BY GREG BURNET

Milling Rough-Sawn Lumber

My company makes a number of wooden doors every year (see "Building a Wooden Storm Door," Sep/14), using rough-sawn (unsurfaced) lumber that we purchase from a local supplier **(1)**. We order the stock with one ripped edge to facilitate the initial milling steps.

The advantages to milling our own lumber—instead of working with S4S (surfaced four sides) lumber (available in most lumberyards and home centers)—go beyond door making and extend to any number of fine-woodworking tasks where having control over the flatness and stability of the wood is paramount. Doing our own milling also lets us dictate the exact thickness of the boards after they are surfaced.

There is a drawback to buying rough-sawn stock, though: You are unable to see the grain and color of the wood, which aren't revealed until during the surfacing process.

SPECIAL TOOLS NEEDED

Flattening and surfacing boards takes some specialized equipment. We use an 8-inch-wide jointer as well as a pair of thickness planers to surface our stock. All of our machines are equipped with Byrd Shelix spiral cutter heads that have indexed carbide cutters **(2)**.

While they're more expensive than traditional cutter heads, we've found them to be a worthwhile investment for our operation. These professional-grade cutting heads all but eliminate chip-out and tear-out (on even the hardest woods), while reducing the number of time-consuming blade changes. And the machines run quieter with these heads.

ACCLIMATE THE WOOD

The rough-sawn lumber we buy is either kiln-dried or air-dried, but we always allow it to acclimate before

Photos: Sue Burnet


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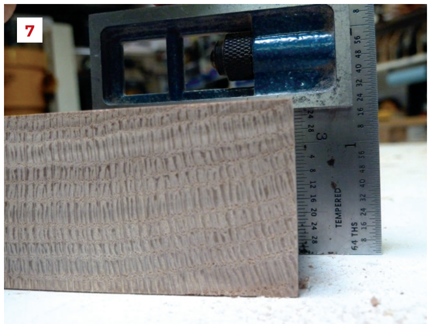
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we start the milling process. We stack the lumber on wall-mounted lumber racks in our shop and try to keep a small inventory of our most commonly used species. The racks are spaced close enough (about 3 feet apart) to keep the stock from sagging under its own weight, and we sticker the boards to allow maximum air circulation.

Acclimating the wood for a few weeks lets the moisture content in the wood balance to the conditions in the shop. This reduces the chance of the stock twisting or warping as it's milled, or worse, after we've finished the project.

FLATTENING COMES FIRST

After making a cut list for each project, we rough-cut the pieces to length for the various components, adding a few inches to the finished length to make up for any checks or planer snipe that might occur on the ends of boards. These defects need to be removed before the boards can be used.

Cutting each piece to length before surfacing also minimizes the amount of material that needs to be removed as the board is milled. Any bow or twist is usually more pronounced the longer the board is.

We begin by flattening one face of the material, to get it ready for thicknessing. We feed the boards face down across the blade of the jointer, letting the edge of the board ride against the jointer fence **(3)**. We take care to "read" the direction of the grain as the boards pass over the jointer knives. Because the top of the cutter head on the jointer rotates toward the operator, the direction of the grain along the edge of the board should angle down and away from the operator to prevent chipping or tearing out.

We make several passes on the jointer, taking off a small amount of wood at a time. With each pass, the rough areas become smaller **(4)** until all roughness is eliminated and the face is completely flat **(5)**. As a last step on the jointer, we smooth the ripped edge of the board **(6)**, which establishes a straight edge that's 90 degrees to the face we just flattened **(7)** and that can be run against the table saw's rip fence. At this point we can finally see the color and figure on the face as well as on the edge of the board.

THICKNESSING NEXT

From the jointer, we run the boards through the first of two thickness planers that smooth and flatten the other face of the board. We make the initial passes on a large, powerful stationary Powermatic planer that hogs material off quickly and easily **(8)**.

We feed each board into the planer with the flattened face placed face down on the planer bed. We make several passes to remove material from the remaining rough face until that side is smooth and parallel to the first side. Next we run the board through a DeWalt planer **(9)**, which is less powerful but makes a finer cut. We alternate passes on each face until we achieve the desired thickness **(10)**.

We mark the best face of each board with chalk so that side is used where it is most visible. Then we either cut the material into components for the project or sticker it in the racks for future use.

Greg Burnet is a JLC Live presenter and owns Chicago Window and Door Solutions, in Lyons, Ill.

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Framing a Two-Pitch I-Joist Roof

BY JESPER KRUSE

In the fall of 2014 my company built an addition to a ski lodge in Greenwood, Maine. The job is close to where I live, so I was eager to get the contract. But I also wanted to stick with my company's specialty: high-performance energy-efficient buildings. I've been trained as a Passive House consultant, and I like to apply the Passive House method to every project. Fortunately, I was able to persuade the owner that spending another 10% of the project cost on improved airtightness and increased insulation would be justified by the reduced heating and cooling costs and the improved comfort in the new building. Working on the plans with architect Eric Sokol, of Winkelman Architecture in Portland, Maine, we added our typical details—essentially, increasing the depth of the roof rafters and the thickness of the walls by using a wood I-joist build-out for super-insulation.

TWO ROOF PITCHES

We used 16-inch-deep wood I-joists for the cathedral roof of the addition, with a supported ridge. The deep joists were overkill for the building's roof span, obviously. But we did have to scratch our heads a little to figure out the framing details for the two-pitch roof system. The roof above the main room of the addition is framed on a 12 pitch, while the roof of the adjacent room has a shallower slope. We framed the addition so the lower roof's rafters would bear on the upper roof system, with the intersection located above the bearing wall that separates the two rooms. After setting the gable end rafter for the lower section, I measured down from the main roof ridge to establish the point of intersection **(1)**. We then set another rafter at the other end of the roof **(2)** and snapped a layout line to guide the placement of the remaining rafters **(3)**.

Photos: Ted Cushman

CONNECTING AIR BARRIERS

One of the tricky things about building an airtight energy-efficient home is maintaining a continuous air barrier, or "air control layer," around all the occupied space. For this house, the plywood sheathing would form the air barrier for the stud walls, and a layer of Pro Clima Intello smart vapor barrier membrane (proclima.com/systems) on the ceiling would form the air barrier for the roof system. We needed to make the connection between the wall air barrier and the ceiling air barrier as we framed: A layer of OSB taped at the seams formed the joint at the wall plate where the rafters would sit **(4)**, and later the interior Intello membrane would be taped to that wall edge.

CUTTING RAFTERS

To make my pattern for the lower rafters, I first made a seat cut **(5)** and a plumb cut **(6)** freehand, based on the roof pitch. Then we held the rafter in place to scribe for the cut where the lower rafter would intersect the already-framed main roof **(7)**. To make it easier and faster to cut this upper angle on the rest of the rafters, we put together a jig made of OSB: We laid up two layers of OSB cut to fit snugly between the flanges of the I-joists, then screwed on another layer of OSB at the proper angle to guide the circular saw when we made the cut **(8)**.

Where the lower rafter would sit atop the upper rafter at the joint, we applied 1x6 web stiffeners to the I-joists, fitting them snug between the I-joist flanges and aligning them so that they would line up vertically above the web stiffeners in the lower roof and above the bearing wall **(9)**.

TRIMMING THE WALLS

When we had framed the walls for the room that would be under the shallower roof, the upper roof (above the main room) hadn't been framed yet. So at that time, we didn't try to frame the appropriate wall angle to match the gable rafter's slope;

instead, we framed the wall straight across. But now that it was time to trim the wall to match the angle, we laid our rafter against it and scribed for the cut **(10)**. Then we transferred the line to the outboard face of the wall and cut the scrap part off (through the sheathing) using a circular saw **(11)** and cut the studs using a recip saw. We pulled the little scrap piece off **(12)**, framed in the gable, and then set our end rafter on the new plate **(13)**.

STRUCTURAL CONCERNS

There's no point in making a roof energy-efficient if it isn't structurally sound. So we took several measures to make sure that the rafter system was ruggedly attached and braced.

Bracing the slope transition. At the broken-back angle where the upper and lower rafters meet, we applied pie-shaped OSB gussets to each side of the joint and nailed them with plenty of 8d nails **(14)**.

Rafter connections. At the wall plate, the rafters are attached with GRK structural screws **(15)**. We also blocked between all the rafters with short pieces of I-joist **(16)**. In addition to preventing toppling of the rafters at the plate, these I-joist blocks also provide an attachment point on the underside of the rafters for strapping and the air-barrier membrane.

Uplift connection at eaves. Although we're not close enough to the ocean to have extreme wind loads, wind uplift is still a concern. Our I-joist wall buildout, mainly intended to provide an insulation cavity for the house, also helps address wind uplift: Because the I-joists are securely screwed into the wall with GRK structural screws **(17)** as well as into the roof rafters **(18)**, the wall I-joists help hold down the roof system.

Jesper Kruse owns and operates Maine Passive House, a green building and design company located in Greenwood, Maine (mainepassivehouse.com). For more information about this job, see the interactive slide shows at jlconline.com.