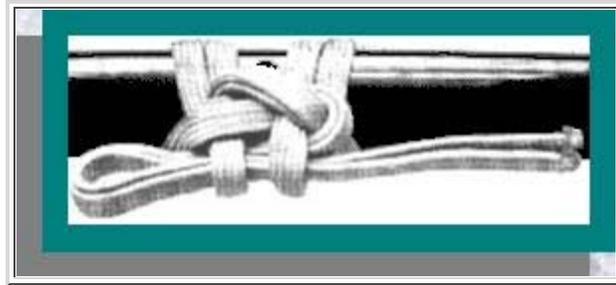


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## ***Saya Lacquering***

### ***How to put on a mirror finish***

*written and illustrated by Thomas L. Buck, Ph.D.*

#### **Form & Function -**

Lacquer's place in Japanese history goes back to the Jomon period. The Tamamushizushi shrine in Horyugi Temple is widely recognized as the oldest lacquer painting in the country, and the Shosoin repository holds famous lacquer works from the Tang dynasty. A deep glossy splendor glistens from the layers of these lacquered pieces - a polish that confers a suppleness, a warmth, a feeling of weightlessness.

The surface polish of an object can enhance that object's form, much as people express their individuality, or reveal who they are, through clothing or image preferences. Polished lacquer does not only affect our response to a form, it defines the form. A polish's relationship to form can be explored in the same way that an individual's feelings are expressed through language and movement, or timing and grace. Such combinations offer dialects which surpass conventional language, and force a deeper emotional response from the observer.

finish, by the time a surface defect manifests itself in the lacquer film, it's usually too late to correct it.

**Step 1:** Preparing the surface - Looking straight into a surface you can pick out obvious flaws like scratches, nicks and holes, but if that is all you do, you miss most of what will become painfully obvious later. To find less pronounced defects you will need to position a light source and your eye so that shadows are created and observable. Imagine a landscape at the moment the sun is setting. The subtlest of features casts a shadow. Once you are in the position to view the topography, you must keep in mind what you did to the surface and anticipate the effects.

If you hand-planed the surface, there may be long, sharply defined ridges that follow the path of the edge of the plane iron. A machine sander will produce a more scalloped surface, the radius of the disk arc repeated. Sanding and scraping may yield more varied effects, especially as the density of the wood varies. Sanding removes softer areas more quickly than harder areas. If the wood grain is uneven you can expect the surface to be uneven although you have taken care to work consistently. From the 'sunset' perspective, the relatively dense areas of the wood will stand out from the surface and will reveal shadows following the grain.

High-gloss lacquer finishing on a saya is time-consuming and demanding. It requires precise surface preparation and a carefully followed schedule of application with constant examination and correction along the way. If correctly readied, a good lacquer finish has the quality of a mirror, if improperly prepared, it will unforgivingly reveal every irregularity in the surface. It is especially important to learn how to judge the quality of the wood surface before you apply any

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in line with the length of the saya and its curve, and to release pressure from the paper at the end of each stroke, to avoid swirl marks.

Avoiding the risks of scraping requires more skill. Scrapers work most efficiently on tightly grained or dense wood; softer or looser grained materials compress under the cutting edge instead of standing up rigidly to be cut down. Consequently, the scraper's effect on the landscape is opposite that of sandpaper. The softer areas spring back after the scraper has passed, leaving them higher than the denser area and producing a ribbed surface that can look like a neatly plowed cornfield at dusk. The correction is a quick follow-up sanding with a hard backup block.

Other trouble areas surround the designed-in features of a saya's surface: slots, round holes, intersecting edges and the like. Scrapers and sandpaper tend to fall into slots and holes, producing general depressions around them or, in the case of scrapers, troughs radiating out from them. Only hard sanding blocks can save you. Inside junctions require planning and perhaps a specialized tool. If the surfaces adjacent to the seam have their grain running parallel to the crease, it's not hard to sand smooth. But if the grain of one or both surfaces runs at an angle to the seam, you may have to be more restrictive in the type of care that you pay to that surface.. The hidden danger of working around any problem area is that it encourages special attention, resulting in a local surface that's inconsistent with the rest of the object.

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When sanding, back up the abrasive paper with some hard material - wood, hard felt, rubber blocks, or posterboard for both the flat and contoured surfaces of the saya. Your paper must not be able to conform to the irregularities you are trying to remove. Take care also to sand

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Lacquer is a low-wetting finish, which means it does not noticeably saturate the wood, but lies on it as a film. The surface tension of this film will draw it away from any sharp edge, leaving little there and making it easy to sand through later when leveling between coats. Therefore, as part of your pre-finishing surface preparation, soften, if not actually round, all edges of the work to be sure they will remain adequately coated. The slight falling off of a surface as it nears the end has another advantage. It compensates for the tendency in leveling between coats to do extra work near the edges which makes it more likely you will sand through the film there. This relieving the surface near the edge prevents time-consuming spot repairs later.

Once all surface irregularities have been removed and all the edges have been prepared, you can begin final sanding with fine papers backed by hard- felt or rubber sanding blocks. Hardwood blocks with coarse abrasive are good for dimensional leveling, but fine papers on hardwood blocks tend to glaze and will streak the surface with burnish marks. There's little value in finish- sanding beyond 320 grit. You will see some improvement of the surface past this point, but once lacquered the surface will return to what it looked like at 320 grit. Also, grits finer than 320 do little more than burnish the wood, making it more difficult for the lacquer to stick without blistering.

**Step 2: Materials, Equipment & Application -** Basically, there are three types of traditional Japanese lacquered finishes: shellac, lac and varnish.

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Shellac is gleaned from the solidifying secretions of insects that colony on trees in Thailand and India This material is liquefied, refined and broken into small pieces. It is marketed as "orange flake" or "French shellac". You can also obtain a bleached shellac.

Lac is derived from the sap of the poisonous oriental tree, rhus vernicifera, and is refined several times to produce "flake lac", a glossy but brittle lacquer of varying degrees of purity.

Both lac and shellac dry to a clear surface with a slight orange peel texture, and are soluble in denatured alcohol or turpentine.

Varnish is a mixture of resin (copal, mastic, damar or sandarac) in a solvent. There are two types: oil varnishes, where the resin is melted with a drying oil and then thinned with a solvent; and spirit varnish, where the resin is dissolved directly in a solvent such as denatured alcohol or turpentine.

These lacquers can be applied by brush, pad or spray, and in most cases the quality of the finished product will be the same. But because some of the materials used contain resins and oils that are dissolved by lacquer thinner, the finish can get muddy and the discoloration can get dragged around with a brush or pad. Otherwise, the steps in the finishing process are basically the same for brushing or spraying, the only differences being in the speed of application and the time involved in leveling the finish.

Essentially, lacquering consists of three stages: filling, leveling and polishing.

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The process begins with the application of a sanding sealer diluted with an equal amount of lacquer thinner. Sanding sealer is a kind of lacquer specially formulated to raise the grain of the wood, to provide a base for better adhesion and to be easily sandable. It gives you a preview of the finished surface, allowing you to locate and repair any imperfections.

After perhaps an hour's drying time a wood filler can

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Throughout, you should be inspecting the surface for defects and correcting them.

One chief concern of the novice is how many coats of lacquer should be applied. This consideration shouldn't be viewed in the same way as it is for painting: painting is accomplished when the surface is opaquely covered. Lacquering is not simply a covering job, for lacquer is not clear paint. On bad lacquer jobs you can actually see two surfaces, a thick layer of clear plastic and under that the surface of the base coat or wood. Done properly, however, you see one polished surface that emanates a uniform sense of depth. It is gotten that way not by the mere addition of clear stuff, but by a cyclic process of adding material and sanding it off until the surface being treated is truly flat, at least to the degree that the eye no longer distinguishes any texture. Only enough material must be left on the surface to enable you to polish it without breaking through to the base coat or wood. So the only answer to the question "How many coats?" must remain simply "Enough," that is, however many coats it takes to complete the job of leveling and polishing.

Effective application technique is largely a matter of speed and consistency, graceful motion and thoroughness. You are trying as quickly as possible to coat a surface evenly and completely, with no unblended areas. In effect, you want to have the entire object wet at once. To do this, you must move quickly from surface to surface in a preconceived patten that will ensure thoroughness, with tightly spaced strokes that overlap each other and the objects edges.

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floods the surface, leveling itself to a mirror gloss just one taste short of drooling. This welds the material to the previous coat and ensures adequate film thickness. As the lacquer coats build, a thoroughly wet application is necessary or a layered structure will result, which is prone to blistering and ghosting. Also, because of the low solids contents of both lac and shellac lacquers you need the thick coat just to have anything left after the thinner has evaporated. Straight

be used on the open- pores of the wood. Most wood fillers consist of chalk, plus a touch of clay and pigment, carried in a mineral spirit or naphtha vehicle. The pigmented chalk is left in the pores of open-grained woods, where it fills most of the space. Thin the filler about 25% with naphtha and apply it with a rag, working the surface across the grain to clean off all excess filler. For woods with large-pores a second application may be necessary after three hours' drying time. Eight to twelve hours later, sand the surface clean with 320- grit paper to remove filler residue and raised grain. You will sand through the sealer coat in places, making an awful mess, but the next coat of sealer, applied just like the first, will blend perfectly.

The surface will now appear improved but not yet truly flat, and it will take the remaining sealer coats, applied heavily but sanded almost completely off, along with the colored lacquer base and subsequent clear lacquer coats, to complete the leveling process. These will be spread out over a period of days, with no more than four coats applied per day. On the first day I stay with the sealer, applying three wet coats one to two hours apart. A wet coat means that the solution is applied so heavily that it

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matte surface with no shiny spots, but may sand through to the wood in places. When this happens apply more sealer and sand again, until there are no shiny spots anywhere. Now employ one las coat of sealer to coat any wood that has been sanded bare, and begin applying the colored lacquer base.

To color the lacquer base, use only japan paints or dry poster paint (flat opaque pigments in an oil-free varnish), toning it down with lampblack and burnt umber to suit whatever effect you are trying to achieve. Keep in mind that when varying pigments are mixed, if the tonal value is below medium, it will appear darker when dry; if above medium value, it will appear lighter. The lacquer is usually diluted with an equal volume of thinner, and it's applied at the same rate as the sealer, a coat every hour or two, no more than three coats per day. Let dry over-night and sand with 320- grip paper the next day. Repeat this

from the can, the solids content is about 20%, and when mixed with equal amounts of thinner it is 10%. Compared to varnish, which is about 50% solids, this is like mixing one quart of varnish with one gallon of thinner.

Perhaps the most important thing to understand about this low solids content is the fact that while the thinner is evaporating, the lacquer film is shrinking. Only one- tenth of what you spray will remain as a film on the wood. The rate of evaporation and shrinkage is extremely fast as first, so the surface can be touched within minutes of being drenched. But the evaporation rate decreases rapidly, and enough thinner is trapped with the film so that shrinkage is still perceptible after a week of drying. It is bad practice to apply more than three, at most four, coats of lacquer without allowing an overnight dry to let most of the trapped thinner escape. Otherwise, the thinner will be buried under so much lacquer that it may take weeks to evaporate completely.

After the first three coats of sealer dry overnight, sand the surface thoroughly with 320-grit paper on a block. This dulls the shiny surface, but the low spots will still shine. The goal is a uniformly

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action with the back side of the wet paper.

Finally, with a fine abrasive polishing compound, such as Semichrome or Blue- magic, and a lamb's- wool or soft cotton pad, complete the polishing process. To avoid dirt scratching the surface, the compound should be applied to the pad, not to the surface. Use buffing compound sparingly and wet it frequently with water to create a slurry that helps to float the surface clean and keep the abrasive cutting. I usually buff in a circular pattern when using the fine abrasive compounds. When the surface has gained the desired luster, it is easiest to both clean and wax with regular furniture polish.

The quality of the finished surface depends completely upon the success of each step, from the preparation of the wood to its final polish. Critical inspection will reveal when a flaw is created. Once

cycle until you can level- sand the entire surface without sanding through to the wood anywhere or until you can no longer see any details of the underlying wood. Then apply the final three coats of clear lacquer and allow the surface to stabilize and harden for about five days, before final leveling and polishing.

Final sanding can be done with 600-grit paper wet. Use the paper with a soft sanding block behind it and with a reciprocating, in-line motion to prevent build-up of lacquer dust on the paper. The surface and paper must be constantly wiped clean, for this white powder clogs the paper and mars the surface. When free of all telltale shiny spots, wipe the surface clean and continue this abrasive

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you start lacquering, it is too late to repair the early stages, but if you need to relacquer once you've begun polishing, first wash the surface with alcohol and water, 50/50, to remove polishing residue and wax. The surface may be rebuffed at any time in the future with the fine compound to restore its original luster.

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