Installing Strip Flooring

Careful prep, layout and tight nailing make a wood floor last for years

BY CHARLES PETERSON

I live in New England, where 200-year-old houses are as common as blue jays and maple trees. Peek into any old house, and you'll find that everything has probably been replaced at least once, except for the fireplace, the timber frame and the hardwood floors. The carpenters who hand-planed and nailed those floors may or may not have given much thought to the floors' longevity, but the floors have stood the test of time. With some attention to detail, carpenters can still put down a floor that will likely outlast everything around it. Although modern flooring includes everything from prefinished laminated plywood to wide boards of exotic species, I'll describe how to install the most common type: ¾-in. thick tongue-and-groove flooring ranging in width from 2½ in. to 3½ in.

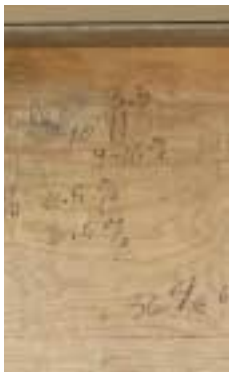
Acclimatize the flooring to the house

Wood is hygroscopic, meaning it soaks up atmospheric moisture and expands or loses moisture and shrinks. While each floorboard may swell or shrink only a tiny fraction of an inch, that dimension multiplied by 100 rows of flooring can translate to gaps between boards in the dry season or heaving and buckling during the wet season.

To minimize moisture problems, the house should be closed in and dry before flooring is brought to the job site. The house's interior should have reached its normal living conditions, whether air-conditioned or heated, for at least a week before installation. Concrete foundations and slabs should have cured for a minimum of 30 days, and moisture from plaster and paint should be given at least a few days to dissipate. I use a relative-moisture meter (available at electronics-supply stores for about $30) to check the house's interior; the relative humidity should be 30% to 50%.

Once the house is ready, I order the flooring and store it in the targeted rooms for a week or more. The goal is to allow the flooring's moisture content to equal the normal living conditions of the house, which makes the flooring less susceptible to moisture-related problems after it's installed. If possible, flooring packages should be spread around instead of stacked to speed the process.

After this initial period, I begin a fairly detailed survey with a moisture meter (photo top left). (I use meters equipped with probes that take a more localized, accurate reading than scanning meters.) In the Northeast, flooring should have no more than 6% to 10% moisture content; the subfloor's content should be within 4% of the flooring. If the installation is above a basement, I check the slab and joists there as well. If the moisture content of the subfloor is too high, I won't install the flooring until the moisture problems are corrected. As I go along, I record the date and readings on the job paperwork as well as on the subfloor (photo top right), which is good backup information in the event of warranty questions.



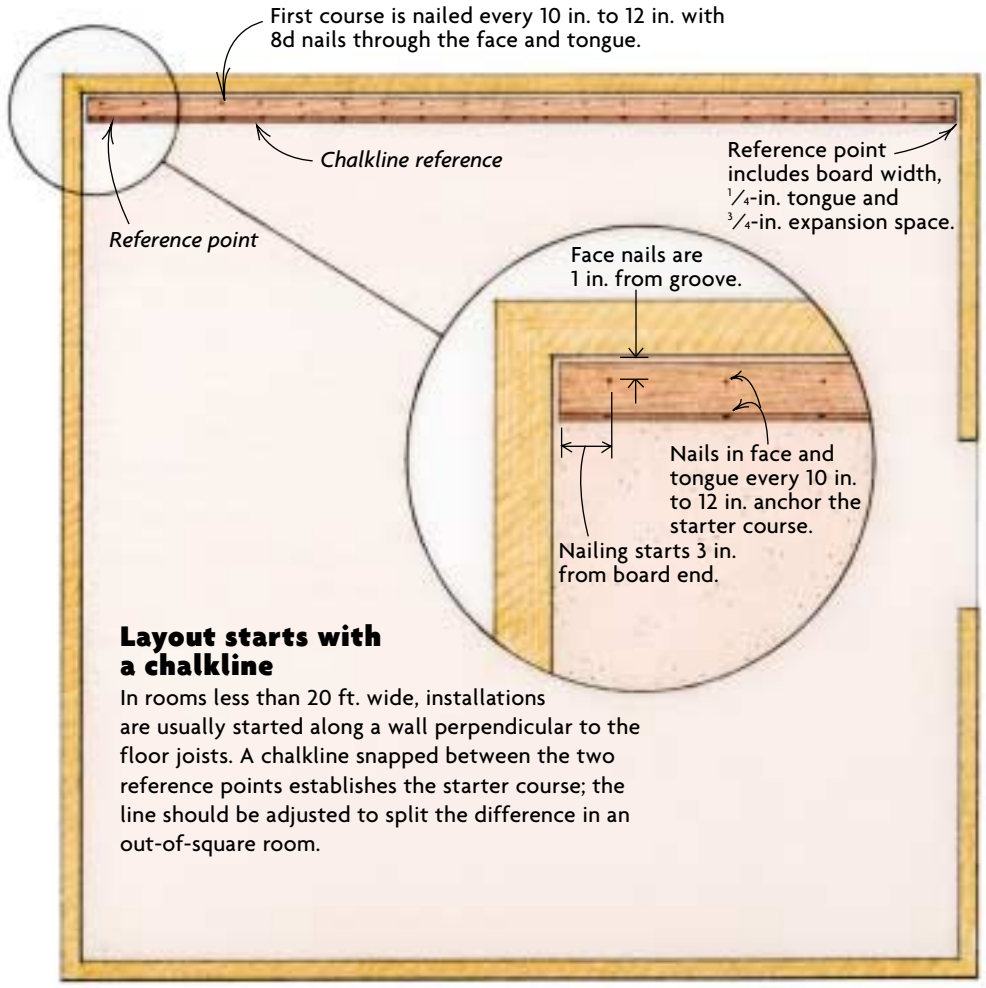
Subfloor becomes a record of the job's moisture content. Moisture-meter readings (left) taken on the subfloor, basement and flooring are all written down on the subfloor for future reference (right).

Shims make solid, long-lasting fill for low spots. To flatten the subfloor, the author glues shims into low spots with construction adhesive. Floor-leveling mixes can dry out over time and should be avoided.

Careful subfloor prep prevents headaches later

Before I think about the layout, I check the subfloor. Now is the best time to fix any squeaks and to shore up any bouncy joists. Although a flooring contractor doesn't have

Edging sander makes quick work of the subfloor's high spots. Created by a crowned joist or the joint between plywood sheets, high spots can be sanded down to flatten the subfloor.

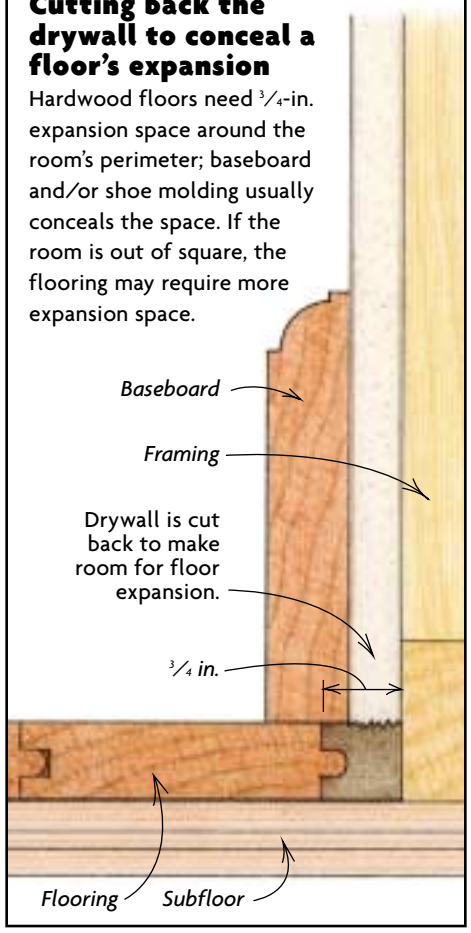


Layout starts with a chalkline

In rooms less than 20 ft. wide, installations are usually started along a wall perpendicular to the floor joists. A chalkline snapped between the two reference points establishes the starter course; the line should be adjusted to split the difference in an out-of-square room.

Cutting back the drywall to conceal a floor's expansion

Hardwood floors need 3/4-in. expansion space around the room's perimeter; baseboard and/or shoe molding usually conceals the space. If the room is out of square, the flooring may require more expansion space.



Reverse the flooring's direction with a slip tongue. Lengths of hardwood splines are glued and pinned into the groove of a center starter course. The flooring can then be nailed down in the opposite direction.

Backerboards provide a solid start. Flooring scraps screwed to a centerline are the first step in an installation begun in the middle of a room. Used in large rooms, this method cuts flooring's seasonal movement.

much control over the choice, the subfloor material is also important. The National Wood Flooring Association (800-422-4556; www.woodfloors.org) recommends the use of CDX plywood, oriented strand board or 1x6 solid boards as substrates. (Medium-density fiberboard won't hold fasteners and isn't recommended.) Any subfloor should be at least 5/8 in. thick so that the fasteners obtain full holding power; the long side of the sheets ought to run perpendicular to the joists and should be nailed every 6 in. or so. Following manufacturer's recommended clearances of 1/8-in. gaps between sheets reduces the chance of subfloor squeaks. Driving a few ring-shank nails or sinking a screw into the joist near a squeak can sometimes erase squeaky spots, too.

Using a couple of bundles of flooring as a test load in the middle of the room, I measure the floor's deflection with a laser; a taut chalkline also works. If the floor deflects more than 1/2 in. over a 15-ft. width, I decrease the bounce by nailing 2x blocking between the joists. (It's interesting to note that I have seen deflection problems in new floors framed with I-joists that have been misused

Drawings: Vince Babak

ON-LINE CONNECTION

Check out a video clip of installing flooring on our Web site at FineHomebuilding.com.

Staggered butt joints make a stronger, better-looking floor. Joints on adjacent rows should be spaced at least 6 in. apart to keep the floor from flexing under load.

Racking the boards makes the nailer's job easier. Working solo or as a team, installers lay out several courses of flooring before nailing so that joints are properly spaced.

to span distances that are beyond their recommended limits.)

Typically, the floor's strength is increased by installing the flooring perpendicular to the joists, but occasionally, flooring is installed parallel to the joists, a practice that may weaken the floor. To reinforce a parallel installation, 2x blocking should be nailed between the joists on 16-in. centers, or the subfloor should be beefed up to a thickness of 1⅛ in.

The subfloor also should be flat, with no high or low spots more than 3/16 in. in 10 ft. To fill low spots up to ¼ in. deep, I glue wood shims with construction adhesive (center photo, p. 47). I don't like to use floor-leveler compounds, which can dry out over time and crumble like crackers underfoot. I use a floor-edging sander to knock down the high spots that are usually found at the juncture of two pieces of plywood (bottom photo, p. 47).

I staple down a layer of #15 builder's felt to the subfloor; the felt does a good job of retarding the movement of moisture from the basement below to the new floor above. I overlap each course 6 in. If the basement is sufficiently dry or if the new floor is to be installed over a living space, I don't use paper, which just adds another step to the process. The paper also can get in the way during jobs where the chalkline layout has to be precise. I never use red rosin paper; its wax coating isn't always consistent, and the paper tends to break down over time.

Start with a solid starter course

There are two places to begin nailing a floor. If the room is less than 20 ft. wide, the floor is typically started from one wall, parallel to the long side of the room; larger rooms and layouts that encompass more than one room and/or hallways are started in the room's center. I start any layout by carefully measuring the width of the room at several points to see if the walls are parallel (drawing left, facing page). From each end of the same wall, I measure and mark the width of a flooring strip plus 1 in. (¾-in. space for expansion and ¼ in. for the tongue), then snap a line between these marks. If the opposing walls are out of parallel, I split the difference. If the baseboard is not thick enough to cover the expansion space, I often trim the bottom of the drywall to gain a little more space (drawing right, facing page).

If I start at the wall, I cull through the stack; find the longest, straightest boards; and with a pneumatic finish nailer, face-nail the first row with 8d nails, spacing the nails every 10 in. to 12 in. The face-nail holes are filled before finishing. The boards are then nailed through the tongue at the same intervals. I always try to hit the joists when possible.

Flooring tends to expand in one direction, toward the board's tongue. In rooms wider than 20 ft., starting the installation in the center can reduce a floor's potential expansion by half. To start a center installation, I screw backer blocks made from flooring scraps along a reference line (photo left, facing page) to keep the first rows of flooring straight. After four or five rows have been installed, the backer blocks are removed. I then glue a spline, or slip tongue (available from most flooring suppliers), to the groove of the first row (photo right, facing page) and pin the spline with finish nails. I slide a small piece of flooring along the spline to ensure proper alignment when pinning. The spline also allows me to run the flooring in the opposite

NAILING CLOSE TO THE WALL



Flooring installers reach a point when they don't have room to swing a hammer to drive a board tight. For about $200, a flooring jack (photo left) compresses ornery boards with a quick pull on a lever. For less money, some use a system of opposing wedges (photo center). One set of wedges is temporarily screwed to the subfloor; the other set is hammered between, tightening the board. The most elemental method is to drive a big flat-bladed screwdriver into the subfloor (photo right) and to use it as a lever to tighten the board as it's nailed.

direction, which comes in handy when I want to run boards into a closet or a hallway.

Rack boards for smooth nailing

Once I've determined the starting point, it's time to start racking and banging the flooring into place. A two-person operation is the most efficient: One distributes, or racks, flooring in advance of the other, who nails. If I'm racking, I lay out at least five or six rows of flooring (photo left, p. 49), making sure that the boards I'm racking aren't getting in the way of the nailer. I stagger the butt joints at least 6 in. apart for aesthetics and strength (photo right, p. 49), and I try not to create staircased (a close series of butt joints, each 6 in. from the previous) or H-patterns (three butt joints together in consecutive rows that resemble the letter *H*) in the floor.

It's good to leave an expansion clearance of ¾ in. between the flooring and vertical obstructions, such as posts. When cutting a board to length at the end of a row, I try to use any remnant 12 in. or longer to start the next row. As I go, I also try to blend color variations and avoid distinct areas of dark or light.

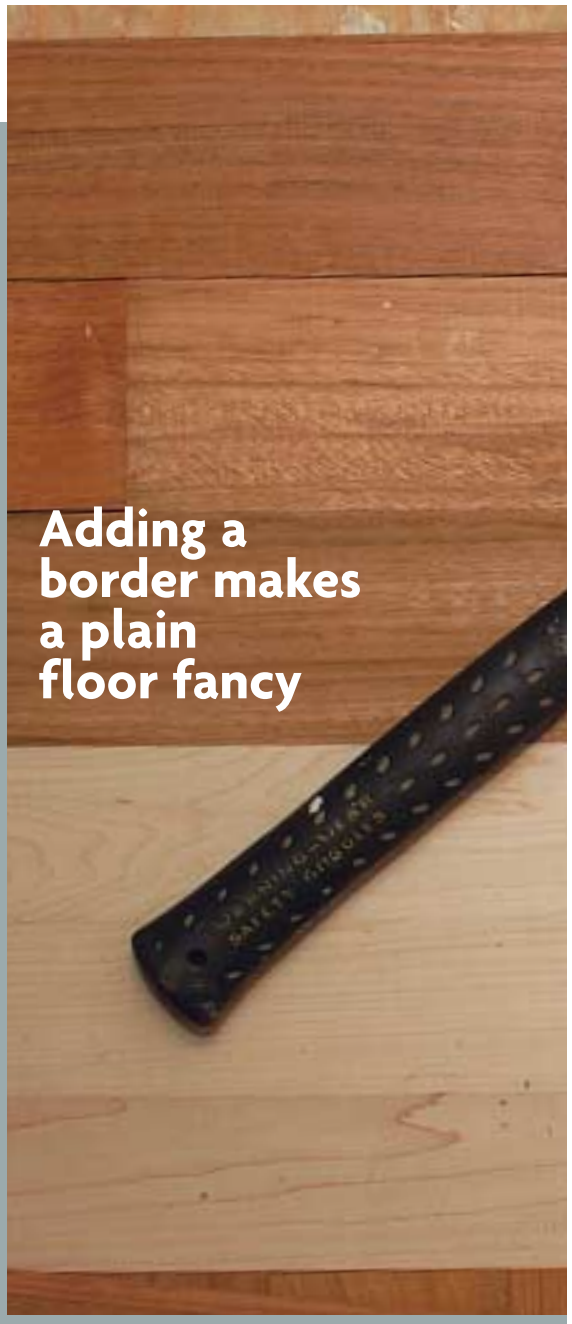
Nailing is the other side of the equation. There are two types of nailers. Manual nailers rely on your strength, which may wane during the job. On the other hand, pneumatic nailers maintain the same nailing force throughout the day, but their air hoses can be cumbersome.

Regardless of the nailer, I try to maintain a comfortable stance with a foot planted on each side of the nailer (photo p. 46) so that my weight keeps the board flat on the floor. I usually use the softer rubber side of the hammer for setting and nailing. Before I nail, I give each board a sharp rap with the hammer to knock it snugly against its neighbor; a short scrap of flooring makes a good caul that protects the board's edges if I need to use the hammer's steel face.

Every few courses, I check the straightness of the flooring as it progresses toward the opposing wall, especially if I'm installing a border (sidebar right). Any variation in a run can be compressed by planing the groove sides of subsequent rows. You can plane off a full 1/16 in. before having to recut the groove, but it's a good idea to spread any correction over a wide area to make it less noticeable.

When the flooring gets to within a couple of feet of the wall, there isn't room to swing the hammer, so I switch to a finish nailer. Without the hammer, I also need some way of keeping the boards tight (sidebar above); a flooring jack works best. If it looks like I'll end a run with less than half a board's width, I either rip a partial board and glue it to the last full piece before face-nailing, or I rip the last board from a wider board. □

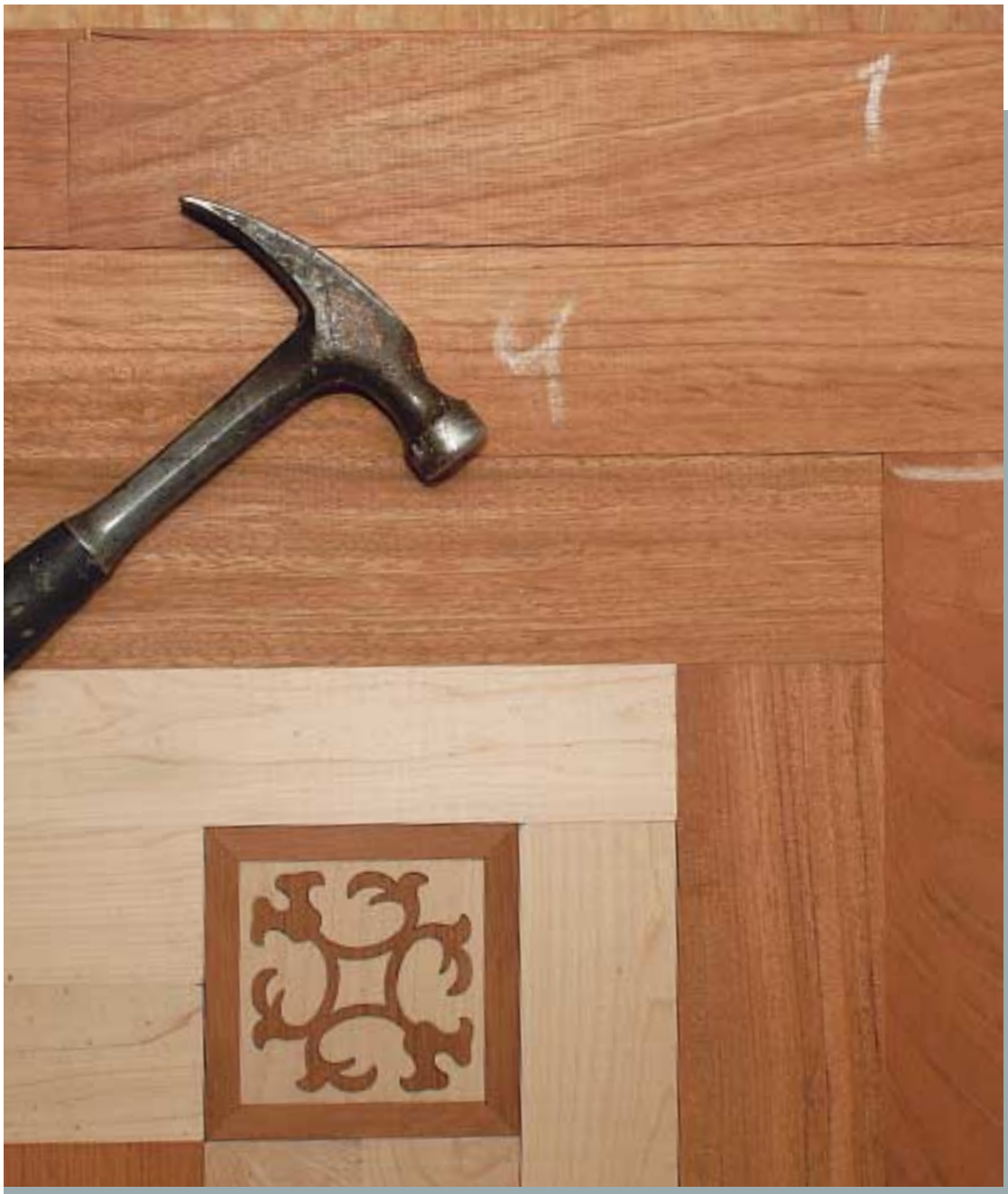
Charles Peterson is a flooring contractor in Gales Ferry, CT. Photos by Charles Bickford.



Adding a border makes a plain floor fancy

Hardwood floors can be customized with a border without too much extra work. When I'm doing a room that features strips, borders or an apron, I start the layout in the center of the room. Using a chalkline and square, I lay out the border on the subfloor. At one end of the room, I screw a stop down along one of the border's edges and butt the flooring to the stop (photo top right, facing page). I let the flooring at the other end run past the border's layout line. If I'm sharp that day, I remember not to drive nails on or beyond the line and save my sawblade's teeth.

Using a long straightedge as a guide, I then cut the ragged ends of the



A temporary stop establishes the border's line. Screwed into the subfloor, scrap flooring provides a clean starting point for the flooring and a fast, straight line for one side of the floor's border.

flooring with a circular saw (photo right). I use a Festool saw (888-463-3786; www.festool-usa.com) and guide, but any good saw and a straightedge will do. After cleaning up, I rout a 1/4-in. groove that matches the flooring (photo far right).

For this project, I ran a border made of 2 1/2-in. maple boards. We used laser-cut corner blocks from Decorative Flooring (888-928-8665; www.decorativeflooring.com); each block cost about $60. Outside of the border, the corners are herringbone (photo above); the butt joints don't open up as much as miters, and I like the design.

—*C. P.*

Router cuts new groove to mate floor and border. Using a top-bearing router bit, the author can cut a groove and mate two boards groove to groove with a spline.

Ragged end runs out past the layout line. At the other end of the floor, the boards run over the line for the border and then are trimmed with a circular saw and straightedge.