

Put a Little Arc in Your Stairs

Standard lumber with a curved fascia jazzes up these decks



by Kim and Linda Katwijk

Stairs that follow the curve of a deck or spring out in an arc from a straight deck liven the look of a project. The idea might send a lot of deck builders running, but curved stairs are nothing to be afraid of. I'll show two methods for building this kind of stair: one using a box frame, where I stack layers of joists and blocking, and the other using jacks (stringers). The first I use on low decks, the second on higher decks.

Either method can be adapted to work with the treads arcing in or out.

Typically, I make the treads from composite decking that I bend to the radius of the stair using heat blankets (see *Tool Kit*, "Bending Composite Decking," May/June 2007; deckmagazine.com). In some cases, I use this bent decking as a guide to lay out flared stringers (more on this later). You don't have to bend decking to build arced stairs,

though. You can use straight decking — composite, PVC, or wood — and just cut the boards to shape or run them at a diagonal.

No matter what type of decking I use, I first do a full-scale layout of the stairs on plywood or even the sidewalk. I use that layout as a template for bending (Figure 1) or cutting the decking, and for finding the lengths of the runs of the top tread jacks when an arcing stair meets a straight deck.

A few things I don't cover in this article include basic stair layout, railing installation, and attachment of stringers to the deck. I also don't cover how to bend plastic decking. What I do discuss is how I make curved stairs from straight framing lumber.

Footings and Landings

No matter what kind of stair you build, it has to be supported where it meets the ground. Requirements vary locally; where I build, supporting the bottom of the stair on pavers satisfies most building officials. I extend the pavers far enough toward the deck from the front of the jacks or the box frame to catch the back of the stair structure as well. Calculate where the pavers have to go by adding up the run of the stair treads. For example, the front of the three-riser box-framed stair shown in this article ended up 20 inches (two 10-inch



Figure 1. When building curved stairs, start with a full-scale layout on plywood. Use it as a template for bending tread stock and for noodling out dimensions.

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Figure 2. Box framing is a simple approach for stairs that have up to three risers.



Figure 3. The upper joists of a box stair hang from a horizontal 2-by that in turn hangs from the bottoms of the deck joists.

tread runs) from the deck. Therefore, I extended the pavers back 20 inches from there to support the lower box of that particular stair.

Box-Framing Arced Stairs

For decks that are low to the grade, box framing is the way to go (**Figure 2**). It's pretty straightforward — you simply nail together a bottom box from treated lumber to form the framework for the lower riser and tread. If the stair has only two risers, the box is supported on the ground and by the deck framing. If there's a second step, it's formed by another, smaller box framed on top of the first and tied into the deck framing.

Each box is the equivalent of one riser and tread. The boxes' joists run perpendicular to the deck, and those of the top box line up with those of the bottom box. I only use this method for decks that are 23 inches or less from the ground, with no more than a total of three risers.

In the example pictured here, the deck itself curves and the stair follows that arc. Creating the curve in the stair is a simple matter of framing the boxes so that they extend a consistent distance

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Figure 4. When an arcing stair springs from a straight deck, the upper tread is deeper in the center than at the edges.

from the deck. The finish risers are made from thin fascia stock and follow the curve set by the boxes.

First, with pressure-treated 2x8s or 2x6s, frame the lower box the combined depth of the bottom and top treads, ripping the lumber to width if needed. Treat all cut edges with end-cut preservative. Space joists according to the decking you are going to use; I always frame 12 inches on-center to allow for running the decking in almost any direction.

Next, build the top box the same way you did the bottom box, and set its joists on top of the bottom joists. Each of the joists in the upper box should extend 10 inches (or whatever

your tread run is) from the deck fascia. I fasten the back end of the upper box to a straight piece of 2x6 that I hang from the deck joists with vertical 2x6s (**Figure 3, previous page**). Install blocking between the stair's joists.

Finish the stair by trimming the risers with a thin piece of deck fascia and installing the treads.

Building With Jacks

Stairs with a total rise of more than 23 inches I build by cutting stair jacks, or stringers. You can use this method on a stair that follows the curve of the deck as the box stairs did in the previous example, though in the project I'll refer to here, the stairs were built off a

straight deck. The arc starts with the top tread.

On a stair like this one, doing a full-scale layout is critical. Because the top tread curves and the deck doesn't, the depth of the top tread varies, as do the runs of the top tread cuts on each jack; that is, the ones in the center are longer than those at the edges of the stair (**Figure 4**). With a full-scale layout drawing, finding the lengths of these cuts is just a matter of measuring the drawing.

Keep in mind that the depth of each tread run has to be at least the code minimum, and that it's only on the top tread that the depth varies. All the other treads will measure the standard run of the stair.

Also note that the angle of the top plumb cut doesn't change even though the run of the top tread varies at each jack. In other words, when you lay out the top tread on the jacks, use the same rise and run (or pitch) as for all the other steps. Draw a standard tread run on the jack at the top tread, then extend it toward the deck by whatever amount that particular tread cut is longer than

Skip the Riser Blocking

Another way to handle curving risers was shown to me by Jason Russell of Dr. Decks in Tacoma, Wash. He cuts his joists 1½ inches shorter than the tread run. Then he heats up a long piece of 2x6 composite decking and bends it along the riser cuts of the joists. This is faster on wider stairs because you cut less blocking, plus it gives a nice, smooth curve.

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Figure 5. Stairs with flaring sides start out with diagonal jacks installed to the outside.

the standard run (as measured on the full-scale layout). Mark the rear plumb cut on the jack, perpendicular to the tread cut.

Finally, trim the sides of the jacks and the risers with thin deck fascia and install the tread material.

Flaring the Sides

You can also build curved stairs whose sides flare outward. This requires diagonal jacks at the outside of the stair to form the base for the flare (**Figure 5**). You can figure out the layout of a diagonal jack mathematically, but it's a nightmare. I find it easier to mark this jack in place.

First cut and install the main jacks normally. Then lay out the top of the 2x12 diagonal jack. Its pitch, and therefore its plumb cut angle, will differ from the rest of the jacks. The rise will be the same, but the run will be longer; you can find it by measuring the horizontal distance between where the diagonal jack will meet the deck framing, and the bottom riser of the outside straight jack. Divide that measurement by the number of treads, and you'll have the tread run for the diagonal jack. Armed with that information, lay out the plumb cut using a framing square.

Set your saw to match the angle at which the diagonal jack will meet the deck, and make the plumb cut at that bevel. Remember there will be left and right diagonal jacks, so the bevel orientations will have to oppose each other.

Get a rough measurement of the diagonal jack's length between where it will meet the deck and the bottom of the main stairs. Rough-cut the jack a little long. Where the bottom of each diagonal jack will land, dig a small hole to accommodate it. Hang the jack temporarily in place, aligning its top edge with the fronts of the tread cuts on the straight jacks; I do this by placing a curved piece of decking on the cuts,

How Much Time to Budget?

Clearly, building curved stairs adds both visual appeal and significant extra labor to a project. How much extra labor is a tough question to answer because of the variables. Not only do different crews work at different paces, but the stairs themselves vary. A curved stair could have curving treads and straight sides, or it could have straight treads and curved sides. That, by the way, may be the simplest option if you don't have the means to heat and bend composite decking for the treads.

Arcing stairs take about twice as long to build as a straight stairs. Add to that the time it takes to bend tread material and install a curving railing, and you can see the hours adding up.



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Figure 6. Verify the diagonal jack's location with a piece of bent decking or a plywood tread template.

with one end of it against the diagonal jack (**Figure 6**). You can also use a piece of plywood cut to the radius of the stair.

Now, scribe the cut and bevel on the diagonal jack where it meets the outside main jack. Remove the diagonal jack, cut its bottom, and reinstall it temporarily.

With the diagonal jack temporarily installed, mark the locations of the fronts of the tread cuts on it, guided by the piece of bent decking, or plywood cut to the stair's radius, that you used in the previous step. The riser cuts will be at a bevel, so while you're marking the riser and tread locations, extend the line of the decking or plywood piece to establish the riser bevel (**Figure 7**). Mark the tread cuts using a level (**Figure 8**). Remove the diagonal jack, and mark the riser cuts using a square set on the tread-cut level marks



Figure 7. Mark the bevel angle on the diagonal jack by extending the curve of the treads.



Figure 8. A level placed across the main jacks is used to establish the tread elevations on the diagonal jacks.

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Figure 9. Mark the riser cuts using a square that's aligned with the tread cut below and the mark representing the front of the tread run above.

and extending up to the front of the tread cut above (**Figure 9**). Make these cuts with a circular saw, and install the diagonal jacks.

Of course, these diagonal jacks are made from straight framing lumber, yet the idea of a flare is to have the side of the stairs curve. I do this with an outside skirting made from deck fascia. Fasten 2-by shims to the top and bottom of the diagonal jack, and clamp a piece of deck fascia to the diagonal jack (**Figure 10**). Lay out the fascia's notches using the same method as with the diagonal jack, make the cuts, and attach the fascia to the diagonal jack. Install deck skirting to face the risers, and lap it over the outside skirting. Finally, install the decking (**Figure 11**).

Railings for curved stairs with straight sides are no different from any other railing. For stairs with flaring sides, one option is to make cardboard templates of the arc and have metal railings fabricated. Innovative Aluminum Systems (877/724-5427, innovativealuminum.com) is one company I've had success working with. ♦

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Figure 10. Thin deck fascia is shimmed out from the top and bottom of the diagonal jack to establish the flare.



Figure 11. Complete the stair by installing the risers and the tread stock.