finish beneath all of their Original varnishes. Certainly, no harm will be done if you do that; but, in most applications neither will any significant benefit be achieved. Much the same benefit can be obtained simply by thinning the Waterlox Original Gloss or Original Satin 25% to 30% and applying it as a *sealer* coat as described earlier. It is our view that the Sealer/Finish is best used as a wipe-on varnish right out of the can when a mid-sheen varnish is the objective.

When a specific function is intended, for example a “sanding sealer”, the finisher will do well to consider the properties of the product; commercial sanding sealers that contain zinc stearate should be avoided since they diminish the moisture excluding ability of the finish

and raise the possibility of "bruising". Further, if the only objective is to make sanding the first coat of finish easier, the finisher can make his own sanding sealer simply by thinning varnish or lacquer on the order of 25% to 30% with the appropriate thinner. Better still, a universal "sealer" can be had simply by applying a coat of shellac mixed in a one-pound cut (or by using Zinsser SealCoat® thinned 50/50 with denatured alcohol). Other "sealing" functions such as providing a barrier coat to lock in contaminants or to prevent oil-based finishes from darkening the color of various exotic species can also be achieved with a coat of shellac. About the only time that a product called a "sealer" is actually indicated (in other words, cannot be made in your shop with materials you probably have on hand) is when the finisher is applying a two-part catalyzed finish.