Building Square Columns with Entasis

A little math and a shop-made router template give classical curves to plywood box columns

BY SCOTT WYNN

Two and a half millennia before CAD, cell phones or hydraulic excavators, Greek construction crews erected buildings whose beauty and strength we still admire. Lacking widgets that 21st-century builders brand essential, these ancient builders firmly grasped some subtleties of design that today are by and large forgotten. For example, they understood that a straight or straight-tapering column can give the unsettling feeling that its sides are somewhat concave. Entasis, a slight, convex taper of the upper two-thirds of a column, remedies this illusion and tricks the eye into perceiving a greater sense of strength. Entasis elevates a column from being a purely structural element to being an elegant symbol of strength.

Based on the Greek and Roman orders of architecture, architectural pattern books of the 19th century codified entasis in a manner that's still useful to builders and architects. Reprints of one such pattern book, Asher Benjamin's *The American Builder's Companion* (Dover, 1969), are still available. While Benjamin treats all five classical orders, I have paraphrased only his method of laying out the Tuscan (drawing right), the simplest, most robust order.

Benjamin describes round columns, but I've found that his proportions work equally well for square ones. I simply substitute my columns' width for Benjamin's diameter. Also unlike Benjamin, I build my columns from plywood, shaping and mitering the sides with bearing-guided bits in a router. My columns are not structural; however, you could enclose structural columns similarly.

Lay out the entasis on particleboard to make a router template

I first derive a columns proportions, then draw them out full scale on a piece of ½-in. medium-density fiberboard. I'll use this router template (drawing, facing page) to shape the column's sides. I shape only one side of the template at first. Then I rout the first column side and use it as a template to rout the second side of the template. This step ensures that both edges curve exactly the same.

Because the sides bend to form the entasis, there is a limit to the thickness of the material. I haven't experimented with lumber or plywood (either of which can work) thicker than ½ in. However, ½-in. material is fine for nonstructural columns and is thick enough to nail conveniently.

To trim the column's sides to the template, I use a straight bit with a bearing mounted flush with the cutting edges. After trimming with the straight bit, I miter the edges with a bearing-guided 45° chamfer bit.

After routing the sides, I cut two squares out of plywood to fit inside the top and bottom of each column. Then I simply glue and nail the parts together. Done: one classically proportioned square column. All that's left is to install the abacus, echinus, astragal, cincture, torus and plinth. ☐

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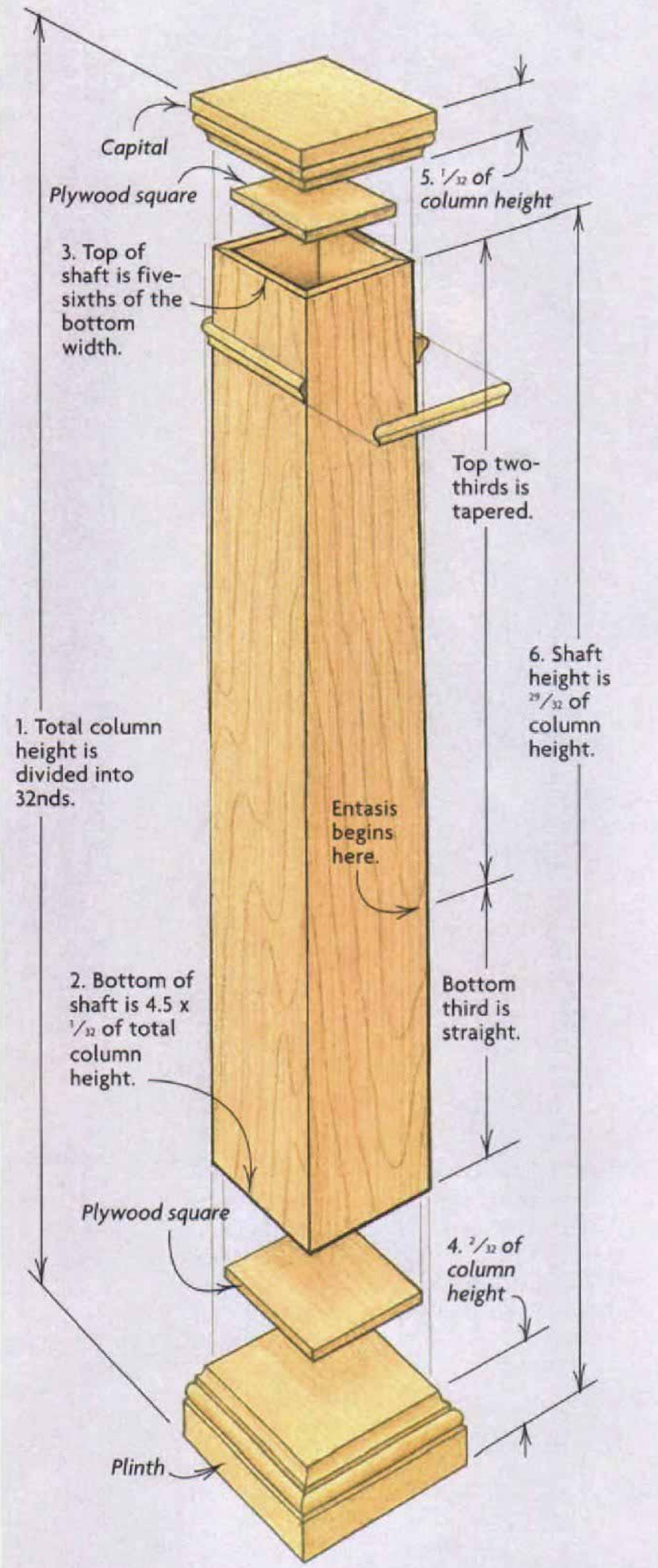


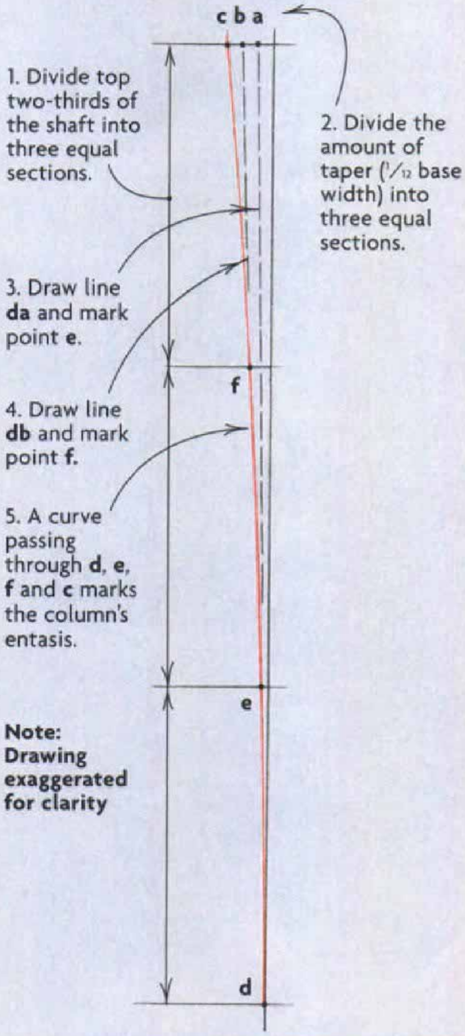
Proportioning a Tuscan column. Start by dividing total height into 32nds. Using a 96-in. tall column as an example, the math below follows the steps shown in the drawing above.

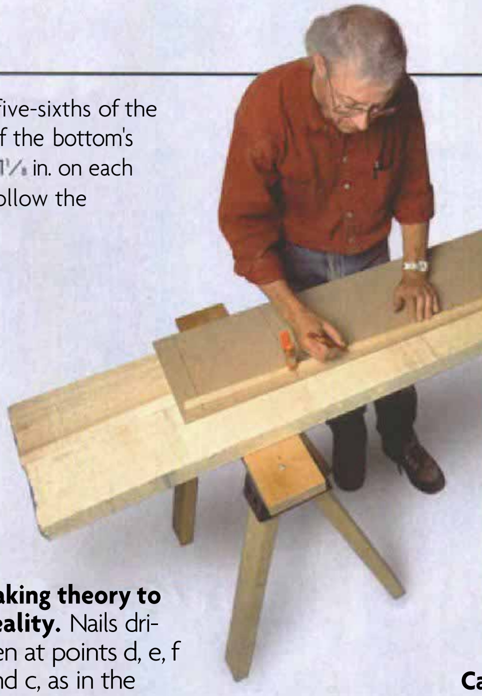
1. 96 in. ÷ 32 = 3 in.
2. 3 in. x 4.5 = 13½ in. (base width)
3. 13.5 in. (base width) x 5/6 = 11¼ in. (top width)
4. Plinth thickness: 2/32 x 96 in. (total height) = 6 in.
5. Capital thickness: 1/32 x 96 in. (total height) = 3 in.
6. Shaft height: 96 in. (total height) – 6 in. (plinth) – 3 in. (capital) = 87 in.

Drawings: Vince Babak

CUT OUT A TEMPLATE

Laying out entasis. If the top of the shaft is five-sixths of the width of the bottom, then each side tapers in $\frac{1}{12}$ of the bottom's width. The top of our sample shaft would taper in $1\frac{1}{8}$ in. on each side: $\frac{1}{12} \times 13\frac{1}{2}$ in. (base width) = $1\frac{1}{8}$ in. From here, follow the numbered directions in the drawing below.





Taking theory to reality. Nails driven at points d, e, f and c, as in the drawing left, form a flexible wood strip into the curve of the column's entasis.

Careful shaping of the particleboard template is crucial. The fairness of this curve determines the fairness of all your subsequent work. Jigsaw just to the line to leave meat for hand-smoothing.

CONSTRUCT THE COLUMN

Two routers make quick work. The first has a bearing-guided straight bit and removes most of the stock up to the template edge. The second is also bearing-guided, and it miters the edge.

With all eight edges mitered, nailing together the column is straight carpentry. The sides are bent and secured incrementally as work moves from bottom to top. Either a nail gun or a helper eases assembly tremendously.