THE ZEN OF FINISHING REVEALED

Fine Finishing For Improved Sales and Profits_____by David Woodruff 2003

Revised by David Woodruff & Michael L. Jones 2011

Wood has been in my blood for as long as I can remember. My father was a custom gunsmith; so I grew up with wood chips, saw dust, and the rich smell of Linseed Oil. I did build several custom gunstocks when younger but twenty-five or so years ago I was infected by the turning bug. While in the corporate life I turned mostly on the weekends then transitioned to dull time professional turning after retirement in 1995.

I did not invent this process as it has been in use for decades if not centuries. There is no mystery to a fine museum quality finish, just time consuming work and developing knowledge through experience and the confidence that this process is repeatable with practically all woods. Thuya is the only wood I have found to date that is problematic in finishing with this process and with any really oily wood, a good cleaning with an acetone soaked cloth, after final sanding, will provide the desired adhesion results.

The materials and process are detailed in this article. This part of the finishing mystery is cleared up. It is up to the individual turner to determine if this additional time and investment is justified. At the minimum, do some real thinking about the value of your product, the target market and if you are participating in the right venues to optimize sales. A lot of time can be wasted in selling at the your product at the wrong venues. It is most important to match the product to the target market. Sort of like not taking a truckload of refrigerators to the North Pole.

Last but certainly not least, the key elements to this process are "Patience" and "Elbow Grease"

Materials List

Please read the tools and materials list first which will familiarize one with the materials used as the finishing steps are detailed. These are not the most economical materials but they are the best I have used to date with experimentation continuing….always. I would urge you to start with the materials listed and experiment with small changes, one at a time, if you decide to shorten time and/or economize on abrasives. I have found that it is false economy to use the cheaper abrasives. Poor quality abrasives require more time to achieve lesser quality. Like most things, you get what you pay for.

Tools Used:

Angle Drill – Variable Speed and Reversible are desirable features
2" & 3" Hook and Loop Sanding Pads on ¼" mandrel, Hard and Soft – Klingspor
Extension Shafts
Various Diameter Wheels – Round & Flap Variety 1"-4"
12"- 16" Forceps – Craft Supplies USA or Flea Markets
Hard Wool Felt – Half Inch Thick – from MSC (to be used with forceps)

MATERIALS USED: These Materials Have Consistently Provided The Best Results

Note on Lacquer systems: Most professional finishing systems are formulated to be used as such. Do not mix and match components from different companies for best results. Mohawk, Behlen's, Stewart MacDonald Musical Instrument Finishes and Sherwin Williams all have high quality products that provide excellent results.

Vinyl Sealers – 1st layer of finish. Provides excellent bonding and adhesion between wood and finish.
Sanding Sealer – 2nd layer of finish. Use regular or Pre-Catalyzed for closed grains and sound wood.
Heavy Bodied Sanding Sealer – 2nd layer for fast build on porous or unevenly spalted areas.
Pre-Catalyzed Nitrocellulose Lacquer – 3rd and successive coats, Satin and/or Gloss sheens.

Klingspor Gold in rolls – J Flex – Grits 80 – 400
Klingspor 2" & 3" Hook and Loop Discs – Grits 60 – 400 (used with VS Drill)

Norton Champagne Magnum sheets – Grits 400 – 1200 (for leveling between coats)

MSC	**400 Grit**	**item# 70344007 no load**
	500 Grit	**item# 70345004 no load**
	800 Grit	**item# 70348008 no load**
	1200 Grit	**item# 67660050 no load**

Call MSC @ 1-800-645-7270 and request the Big Book, many excellent items are available for wood turners including tool steel for tool making, buy M4 or extreme cobalt in round or bar stock and save $.

Micro-Mesh Wet Sanding Woodworking Kit – (Various Retailers)

18 Micro-Mesh abrasive sheets (two 3" x 6" pieces of each grit): 1500, 1800, 2400, 3200, 3600, 4000, 6000, 8000 and 12000-grit plus a foam sanding block

Recommend Drying Final Lacquer Coats Minimum of One Week Before Wet Sanding To Achieve Proper Surface Hardness.

Liberon 0000 Steel Wool – Item K40 (use only this steel wool)
Packard Woodworks Inc. – www.packardwoodworks.com

Polishing Compounds: (available at auto finishing stores)
3M Finesse-it II®, or Meguires Deep Crystal® Car Polish
Use with soft cloth to achieve high gloss.
To reduce gloss, lightly dry buff with Liberon 0000 steel wool.

Renaissance Wax – (Available from Craft Supplies USA 1-800-551-8876)
Follow directions – use sparingly.

Cyanoacrylate From CPH International – 1-800-900-GLUE (4583) or www.starbond.com
The Best CA at the Best Price – EM-02 (thick) and EM-600 (thin)
Many Uses: sealing cracks, hardening soft spalted areas, securing bark when natural edge is desired, securing waste block to work piece, rim inlays, mineral inlays or just making wood do what you want it to do.

Finishing Sequence:

After 12-24 months of air drying and skim turning, finish thinning and shaping the vessel at 8%-10% moisture content (NC region) and begin sanding and finishing. Be sure to use very sharp tools with light pressure on the final smoothing passes on your vessel. This will greatly reduce the amount of sanding which in turn reduces the amount of problematic heat generated.

Power Sanding Your Turning:

Note: Precise surface preparation at each stage makes the job easier and more satisfying and eventually much faster.

After final turning and re-shaping, begin sanding inside and out with a proper grit of sandpaper depending on degree of tool marks and curve discontinuities. Use 12" forceps with Gold Cloth wrapped around a 1" x 2" piece of half inch thick hard felt for sanding inside the vessel. The VS Angle Drill with extension, Hook and Loop pads, flap wheels, etc. may also be used for interior sanding. The VS drill should counter rotate to work piece and be steadied by the tool rest or better yet a yoke type guide such as the Irons Tool Post. When sanding inside the vessel make certain to vacuum or used compressed air between grit changes to remove abrasive particles remaining from previous abrasive.

Progress through grits up to 320 being certain to remove all tool marks while preserving and improving curve continuity and overall vessel shape. The above process is done with the lathe turning at 200 – 1200 rpm depending on size of the work piece. If the wood or paper begins to feel warm, reduce speed, reduce pressure and change to a clean sharp piece of sandpaper. Excessive heat will cause heat checking and also distort your vessel. Reversing the turning direction between grit changes achieves faster and improved results. (BE SURE chuck or faceplate set screws are tightened to prevent inertial unscrewing when turning in a clockwise direction) This is the last time I sand with the lathe turning and/or use any power tools for sanding, buffing, etc. From this point on, I use only hand power but keep the piece mounted to a faceplate or waste block to utilize the lathe as a rotary vise.

Final Sanding / Lacquer Application:

Stop the lathe and with the piece still mounted, hand sand using 400 & 800 grit Norton Paper, sand with the grain or vessel direction to remove all concentric lines as a result of previously sanding while turning. After you are satisfied with the surface appearance begin the application of 2-4 coats of Vinyl Sealer. Spray fairly close and wet. Apply each coat of sufficient quantity just before creating runs. The initial coats are applied until the wood surface does not show dull spots. (Will vary with different woods and indicates the wood is saturated). Allow sealer to dry overnight. Apply 3 – 5 coats

of sanding sealer in 15 minute intervals and allow to dry 24 hours, then hand sand with 400 – 600 Norton Paper. It is not necessary to sand down to the wood, although some areas will sand through. The sanding sealer coats have high solids to build film thickness quickly. The objective here is to level the surface while removing the inevitable runs and raised wood fibers. If you did sand through, spot in with sanding sealer and level again after 24 hours. A light buffing with Liberon Steel Wool will improve the surface for the next lacquer applications. If surface is relatively smooth and level, apply Pre-Catalyzed Lacquer in 4 – 5 coat sessions, allowing them to dry for 48 hours before scuffing and light leveling. Some woods may not require as much sanding if care is used in building up lacquer thickness. Occasionally, on softer or spalted woods I have applied 15-25 coats with minimal sanding due to the nature of the wood. Allow lacquer to harden minimum of two weeks then proceed to level with 600 & 800 Norton Champagne paper.
This step is to achieve a flat, smooth and uniform lacquer surface. Be sure you have not sanded through to the wood at any point. Apply several more coats of lacquer, (4 or 5). Allow lacquer to harden for two weeks minimum. Examine the surface appearance for runs, bumps, orange peel, etc. and lightly level the surface with Norton 600 or 800 grit again and buff with the Liberon 0000 steel wool. (Recommended, but may be unnecessary – your call). It is better to err on the side of more coats than less. This is an experience judgment. When you feel you may have sufficient coats, apply two more. That is better than having to apply additional coats after having wet sanded through the lacquer surface to the wood. Careful application of these final coats of lacquer will make the wet sanding process easier and quicker.

Leveling and Polishing:

After the final coats of lacquer have hardened (minimum of one week, more is better) lightly dry sand with Norton 800, 1200, then further reduce scratches and orange peel by wet sanding with Micro Mesh Abrasives 1500 - 4000. Immerse the Micro Mesh wrapped around the foam block into water and lightly sand the surface using circular motion. Use paper towels to frequently wipe off the white residue. Keep sand paper wet frequently with fresh water to eliminate the small pills that build up on the sandpaper and scratch the lacquer. Do not over-sand, as this will eventually remove all the lacquer down to the wood surface. This is an important step in the final appearance of the finished piece. Wet sand only sufficiently to achieve a uniform dull appearance. If you see very small shiny dots this usually indicates that a little more wet sanding is required to further level the surface to reach the lowest areas of the orange peel surface. Drop back to a coarser grit if need be. Experience is the only teacher in this process. The objective is to just level the surface of orange peel, dust and other surface imperfections. If there is a drip or run, wet sand that area only, then blend with the surrounding area. The lacquer must be very dry and hard, to wet sand large runs. Otherwise it is still too soft and will likely peel from the wood. If this occurs, the lacquer must again be layered up to that spot. It is not unusual to have applied 15 or more applications before final sanding. Typically you are applying 3 – 5 coats consecutively in 3 stages. Actually, not that time consuming if you think about it. You might spray for a minute, do something else, spray another coat in 15 minutes or when you think about it, then a third coat, etc., You get the idea. Allow curing for two weeks minimum and working back up to this point.

A level lacquer surface at this point is very important to the visual appearance of the polished surface. A person can look at a nicely finished piece, even very glossy and still not really like the appearance. It is usually the lack of levelness that is unappealing. The eye is extremely critical in detecting even very slight irregularities. It is a matter of learning to understand what the eye is already seeing.

After wet sanding, the surface will be uniformly dull. If you prefer a low sheen apply the Renaissance wax sparingly with Liberon steel wool. To increase sheen use liquid polishing compound is applied to a soft cloth and buff in all directions, finishing with grain and/or vessel direction. If a still higher gloss is desired, wipe residue from piece and repeat polishing step. Remove the polishing compound by buffing with a soft cloth. If you own a lathe with variable speed, it is possible to polish at between 100 and 150 rpm but no faster as this will prematurely dry out the compound. Stop the lathe to buff residue off with a soft cloth or cloth could wrap up causing serious injury. The objective is to develop a uniform sheen with as much gloss as you desire. At this point apply Renaissance wax sparingly with a soft cloth and be certain to go over the same area several times. It is important that no visible wax streaks can be seen, hence the need to overlap the same area several times. This wax dries very hard and streaks are difficult to buff out. If the wax has been properly applied you can buff with a soft dry cloth after 5 minutes or an hour or next week and achieve a very nice gloss. A second application in a month or two provides lasting protection. I choose not to power buff because often the wax is totally removed in some areas but usually not noticed until the piece ages a few days, and then the dull spots appear. I go to this degree of effort first to satisfy myself, with the second objective being for the completed piece to look as nice two or

three years later in my customer's home as the day it was purchased. I double turn after drying to around 6% moisture so the curves will not change due to the piece continuing to lose moisture or the wood discolors over time because a piece has been finished with 15% + moisture trapped in the wood. I have known turners that finish basically green wood and wonder why the piece mildews under the finish and looks like…. horrible in a few months.

I ADMIT IT ! I AM A FINISHING FANATIC ! I NEED HELP !

BE PATIENT, DON'T TRY TO COMPLETE A NICELY TURNED PIECE IN ONE DAY!

I use Renaissance Wax due to it's Non-Fingerprinting Resistance as the pieces at an art exhibit are handled numerous times. Even if a person has been eating barbecued ribs the gunk wipes off easily and the sheen is still there.

Personal Note: The process I have just described is not the only way to achieve a very smooth, aesthetically pleasing finish that looks good and feels silky smooth. It is the process I have worked out for my pieces and is the process I can duplicate every time, with any wood. It is predictable and I know how the finished piece will look every time. This process also provides wide flexibility in the choice of gloss levels. I did find out through trial and error that not all lacquers, abrasives, steel wool, waxes, etc. are created equal. The products I use and have listed here are not the most economical, but are the best and most consistent that I have found to date. I never stop experimenting, trying to learn or improve my art.

At first this finishing process will seem very time consuming, but just as in turning you learn to do the various steps quicker and soon you will find that the end result will justify the extra time and effort. A wise and experienced wood worker (my father) taught me a long time ago, "that when you begin sanding on a project, your work is half completed."

I truly believe the way a piece feels to the touch is just as important a selling point as the way it looks.

Suppliers List:

CPH International – 1-800-900-GLUE (4583) or www.starbond.com
Stewart MacDonald - US & Canada 1-800-848-2273 or www.stewmac.com
Klingspor's Woodworking Shop 336-768-9663 (Winston) www.woodworkingshop.com
Craft Supplies USA 1-800-551-8876 or www.woodturnerscatalog.com
Norton Abrasives – www.nortonabrasives.com (information only)
MSC Industrial Supply – 1-800-645-7270 or www.mscdirect.com
Liberon Finishing Products – www.liberon.co.uk
Packard Woodworks Inc. – 1-800-683-8876 or www.packardwoodworks.com