Table-Saw Molding

The secret is in the order of cuts

by Bruce Andrews

When the landmark Winooski Block was finished in 1862, the builders festooned it with all manner of ornamental moldings and wooden filigree. But by the time we (Moose Creek Restorations Ltd.) got the repair contract, 117 Vermont winters had weathered, cracked and split all of its remaining woodwork. Three-fourths of the building's cornice moldings were either rotten or missing. We were to replace 10,000 linear feet of various moldings, not one of them a type manufactured today, and we didn't even own the usual tool for milling moldings, the spindle shaper. We still were able to complete the job, relying on our table saw and a lot of careful planning. We found that the table saw could handle most any profile—it could even scoop out concave curves—but we also learned that every profile required its own sequence of cuts. Figuring out that sequence is the heart of our method.

The first thing we worried about was getting enough good stock. Molding stock must be the highest quality, close grained and knot free. We were still short of stock after several deals to obtain a couple thousand board feet of Vermont pine in varying widths, thicknesses and lengths-all rough cut and in need of finish planing, dimensioning, and in some cases, drying. We were bemoaning our plight when two young entrepreneurs wandered into our office. They asked if we knew anyone who could use several thousand board feet of redwood and cypress beer-vat staves from the old Rheingold Beer brewery that was being dismantled in Brooklyn, N.Y. Well, yes, we probably knew someone. The wood reeked of stale beer, but it was superb for our purposes. It was straight, close grained and of course, well seasoned.

Before any shaping could be done, we had to prepare our stock. We thought that the wood might have nails hidden in it, but we found none. We did find metal flecks where the vat bands had deteriorated, but with wire brushes and large paint scrapers we removed almost all the rust. On our 16-in. radial-arm saw, we ripped the lumber to the rough sizes we needed, about ¼ in. thicker and ½ in. wider than the dimensions of the finished moldings. Next we prepared the stock on a jointer and a thickness planer. Once we had dressed down the old surfaces ¼ in., the wood was perfect and unmarked. As we worked, we checked our cutters for sharpness. Our stock was as straight and as square as we could make it; we were ready to begin shaping.

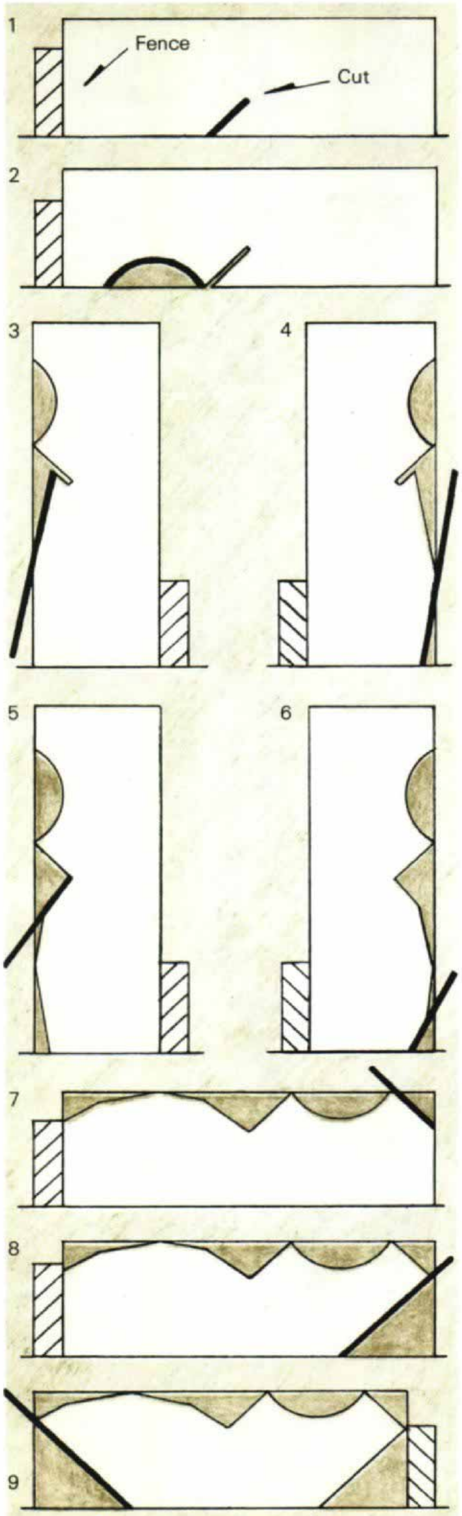


Figure 1: Sequence of cuts

Illustrations: Carol Hubbard

Setting up—Milling complex moldings on a table saw requires precision. Begin with an accurate template of the molding, to which you can adjust the sawblade's settings and against which you can compare results. The best template is a short piece of the molding you want to copy. If you must create a template from molding in place, you'll have to use a profile gauge. (See Figure 2 on the next page.) Many exterior moldings are too large to be handled with one application of the gauge. If this is the case with your trim, you'll have to take a series of readings, transfer them to paper and combine them for the complete profile. In fact, it's a good idea to sketch all molding profiles on site, for the gauges may get distorted before you return to the shop. Fashion your template out of a rigid material such as Masonite or plywood.

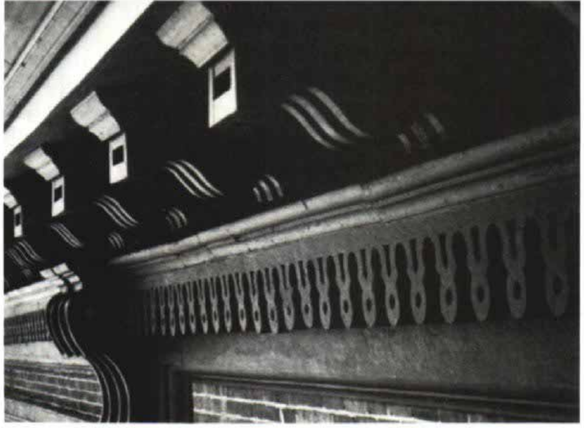
Before any cutting, even before setting the sawblade, scrutinize the template or molding cross section. The question is how to determine the order of the cuts. You don't want to take out a piece of stock you'll need later to run against the fence for making another cut. Think things through on a piece of paper. Certain cuts simply have to be made before others.

In Figure 1, for example, cut 1 is crucial because it is a dividing line between two curves: If its angle is incorrect or its cut misaligned, the proportions of both curves will suffer. If it is too deep, it undercuts the convex curve; if too shallow, material in the notch will have to be cleaned out later—a waste of time.

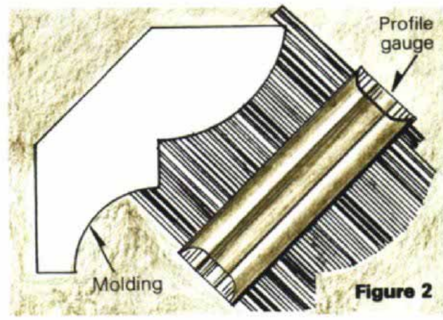
Cut 2, which creates the concave curve, must meet precisely the high point of cut 1. Because the stock is fed into the sawblade at an angle, this is a delicate cut.

Cuts 3 through 6, creating the convex curve, must be made after 2. If they had been made before 2, the convex curve would have made subsequent cuts a problem. (The stock could easily roll on that curve as it is fed into the sawblade.)

Cut 7 is delayed so that the point it creates with cut 2 won't be battered as the stock is maneuvered over the saw. Cuts 8 and 9 are made last, because leaving the corners of the stock square



The Winooski Block (left) is capped by a cornice assembly over 6 ft. wide; it consists of 14 elements, including 7 moldings that were reproduced on a table saw. The milling of the molding is described on the facing page.



You need a template to mill new moldings. Use a piece of the original, or transfer readings from profile gauge to paper on site and cut a template later in the shop.

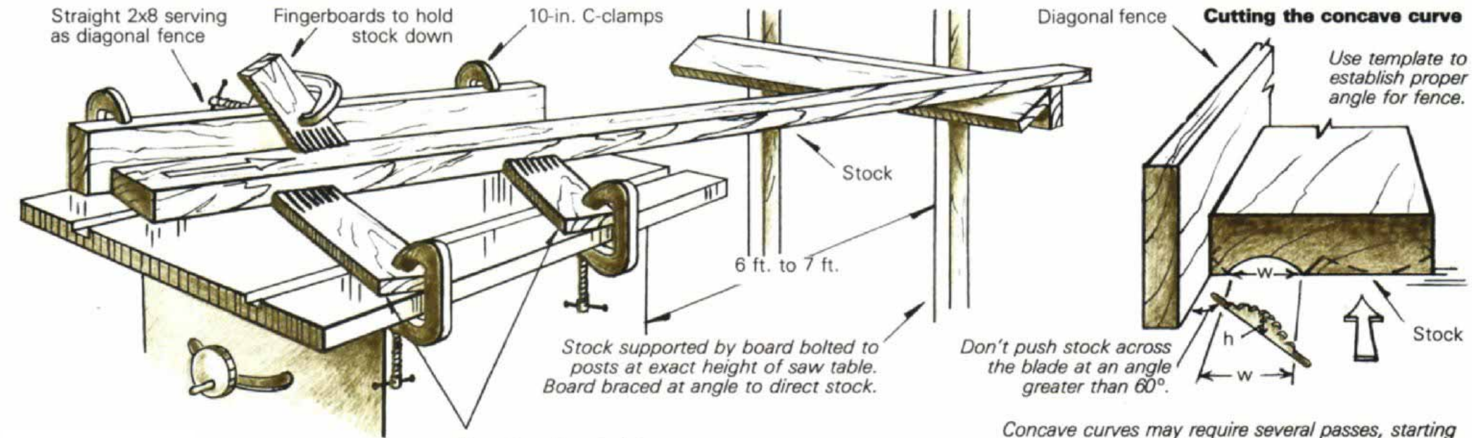


Figure 3
Cutting setup

Concave curves may require several passes, starting with the blade set low. On the last cut, saw points should just touch curve outline.

ensures the stability and accuracy of preceding cuts. (Cuts 3 through 6 would have been almost impossible if cut 9 had preceded them.)

To save time, pass all molding stock through a given saw setting; be fastidious about such settings, making practice cuts on scrap work. Cut more molding stock than you'll need at each setting, so you'll always have waste stock with the necessary previous cuts. In other words, to get an accurate setting for cut 5, you'll need stock with cuts 1 through 4 already made.

Cutting—We used a 10-in. Rockwell Unisaw with a 48-point carbide-tipped blade for all molding cuts. For most cuts we used the rip fence provided by the manufacturer. For cut 2 however, we needed a diagonal fence, so we trued a 2x8, used a template to carefully set it at the proper angle for the desired cove, and clamped it to the table with 10-in. Jorgensen C-clamps (Figure 3). To reduce stock flutter we used fingerboards, pieces of wood with a series of parallel kerfs cut in one end. Two fingerboards clamped to the table held the stock against the fence, while one fingerboard clamped to the fence held the stock down. The kerfs allowed enough play to let the wood slide through, but maintained enough pressure to ensure a straight cut. Using fingerboards and extension tables, you could cut all the molding unassisted, but you may prefer to have a helper to pull the stock gently through the last few inches of a cut. Several times a day, wipe the tabletop and sawblade clean with turpentine, to minimize binding.

Except for cut 2, all cuts were made with the rip fence running parallel to the blade on one side or the other. As shown in Figure 1, cuts 1 and 2 were made with the stock face down on the table, while cuts 7, 8 and 9 were made with it face up. The stock stood on edge for cuts 3 through 5. (When cutting some symmetrical convex shapes, you can leave the sawblade at the same angle, and after one pass, turn the stock 180° to get the cut whose angle mirrors the first.) Each cut was preceded by carefully adjusting blade height and angle against the template. The last cuts on a molding (cuts 8 and 9) should be slightly larger than 45°—if your sawblade will tilt just a little more—to avoid gaps where the building surfaces are not quite perpendicular.

We cut the concave shape (cut 2) into the molding by passing the stock diagonally across the table-saw blade. (See Figure 3, at right.)To set the blade and fence correctly, you'll need a piece of the old molding. (A template is less effective.) Holding the high point of the curve over the blade, slowly crank up the blade so that the tip of the highest tooth just grazes that curve's apex; lock the setting and try a few cuts. To create the width of the curve, angle the piece of molding until all the teeth of the exposed blade lightly touch the arc of the molding. Another person should snug the fence against the angled molding and then clamp the fence to the table while you hold the molding in place. You'll have to tinker a bit to get the exact angle you need.

You can create almost any symmetrical curve with this method. Pushing the stock across the blade at a wider angle will result in a wider curve. However, the widest angle at which we would push wood across the blade is 60°; with wider angles, not enough of the sawteeth are gripping and the blade will bind. (I'm not sure why, but a 48-tooth carbide blade binds up less than an 82-tooth one. It may be that the chips clear more easily.) If the blade is binding, make several passes to get the curve, starting the blade low and cranking it up ¼ in. for each pass. Don't get so wrapped up in your calculations that you become careless. Keep fingers clear of the blade. The speed at which you feed the stock must be determined on the job: Too fast and the blade will bind, too slowly and the wood will burn. The greater the angle of feed, the more often you should clean the blade.

The quality of the wood greatly affects the complexity of cuts you can make. Hardwoods are more difficult to mill without proper equipment. If concave curves are possible at all on hardwood, you'll have to make many gradually increasing cuts; the angle of the stock to the blade will be limited. Fortunately the grain in our cypress varied less than ¼ in. in 15-ft.

To refine the shape of our convex curves, we used many tools, including jack planes, curved shavehooks and spokeshaves. Among power sanders, Rockwell's Speed-block was the favorite; we clamped the finished molding to benches and sanded it using 50-grit pads.

Using these techniques we milled 1,000 linear feet for each of nine molding types, some more complex than the one described above. □

Bruce Andrews is a partner of Moose Creek Restorations Ltd., in Burlington, Vt.