

Glue Blocks—Cool...But Not as Simple or as Safe as You Think

Some Wood Science and Pragmatism

Wells Shoemaker, January, 2022

Many turners, especially those who started in the previous century, used glue blocks and a face plate to attach a blank to the lathe. The block made it possible to turn a bowl without without running screws into the finished vessel and leaving ugly marks on one's bottom. (*Hey, nothing personal!*) It was inexpensive, simple, and effective...but slow.

Now most of us use chucks as our primary attachment. Ah, but there's an overlap. A thin blank can make a nice platter or shallow bowl, but there may be insufficient wood to form either a tenon or a mortise. So how about using the glue block to make a tenon to grip with the chuck...and then just turn it away when you're done? *Well, yes of course!*

However, there is a trick to using a block you intend to grip mechanically, as opposed to screwing to a steel plate. That trick has to do with:

1. What kind of wood you choose for the glue block
2. The grain orientation—tangential versus quartersawn
3. Centering it on the blank, and
4. Proper gluing.

This content gratefully derived from a fine presentation at the 2019 Oregon Symposium, teaching at Craft Supply in Provo, reading in Aptos, and lots of practice in my shop.



1. Choice of Wood:

We may call it a “scrap block” or a “waste block,” not really high compliments, but this piece of wood is almost as important as the wood of finished bowl...just smaller and destined to become shavings. (Craft sells a 5-pack of marginally thin blocks for \$10.) The ideal block to grip with a chuck will be:

1. Tight grain, non-porous hardwood, such as maple, cherry, walnut, or sycamore. Oak and ash are fine...most of the time (see grain section below)
2. Possible...but not great...to use softer hardwoods like poplar, alder, & avocado
3. Decline to use compressible softwoods like pine, fir and hemlock construction lumber, modern redwood, and definitely not cypress! If you do anyway...pay close attention to the section on grain below
4. Avoid resinous and exotic woods—glue adherence can be sketchy
5. Bone dry. A glued-down, damp blank that shrinks is going to crack. Headache.
6. No cracks, knots, or flaws. (Don't want to “waste block” your forehead!)
7. At least 1” thick so you can grip with the full depth of your chuck jaws (7/16 - 1/2”)
8. As large a diameter as feasible, ideally >3”, more the better. 6” for something >15” diameter.

2. Grain Orientation, and a Special Mention of Plywood

The grain orientation of the glue block is often overlooked in the haste of mounting a lovely blank, but remember that if your block loses integrity, you'll have a UFO—Unintended Flying Object—right in your shop! Those UFO's can be headhunters.

Let's look at the critical difference between tangential and quartersawn grain blocks, and then address plywood.

Tangential Cut: Looking sideways at a tangentially cut piece of wood, you'll see layers of sequential growth rings one above the other. It won't matter too much if the center pith of the tree would be towards the top or the bottom of the blank for this work



*Tangential cut (D = 4")
Possibly durable enough for
a lightweight little bowl*



*Tangential cut redwood 2nd growth/unreliable
1/2" growth rings of soft/punky wood + a crack
Almost certain to fail under stress*



Tangential cut, 8" diameter, tightly spaced growth rings, from a very large tree. Might get away with this one as a block for a big platter, but better destiny a bowl!

1. The annual layers of wood are held together by relatively weak bonds for some species. They can shear off with no warning under the magnified stresses typical for a small block serving as the center of force for a larger, heavier blank spinning at brisk RPMs and handling pressure and shocks from cutting tools...and catches.
2. The strong long fibers of the wood are running parallel to the face...which won't help you much when twisting torque tries to pull it apart.
3. Those annual layer-to-layer bonds are notoriously weak for some woods which have dramatic contrasts between the density of summer and winter wood (e.g. Doug fir)
4. It's additionally concerning if your board comes from sections of the tree close to the bark (sap wood) where the juvenile bonds are weakest. Pick a piece that's been in the tree longer!
5. Clamping the dovetail jaws into a tangentially cut tenon can actually act like a splitting wedge driving right into the weakness! With torque added, it can just pop off, leaving a wafer in your chuck and your blank stuck in the sheetrock on the far side of the shop. I don't know any turner who hasn't experienced this...but once is enough.
6. We've all split wood for the fireplace and for kindling. Wood that splits really easily...such as fir, pine, redwood, and even some hardwoods like ash...tell you that those bonds are weak and shouldn't be trusted with your nose, teeth, and brains.
7. Face shields are for dust and chips. They won't help you with a full-frontal conk.

Bottom lines: Tangential cuts—bad choice for glue blocks in general. Don't trust sap wood from conifers and be cautious with peripheral cuts from hardwoods, too.

Quartersawn Cut: Looking at a quartersawn block sideways, the annual growth rings run vertically like a comb, not flat like a layer cake. The long fibers of the wood are not likely to shear off under the stress your lathe can generate. Gripping this tenon circumferentially may actually make the block stronger.

Lots of lumber you might use for a scrap block comes from something in between tangential and quartersawn, which is adequate comfort for the hardwood blocks. Maybe not so much for fir, pine, or redwood. Complex figure is usually helpful to resist shear, but turn down any block with knots, sap seams, spalting, insect damage, or even small cracks.



*Quartersawn block with formed tenon and center awl punch.
Original growth, tight grain redwood without defects...probably OK!*

Plywood: Intuitively, because plywood is glued together with grain layers alternating perpendicular to each other, it seems appealing to use it for a glue block. *Yikes, not necessarily so! All of the critique described for tangential cuts applies. The bonding between the layers is glue, and the often insubstantial wood fibers in modern plywood can give way adjacent to the glue line and the disc can peel apart like a sandwich.*

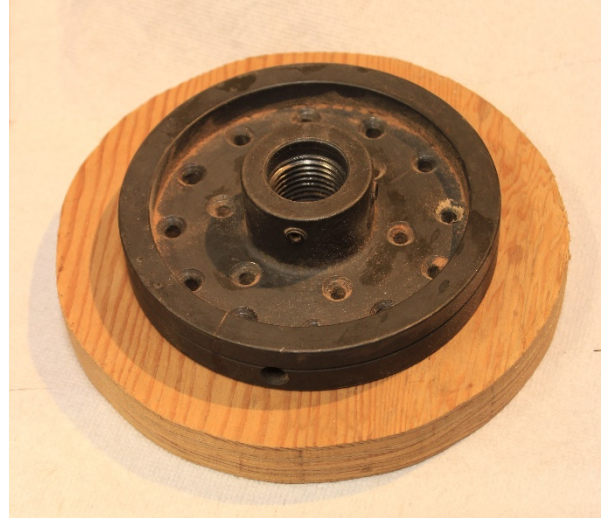
Modern **conifer-based plywood** comes from increasingly soft wood from younger and younger trees, with a disturbing frequency of large voids and substandard internal layers hidden from view (see photos next page). Ply works great as a large, flat sheet, but a small circle can delaminate all too easily with concentrated twisting stress.

Contemporary **hardwood-faced plywood** can be even worse. *Why?* Because the layer you use to glue to your turning blank may be a veneer less than 0.010 thick, and it peels off like paper. Baltic Birch? Maybe, but it isn't available in thickness 1" thickness.

Add to the negativity: Scraps you have kicking around are likely not even a full $\frac{3}{4}$ " thick.



1.25" Subfloor ply, stored well, sound



Thick enough for screws. Skip the tenon.

If you must use plywood, consider screwing a face plate to it rather than making a tenon. Make it the largest diameter you feasibly can. And don't trust the glue in old plywood or plywood that has spent time in the weather.

MDF and manufactured wood might be better. I haven't used it this way.

Bottom line: You can get away with plywood, but better to use something else.

Some Plywood Flaws



Not what you want hiding in your block!



Paper thin hardwood veneer



Ugly gap revealed by serendipity
Weathered and unreliable



Even uglier calamity void

3. Centering the Block on the Blank



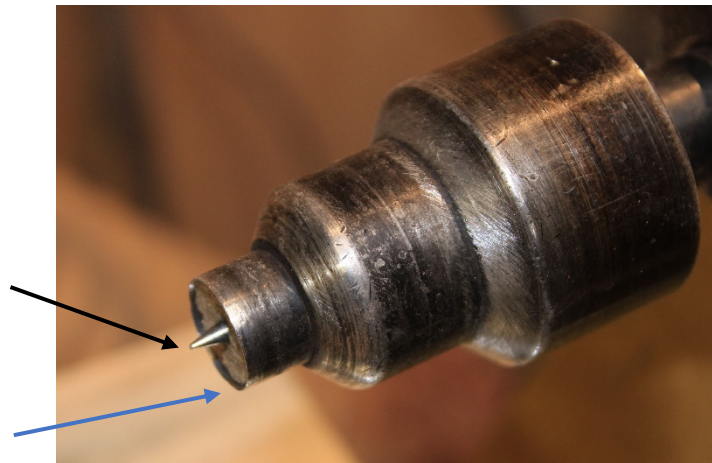
This is lots easier to do on the lathe than it is on the bench.

On the bench, you rely on clamps, which can make the block slip around, losing your center and forfeiting effective diameter of the tenon.

Yes, you can put a wee, shallow dowel in both sides to hold it from skidding, but that hassle isn't necessary if you have a lathe with a businesslike tailstock.

Center it on the Lathe

1. Secure your blank to the headstock with a faceplate or a screw chuck fastened to what will become the open part of the bowl. (Those holes will be turned away.)
2. Engage the tailstock for stability.
3. Face off the bottom where your glue block will be attached. You want it FLAT so the full surface area is adhering. Use a straight edge ruler to get this part right! If it's convex...the block will be riding on a small knob and it will fail. If it's concave, your block will only bind to a ring...not strong. Practice practice....
4. Cut your glue block on the band saw and mark the center point..."pretty close" is good enough, as all of the glue block will eventually be shaved off.
5. Put an awl puncture at the center point. That's where your tailstock pin is going to go. Hint: The center pin with a ring contact point makes the final step embarrassingly simple. Pin keeps it in place, ring gives good clamping pressure.



6. Flatten the surface of the glue block you want to adhere. This sounds so easy...but a piece of “scrap wood” has probably moved over time and it isn’t likely flat anymore. It needs to be clean...no finish, wax, solvents, or oils.
 - a. Sand it on a stationary platform or edge sander, or
 - b. Try to flatten it by rubbing it on a large piece of sandpaper on a flat surface. Flat isn’t easy.
 - c. No harm in gripping the block in a big chuck and facing it off on the lathe
7. Dry run: Bring the tailstock up, test your ability to get the pin in the awl puncture and force the glue block against the blank. Wet run comes next!

4. Proper Gluing: More Choices

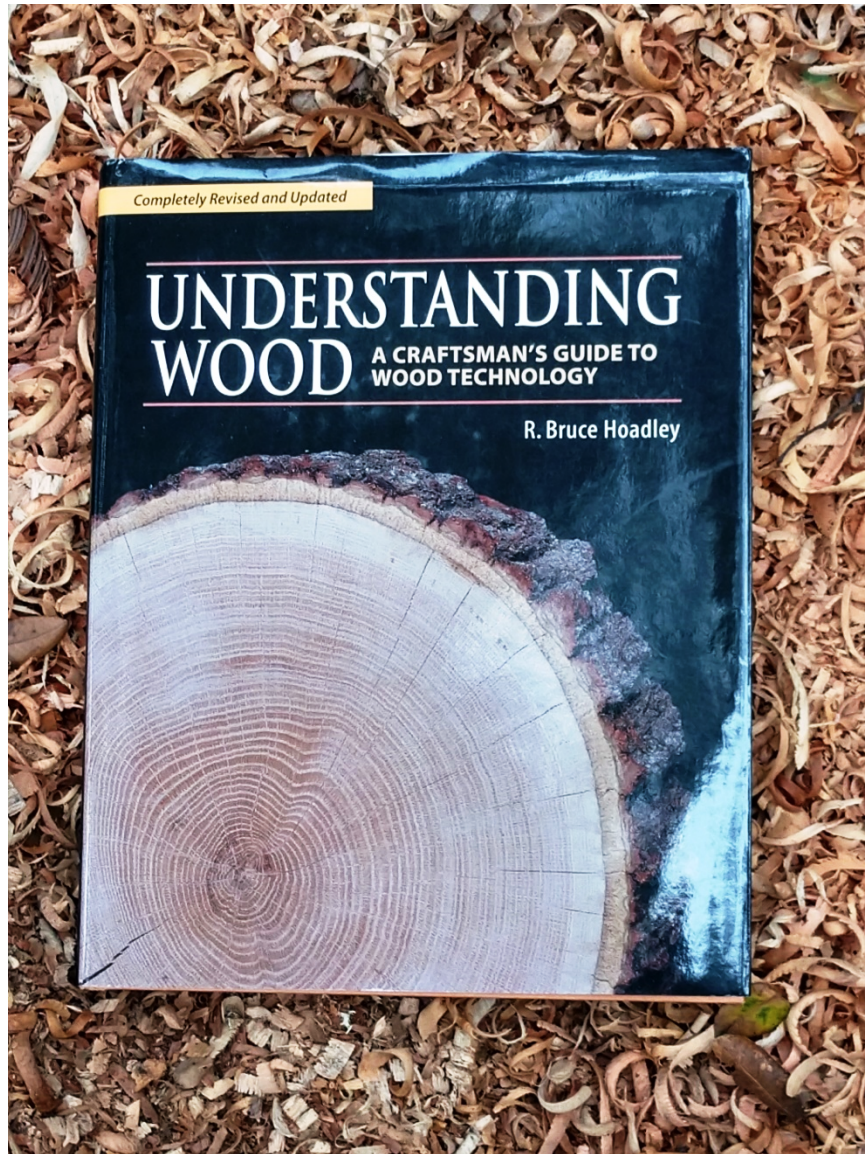
Realistic choices for gluing include:

1. Using the **wood glue** of your choice—PVA glues such as Titebond 1, 2, or 3, Elmer’s white or yellow...doesn’t matter too much. They’re all strong enough. Best to apply glue to both surfaces and allow a few minutes for it to soak in before applying pressure.
 - a. This needs to set overnight, and better for 24 hours, no matter what the package says.
2. **Fast setting glues** are available, as are fast setting epoxies if you’re in a hurry. Even if labeled “fast,” give it plenty of time to gain full bond strength before cranking that puppy up to full RPM’s. Do-overs take more time than the wait.
3. **CA glue.** Not the thin grade, which sets way too fast to get your pieces aligned. It’s also rather brittle with shocks. However, the medium or slow will work.¹
 - a. Apply the glue generously over the surface of the block.
 - b. Put in place with the tailstock holding it just touching.
 - c. **Spin the block** against the flat of the blank to spread the glue well.
 - d. Tighten the tailstock firmly, not heroically! Expect some glue to squeeze out, and catch them with some wastepaper to keep your ways clean.
 - e. Go have lunch and come back ready to turn.
4. While the assembly is gripped so nicely and the glue has set, turn your dovetail tenon the usual way! (1/8” larger diameter than the inner diameter of your jaws for best grip)
5. Take it down, mount it in the chuck, and you’re off to the races!

¹ *Want to be sure it sets properly? When the wet pieces are nearly touching, shoot a blast of aerosol accelerator into the crack and quickly crank up the pressure. The pro demonstrator in Oregon started turning a 6” diameter maple burl within five minutes! That was persuasive.*

And, if you don't have it already, buy this book. It's the 2000 edition, from Taunton Press. Cost around \$45, worth every single penny...in fact, it's a phenomenal bargain compared to almost anything you order for a lathe.

Read one chapter at a time, and take your time. Repeat. I'm still getting new information on the third annual pass...of course, there's also the senior memory challenge.



Thank you, John Wells, for sharing precisely that message with me. I'll pass it on!

Good luck!

Wells Shoemaker, Woodturner

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