

SHELLAC

by Tim McCall

<https://mccallrestoration.com/background/>

Shellac is perhaps the most misunderstood of all finishes. It is also the subject of the most mystique, notably in the techniques of French polishing. It is a classic evaporative finish with low toxicity (dry shellac is edible) and a wide range of possible uses and application methods. Best of all, it is the most forgiving of all finishes - being so easily repairable, it's almost impossible to get into a situation which can't be readily resolved.

Much has been written, often erroneously, about shellac's detractions: it is awkward to use, it is easily marked and isn't durable and so forth. However, it does have many advantages. Shellac is among the most aesthetically pleasing finish available; it has excellent resistance to ultra-violet deterioration and darkening (being about the most stable of all natural / synthetic resins). It is tough enough to be used as a floor finish and also makes a superb 'tie-down' or seal coat with good bonding to most other finishes. It can seal over knots, oil / oily woods and waxes, is easy to repair and has excellent resistance to moisture vapor transmission. It is the most frequent choice for restoration of antique surfaces as well as being an excellent finish for modern furniture. Admittedly it does have a few shortcomings: it readily redissolves in alcohol and will heat mark above 180F; that said, it is easily repaired compared to lacquers and varnishes.

As a finishing material in the West, shellac came to prominence in the 1820s with the advent of French polishing and the industrial refining of shellac. Derived from the raw material known as 'stick-lac', shellac is available in several grades of dry shellac, both in flake or button form, and in various colors. Dry shellac flakes will have an indefinite shelf life if kept stored cool and dry (ideally in a refrigerator). Seedlac is the least refined form and is seldom used as a finish resin. 'Buttonlac' and 'garnet' are dark brown with a yellow tint, 'orange' has a warm reddish tone and 'blond', 'lemon' or 'pale extra' are a light yellow. Bleached or 'white' shellac is treated in an alkali chlorine bath which makes it inherently unstable in liquid form. For this reason, I try to avoid this grade and use pale or lemon shellacs instead, which are filtered through activated charcoal.

Shellac contains between 3% to 5% wax, especially in orange and button grades, which is visible as a cloudy film which settles out when left to stand for a few days. This wax will make the dry shellac film less resistant to water marking as well as reducing the gloss slightly. However, the wax can help to prevent gumming abrasive papers when power sanding due to its lubricating action. I prefer dewaxed grades such as 'pale extra', which is produced by filtering through active charcoal; dewaxed shellacs are harder, glossier and more water resistant, making them preferable for French polishing or for sealing under other finishes which will not tolerate wax.

Preparation:

The secret to successful application lies in preparing shellac from dry flakes: when mixed with alcohol, it begins to form chemical compounds called esters, which act as plasticisers to the dry film. Eventually, the liquid material will not dry at all. Even if liquid shellac has a date stamp on it when bought, the hapless purchaser has no idea if it has been stored properly - high temperatures can drastically degrade shellac. Preparing your own gives you complete control over the quality. I use ethyl (denatured) alcohol, reagent grades of which contain less water (available from chemical suppliers), and combine the flakes and alcohol in a non-metallic container. Liquid shellac is described in 'pound cuts' - for instance a '3lb. cut' refers to 3 pounds of shellac to a gallon of alcohol; proprietary liquid shellac is typically around 3 - 4 lb cut. I find a 1 1/2 to 2lb cut is preferable for all uses; this is made by combining a pint of alcohol with 1/4 lb of shellac flakes. The exact ratios aren't critical - different shellac grades may require slightly more alcohol - but experimentation will produce the 'cut' you like.

This mixing process can be speeded up by crushing the flakes into a powder (with a coffee grinder) and / or standing the mix container in hot water. To produce a dewaxed shellac, allow the wax to settle and siphon off (or strain several times through cloth), or simply use dewaxed flakes. By always using fresh shellac, you will greatly enhance the durability and water resistance of the dry film (I have tried to mark dewaxed shellac films with hot water for an hour or two without success - so much for the mythology!). Store liquid shellacs cool and preferably keep them for only 3-4 months maximum as they will eventually reach a point where they will not cure hard, due to chemical reaction with the alcohol solvent.

Incidentally, many 'French polish' suppliers add other resins such as nitrocellulose to their liquid formulations; while these add a degree of water and alcohol resistance, in the longer term they lack the chemical stability of shellac alone. Nitrocellulose films will yellow and lose flexibility faster than shellac, increasing the chances for stress cracking. This also applies to 'padding lacquers', which, despite being sold as 'French polish' (which is a technique, not a material), contain substantial amounts of nitrocellulose and resins other than shellac (the clue being in their solvent base, e.g. methyl isobutyl ketone and ethyl acetate. These padding lacquers also require a different application technique to traditional French polishing methods, and have a more 'plastic' appearance than shellac along with a higher film build.

If old liquid shellac is found not to harden after application, you will have to strip it off and start again - avoid the temptation to seal it in with fresh shellac: the top layer will soon start to crack. Apply a drop to a non-porous surface - if it hasn't dried hard after an hour or two, discard the remainder.

Application:

Shellac can be applied by brush, spray or padding (French polishing). Needless to say, these methods can be combined - for example, initial coats of shellac can be sprayed or brushed, followed by a French polish rubber. In fact, this is an invaluable time saver if there are large areas of woodwork to finish.

Padding:

While French polishing is often shrouded in craft lore and mystique, the principles are very simple. It is sometimes suggested to apply shellac with a rag alone; whilst this can work in simple applications, I find the traditional choice of cotton wadding and a fine white cotton outer covering for the pad or rubber to be preferable. This 'rubber' is merely a reservoir for the polish; however, other touted substitutes for wadding, such as cheesecloth, are not as good. The rubber releases the liquid shellac at just the right rate without drips or whip marks. The methodology is quite simple: initially, shellac and alcohol are applied to the surface with the rubber; further applications of shellac and solvent soften the already deposited shellac and

help to push it into the grain. The purpose of working in circles or figure-of-eight's is primarily to fill the grain and prevent ridging which can happen if the rubber is used solely with the grain (as I've seen occasionally suggested).

At some point in the process, it is almost invariably recommended to use non-drying oils such as raw linseed as a lubricant. Having both used oil and not, I find its use greatly complicates the procedure and unquestionably damages the dried film. Its main claim as a trade method is that it can allow a rapid build of polish; unfortunately trade methods serve a purpose which is at odds with the quality of the finish, namely repeat business! Let me clarify this point: any oil in the dry film will plasticize the material and weaken it. Raw linseed oil will slowly polymerize by oxygen absorption and will expand in the process; shellac shrinks during the cure phase. This sets up a contradictory movement in the film structure, which is evidenced by the fine cracking seen in older shellac finishes. Linseed oil will also darken over time, degrading film clarity. Furthermore, the notion that the oil residues can be picked up by an alcohol laced rubber defies logic: oil is a hydrocarbon and is not soluble in polar solvents such as alcohol; besides, the rubber is a reservoir, not a sponge! Naphtha might be a better solvent choice, but this still assumes that all the oil rises magically to the surface during drying. However, the action of friction with the rubber during polishing ensures that in reality, the oil is distributed throughout the film. This means that a 'spirit' rubber will merely soften the top surface and remove at best only a skim of oil with the shellac, leaving the majority in the film structure.

Rather than using oil as a lubricant, proper control of the rubber should be developed: too slack a grip can cause juddering and sticking. Keeping an adequate supply of shellac in the rubber is important; initially the rubber will move softened shellac around on the surface, blending new material with previous coats. Over time, gradually increase the amount of alcohol on the rubber face which lubricates by softening the deposited material. Eventually, the rubber will be almost solely moving shellac about on the surface, and the process can be stopped to allow it to set up, prior to the next coat being applied. I have polished for hours like this, with no apparent sticking of the rubber. This approach removes the need for 'spiriting off', will not plasticize the cured film and speeds the total process. Otherwise

the basic polishing procedures, including flattening and rubbing out with abrasives, can follow the orthodox methods.

If oil is used as a seal coat (to enhance grain definition) in place of 'fadding in' with shellac, make sure that (polymerized) boiled linseed is used; apply very sparingly and allow sufficient time for it to cure before top coating with shellac - at least two days. This is to prevent a weakened bond between the polish film and the wood (sealing the oil with shellac too quickly will prevent oxygen from sufficiently curing the oil).

Applying shellac with a rubber allows very thin coats of polish to be applied, which are more stable and durable in almost any film structure than thick ones. The mechanical friction of the method also ensures excellent film cohesion, better than with a brush or spray. I find that applying shellac with a rubber is the fastest way to achieve a finish build, as the pad actively pushes the resin into the pores.

Brushing:

Applying shellac by brush is very straightforward: use a good quality artists' grade brush, flat and reasonably soft, with either nylon synthetic or sable bristles (synthetic will last longer). Again, keeping to a 1 / 2lb cut will ensure a film build generally free of ridging and streaking as can happen with heavier cuts. The main trick is to not 'back-brush' as with oil varnishes - this will tend to remove the material you have just laid down. Cover the given area once entirely, and then test with your finger to see when the coat is almost tack-free before applying another brush layer. Keep the brush reasonably loaded, but not so much that it drips. Although the film build can seem slow, the object is not to create a thick coating. The fastest way to fill grain with finish is to sand between coats, rather than piling on more resin. After eight or nine successive brush coats in a session, allow the surface to dry overnight. More shellac can be applied for a glossier finish, or the work rubbed out and waxed to finish the job.

Spraying:

Although this article is about hand finishes, many people never seem to think in terms of spraying shellac. This is a useful technique, such as when using a dewaxed shellac as a sealer under other finishes (manufacturers

who warn again this are not critical of the shellac so much as it's wax content - always use dewaxed shellac as a sealer). Again, a 1 1/2 - 2lb cut at about 30 p.s.i. works well. It is not so different from spraying cellulose lacquer, but allow longer between coats as it dries more slowly (lacquer thinner is much more volatile than alcohol). As with all spraying, test to refine the method so as to avoid an uneven 'orange-peel' surface (too low pressure or holding the gun too far away) or sags/drips or pin holing (too high pressure or spraying too heavily too close to the surface). Shellac reacts with steel, so aluminum airways in the gun are helpful. Clean the gun scrupulously with alcohol afterwards, although avoid prolonged soaking of the seals. Spraying will be the slowest way to get a film build, but it can do things other methods can't: for example, airbrushes are invaluable in restoration work for 'graining' and 'feathering in' on a repair. If a full grain finish is required, avoid doing it all by spray as the film structure is not as durable as that from a rubber or brush, which mechanically fuse the finish layers. The use of grain fillers will be a preferable alternative here.

Controlling sheen:

Both brush and spray application offer another possibility: gloss is traditionally adjusted with abrasives on the completed surface; however, as with 'satin' varnishes, another way is to add flattening agents, such as fumed silica, to the resin. With shellac, this gives a softer degree of sheen (depending on the amount of flattening agent used) versus the somewhat brighter and less opaque look of an abraded polished surface. This can be very useful in toning repairs on old or antique surfaces. This will not work with a rubber, as the wadding will act as a filter for the silica particles. Flattening agents are generally supplied for commercial use, but are also available for small scale finishing.

Tinting:

Shellacs are easily tinted with aniline 'spirit' dyes. Traditional base anilines tend to fade easily, but the metal-complex anilines, such as Orasol dyes, are much more lightfast, even in the volatile red / yellow range. They are very concentrated, so one 4 oz container in each color will last the proverbial lifetime (see suppliers). They make shellacs an invaluable color matching

and shading medium; generally I use pale dewaxed shellac as the base, with the dye dissolved in alcohol first, before adding to the polish. Of course, different grades and colors of straight shellac can be mixed to produce varying colors too.

Damage repair:

Damaged shellac surfaces typically divide into two forms: heat damage and water marking. Heated objects and water will leave a characteristic white mark on the surface. Water marking is more prevalent with higher wax content shellacs and is caused by moisture getting trapped in the film. Careful application of alcohol with a fine artist's brush will redissolve the surface, allowing the moisture in the water marks to evaporate, or by re-amalgamating the heat mark damage. This will disturb the surface texture and may require a rubber of shellac to level the marks. This works best with newer surfaces (up to 20-30 years old) as even evaporative finishes will crosslink to some degree over time, becoming less soluble in the process.

Resources / materials:

Shellacshack.com

Shellac.net

Wellermart.com

Homesteadfinishingproducts.com – Jeff Jewitt's site - has separate eBay store for products.