

## Finish Notes

### Introduction

The following notes should be viewed as guidelines. I have found that finishing lends itself well to experimentation. Often the composition of the piece defines the best ultimate finish. For example, if a piece is made from old wood stain should be lighter than if using new wood and in many cases is not even necessary. I tend to work mostly in traditional styles and usually am trying to achieve an antique appearing patina. That said, the finishes noted below can also be used on contemporary designs but might call for a lighter stain and/or sealer. Much of the contemporary work today minimizes the use of stain and relies on natural aging to tone the wood. The use of various oils has also become very popular. I will not describe any of these finishes since my experience with them is limited, but will mention that one can find numerous articles describing their use and benefits in several woodworking magazines.

To help with experimentation let me relate a few observations I have made over the years.

- There are three types of solvents used in the finishes described below: water, alcohol, and paint thinner. If you remember your high school chemistry, water is a polar solvent and therefore it is compatible with things that are hydrophilic (meaning “water loving”) – e.g., water-based stains, milk paint, etc. Paint thinner is the opposite and not polar so it tends to be compatible with things that are hydrophobic (meaning “water repelling”) - like oils or waxes. Alcohol sort of falls in between the other two solvents. I will not delve into the specific differences between suspensions (e.g., most oil-based stains, paints) and solutions (e.g., water-based stains) or the difference between polyurethane (polymerized) and shellac (deposited) finishes, since in each instances, once dry the mechanics are not that important. However, when you are experimenting it is helpful to understand some general characteristics of the materials you are working with.
- Many oil-based stains consist of colored particles (pigments) floating in an oil based solvent (suspension or colloid). When dry, the pigments in these stains pretty much reside on the surface of the wood and because the pigments are typically not transparent, they tend to obscure the underlying wood. This is especially noticeable if the finished piece is viewed under bright sunlight. You can almost see through the stain to the underlying light wood, and therefore the finish can appear somewhat “anemic”. These stains also tend to block sunlight so aging of the underlying wood is reduced significantly.
- Water and alcohol based stains are typically solutions and actually color the wood fibers. Usually the depth of coloring depends on how long the stain is in contact with the wood fibers (most wood absorbs water fairly readily since in nature it is a water transport vehicle for trees). In bright sunlight these stains maintain their color in the same fashion as wood that has darkened with age. My experience has indicated that alcohol-based stains tend to be more sensitive to sun fading than water based-stains so I prefer not to use alcohol stains.

- Shellac is a natural product derived from the shellac beetle. Actually, it is used as confectioner's glaze in a purified form – it's what makes "M&Ms melt in your mouth and not your hands". Shellac pretty much dissolves in alcohol and can be evenly spread over a surface using a brush (or sprayer). When the alcohol evaporates, a coat of shellac remains. It is important to remember that the shellac does not undergo a chemical polymerization upon drying, so if a shellac finish comes in contact with alcohol the shellac will re-dissolve. This comes in handy for touching-up or repairing a finish, but it can be a major problem for surfaces that might come in contact with alcohol. Also shellac dissolves slightly in water (but not nearly to the degree it does in alcohol). Therefore, if the finish exposed to water, the water binds to the shellac creating a white precipitate (in other words it turns from clear to cloudy). This is an issue for surfaces that come in contact with water. This can result in white "glass rings" or spots in the finish. If the water is left to stand for a period of time it can penetrate the shellac finish and raise the grain of the wood underneath. You can sometimes remove a water spot or ring if it is contained within the finish by carefully rubbing the area with a soft cloth moistened with a little denatured alcohol and then recoating the area with a light coat of fresh shellac.
- Polyurethane, as well as varnishes, actually polymerize as they dry. That means once cured they no longer dissolve in their organic solvent like paint thinner. In other words, once polymerized these finishes are not reversible as is the case with shellac. I will not describe lacquer based finishes since I have never worked with them.
- Paste waxes are essentially waxes suspended in organic solvents and once the solvent evaporates the wax is deposited on the surface. You can actually think of milk paint as being similar but the solvent is water that evaporates. That is why you can remove wax with a bit of paint thinner or most of the milk paint with a bit of water (milk paint has milk-based binders, which tightly adhere to wood fibers, thus making complete removal with water impractical) .
- The mechanism by which paints, finishes, and stains bond to a surface varies with different media. It is important to note the role temperature, dry time, and humidity play in affecting optimal bonding.
- Since I typically use wide stock, I prefer a natural finish that is transparent and highlights the wood grain. For wide, solid wood surfaces commercial manufactures like to use glued up narrow boards. This is to both maximize yield and minimize warping. To hide the glue seams and provide a uniform color, they typically color the final finish (historically a lacquer-based product). These colored finishes are available if someone wants a more commercial looking end result.
- Applying the final toner (burnt umber) takes a bit of practice. If you are trying to achieve an antique look it is best to use the toner uncut. It tends to be pasty and actually becomes tacky pretty fast. Therefore it is wise to apply it one section at a time. Typically I quickly brush on a coat over an area usually no larger than two square feet and then wipe off the excess using a soft cloth while removing any streaks. This should give a uniform rich color to the surface. If it is a large surface, I

immediately cover an adjacent area and repeat the process, blending the intersection where the two areas meet. This is continued until there is a good breaking point – for example an entire table top is toned and the next area to be toned is the table base. After the initial coating of toner is applied you can stop and the result should be a uniform mellow color – sort of like an antique that has been refinished. On the other hand, if you want to add a bit of patina you can go back over the surface “blotching it” with additional toner. By this time the wiping cloth should be pretty saturated with toner and it can be used for blotching (or you can dabble on additional material with a brush). You then can also use the saturated cloth to blend/feather the additional toner to get the look you want (it helps to study actual antique pieces to decide the type of patina that appeals to you). Once finished it is important to let the toner completely dry. Usually overnight is adequate, but it might require several days if you have applied it pretty thickly in areas or the temperature is low or humidity high.

- I cannot emphasize one point enough - you need to keep track of **all rags** used in working with any oil base products, such as toner or oil based paints. They should be spread out to dry on a noncombustible surface (preferable outdoors). I have learned firsthand the potential hazards of working with oil based products. In our first few months at Eldred Wheeler, we started throwing our oily rags into a dumpster outside our facility. It was winter and the outside temperature was a bit below freezing. To our surprise the dumpster was on fire in less than one hour. In another instance, one of our contract carvers was finishing a set of Windsor chairs at home and using linseed oil as the final sealer. He must have been wiping his hands on his jeans while he applied the oil. He just finished when he remembered he needed to rush off with his wife to his daughter’s high school for a meeting. He quickly took off his clothes, left them in a heap on the bathroom floor, quickly jumped in the shower, threw on some fresh clothes, and headed out the door. When his family returned their house was a pile of ashes. If this seems unbelievable, take a small cloth and soak it in linseed oil. Wad it up in your hand and grasp it tightly. You will be amazed at how fast it becomes too hot to hold.

### **Natural Finish Steps (shellac – non durable)**

1. Use water-based stain: combination of Lockwood 145 [maple] and Lockwood 200 [cherry] and Lockwood 8 [walnut]. To make the stain, first fill a used plastic water container about half full with water. Next add a small amount of the maple stain powder, stirring as you add it. Mix well and test on a piece of scrape wood until the correct shade is obtained. Then add small amounts of walnut or cherry depending in whether you want a browner or redder tint. I have found that the maple stain in brush if you do not add a bit of walnut to soften it a little. You can make the solution fairly concentrated for storage and then dilute the concentrate with water to achieve

the right shade when you want to use it. Make sure to store the stain in a glass or plastic container (metal reacts with the stain.) Before using the stain, test the final color on a piece of scrap wood. The color wet is pretty much what you get.

2. This stain works best on cherry and maple but can also be used on pine popular and bass. It also works on open grained woods like mahogany and walnut, but they require filler as an additional step. Also for new walnut it is helpful to beach it first with Clorox bleach, let dry overnight, lightly sand it, and then stain with a maple colored stain.
3. Water-based stains, dries fast and will raise raises grain especially on new wood or when refinishing if the finish is stripped and the wood heavily sanded. You can use water to raise grain first and the sand before applying stain and this will help reduce the amount the stain raises the grain.
4. As a side note: Typically the lighting in a room setting is somewhat darker than that found in most workshop areas. Keep this in mind when deciding on the final shade of a finish. Experience will ultimately help you determine the right shade for a given setting but at the start you might want to work up a sample board and view it in the area where you will be placing the piece.
5. Brush on a coat of stain and when the piece is covered, wipe off any excess with a rag. The stain saturates the wood surface so you can apply it randomly and without worrying about overlap. The key is to cover the entire surface before a section dries. For large pieces apply the stain section by section. If a section begins to dry or you can blend areas by simply wetting the surface that has partially dried with water and finish staining. To darken the piece you can apply another coat of stain (but let the stain dry completely between coats). Remember that the toner will darken things a fair amount so it is typically better to error on the side of being too light than too dark at this stage.
6. After the stain dries apply a light wash of shellac as a sealer (3 lb cut 50% with denatured alcohol (make sure the denatured alcohol is mostly ethanol with only a little or no methanol). This can be brushed on quickly and dries very fast.
7. Lightly sand the entire piece (120 grit is usually adequate). Do not worry about light scratches, since they will disappear when the final stain is applied. The purpose here is to smooth out any areas where the grain has raised so you do not have to be that aggressive with your sanding.
8. Apply another coat of the **same** stain and quickly wipe off any excess. Be careful not the put excessive amount on the end grain - rather quickly wipe the surface stain with a rag over the end grain. Let dry (again, should be pretty fast.)

9. Brush on another 2-3 coats of diluted shellac, letting dry between coats. Once dry, rub with 0000 steel wool. You can see where the shellac powder accumulates (light appearing) and if in the grain or in any scratches you likely should apply another coat of shellac (otherwise the toner which will be applied next will concentrate and darken those areas).
10. Apply the toner (Burnt Umber in oil). It can be applied straight (non-diluted) if you want to control the process of antiquing. You can also add a touch of paint thinner to make it easier to apply to large surfaces. It will typically need to dry overnight (depending on temperature and humidity). If you want to go a shade darker you can apply additional coats/s but letting it dry overnight between coats.
- 11. NOTE: the toner is cut in linseed oil so make sure any rags are spread out and not bunched, otherwise they can catch fire. I always put outside and also wet them.**
12. As a final coat add Miniwax Paste Wax for dark surfaces. Let dry and buff with a soft cloth.
13. You can also apply a light coat of paste varnish (polyurethane) prior to applying the paste wax. The light coat of paste varnish provides a protective film which not only seals in the toner but also provides the shellac with moderate protection from water. For surfaces that have a high probability of being exposed to water or alcohol, it is best to finish them with the compatible durable finish noted below.

### **Natural Finish Steps (polyurethane –durable)**

1. Make up the Maple stain and prepare the surface as noted above
2. Brush on a coat of stain and when the piece is covered, wipe off any excess with a rag. The stain saturates the wood surface so you can apply it randomly and without worrying about overlaps. The key is to cover the entire surface before a section dries. For large pieces apply the stain section by section. If a section begins to dry or you need to blend areas simply wet the surface that has partially dried with clean water and finish staining. To darken the piece you can apply another coat of stain (letting the stain dry completely between coats). Remember that the toner will darken things a fair amount so it is typically better to error on the side of being too light than too dark at this stage.
3. After the stain dries apply a light wash of shellac as a sealer (3 lb cut 50% with denatured alcohol (make denatured alcohol is mostly ethanol with only a little or no methanol). This can be brushed on quickly and dries very fast.
4. Lightly sand the entire piece (120 grit is usually adequate). Do not worry about light scratches, since they will disappear when the final stain is applied. The purpose here

is to smooth out any areas where the grain has raised so you do not have to be that aggressive with your sanding.

5. Apply another coat of the **same** stain and wipe once applied. Be careful not to put excessive amount on the end grain - rather quickly wipe the surface stain with a rag over the end grain. Let dry (again pretty fast.)
6. Polyurethane coat. Use Minwax satin polyurethane (or Last & Last satin oil based polyurethane). Use long strokes. Must be aware of brush overlap. Let dry thoroughly (overnight is best).
7. Once dry, rub the surface with 0000 steel wool. You can see where the polyurethane powder accumulates and if a lot you likely should apply another coat of polyurethane since the toner that is applied next will concentrate and appear dark brown in those areas. As a side note: if working with open grained woods (i.e., mahogany, walnut) and the polyurethane powder seems to accumulate pretty much only in the grain after the first coat you can tone the piece at this step and remove any excess wiping across the grain. Let dry over night and apply another coat of polyurethane. Again let dry overnight and then steel wool the surface (skip steps 8 and 9). This can sometimes be used to bypass using filler.
8. Once you are OK with surface apply the toner (Burnt Umber in oil). It can be applied straight (non-diluted) if you want to control the process of antiquing. You can also add a touch of paint thinner to make it easier to apply to large surfaces. It will typically need to dry overnight (depending on temperature and humidity). If you want to go a shade darker you can apply additional coats/s but letting it dry overnight between
9. Apply a final coat of polyurethane and let dry overnight.
10. Once thoroughly dry, rub with 0000 steel wool making sure not to cut through the finish. You can put a coat of paste wax on the surface (Minwax Paste Wax special for dark surfaces. After it dries lightly wipe with 0000 steel wool. A polyurethane finish is technically a no wax finish but the wax helps even out the sheen.
11. I usually only put the durable finish on surfaces that will be exposed to water, like the tops of tables and chests (or wooden chair seats, like on Windsor chairs). I use the regular finish on the rest of the piece.

## **Milk Paint Finish**

1. First make up the milk paint solutions. The paint comes in powdered form and I have found it best to add the powder to the water rather than the other way round. Depending on the color, there is significant difference in the way the powder reacts

with the water. Red mixes very easily. Black, green, and blue are a little slower to mix. And yellow, pumpkin, and white are considerably more finicky. Red is usually ready to apply almost immediately, but it is best to wait 10-15 minutes for black, green, and blue. During that time it is important to check frequently to make sure it is not turning into a sort of paste. If it does add a bit more water. If you do not catch it soon enough the adhesion properties of the paint can be seriously diminished. The same is true for yellow, white, and pumpkin, but they tend to become pasty even faster. You can mix different colors but make up enough to complete whatever you are doing since matching a mixed color can be problematic later on. Also I use red, green and a bit of black to make Spanish brown. It can be used as a primary color or for coloring the backs or bottoms of pieces to give them an antique appearance.

2. For new wood stain it with the water-based stain used for a natural finish. The actual stain color is not that important since its purpose is to give some color to the wood prior to applying the paint (especially if there will be areas of wear added to simulate age).
3. Brush on a coat of the milk paint. It can be applied rather fast without worrying about drips since once it begins to dry a bit, you can brush out any drips or streaks. If you are going to wear the piece to simulate age, it is best to apply a light wash of red before putting on the final color. The red wash gives the wood a warm tone.
4. Once the paint is dry (fairly fast, usually 30 minutes – 1 hour), you can wear it using a damp cloth or damp 0000 steel wool. If you do simulate wear, let it dry before going to the next step.
5. The next step is referred to as “blotching” and involves a bit of artistic judgment. Its purpose is to give the paint a bit of patina. It is best to make up a few test strips of painted surfaces. Start with the water-based natural color stain and blotch the surface so it has variations in light and dark shades. If the resulting paint color is too dark lighten the stain with water and try again until the effect is what you are looking for (the color wet is fairly close to the final shade).
6. Let the stain dry and if it has a bit too much contrast you can use a damp cloth to feather the stain and soften the effect. Again once you are satisfied with the result, let the surface dry completely. The last couple steps can be varied depending on the result you are looking to achieve. A little experimentation is wise to determine the final result is what you are after.
7. The next step is to seal the paint finish. If you do not require a durable finish you can experiment using either clear or orange diluted shellac - or even dark or natural paste wax if sealing is not an issue. For a durable finish that is not going to be affected by

moisture I recommend using satin polyurethane (especially for chair seats or the tops of tables or chests).

- a. The clear or dark paste wax finishes retain a bit of the dull milk paint sheen, the main difference between the two shades is that the dark paste wax imparts a bit of color and tones down the milk paint color, especially blue, yellow, white, and pumpkin.
  - b. The same thing goes for the orange verses clear shellac. The orange shellac takes the primary color down a couple of shades. Again especially blue, yellow, white, and pumpkin. It is important to use fairly dilute shellac (i.e. 3 lb cut 50% with denatured alcohol) so there is not too much luster imparted to the painted surface. If you want to brighten things up you can always add a second coat, but it can be difficult to remove excess shellac without affecting the paint underneath.
  - c. You should put the polyurethane on full strength and if the surface is very absorbent you should consider two coats. That is why it is good to use satin, lest you end up with an unattractive (and unconvincing) glossy surface.
8. If you have sealed the surface with either shellac or polyurethane the final step is to coat it with paste wax. Again you can use either natural or dark paste wax depending on the result you are targeting. I typically apply it with a disposable bristle brush. It enables you to get wax in all the cracks and crevasses. I let it dry until any large bits are hard to the touch. I then lightly polish with a soft cloth (for broad surfaces) or a clean disposable brush for carved or irregular surfaces. It is important to remember that it is typically a combination of wax, oil, and dust that give antique pieces much of their sought after "patina".

## Selected Vendors

1. **Water Based Stains:** W.D. Lockwood; 4 oz bottles; Lockwood 145 [maple]; Lockwood 200 [cherry]; Lockwood 8 [walnut]; <http://www.wdlockwood.com/main.html>
2. **Toner:** Sheffield Bronze Paint Corp; ½ Pint cans; Colors in Oil; burnt umber (they sell commercial quantities so could buy as a group) <http://www.sheffieldbronze.com/colors-in-oil/>; or as an alternative for a single pint <http://www.thefurnitureconnoisseur.com/Sheffield-Oil-Colors.html>
3. **Milk Paint:** Old Fashioned Milk Paint Company; Pint packages; large variety of colors; <http://www.milkpaint.com/>
4. Minwax polys, Bullseye shellacs, & Minwax paste waxes: almost any hardware store