Working With Local Wood

by Andy Engel

Overcome challenges in supply, code, and labor to build a unique deck

Last summer, my old friend and customer Strother asked me to build him a deck. But there was a catch: He wanted to use local materials. One reason was that materials sourced nearby contain a lot less embodied energy than materials trucked in from afar. Plus, buying them supports the local economy, something I also make a conscious effort to do. Finally, a deck made from local woods has a unique appeal. Where's the downside?

Well, there are a few. Local materials can be more work. And they can be hard to sell to the building department. And they can be hard to find. It largely depends on where you are.

What Local Woods?

If you're in the South, local materials might simply mean locally produced and treated southern pine. In the Northwest, you may have locally available Douglas fir, cedar, and redwood. Where I am in Connecticut, though, none of the typical commercial decking woods are locally produced. Even so, some of our local species do have the properties required for decks. Strother, who is a professional woodworker, and I agreed that the relative availability, rot resistance, and appearance of black locust and white oak made them obvious choices.

What's a Board Foot?

A board foot is equal to 144 cubic inches, so 1 foot of 1x12 equals one board foot, as do 2 feet of 1x6, 1 foot of 2x6, and 9 inches of 4x4.

Black-locust heartwood, for example, doesn't rot over a human lifetime, and it's strong, with a modulus of elasticity (and therefore span capability) that exceeds that of Douglas fir and southern pine by a considerable margin. The heartwoods of both black locust and white oak are listed as being nearly as rot resistant as red cedar's and redwood's by the USDA's Forest Products Lab. White oak is also extremely strong; Old Ironsides, the USS Constitution, got its nickname because cannonballs from the HMS Guerriere were reported to have bounced off its white-oak sides during the naval battle between those ships in the War of 1812. Black locust and white oak are tough woods to work, but when green they aren't too bad. And given that decks are outdoor structures, it hardly seemed worth the extra cost to use dry lumber.

Using white oak would mean I'd have to choose materials carefully, as it looks similar to the more common red and chestnut oaks, which don't share its rot resistance. Though I wasn't too concerned about rot: I'm convinced that with careful detailing, which I planned to do as a matter of course, a deck that won't rot can be built from balsa wood.

Selling Local to the Building Inspector

I knew getting local wood approved by the building department would be a challenge. The inspector was sympathetic, and the materials I showed him from the Forest Products Lab convinced him of the rot resistance of black locust and white oak. Likewise, he had no problem with the spans I proposed based on the lumber's known properties. However, he required the framing lumber to be grade stamped, and confirmed this decision with the state's chief building inspector.

None of the local sawmills I deal with grade lumber in any official way nor could I find any others in New England that would grade hardwoods for structural qualities. (I'm told by people with experience that this wouldn't have been an issue in much of the West, where structural lumber is commonly harvested and milled, and certified graders are readily available.) This development was frustrating, living as I do in an area filled with structurally sound homes two and a half centuries old, none of which were built with graded lumber. In the end, I framed the deck with regular old treated lumber trucked up from below the Mason–Dixon line. The inspector did allow me to use white oak for the decking and locust for the posts and rails.

Figure 1. Local lumber often comes rough sawn and has to be jointed flat and planed to a consistent thickness.

Buying the Lumber

Local materials may impose certain limits on your design. The white oak available to me ranged greatly in width, which meant I couldn't use a standard-width decking. I suggested to Strother that we use random widths instead, and fortunately, he liked the idea very much.

I bought the decking lumber at a sawmill run by a taciturn New Englander named Bob. The mill's saw is ancient and its safe use seems to depend solely on the operator keeping clear of the moving parts. I once asked how old it was and Bob asked, "Which part?" The day I went to purchase the wood, Bob led me through the mud to a covered stack of rough-sawn white oak that ranged from more than 12 inches wide to about 6 inches wide.

One key to using any naturally rot-resistant wood is that it be all heartwood — sapwood of any species is rot prone. A second key is to work with an honest sawyer. With Bob on one end and me on the other, we dug into the pile. Bob would look each board over, point out sapwood and other defects, then say something like, "Can you get 6 feet out of this?" I'd nod or shake my head no, and we'd toss it on the truck or set it aside. I tried to keep track of board footage but lost count within minutes. At one point I asked Bob, and he said something like, "About 173 feet there now." I gave up and trusted him — a good decision, as I ended up with about 20 percent more usable wood than I paid for.

Turning Lumber Into Boards

I could have bought the lumber at a mill with a finishing shop that would have planed and sized the boards. I didn't, in part because I wanted to keep the cost down, but mainly because I wanted to mill the wood with an eye to eliminating the sapwood while maximizing the lumber yield, something

I didn't trust anyone else to do. And I had Strother's woodshop at my disposal, where I intended to mill the rough lumber into decking.

Milling lumber requires several stages. Before it's planed to a uniform, smooth thickness (**Figure 1, page 1**), it has to be jointed flat. This is a step a lot of people don't understand. A planer's power feeders shove the board across the planer's cutters. You set the distance between the feed rollers and the cutters, and the planed face comes out reflecting the surface of the board that was in contact with the rollers — so if the top is twisted, the bottom will be too. If you want flat lumber, you first have to flatten one face of the board using a jointer. Most shops have a 6-inch-wide or at best an 8-inch-wide jointer, which is inadequate for this purpose unless you first rip the stock down. I didn't want to do that until I'd planed the lumber, so I could see where the sapwood ended.

Figure 2. The author uses Festool's guide rails to quickly create an initial straight edge on rough lumber.

Figure 3. With one edge straightened with a circular saw, the decking was ripped to width on a table saw.

Happily, Strother has a 16-inch industrial jointer. It still took multiple passes and the better part of two days to joint 500 board feet of white oak flat. With one side flat, I spent half the next day planing the lumber to its final thickness of 3/4 inch. I made a mountain of wood chips, which, by the way, make excellent mulch for blueberry bushes.

Now that I could see the defects clearly, I looked the lumber over and took measurements. The wide stock had to be ripped down, as deck boards more than about 8 inches wide would split as they dried. And the edges of all the lumber needed to be straightened. Based on the stock I had, I decided which random widths to use, which in fact weren't really random. To make it easier to lay the decking, I standardized widths in 1-inch increments between 3 1/2 inches and 7 1/2 inches.

The next step was to rip one edge of each board straight and defect-free. For boards up to 12 feet long, I was able to join together several guide rails and rip the edge with a Festool circular saw (Tooltechnic Systems; 888/337-8600, festoolusa.com). Festool's system is awesome. Rubber strips on the bottom of the guide rails grip the lumber and don't allow the rail to move (**Figure 2**). A groove in the Festool saw mates with a rail on the guide, and you can quickly and easily get furniture-quality rips. No clamps are needed — you really have to use this saw to appreciate the system. For longer boards, I snapped a chalk line and made the cut by eye. This filled another day.

With one good edge on each board, I set up the table saw to rip the widest decking, the 7 1/2-inch stock (**Figure 3**). I waded through the pile, measuring each board and deciding how to get the best yield as I went. Some boards I ripped to 7 1/2 inches, while I set others and offcuts from the first round of rips into piles to be ripped to other widths. It took about half a day to rip all the decking.

A Belt-and-Suspenders Approach to Rot

I planned to finish the tops of all the boards with TWP 100 (Specialty Coatings; 404/355-0668, twp100.com), a combination sealer, stain, and preservative, but according to the directions, that would have to wait until a few months after installation. I also planned to coat the boards on the bottom and sides with a copper-based preservative. This was a belt-and-suspenders measure in case something other than white oak had snuck past both Bob and me; there are hundreds of species of oak and probably a dozen in New England alone, and the visual differences between them can be subtle.

Figure 4. Copper flashing keeps water from collecting in rot-prone areas, such as between double joists.

Figure 5. Rounding over the bottom of the cut ends of decking minimizes the amount of end grain in contact with water that puddles on the joists.

Figure 6. The silicon-bronze screws used on this deck all required predrilling and countersinking.

I didn't want to use TWP on the board bottoms because of its sealant properties. My concern was that water would eventually get into the tops of the boards through cracks and screw holes. I wasn't able to find any research about how deck boards dry, but one general building-science principle is that water moves through materials from the warmer side to the cooler side. It's more complicated than that, but heat is often the main driver of moisture. If that model held true, water in the boards would be driven by the sun toward the cooler bottoms of the boards where it would evaporate (depending on relative vapor pressures — I told you it was complicated). A sealer on the bottom would slow drying there.

Since I was afraid that sealing the bottom might let moisture build up and eventually cause rot, my answer was to coat the bottoms and the sides of the decking with a copper solution that's a preservative but not a sealant. Unfortunately, it also stains the wood green. I rolled the bottoms and brushed the edges, being careful to keep the copper solution off the faces of the boards to avoid staining them. Once the copper solution dried, I eased the top edges of the decking with a 1/4-inch-radius roundover bit in my router. This removed any copper that had strayed onto the edge, and relieved the sharp edges.

Installing the Decking

Now the decking was ready to install. I took a few belt-and-suspenders precautions here as well. Because water can get trapped between built-up framing members and raise moisture levels enough locally to start rotting the decking above, I flashed the tops of any double beams that would contact the bottom of the decking (**Figure 4**). I used YorkShield 106 HP, a hybrid of plastic and copper (York Manufacturing; 800/551-2828, yorkmfg.com). It's cheaper than standard copper flashing, although more costly than plastic. The copper has anti-microbial properties that might help prevent rot organisms from getting a start (that's why you rarely see mildew, algae, or moss growing on a roof directly below copper flashing), and the cost of the flashing was a small part of the deck's overall cost.

Where two deck boards butted together, I left a gap of about 1/4 inch. End grain wicks water, and this gap is meant to allow the joint to dry as quickly as possible to minimize wicking. After cutting the boards to length, I rounded over the cut edges top and bottom (**Figure 5**). The top roundover was for looks, while the bottom roundover was to keep the end grain from sitting in water that might puddle on the flashing below. I also sealed the end grain with TWP to keep out water.

Screw holes are particularly vulnerable to moisture intrusion, and I was concerned about rot starting there. Again in part because of copper's anti-microbial properties, I used silicon bronze (bronze is a copper alloy) boat-building screws to hold down the decking (Jamestown Distributors; 800/497-0010, jamestowndistributors.com). These screws are relatively weak in shear compared with steel screws, and each connection had to be predrilled and countersunk with a special tapered bit and countersink to prevent snapping off the screws (**Figure 6, page 5**).

Figure 7. Shaping the bottom rail like a roof gable helps it shed water.

Figure 8. Copper-pipe balusters provide a unique look and may help prevent rot where they contact the wood.

Figure 9. Bronze angle supports the railing and provides an air gap to foster drying at a vulnerable joint.

Lubrication is also recommended, but no way was I going to run the threads of each of the 1,000 screws in that deck over a block of beeswax, the way I usually lube screws. Instead, I shaved a block of paraffin into a jar of mineral spirits I'd warmed in a hot water bath (do not do this near an ignition source, as both mineral spirits and paraffin are flammable). Once the wax dissolved, I laid out all the screws in a throw-away aluminum baking pan and doused the lot with the wax solution. Lubricating 1,000 screws this way took about 15 minutes.

Detailing the Railing

I approached the railing much as I did the decking. After drilling through-holes for the balusters in the railing and slopping in some TWP, I ran the bottom railing through a table saw to shape its top like a gable roof to shed water (**Figure 7**). The top railing was left square, and capped with 1x6 white oak. The balusters are $\frac{1}{2}$-inch copper plumbing pipe, which fit snugly in the holes drilled in the railing, and again placed copper in contact with wood in a place that's particularly rot prone (**Figure 8**). To be sure the balusters stayed put, I fastened them through the railing from the side with brass (another copper alloy) screws.

Holding the railing to the posts are sections of $\frac{1}{4}$-inch-by-1$\frac{1}{2}$-inch bronze angle. I ordered 4 feet of it online, cut it into 3-inch lengths on my chopsaw using a blade for cutting non-ferrous metal, and drilled and countersunk the screw holes on my drill press (**Figure 9**). I used a fine file to dress the edges. Using the bronze angles to attach the rail to the posts allowed me to keep a $\frac{1}{4}$-inch space between the posts and the end grain of the railings to avoid trapping water. Prior to installation, I coated the ends of the railing with TWP to prevent the end grain from wicking water.

Job Cost

I don't know exactly what the economics of using local wood turned out to be. There was definitely a lot more labor, but because of the deck's complicated geometry, it's hard to say just what cost what. I quoted $15,000 for the project. Retrospectively, that should have been closer to $18,000. I'll assign half of the difference to the lumber, and the rest to the geometry. There's not a lot I would do differently, except I might buy the lumber planed and ripped. I'd end up throwing away more sapwood, but I think the time savings would make up for that. ❖

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