

# Saving Your Sole

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## Restore and Refinish Your Teak & Holly Cabin Sole

I've had a number of customers ask me for quotes to replace their cabin sole with the assumption that the existing boards were just too far gone to bring back to any acceptable level. These boards were blotchy yellow or blackened in areas, had dings or dents and had really become an eyesore as you stepped below. Yet, in most cases, after review, I suggested restoration rather than full replacement. Either approach can be expensive and time-consuming. But, as long as there is little or no rot on the existing boards, a restoration is certainly the less expensive route. If done properly, it can look far better than one might ever imagine. And restoration is something almost anyone can do themselves, with a little know how, a fair amount of time, patience and lots of attention to detail. Of course, in reality, even the best restoration may not look brand new, but a well used boat should have a bit of character, to show it actually gets some use, don't you think?



Most wood cabin soles manufactured over the last 35 years or so have been made from plywood, with a thin layer of teak and holly veneer on the surface. That veneer layer can be as thin as a sheet of copy paper, or as thick as 3/64ths of an inch. Each manufacturer buys their teak and holly plywood through different sources, who may use different thicknesses for their veneers. Normally, the thicker the veneer, the more expensive the plywood. You might think this would mean that better-built production boats have the thickest veneers, however, this is not always true. So, even if you own a high quality production boat, power or sail, before you dive in with a big sander to prepare your old sole for refinishing, read this first.

Cabin sole restorations take time. In addition to the physical man-hours, there is a lot of waiting involved. You will need to be patient. Winter in the Northeast is a good time to take on a project of this magnitude since sailing will have less tendency to get in the way of working or waiting. Yet, winter can also be a difficult time to finish this project in the Northeast due to temperature requirements for varnish and epoxy. So, you may want to plan a portion of it for spring, as well.



There are a series of steps to a successful restoration and refinishing of your cabin sole. There are many variables to consider and choices to make, both before you start and along the way. We restore soles using a few different approaches. One, which requires a controlled environment, where we encapsulate each board in clear epoxy before applying varnish. This includes the top surfaces, which will still require a fine, smooth finish. Because of the temperature challenges during winter, for this article we'll plan a traditionally varnished surface on top, but with an epoxy barrier applied to the available edges and bottoms. This will still be an excellent defense against moisture intrusion going forward.

### Preliminary Steps: Assessment/Logistics/Planning/Set-Up

Take a close look at the cabin sole. Can it be removed from the boat or are most boards permanently installed? If the latter, there will be a few more challenges to do the work over the winter months. If your boat will be stored outdoors and you must do some or all of the restoration on board, a good (and safe) space heater will certainly be a necessity. If all boards can be removed without too much trouble, even better, it is the perfect winter project.

What are the issues? Blackened areas are an indication that you have moisture trapped under the existing varnish, inside the plywood. If you have a moisture meter, take readings all over the sole and note the high moisture areas. You may find it isn't only in the darker areas. You'll want these notes for comparison later on after removal of the old finish and some drying out of the boards.

Are there many yellowed or discolored areas, or dings and dents that need filling? Unless these areas are only in one or two small places, hiding under the saloon table or behind the mast, you'll need to strip the entire old finish in order to have a more consistent look upon refinishing.

On sections that can be removed, check the bottoms and edges for evidence of moisture intrusion or retention. If present, find the source of the moisture and try to eliminate it before restoring the boards and having the moisture enter again and ruin your newly finished job. As I mentioned, part of our plan will be to add a barrier coat to stop future moisture intrusion, but some of the fixed board bottoms may not be accessible. So, it is important to limit any moisture avenues possible, no matter what. Also, be sure to dry out the bilge. A dry environment will help the fixed boards that may have absorbed some moisture dry out faster once the old finish is stripped.



If you will be working outside at a boatyard on your boat, under cover, consider what your electrical requirements might be. You'll be running a sander, heat gun, dust collector, vacuum, lighting, a space heater, etc. Anything that generates heat uses a lot of electricity. The guy on the boat next to you might be doing the same job, at the same time. You can be sure that the 15 or 20 amp circuit you're both plugged into will blow when there is no one around to reset the breaker. So plan your needs and your times accordingly. For instance, if you are using a heat gun, don't use the space heater. Also, use 12-gauge outdoor-rated extension cords or heavier for these high demands.

Plan to do your stripping and sanding work in a different area than the varnish work for those pieces that you can remove from the boat. When working on board, controlling dust can be a bit more of a challenge, since you will need to strip and sand - creating loads of airborne dust particles - in the same area in which you need to lay on that perfect finish. So, you'll need a way to remove the majority of dust on board. You can purchase a portable, dust filter-type air cleaner at most industrial tool supply outlets for between \$100- \$200. Additionally, an inexpensive 20-inch household box fan set up in the overhead hatch (blowing out) will greatly help the removal of dust and fumes in the air.

You'll need good lighting for this job. Get it all set up ahead of time. Run your wires for all the electrical needs on board so they are not on the floor. Bring aboard your tools, gear and remove any of the boards from the boat that you can. Remove the salon table if possible, and secure it up on a settee out of your way. Remove any hardware that is mounted on the boards or other parts that may be in the way. Mark and bag the small pieces for later reassembly. Okay, you should be ready to go.

The steps that follow are pretty much the same whether you are working on board or in your basement; but those on board may be less convenient to perform.

### Step 1. Removal of the Old Finish/Stripping

There are generally three ways to remove old varnish from wood: heat, chemical removal or heavy sanding. Let's throw the last one out right now. Heavy sanding and veneers should never meet. So your choices here are really only two. We use both approaches, but for the most part, heat is our standard method. Chemical removers can be quite messy and require extra steps to be sure all traces of chemical are removed from the grain. So, unless we have no choice, we strip using a quality heat gun and a 1-inch carbide furniture scraper. I believe it is the cleanest, safest and most detailed method for the job.

If you've never done it before, using a heat gun and scraper together can be a bit tricky until you get the hang of it. Practice beforehand on an old piece of varnished or painted wood. The technique doesn't take too long to figure out, but it might take a while to get used to it.



Basically, you must heat the varnish to soften it without burning the wood under the varnish or anything around it. Mask adjacent areas on board with tape to protect them from the heat. Set your heat gun to a fairly hot setting. We use a variable temperature gun set to around 800-900 degrees for veneer. If any hotter, the glues that hold the veneer may also soften. Work a small 2-inch square area with the gun angled and aimed at an area 1-2 inches off the surface. Keep the gun moving in small circles around the area. As you begin to see tiny bubbles in the surface, scrape the area with the carbide scraper. Pull towards you. With a little downward pressure, it should come off almost like butter, clear down to the wood. It's actually not always necessary to bring the old varnish to the bubbling point. After a while you'll get the feel of it and know just when it's heated enough to begin a scraping stroke.

Continue moving the heat and expand out into adjacent areas, by stripping with your one hand and heating the next area with the gun in the other. When enough area is heated, pull the gun back about 6 or 7 inches. This will help keep the area heated while you work without burning the wood. Be very careful where you point the gun when you move it away from the work! At first this process will seem slow and cumbersome, but once you get the hang of it, it'll move much quicker. I actually enjoy stripping wood this way. You should be able to strip a 2 x 2 ft. section in about 15-20 minutes. Be very careful to always keep the blade flat against the surface. Do not dig into the wood or rip the grain. Pull the scraper with the grain, never across it. All those old areas that were yellowed will miraculously turn back to the color of the original wood once the varnish strips off.

If you have wet areas, be particularly careful because the grain softened by the moisture in these areas can easily come up along with the old varnish. This also holds true for some very thin or grainy veneers. If you see some of the small grain ripping out as you scrape in grainier areas, try stripping in the opposite direction. Always use a sharp blade on the scraper.

After stripping, the boards will still need sanding, so don't be too concerned about the rough or inconsistent look at this stage. On a 30-40 footer, you should plan for the stripping phase to take 10-20 hours of work, depending on the size of the cabin sole.

## 2. Sanding & Detailing

Once the stripping is complete, the detailing begins. Make sure to mask any adjacent surfaces on board to protect from sanding mistakes just as mentioned earlier for stripping. Again, be sure you know the thickness of your veneer. We give the stripped boards a carefully executed machine sanding using a good quality variable speed random orbital (RO) sander with a vacuum attachment. (Working inside a boat, the vacuum attachment is a necessity.) If the veneer is thicker, we may use 120-grit sanding discs. But the key here is to be sure to use the sander on a slower setting. For thinner veneers, we may use 150-grit on a low setting. In either case, the goal is to get the overall surface smooth and consistent. Don't use much pressure on the sander and definitely don't use the edge of the sander to work a particularly bad area. Keep the sander basically flat and keep it moving. This is not the final sanding, so you'll have plenty of other chances to work those areas further by hand.



This is a good spot to re-check the moisture content in the boards. If necessary, the boards should be allowed to dry out further for a while. (see 2b. Drying Out). Also, if bleaching will be necessary (see 2a. Bleaching) perform the task before any drying out period is begun.

After the entire board has been carefully RO-sanded, and there is more consistency in the look of the surface, the next step is to sand by hand. RO sanders can leave an unattractive circular pattern in the wood when viewed at various angles. If left alone, these unsightly marks will still show through even after many coats of varnish are applied. Varnish is virtually clear, so mistakes underneath it will never be hidden, no matter how many coats of varnish are added. So, removing that unattractive pattern is essential. Using a sanding block with a paper slightly coarser than the one just used on the RO sander, sand the board parallel to the grain. If you used 120-grit on the RO sander, use 100-grit on the block. (if RO'd w/150, block



w/120). This will really help get the surface more consistent and remove any circular pattern.

Dust off and vacuum everything. Then use a rag dampened with mineral spirits or spray thinner to wipe the board clean. Wipe in one direction so you move any residual particles off instead of just moving them around. Wiping on mineral spirits will also simulate how the teak and holly will look for color and consistency once it's been varnish coated. (Spray thinner will evaporate too quickly to give you any real idea.)

Now is the time to make repairs (see 2c. Epoxy Fills and Repairs) to any areas that may have dings to be filled and faired. However, if there is still moisture in the wood, it would be best to wait until any drying out process is complete.

Okay, so after any side steps that may have been necessary are complete (see 2a, 2b, 2c) and the medium grit hand sanding (100/120-grit) is done, change the paper on the sanding block and repeat the process with 220-grit, again sanding parallel to the grain. Vacuum and clean thoroughly with solvent.

## Possible Side Steps

### 2a. Bleaching

If any boards have dark staining from moisture build up, you can bleach them, but realistically the results will be only somewhat better. But a little lighter is sometimes better than none at all.

Mix oxalic acid together with hot water. Use a ratio of 1/4 lbs. of oxalic acid to 1 quart of water. (You can use a portable camping stove or the galley range to heat a pot of water.) Paint the hot solution onto the areas you want to lighten using a foam brush. Apply coat after coat until the solution cools or you run out. Let stand overnight. Upon review the following day, see what you have accomplished. If you feel it needs more bleaching, repeat the step.

After the acid bleaching is complete, it's time to neutralize the acid solution. You can use borax, soda ash (baking soda) or even vinegar as a neutralizer. Be sure to clean/neutralize all areas in which oxalic acid was applied with one of these products. If not, the acid could later ruin the new finish.



Any bleaching must be done after initial sanding, but before final sanding and detailing is complete. It will require time for the wood to dry before moving on.

### 2b. Drying Out

Any boards that have moisture in them will need to be dried out. Ideally, a warm, dry workshop is an excellent place for this. But, some boards cannot be removed from the boat, so as stated earlier, be sure to remove as much moisture from the boat itself as possible to help expedite this process. Use a few moisture absorbent crystal containers below decks. In the shop, I find that standing the boards on end tends to move the moisture down and out faster, in large part due to gravity.



Once the area close to the floor is dry, usually the rest is too. Retest the boards to ensure that all moisture readings have dropped below 14 percent minimum. 11-12 is okay, 8 or lower is great. Varnish may not adhere well where readings are above 18. The drying out process can take weeks or even months, depending on how much moisture has been absorbed and how dry and warm the environment is. Stripping the finish with heat certainly helped get the drying started. Once the wood is dry enough, you can move forward.

### 2c. Epoxy Fills and Repairs

There are so many different types of damage that might need repairing and ways to repair each that we can't possibly address them all here. Most will entail a ding/dent, a separated veneer edge, a cracked board or something similar.

Most repairs will be made with epoxy, either used in a clear form or with thickeners. You can fill most dings/dents in the surface with clear epoxy after thoroughly sanding the dented area. Use acetone to clean the area. Drip the clear epoxy into the dent/recess until it is barely above level with the surrounding surface. To help attain a smoother surface when the epoxy dries, lay a piece of wax paper over the wet epoxy with which you filled the recess and smooth it out to the surrounding surface. Once dry, this paper will peel right off, offering an almost smooth surface to begin sanding everything fair. Later, when varnish is applied, it will look very much the same color as the epoxy. Though this process will not totally hide where the dent was, the recess itself will be gone. As I said earlier, a little character is not necessarily a bad thing.



If a piece of veneer is chipped off on the edge of a board we'll glue in a new piece. I'll find a teak remnant in the shop that matches the color and texture of the missing veneer, trim and shape it to fit, epoxy it in, then sand it all fair. Again, in the end it may show a little, but should look far better than leaving it chipped. Fill, fix and fair whatever you feel will add to the overall restoration before moving to the finishing steps.

### 3. Epoxying the Bottoms/Edges

This step can be done at any point in the overall sole restoration project since it deals with the other+five surfaces, but is best done after drying out and before applying any varnish. We typically do this part at some point after the boards have been stripped, but before they have been finish sanded.

Though the fixed board bottoms will not be accessible for this full treatment, many of their edges will be. Moisture is absorbed much faster through an edge than through a top or bottom surface, so be sure to epoxy the exposed edges wherever accessible. Lay



any boards that were removed from the boat upside-down on a sturdy work surface. Clean any areas of grease or mildew. Be sure they are dry. Sand the bottoms with the RO sander using 80- grit sanding discs. Sand the edges as well, but so as not to chip the veneer, hand/block sand with 80- grit. Don't be afraid to remove a few mils of edge surface, particularly if the boards were a tight fit. (We want to be sure everything fits together well, without having to trim after all the epoxy is added to the edges.)

Once sanded, vacuum and wipe clean with acetone. Tape the teak and holly veneer surface along the edge perimeter to protect it from any drips or errant brushing of epoxy. Only mix an amount of epoxy that you can use in 15 minutes. This is important: heat the wood. You can heat it with a heat gun or heat lamps, but get the surface warmed to much higher than the ambient temperature. This will open the wood grain up and allow the epoxy to penetrate deeply, creating a much better moisture barrier.

**NOTE: Use a respirator with an organic vapor cartridge when working indoors with epoxy, solvents or varnishes.**

Using an epoxy-resistant foam roller, apply the epoxy with the grain, across the grain and diagonal to the grain with overlapping strokes for thorough coating. Then, for a smoother finish, use a disposable chip brush or foam brush to tip+out, or spread everything smooth, in one direction. This will also reduce air bubbles. It's not necessary for the bottoms to be visually perfect.

Coat all four edges. Work the epoxy into the edge grain, then smooth it out with long brush strokes along the edge. Allow all to dry a few hours, then apply a second coat in the same manor. Don't let the first coat dry more than 24 hours or you may need to sand and prep everything again before applying the 2nd coat. Remove the masking tape from the veneer surface before the epoxy sets if possible. If working in a cooler place, total cure could take a week, or even more. Once cured you can then continue the top surface restoration.

#### 4. Sealing the Teak and Holly Surface

Set up away from your sanding area. Make sure your area is as dust free as possible. We use a separate dust controlled room for our varnishing and use dust removers when working down below on board.

We vacuum every surface on board as well, bulkheads, headliners, curtains, lockers, etc. Mask as necessary.

Raw plywood veneers need their soft fibers sealed before applying varnish. This can be accomplished with a very thinned-out varnish, but I recommend using Interlux 1026 Wood Sealer for this purpose. Give a final solvent wipe to each board just before you start it. Next, lightly go over the surface with a tack cloth. Don't use it flat, like it comes out of the package. Peel all the cloth folds open and then lightly wad it all up. Don't rub hard; just wipe lightly to pick up any remaining loose particles.

The sealer is quite thin and can quickly be applied by foam or traditional brush. Start about 12 inches in from the edge and apply the sealer out to the edges. Apply it across the grain and then brush it out in long strokes along the grain. Work towards the wet edge; always lay the freshly dipped brush down into an uncoated area about 8-12 inches from where you just coated, then brush into the coated area, picking the brush up like an airplane taking off as you reach the previous wet edge. Continue this pattern over the whole piece. Apply one coat of sealer to everything. Much of this first coat will be absorbed. After drying, look for a shiny consistency. If there are still dull areas, you'd want to add a second coat. Don't sand between the first and second coats. Let the 2nd coat dry overnight. Move boards away from the varnishing area. Very lightly sand the sealer with 320-grit paper on a soft sanding block. Be careful not to sand through the sealer. Key word: **lightly.**+Vacuum all. Solvent-wipe. Return to varnishing area.



## 5. Varnish Coating

The finishing application can be done in a number of ways. You can spray it, roll it or brush it. We use all three methods depending on circumstances. Here, since spraying is not feasible for most readers, we recommend a roll and tip/brush method.

Your choice of varnish will determine how many coats you need or want. For cabin soles, which get a lot of shoe traffic, a polyurethane-based varnish is a good choice. We often use Interlux's Goldspar line. Choose their #60 for a satin finish or #95 for gloss. There are many other quality-made brands available, but be sure to pick one made for the marine environment.

So, do you want a gloss finish or satin? Some say satin is less slippery. I say it just looks less slippery. However one good thing about satin is that you won't need as many coats to make the surface look smooth. Usually 4-5 coats of satin will leave a very nice finish. Though that same number of gloss coats may be sufficient, it will definitely not look as smoothly finished. The gloss highlights the grain and every imperfection in the wood, while satin seems to hide everything. Though 4-5 coats won't completely fill in all the grain so the finish is smooth, with a satin finish, it will look smooth. It will take many more coats to achieve a smooth look with gloss. But a well-prepared and heavily coated gloss finish is magnificent when you step below.

Remove any masking tape that was used for the sealer application. Now mask those areas again for the varnish. Be sure to change the masking every 2-3 coats, max. Too many layers of dried-on varnish will create major problems later on when trying to remove the tape.

If using satin varnish, be sure to stir the varnish lightly while it's in the can to evenly distribute the flattening agent. Never shake varnish. And don't use it directly from the can. Pour it through a strainer into a paint pot of workable size. Add a small amount of the manufacturer's recommended thinner for better brushing flow. No more than 5-10% should be added unless you are using it in lieu of a sealer. Thinners thin so don't use too much or you'll need more coats. In this case you will be rolling the varnish on, so pour the varnish into a roller tray with a disposable tray insert. JEN brand foam rollers are great for this application. They come in 9-inch sleeves which can be cut to 7-inch if that's the size of your roller frame. The 7-inch size is a bit less cumbersome.



Give a final solvent wipe. (A spray thinner, rather than mineral spirits works better here because it evaporates more quickly. We use Interlux 216 Thinner or Epifanes Spray Thinner.) Then use the tack cloth.

Roll on the varnish, covering an area about 2-foot square. There will be hundreds of air bubbles, but don't be too worried and don't overwork the roller or that will add even more bubbles. Now use a 3-inch JEN foam brush to tip out the rolled varnish. Always work towards the wet edge and brush in the direction of the grain. Start the brush on a dry section next to the rolled varnish and lightly sweep into the wet area. Use long strokes. Fill the roller with varnish again and apply to the next 2-foot square area, barely over-lapping (if at all) the last wet edge. Tip it out with the brush going from dry area through the newly rolled varnish and releasing easily as you move into the previously tipped area. Continue this over all boards, trying to spread a consistent amount of varnish throughout. Don't start the brush in a wet area and never attempt to touch-up or brush more varnish on an area that has begun to settle, which is normally within 2-3 minutes. Each time the brush loads up with excess varnish, clean it off into a separate catch-pot, not on the edge of the roller tray. This will be a frothy mixture you do not want getting back into the good varnish. You want the brush to be wet, but not overly full and definitely not frothy.

Once coated, let dry overnight. Lightly sand with 220-320 paper by hand. Vacuum, solvent wipe, tack. Recoat as above. Remember to move the boards to a sanding area away from the varnish area if possible, every time you need to sand between coats. Apply at least 4 coats for satin finish or 7-8 coats for gloss, minimum. Use a new roller tray insert, foam roller and foam brush for each new coat. Always allow 24 hours minimum between coating and sanding/recoating. As the coats build up, the surface will become smoother after each sanding. Be sure to sand between all coats with 220-320 paper. Removing dust before applying each coat is important, but removing all dust before the final coats is imperative, especially when using gloss.

When applying the final coat or two, I like to use a high-quality 3-inch badger brush, rather than a roller. It takes longer, but with an experienced hand can yield a near-perfect finish.



## 6. Drying

Just because the final coat has dried on the surface, it won't be safe to reinstall the boards and start walking on them right away. Varnish takes a long time to fully cure. The more coats, the longer it takes for all the solvents to evaporate out. Lower temperatures also slow the curing process, so try to keep the finished boards above 55 degrees, though that may not be possible on the fixed pieces. But keep the curing process in mind. 8 coats of traditional varnish could take about 2 months to fully cure. Polyurethane varnishes cure a bit quicker. Wait 2 weeks, if you can, even before you walk around in bare or stocking feet.

## 7. Finishing Up and Maintenance.

After reinstalling the sole back into position on board, you'll want to stand guard at the companionway for anyone who tries to go below wearing shoes. It's a good habit to leave shoes off below anyway, except maybe underway. Shoe bottoms will wear away the varnish much quicker and require that you refresh the finish more frequently. If you get into the habit of no shoes below, you should be able to go for 3- 4 years before its necessary to freshen things up with a couple of new coats. Even longer if you aren't that picky about a little wear showing. But always keep an eye out for moisture intrusion. If it's still finding a way in, it can wreak havoc on your newly restored cabin sole. Always wipe up around the companionway area, especially after a rough sail. If rain gets in from a left open hatch, be sure to dry it up right away. It's not that the varnish surface can't handle it, but any inaccessible edges that could not be epoxy-coated will eventually absorb water if it's left to work its way in.

Clean the sole regularly with Murphy's Oil Soap or simply with a damp rag moistened with a white vinegar and water mix. Don't use waxes or coatings on any varnished surface or you may contaminate that surface giving you problems the next time you try to add a fresh coat. Always clean before sanding a varnished surface for maintenance coating so you don't sand the dirt or other impurities into the existing

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