



# Build a Hybrid

# Timber-Frame

Incorporate the beauty of structural timbers into a stick-frame house



# Floor

BY SAM KOERBER

**W**hen I built my first house at the age of 19, I wanted it to be cheap but interesting. My dad suggested using doubled-up 2x10s for the floor joists, skinning them along the bottom edge with 1x4s to hide the seam, and capping them with tongue-and-groove planks. It amounted to a budget version of a real timber-frame floor, but it worked, and living in that house caused the look of exposed structural timbers to seep into my design psyche and become an essential part of my style.

It was only after building a few more houses with this technique that I realized my doubled joists weren't much cheaper than real timbers, and that although the look was OK, it still wasn't what I really wanted. I had seen other builders apply solid, nonstructural timbers to finished drywall ceilings, but that seemed way too much work for what, to me, wasn't authentic.

So when the next opportunity came along, I went with a hybrid approach that I still use today: a conventional stick-built house that incorporates real structural timbers and traditional joinery, completed mostly with common carpentry tools. This represents an authentic and sparing taste of the timber-frame aesthetic.

## Timbers can mix with 2xs

My usual approach is to frame one part of the main-level ceiling in timbers, and then use dimensional or engineered lumber elsewhere in the house. In order to make this work, the needs of each room must be coordinated with the realities of having exposed timbers, because you're surrendering the drywall-covered joist bays that are used to hide mechanicals. Upstairs bathrooms need to be located so that waste lines are not visible from below. Similarly, if you

**1 Beam in wall** If a beam lands in a pocket below the top plate of a wall—a common situation in 1½-story frames—it's helpful to notch the studs along that wall so that an inset 2x cleat can be added for nailing the tongue-and-groove sub-floor planks.

**2 Beam on top plate** As with other structural beams, timber beams landing on a stud wall must be supported by posts. But because timbers vary, it's often necessary to remove material from the bottom of a beam where it bears on the wall plate in order to keep the floor above level.

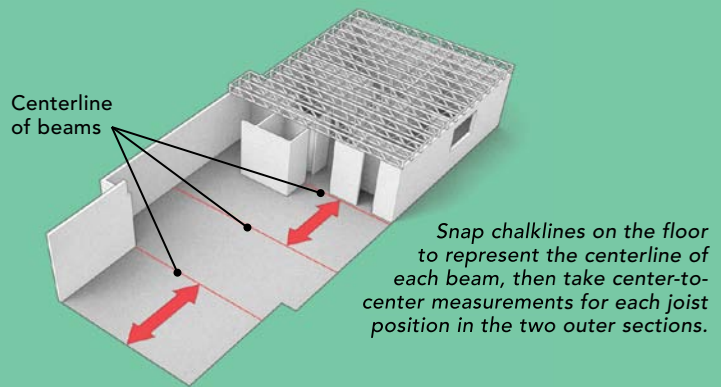
**3 Dovetailed mortises** To avoid visible fasteners, joists connect to beams with dovetailed tenons that fit into slightly oversize mortises. Hardwood shims are driven along each cheek of the loose-fitting tenons, drawing the pieces together.

**4 Planks complete the look** A layer of tongue-and-groove planks installed over the joists and beams mimics traditional board sheathing, and a layer of AdvanTech subfloor with Zip System tape protects the installation from the weather until the house is dried in.



## SEQUENCE FOR A SNUG FIT

To maximize efficiency, we cut as many joists as possible before anything is lifted into position. To do this, we mark beam positions on the subfloor and take measurements to create a joist cutlist. This floor breaks down into three sections, but only the two outer sections are cut ahead of time, leaving the center joists to be measured once the beams are set in place.



### **Kerfs on a bevel.**

Working with two saws—one that bevels left and one that bevels right—a pair of carpenters can work their way quickly down the length of a beam, establishing the shape of each mortise.



### **Chisel to the lines.**

Although any wide chisel can get the job done, the extra length of a large timber-framing chisel makes it the ideal tool for removing the bulk of the kerfed waste.



### **A square seat.**

To ensure that the joists bear solidly on the bottom of each mortise without the need for tapered shims, check the bottom for square against the side of the beam.

## MORTISES FOR THE BEAMS

The beams are set atop timbers that span pairs of stout sawhorses 20 in. tall, which is a comfortable working height. This allows the beams to be rolled as necessary as mortises are roughed out on both sides.

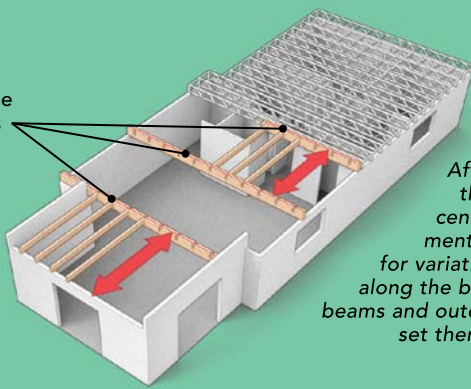
want recessed lighting in the kitchen, it makes more sense to finish this area with conventional drywall.

You also need to think about beam and joist spans, and about whether you want to (or can) get away without posts. In most cases, posts are necessary, and they can reinforce the timber-frame look. The clients for the house shown here wanted a clear-span look, so we eliminated posts by supporting the beams with a trusslike setup connected to the roof framing above. Whether or not posts are used, beams and joists should be sized by an architect or engineer.

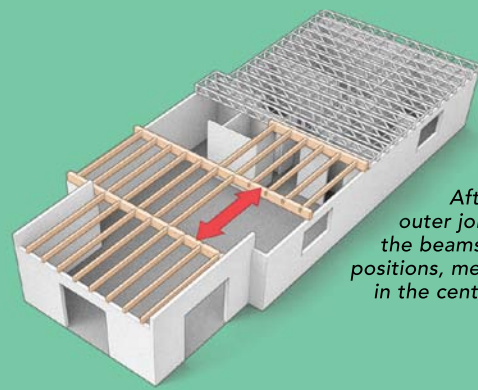
When the plans are finalized, they become your cutlist for ordering the timbers from a sawyer. I typically order posts and joists one or two feet longer than needed to allow enough room for the tenons to be cut, and I get a couple of extra joists in case I make a mistake during layout and assembly. For beams, I order only what I need, and I have them cut to exact length if possible.

Although I've used poplar and oak in previous timber-framing projects, my favorite wood is white pine. It's straight, has the lowest shrinkage ratio of any species, works easily with both power tools

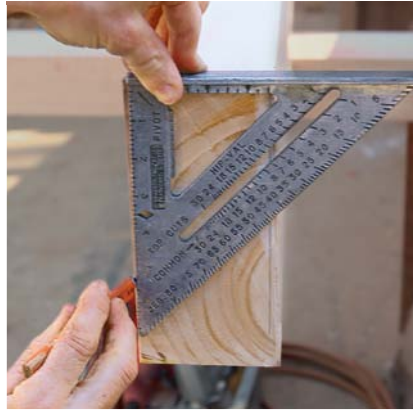
Centerline  
of beams



After adjusting the center-to-center measurements to account for variations in width along the beam, cut the beams and outer joists, and set them into place.



After securing the outer joists and locking the beams into their final positions, measure the joists in the center section for a perfect fit.



**Square it off the top.** Working from the center of the joist end, measure an equal distance to each side, then square down the height of the beam mortises. Connect the dots to mark the bottom of the tenon.



**Up and down.** Set the circular saw to a 15° bevel and a 2-in. depth of cut, then make a pair of cuts along the marked lines—down one side and then up the other—to shape the dovetailed sides of the tenon.

**Remove the waste.** After scribing a line around the outside of the joist, cut away the waste to leave the finished tenon.

## TENONS FOR THE JOISTS

Depending on their position in the layout, joists bear directly on a plate or connect to a beam with a dovetail tenon on each end, or they connect with a tenon on one end and a square cut on the other. The top of each joist needs to sit flush and square to the beams in order to adequately support the floor sheathing above, so the layout always references from the top face.

and hand tools, and looks beautiful when finished with either linseed oil or stain.

Fresh-cut, so-called green lumber is the norm in timber framing, but depending on the sawyer, it may be possible to pay extra to have the wood partially kiln dried. I use the word *partially* because I've found that even kiln-dried timbers still have a relatively high moisture content. So while they may be slightly lighter in weight, and joints may stay a little tighter because there's going to be a bit less shrinkage after installation, I don't bother paying the extra for kiln-

dried timbers. It's best to go into this project with an understanding that no matter what you do, the timbers will be heavy, and they will shrink and move as they dry. That's where technique comes into play.

### Framing for finish

Because this hybrid approach is essentially structural framing that doubles as finish carpentry, you need to think like both a framer and a finish carpenter. The most challenging parts of the job are strategizing, moving the material efficiently, and designing and executing the

# DRESS, SAND, AND INSTALL

To give the timbers a hand-dressed look, we ease all the edges, do a rough sanding to remove any layout marks, and treat all cuts with a wax sealer such as Green Wood End Sealer (\$16, rockler.com) before lifting each piece into place. A final sanding is usually necessary but will come after the wood has dried to a lower moisture content.



**Remove the crown.** Snap a chalkline along one side of each timber (held down 1 in. from each end) so that any major deviation from the 1-in. benchmark can be shaved off with a power planer (top).



**Ease the edges.** Holding it nearly flat, pull a sharp drawknife down the length of each timber to ease the edges and disguise imperfections.



**Rough sanding.** Use a high-speed sander with 40-grit paper to clean up the rough-hewn results of the drawknife work and to remove layout marks.

installation to take into account all the other parts of the house that will be built along with the floor. Because the framing will all be visible, you have to lay out and cut the various joints with care so that they result in a finished look.

All of the timber-frame joints I use have a functional purpose. The mortise-and-tenon joints used at post-and-beam connections keep the post in line with the beam even as both members shrink and twist. The dovetail tenon joints for the joists and the beam allow the top of the beam to be flush with the top of the joists, and the shims pull it tight to counteract some of the shrinkage that occurs as the pieces dry.

I've developed a workflow that allows me to cut all the necessary joints with common carpentry tools. In addition to the usual bevel-left and bevel-right 7¼-in. circular saws, power planer, and high-speed

sander, I use a 2-in. timber-framing chisel, a wooden mallet, and a drawknife, which is great for dressing the edges of the timbers. You may find that a 10-in. or even 16-in. circular saw, a chain mortiser, and a wide beam planer such as the Makita KP312 are all helpful also.

## Big-timber logistics

Being efficient in how you move the timbers is crucial. It's best to arrange the timber delivery when an excavator is on-site for backfilling and grading. The excavator can pick up the bundle with a couple of straps and then place it on the main floor. If the walls are up, I might work on the joists outside the house and then carry them in for installation. The beams are usually too heavy to carry easily, so if I can't have them dropped inside, I at least have them placed so that



**Easy lifting.** A wheeled material lift, available from rental yards for about \$60 a day, makes quick work of lifting the beams and joists into position.

they lean into a doorway. This way, we can maneuver the beams into the house on rollers made from offcuts of PVC pipe and then lift them onto sawhorses one end at a time so that they can be worked more comfortably.

For working on the timbers, I like to have four 20-in.-tall pony-style sawhorses. I set them up in pairs—ideally over a well-supported section of the subfloor framing—and set one of the timbers across each pair in order to give me a surface for stacking the rest of the pile. This setup allows several guys to be working on the timbers at the same time, and it provides room to roll the timbers as necessary.

To raise the finished pieces on this job, I rented a material lift for about \$60 a day. The lift is rated at 750 lb. and is the perfect tool for lifting, maneuvering, and setting timbers from a subfloor deck.



**Shims for the tenons.** Untapered oak shims draw the shoulders of the joists tight against the beam face, locking the joists into place.



**Screws for the plates.** With the drywall groove aligned to the interior face of the stud wall, a single structural screw (TimberLoks were used here) driven through the top of its end secures the joist to the top plate below. Because the lumber is wet, no pilot hole is needed.

If there is a strong anchor point overhead—either part of the house frame or a temporary rig—a chain hoist also can be used.

We try to put up the timbers during a stint of dry weather, then we install the tongue-and-groove planks, followed by a layer of  $\frac{3}{4}$ -in. AdvanTech sheathing. If noise is a concern, we install a layer of  $\frac{1}{2}$ -in. Homasote atop the tongue-and-groove planks and then add the sheathing. AdvanTech is not intended to be waterproof, but sealing the seams with Zip System tape goes a long way toward preventing water from seeping through during construction. This last detail protects the beams from water stains that develop from rain and snow that fall during construction, saving a lot of sanding in the end. □

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