

Drawbore Your Tenons

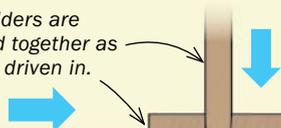
Ditch the clamps and add detail
with this age-old technique

BY STEVE LATTA

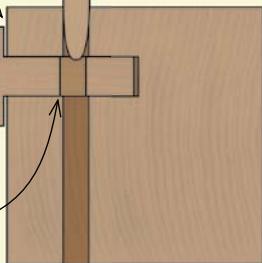
OFFSET HOLES ARE THE KEY

As the pin passes through the offset holes in the mortise and tenon, it pulls the joint tight, eliminating the need for clamps.

Shoulders are pulled together as pin is driven in.



Hole in tenon is offset toward shoulder.



More often than not, I add draw-bored pins to my mortise-and-tenon joints. They send a message of strength and endurance, and speak of a time when things were built to last longer. More importantly, they make assembly much easier.

Drawboring means offsetting the hole in the tenon so that the pin pulls the parts together tightly—and permanently. If your tenon shoulders are square, your assembly will be, too. This changes the way you work. Clamps, which can damage workpieces and pull them out of square, are eliminated. This is especially great on doors, where a little twist can add up to a big problem. I also like the flow of my work when I drawbore. Without clamps in the way on each subassembly, I can just pin the joints and keep moving, without having to wait for glue to dry.

Drawboring is also a godsend when clamping is difficult. Long tables, like the one I'm making for a local church, sometimes exceed the reach of my clamps, but drawbored pins work all the same. They also work well for the angled joints in chairs, which are tough to grip firmly with clamps. In other cases, where a pin goes into an elongated slot to allow wood movement, such as on breadboard ends, I use drawboring to ensure those pieces stay tight.

This type of construction often lends itself to pre-finishing components, which can be damaged by clamps. After assembly, a bit of oil on the pin ends and perhaps another layer of finish are all that is required.

Strong, but subtle

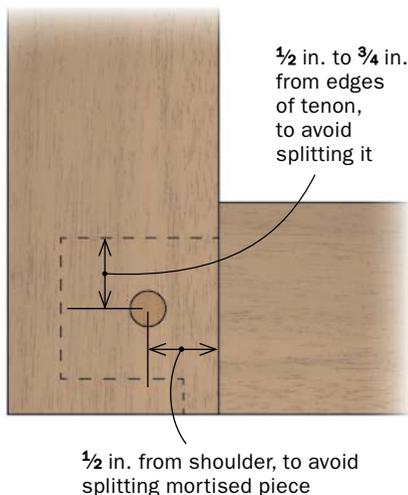
There are a variety of ways to style the heads of pins, whether drawboring them or not. I think of myself as a tradesman more than a designer, and I like to keep it simple. I tend to match the pin material to the surrounding wood, so the darker end grain of the pin stands out only slightly, and I trim the pins flush with the surface. For very soft woods, like pine, I make the pins from a harder wood like maple, providing extra strength while maintaining a nice color and grain match.

I make pins from riftsawn or quarter-sawn stock if possible, with straight grain on both faces, cutting them $\frac{1}{4}$ in. square and 4 in. or 5 in. long. You don't need to use thicker pins on bigger pieces, at least not for strength reasons, because the glue reinforces the joint and you'll never shear

Get the offset right

Getting the offset dead on is critical. Too much, and the pin will jam and could split the mortised piece; too little, and you won't pull the shoulders tight. The steps below will help you nail the offset in any situation.

1 DRILL THE MORTISED PIECE



Go all the way through. After laying out the pin locations, use a drill press and a brad-point bit for clean, accurate holes. Put a sacrificial piece below to keep the exit hole clean, too.

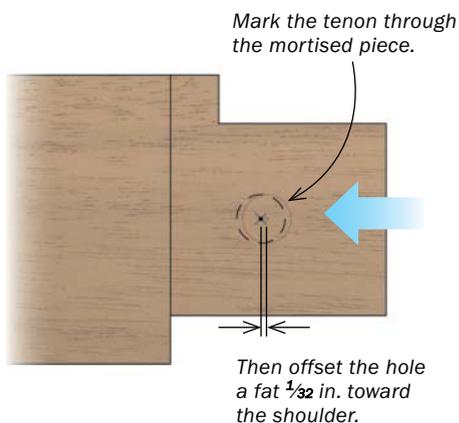
2 OFFSET THE HOLE IN THE TENON



Mark the tenons. Insert the tenons all the way, with no gap at the shoulder. Then use the same drill bit to mark the center of the pin holes.



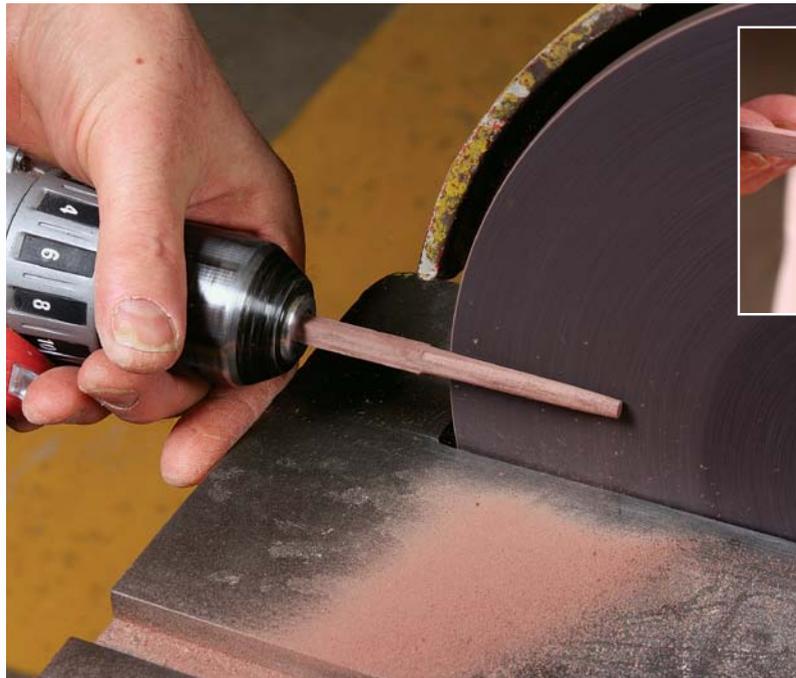
Mark the offset. Use an awl to offset the center of the hole in the tenon.



Drill the tenons. Use the same drill and be sure to center it on the right mark.

Make and install the pins

Latta always uses straight-grained stock for pins to avoid splitting. Except on narrow workpieces, he prefers the look of square heads. Whether they will end up round or square, however, he makes the pins the same way.



From square to round. Rip the pin stock square, the same size as the pin holes. Cut the pieces 3 in. or 4 in. longer than necessary, and chuck the pin in a drill to round the lower section, holding it against a belt or disk sander (left) as the drill spins. Take the pin to a full round near the bottom, but taper the transition to the square head section. Sharpen the tip so it will grab the drawbore offset.

a ¼-in. pin. However, I occasionally vary the size for aesthetic reasons, using slightly fatter pins on big timbers or slightly thinner ones on small doors.

I generally use square heads on my pins, and turn them 45° to create a traditional diamond look. A bonus is that if they go in a little twisted, it is less obvious in the diamond orientation than if I were trying to get them perfectly square. Some woodworkers cut a square slot in the top of the hole to accommodate a square head, but I haven't found this necessary. If you use the same or harder wood for the pins, a square head will make its own pocket, especially if you taper the transition from the round section to the square head when making the pins. Occasionally, the head gets rounded slightly, but imperfection is part of the handcrafted look.

If the pieces being joined are narrow, say less than 2 in. wide, square pins can look like overkill, so I use round ones there. But there is no right or wrong here. It's up to the individual builder to give this age-old joinery detail his or her unique spin.

Pinning a door is lesson one

Drawboring is a wonderful way to assemble doors and this is a good first lesson in the basic technique. The same steps apply



No glue needed. Latta uses paraffin wax on his drawbored pins (above), not glue, making them easier to drive. Don't worry; they'll stay put for life. Working over a dog hole on his bench, he drives in the pin (right) until he is happy with the way the head looks. Use a wrench to steer square pins as you drive them. Latta prefers to twist his square pins 45° for a diamond look.





Trim 'em flush. Use a flush-cut saw (above) to trim the pins close but not completely flush. Then pare them level with a chisel (left).

in any situation. On most doors, only a single pin will fit into each tenon, but on very large doors, two pins are better. See p. 42 for how to position two pins in a tenon.

Once you've cut the mortises and tenons, pin layout always starts on the mortised piece, in this case the door stile. Bore the holes on the drill press, using a 1/4-in.-dia. brad-point bit. You are drilling through the stiles only here, with the door apart. You'll drill through the tenons later. Use a backer board to avoid blowout on the back side of the stile. If you drill slowly, you'll get only minimal chipout inside the mortise.

Assemble the door, using a clamp as necessary to draw the joinery tight. Then insert the same brad point into the hole to mark its center on the tenon. Now disassemble the parts and, using the tip of the bit or an awl, make a more pronounced mark just a hair more than 1/32 in. toward the shoulder of the tenon. Be sure you go toward the shoulder and not away. It is an easy mistake with the direst of consequences.

Now, using a drill press and the same brad-point bit, bore through this new mark. Afterward, reassemble the joint and eyeball the offset to make sure it is right.

Prep the pins—To round and taper the pin body, I simply chuck it into my

WATCH YOUR BACKSIDE

The back of the pin will be visible on a door, so it needs to look as good as the front.



Saw it off. Cut off most of the excess, leaving a little extra for paring.



Check for gaps, and fill if needed. If you see a problem (above) after sawing off the back of the pin, grind a round tip onto a piece of steel and use it to dimple the end, expanding it (right). Then trim the pin flush with a chisel as usual.



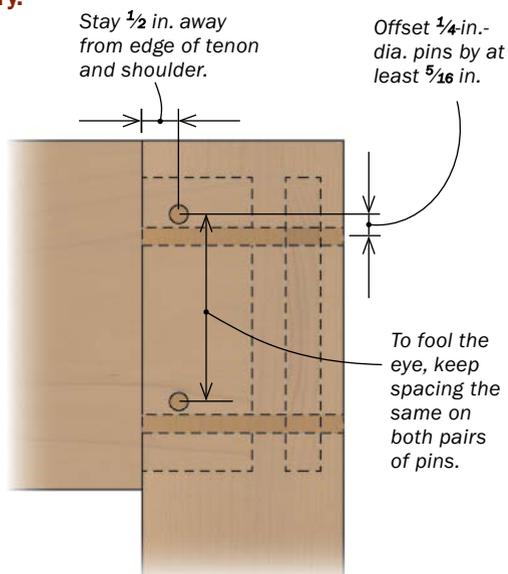
Tame difficult glue-ups

BIG TABLE BASES

Drawboring works great on a large table, where you might not have clamps long enough for the job. The technique also lets you assemble the entire base at once without waiting for a subassembly to dry.

STAGGER THE LAYOUT

Follow the general layout rules shown on p. 39, but stagger the pins on adjacent faces of each leg so that they don't run into each other inside.



Easy assembly. Pin the long sides first (left), laying them flat on the bench to make them easy to handle. Finish up the assembly with the table base standing upright (below).



ANGLED JOINERY

Drawbored pins are perfect for chairs, pulling together the angled and curved joints as easily as square ones.

Tight joints and no waiting. Latta starts by assembling the chair back (right). Without waiting for glue to dry, he can assemble the front of the chair, and join it to the back (below). It's only now that he must pause, to take the final measurements for the arm joinery.



cordless drill and spin it against a belt or disk sander, leaving the last couple of inches square. This method is fast and accurate. With doors, where the inside face will be visible, I leave the round section a little fuller, not quite rounding the square entirely, to be sure the hole is filled on the inside of the door. But I always sharpen the tip of the pin on the sander so that it will clear and then catch the offset hole.

Drive them home and trim them flush—There's no need to glue the pins. Instead, prior to assembly, put a thin layer of glue on the tenons and a heavier layer along the walls of the mortise. Excess glue on the tenons will end up as squeeze-out.

I wax and insert the pins from the front of the door, holding the square section with an adjustable wrench. This helps me control the orientation of the head as I pound in the pin, using a steel hammer. I hammer the pin until the head has firmly established itself in the face of the stile.

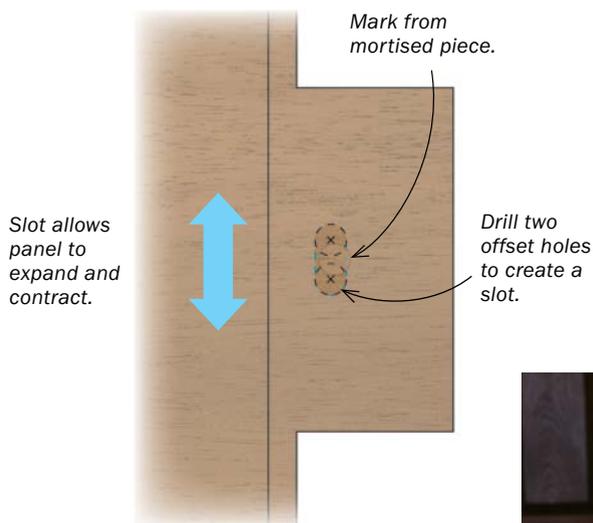
Trim the pins after the glue on the mortise-and-tenon is dry. I cut them close with a flush-cut saw, and then pare them perfectly flat with a chisel.

A host of other uses

A long table is one place where drawboring works great. The process here is

PULL BREADBOARDS TIGHT

Breadboards must allow the panel to expand and contract with the seasons while staying tight to it for decades to come. The solution is elongated holes in the tenons, combined with drawbored pins.



Two holes in the tenon. To lay out the slots, Latta uses dividers to mark centers for two offset holes with $\frac{1}{4}$ in. of wood between them.



Turn them into a slot. A bit of chisel work knocks out the material in the middle, creating a smooth slot.

very similar to the one on a door, with a few differences. Because the aprons are wider than the door parts, two pins are required, and since the legs are so much thicker, the pins need to be a couple of inches longer. Also, because I don't care about the back side, I sand the round section a bit smaller, too.

Most importantly, though, you need to stagger the pins in a table leg, or they will intersect inside. You'll want to keep their spacing consistent so they look good, while keeping them far enough from the edge of the tenon to avoid splitting.

Because of their angles and curves, chairs are often difficult to assemble. Again, drawboring offers an easy solution. Pinning the tenons ensures tight joints and makes this multi-stage glue-up much faster.

Breadboard ends are a great way to keep an unsupported panel flat. Whether it's the top of a trestle table, the lid on a blanket chest, or the drop-front on a traditional desk, tenoning a long rail to the ends does wonders to stop warping as moisture content changes with the seasons.

But these cross-grain rails create a problem. Their length won't change, but the width of the panel certainly will. That means you can't glue all the tenons, and instead must use pins or screws to attach



Assemble and pin. To keep the front of the breadboard flush with the front edge of this chest lid, Latta applies glue to the front tenon only, and drills a normal hole there. The panel's movement is directed toward the back, via slots in the other tenons.

them, elongating the holes in the tenons to allow them to move sideways.

That inevitable movement leads to another problem: The ends of these rails won't stay aligned with the edges of the panel. On a tabletop, you want to lock down the tenon in the middle to divide

the misalignment between each end. But on a blanket chest that will always be against a wall, you want to lock in the front tenon to keep the front end flush and send all of the movement toward the back edge, where the misalignment won't be as noticeable. Chalk up another victory for drawboring. □

Online Extra

To see how a drawbored joint comes together, watch the video at FineWoodworking.com/extras.

Contributing editor Steve Latta teaches furniture making at Thaddeus Stevens College of Technology in Lancaster, Pa.