

Building a Basic Stool

Working with green wood can be fun as well as simple

by Harriet Hodges



A Windsor stool makes an ideal first project for beginners or a quick exercise for woodworkers who have been at it for a while. A stool comes in handy in most households, and it can make a welcome gift. Tool and wood needs are simple. Hardwood for the undercarriage must be clear and straight-grained, but you can use wood of dubious quality for the seat. The process of building a stool allows for mistakes: I once made a tenon $\frac{1}{2}$ in. too long on one leg of a stool, and it still went together just fine.

Decide on a design

To get started with a stool project, you need to decide the number of legs, style of turning, how tall, seat shape and whether to upholster. You can choose the finish later.

Three legs or four? Even if you live in a house with a pitted earth floor, a stool with three legs will never teeter. Do decide the height now. Legs can be cut down later, but tapers look clumsy when they are sawed off too close to the end, and stretchers look silly too close to the ground.

Turned bamboo patterns are handsome

and easy to make. I would advise against plain legs—they bespeak factory work. Add some coves and tapers or some beaded balls. Why not make your stool interesting or even playful? Make some cardboard templates, paint them black and live with them a little. Leg diameters in the drawing on the facing page are minimums for strength.

A bead or two on the perimeter of a seat makes a nice touch. If you dish the seat, don't overdo it. The dish doesn't add much to comfort. With a leather top—a luxurious touch—a groove accepts the leather and a rattan spline. Or, if you're using a soft wood, brass tacks secure the leather to the seat and add a decorative touch.

A seat diameter of 10 in. to 11 in. is approximate. Larger or smaller works. Allow enough space above the stretchers for two big feet. (I didn't do that on my delicate first stool and quickly renamed it a child's stool.) I like to limit the splay of the legs, but the more stability you want, the more splay you must have.

You'll need a brace and a sharp $\frac{5}{8}$ -in. bit, a bevel gauge, a protractor, a lathe and some turning tools, a thin-bladed saw, a

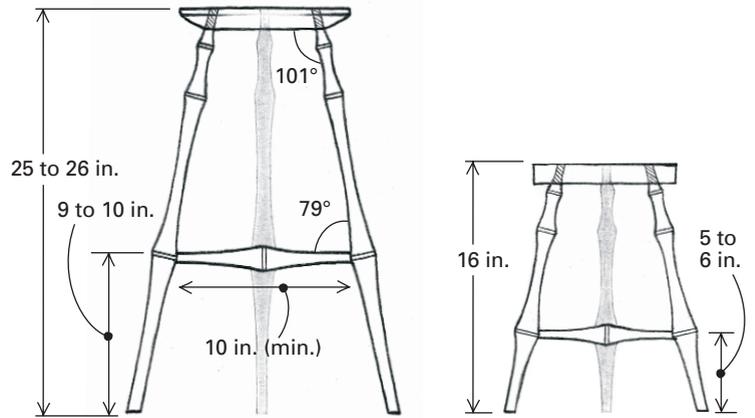
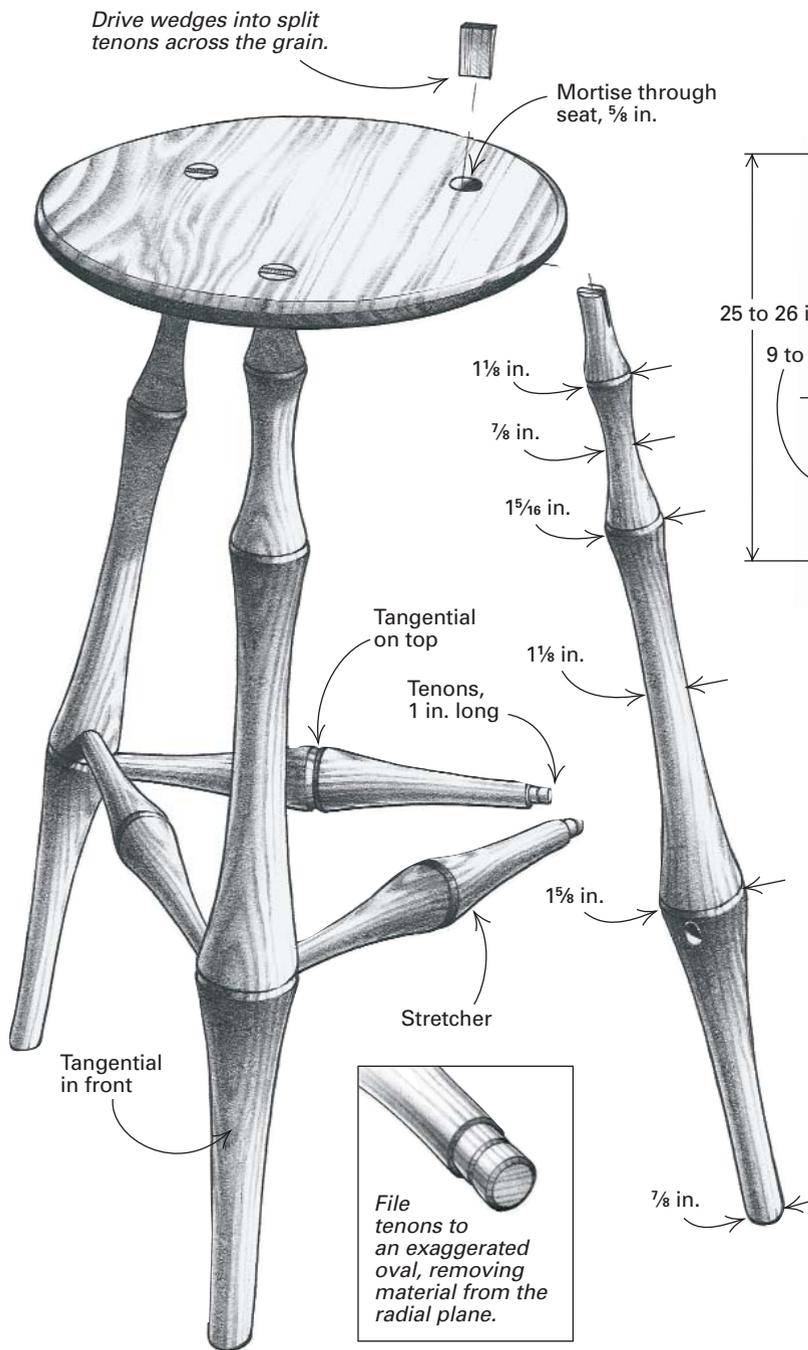
chisel or two, and some splitting implements. Find a reamer (available from Garrett Wade; 800-221-2942) for shaping tapered holes in the underside of the seat and a tap wrench to hold it. Turn a test taper of very dry wood for the tops of the legs. Match the shape to your reamer to use as a master when turning the legs.

For the joinery to hold, the legs must be green hardwood; walnut, maple, cherry or beech all work well. But the seat, particularly for a first stool, should be a soft wood such as basswood, horse chestnut, pine or poplar. The wood will more easily compress around the tenons of the legs and make better-looking joints that go together smoothly. For the legs, secure a bolt of hardwood about 12 in. dia. and as straight-grained as possible. The bolt should be recently felled and, exclusive of the pith and the sapwood, should allow $2\frac{1}{2}$ -in.-sq. pieces to be split from it. Minor defects are acceptable. The leg should be long enough to remove any checking.

Split the bolt with an ax or a froe as close to $2\frac{1}{2}$ in. as you dare. Square up the shapes with a bandsaw if you have one, taking

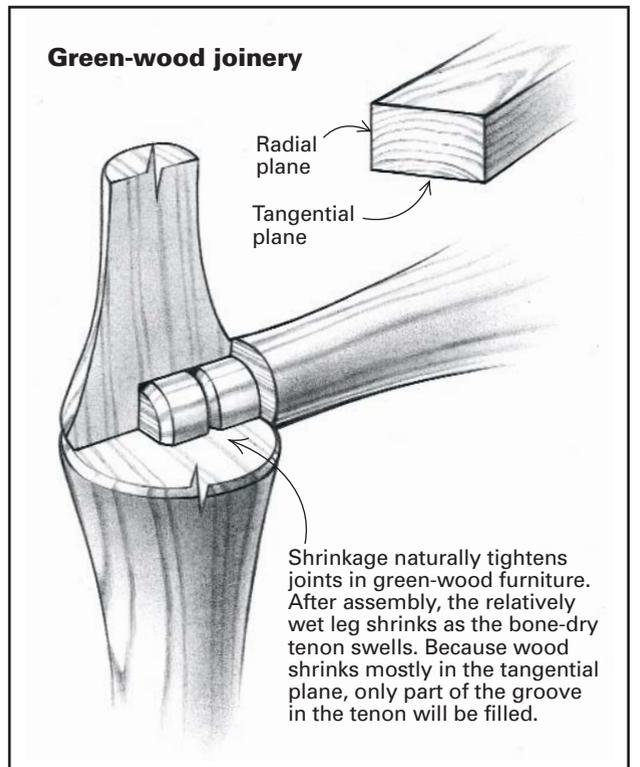
The basics of a Windsor stool

Design details can vary depending on how the stool will be used. Dimensions are those the author often uses but are not critical. Find a shape that's pleasing to the eye. Softwood seats are 1½ in. to 2 in. thick and 10 in. to 11 in. dia. Correct grain orientation is critical to the strength of Windsor stools.



Adult bar or drafting stool

Dining or fireside stool



special care to make cuts parallel to an annual ring in the radial plane. You want to follow the grain of the wood to build in maximum strength. Cutting across the grain allows fibers to lift and form a split. For the seat, almost any piece of 1½-in.- to 2-in.-thick wood is fine as long as it has been dried for at least six months and has been stored outside to around 30% moisture content. Have on hand some dry, straight-grained hardwood for wedges.

Turn the seat and legs on a lathe

I like to use an English prick plate and double-faced tape to hold the seat blank in the lathe. A prick plate is a round blank screwed to a faceplate, through which sharp nail points protrude by about ¾ in. It will, with the tailstock tight against the workpiece, hold a flat blank nicely in the lathe. You can also drive screws through your faceplate into what will be the bottom of your seat. (Call it vanity, but I don't

like screw holes, filled or not.) With either method, turn the underside and the side edges first.

Once you've roughed out your leg stock, cut it to length. Make a story stick of your design, with marks to indicate diameters. Round stock to its largest diameter; turn the middle before heading for the ends. The tenon is the only part of the leg needing precision. It must match your test taper but be a hair oversized to allow for shrink-



age in a makeshift kiln you'll use later.

If you are fairly new to turning, I recommend removing your first leg from the lathe and setting it upright to look at it. What looks good horizontally is often clumsy in the vertical plane—a trick the eye plays. Once you are pleased with the design and proportion of your first leg, turn the rest. Mark the line where the stretchers go with a skew tip. Sand the legs through 220-grit for a paint finish and 400-grit for a natural finish. Moisten them, let dry and lightly sand off the raised grain.

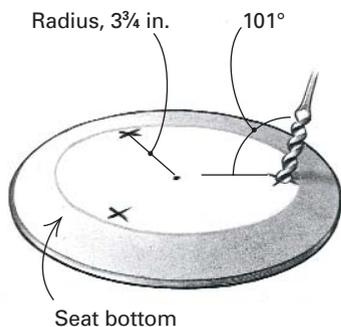
Bore and ream the holes in the seat by hand

You want the leg holes on the bottom of the seat to line up properly with the grain pattern in the seat. With three-legged stools, put one leg on the centerline. Mark sight lines from each leg hole to the seat center. Prick the hole centers with an awl, and clamp the seat to the workbench so that the area you bore through will overhang the bench.

Set your bevel gauge to 101° , or another desired angle, and center it on the sight line. Bore with a $\frac{5}{8}$ -in. bit in a brace until you can just feel the point poke through. Check angles as you drill with a mirror and by eye (see the top photo at left). Flip the seat, and bore through the other side to prevent tearout on the top of the seat.

Ream the holes from the bottom of the seat (see the bottom photo at left) until the test taper fits a hair proud all around the top of the seat. As you ream, test the angle with a bevel gauge set parallel to the sight line and a try square set perpendicular to it. If this is your first stool, it is likely your tapered holes will vary, so aim to match each leg to a hole. I use colored stick-on tabs to match them up (see the bottom photo on the facing page). Fit a leg to a hole until the leg is slightly proud on the topside. Mark around the leg. You want all legs proud by about the same amount, roughly $\frac{1}{4}$ in. or so. Mark the ends of the legs for wedges, and saw thin kerfs.

Once your legs are fitted, align them in the holes so that the grain orientation is correct; the grain pattern will be in the tangential plane facing out at the points where the stretchers go (see the drawing on p. 59). Pound them lightly into place. Sight through one leg to find the center of its opposite. Mark this spot with an awl. Turn the stool. Sight again and mark the other leg. Do the same to mark all the holes for the stretchers. Measure and record the dis-



Boring holes in seat—The author sights angles from two directions using a sliding bevel gauge and a mirror to align bit to bevel (photo and drawing above). The reamer (right) cuts a taper in the hole to match that on the tops of the legs.



tances between the awl marks on matched pairs, and add for tenons. Don't be alarmed if stretcher lengths are not equal. It doesn't matter. Cut stretchers to size, turn them on the lathe and sand them.

Fit the stretchers to the legs

Just as you fit leg tenons to the seat, stretcher tenons must be matched to leg mortises. Wrap legs and stretchers in aluminum foil, except the tenon ends, and put them in a kiln, such as a gas oven with the pilot on. The tenons should come to near zero moisture content, and the rest of the leg should retain enough moisture to shrink around the tenons. The pieces should feel faintly damp when you unwrap them.

File a small amount of material from a tenon on one of the stretchers in the radial planes. This intentional slop is where swelling will take place once the pieces are joined. Chamfer the end slightly. Try the fit in a scrap that can be split off the tenon if it gets stuck. If the tenon slips in easily, it's too small. If the tenon won't penetrate with moderate hammer blows, it's obviously too big. Judicious filing works. Or put the piece back on the lathe. When the tenon fits tightly, record its diameter with vernier calipers and prepare the others.

For boring holes in the legs, a reliable holding system is a must, no easy matter with tapered stock (see the top right photo). Drill all the holes in the legs using a bevel gauge and a mirror. As for jigs, you don't need them: Your hands and eyes are capable of more than enough accuracy.

Assemble stool, and level legs

Once you're sure all the joints will align and fit right, glue the stretcher assembly first. Pound parts together with a mallet. Be quick; the tenon is swelling.

After legs and stretchers are together, place the seat upside down on blocks on the bench, and swab the mortises lightly with glue. Work glue into the tenon kerfs, and wrestle the assembly into place. Pound legs alternately, stopping when the sound changes. Turn the stool over. Hammer in glue-smear wedges. Cut small wedges to fill in any smaller gaps. Let the glue dry before trimming tenons. Scrape and sand the seat smooth. Set the stool on plate glass. Make sure it's level and steady, blocking it up if not. Mark all around, saw off the legs on the marks and chamfer the edges. □

At her farm in New Castle, Va., Harriet Hodges makes Windsor chairs and stools.



Dry-fit the legs to measure the stretchers. Stretchers are cut to fit; it doesn't matter whether all the stretchers are the same size.



Wedges and dogs hold the legs in place when boring holes for the stretchers. Three dogs hold the workpiece firmly at a comfortable height off the floor.



Colored tabs make a quick visual index of one part of the stool to another. The author supports the seat on scrap blocks when pounding legs in place.