Making Curved Casing

Strip-laminating arches to match straight casing profiles

by Jonathan F. Shafer

A few years ago I was asked to step in and complete the finish work on an 11,500-sq. ft. Tudor home that had taken 18 months to get through drywall. Completing the trim took an additional 12 months and posed many challenges, such as hanging 8-ft. high doors, building four stairways and running thousands of feet of wide casings and base. The house also had many arch-top windows (photo below) and doorways of various heights and widths. The curved window and door casings had to match the existing straight casing, so I decided to produce the curved casings on site with the help of a talented crew of finish carpenters.

My approach to this challenge was to strip-laminate the arched casings. By alternating strips from two pieces of straight, even-grained casing, we reproduced the casing profile. We ripped the strips from straight casing and then bent them around a form for each window and door. We also laminated extension jambs for each window, using the same bending forms.

Making the patterns—Our first step was to make patterns of all the arched windows and doors. How we produced the patterns varied depending on the particular application—some methods were as simple as tracing on kraft paper (available in long rolls) against the window frame, while others were as involved as mathematically computing arcs and multiple radius points.

One method we used on some of the more complex windows required a thin, flexible ripping of even-grained wood long enough to follow the arch along a window frame. This strip was clamped or held by helpers against the inside of the frame. We maintained the arch shape by tacking crosspieces to the bowed strip. The more crosspieces we used, the better the shape was held after the clamps were removed. We then transferred the shape of the arch to kraft paper.

With another method, we tacked plywood against the window, using a piece wide enough to contain the unknown radius points. We then used a beam compass to find the radius points on the plywood by trial and error. Again, the arch was then transferred to kraft paper. I came on the project too late to have done it, but in the future I would make tracings of each window frame prior to installation.

Finally, we cut out each pattern and checked it against the corresponding window, making necessary adjustments. The patterns also had to be extended on both ends to allow extra casing length for trimming later. We labeled the patterns for window location and wood species.

Building the bending forms—When the patterns were ready, we built a bending form for each one. We constructed them from 2x stock cut into arcs on a bandsaw (for the design of a bending form for curved jambs, see the sidebar on p. 85). With roundtop casings, the 2x arcs were made using a simple circle-cutting

The curved casing for these windows was fabricated on site, using two pieces of straight stock cut into narrow strips and laminated around a form.

jig fixed to the bandsaw table (drawing below). We extended the table with a piece of ¼-in. plywood and ran a screw through it to create a pivot point. The 2x stock was then pivoted around the pivot point on a ¼-in. plywood carriage.

To cut the more gradual arcs of the bigger windows, we used a 1x3 to extend the pivot point of the circle-cutting jig across the shop (photo below). The 2x arcs were screwed to a plywood base or to the subfloor, depending on how big they were.

Ripping strips—Once the bending forms were completed, the strip-cutting .operation was next. The basic principle here is that you're taking a piece of straight casing with the molded profile you want and ripping it into narrow strips that you can bend around a form and glue back together. But if you were to do this by ripping a single piece of casing, the resulting molding would be narrower than the original because of the material lost to the saw kerf. Therefore, you have to make alternate cuts on two pieces of straight casing.

To ensure that the laminating strips were cut to a uniform width, we used thin pieces of pine as spacers resting against a preset table-saw fence. This enabled us to cut the casing incrementally without changing the position of the saw fence.

In our case, the saw blade, and hence the laminating strip, was roughly ⅛-in. wide. The spacers were cut so that each was twice the width of the table-saw blade. We cut our spacers the same length as the short auxiliary fence on my table saw. To keep them from slipping with the casing as it was being cut we simply tacked a brad to the underside of each spacer, which hooked over the front edge of the saw table (drawing next page).

After the spacers were completed, we adjusted both pieces of casing (ripped a little off them) so that the finished width was an even number multiple of the spacers. Our casing had a rabbeted back band around the outside edge, so we were able to reduce slightly the outside edge of the casing without changing the profile. (The side casings were also adjusted in width to make them equal to the arched head piece.)

Next, we glued and clamped the back band to the casing. We also filled in the plowed relief on the back of the casing by gluing in thin material and jointing it flush. This was necessary so that each strip would be cut square to the others.

We set the table-saw fence to equal the total adjusted casing width (casing plus back band) minus the width of one spacer. Finally, we equipped our table saw with a riving knife (or splitter) mounted behind the blade. This protected the thin strips from damage as they came off of the saw.

In order to produce alternating strips from two pieces of straight casings, we ripped the first piece of casing on the saw with the outside edge against the fence (drawing next page). Next, the second, piece of casing was ripped with the inside edge against the fence, and so on.

On the first piece of casing that we did, I made the mistake of dropping the laminating strips into a pile, thinking I could easily sort them out later. Wrong. It took me over an hour to put the pieces in order before gluing them up. For subsequent casing, I built a rack to hold the strips in order (top photo, next page). The rack was simply a pair of 1x4s with saw kerfs in them, nailed to a short bench.

Glue up—Before we could start gluing, the bending forms had to be adjusted to allow for the jamb reveal—the difference between the inside edge of the jamb and the inside edge of the casing. We tacked ¼-in. thick spacing shims (the width of the reveal) against the forms. We also covered the forms with waxed paper to prevent the casing from adhering to them during glue up.

We had plenty of pre-adjusted clamps on hand to do the job—everything from bar clamps to wedges against wood blocks screwed to the floor. Our clamping cauls were bandsawn to match the outside radius of the casing. We dry-fit the strips around the form so that we could work out a clamping strategy (bottom photo, next page). During glue up, we quickly and evenly brushed yellow glue on each piece. Because the casing was relatively wide and the set-up time relatively short, we glued and clamped the strips in three stages and let the glue dry overnight before proceeding to the next stage. Once the complete casing was dry, we scraped and sanded the casing profile, removing glue squeeze-out and any irregularities in the profile.

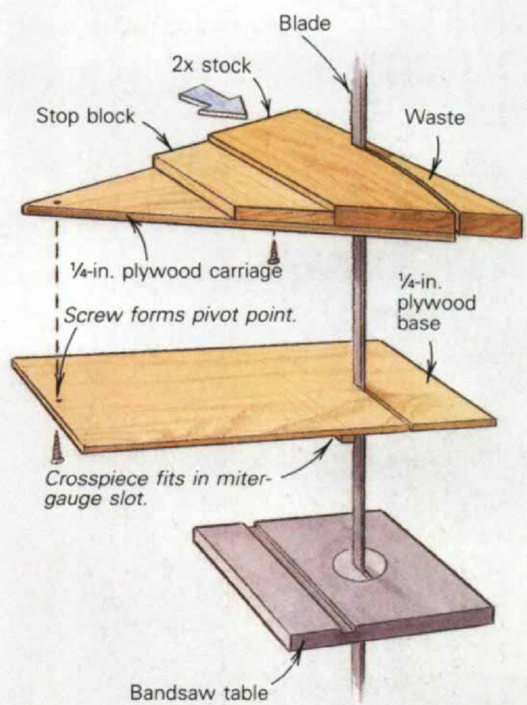
Making extension jambs—We made the extension jambs for the windows with the same bending form used for the casing—all we had to do was remove the ¼-in. shims. The reveal was ¼ in. so we made the extension jambs ⅝ in. thick, allowing sufficient material to secure the casing. We produced strips roughly ⅛ in. thick to reduce the chance of springback and wide enough to fill the space between the window frame and the edge of the drywall, plus ¼ in. extra for ripping and jointing to the finished width after the glue had dried.

Ripping and jointing was a two-man operation. One man fed the piece into the table saw or jointer, and the other helped support the piece as it went into and came out of each machine. Cutting and fitting the extension jambs to proper length was a trial-and-error process, the error always being on the long side until the jambs fit. Next they were glued and nailed to the window frames through predrilled holes.

Fitting the casings—The ease of fitting the casings to the windows was directly related to the care with which the pattern had been made. If the pattern was true to the window form, the casing was relatively true to the window. Because our laminating strips were about

For round-top windows with small radii, Shafer cut sections of the bending forms on the simple jig shown in the drawing. For bigger windows, he attached a length of 1x3 to the plywood carriage (above) and extended it across the room to a center point on top of a workbench.

Bandsaw circle-cutting jig

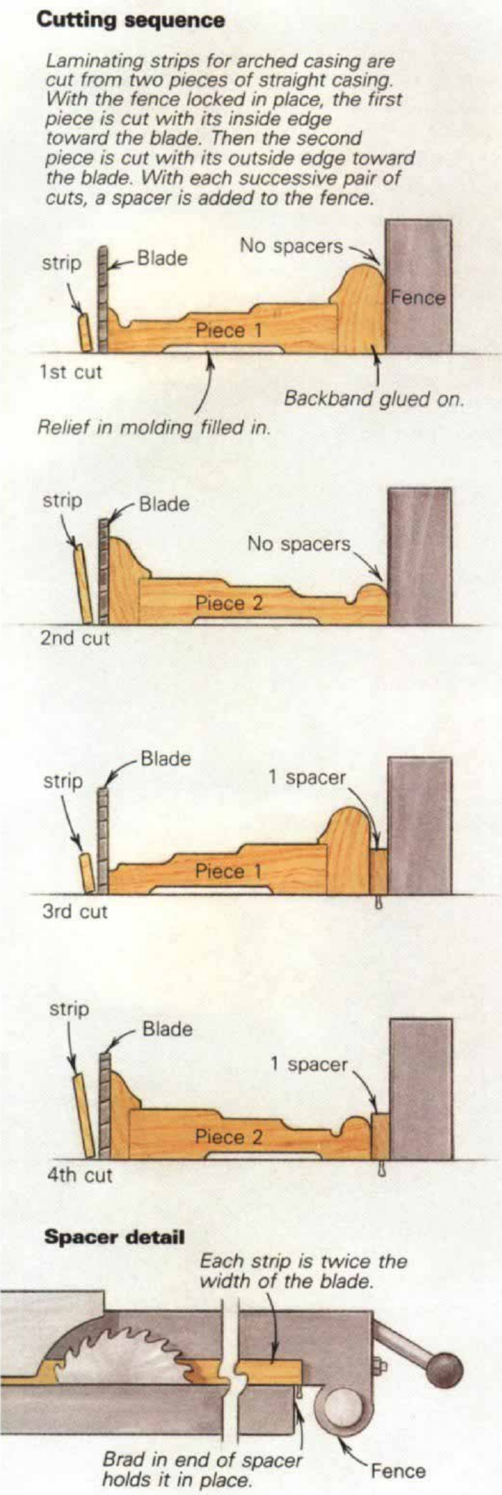


⅛ in. wide, the springback was negligible. We were using relatively wide casings, so springing the casing to match the window—anywhere the pattern was not true—was very difficult, if not impossible. We had to live with compromises in a few places.

Just as with the extension jambs, fitting the casing was a trial-and-error process. It was relatively simple on the windows with one-piece casings that were butted directly to the window stools. Likewise, using plinth blocks would have simplified fitting the casing on the bigger windows and doors. But we decided to miter the corners between the arched casing and the side casings.

We calculated the miter by tracing the head casing and side casings right on the drywall, then connecting the points where their inside edges and outside edges intersected. The head casing was cut to match this line, and the corresponding angle was then cut on the side pieces. After the miter was judged to be tight, the bottoms of the side pieces were marked and cut square to rest on the window stool, or mitered if the window was picture-framed. □

Jonathan F. Shafer was a carpenter in Dublin, Ohio, when he worked on this project. He has since relocated to Bellingham, Washington. Photos by Kevin Ireton.



To ensure that the laminating strips were cut to a uniform width, Shafer kept the table-saw fence at a fixed distance from the blade and used spacer strips to move the straight stock incrementally closer to the blade. The rack beside the saw holds the laminating strips in their proper order for gluing.

The bending form is simply 2x stock cut into curved sections and screwed to a piece of plywood. Here the laminated strips have been clamped up without glue to work out the clamping strategy and eliminate some of the usual glue-up trauma.

Reusable jig for curved jambs

With the trend toward New Classicism in architecture has come a renewed popularity of arch-top windows and, to a lesser extent, doors. Making the jambs for these doors and windows presents only minor challenges. The millwork is straightforward, a matter of laminating a stack of plies in a curved jig. The problem is cost. One of the axioms in the millworking business is that no matter how many stock jigs you have cluttering up the back room, the next customer will want a window of a slightly different size. Building a custom jig for each order soon prices the work out of the market.

Over the last few years, David Marsaudon and the other folks at San Juan Wood Design have developed and refined a jig for making arch-top jambs that employs reusable parts. With this jig, they can lay up fair, smooth arcs of virtually any radius, and do so at a cost that gives them a competitive edge in the custom market. Their jig is made with some scrap plywood, strips of ¼-in. hardboard, a sheet of particleboard and a shop full of clamps. I visited San Juan's shop in Friday Harbor, Washington, and got a close look at how the jig works.

Building the jig—The jig, which somewhat resembles a dinosaur skeleton, is made of three parts: a semicircular particleboard panel, a set of clamping blocks and a mold surface. The radius of the particleboard panel determines the final size of the jamb.

I watched craftsmen Roger Paul and Jerry Mullis make the frame. They started with a given finished radius (the inside of the finished window frame) of 73 in. Based on previous trials, they estimated springback to be 2½ in., so the jig had to have a radius of 70½ in. By subtracting the thickness of the mold surface (¼ in.) and the depth of the clamping blocks (3 in.), they came up with a panel radius of 67¼ in. A new panel must be cut specifically for each size window frame, but smaller panels can be cut from larger ones to save on materials.

Paul and Mullis propped this panel vertically on a bench, and screwed to its rounded top a set of clamping blocks at about 8 in. o. c. Made from scraps of ¾-in. plywood laminated in pairs, these blocks are saved for reuse in each new jig. Finally, Paul and Mullis stapled a skin of ¼-in. hardboard, as wide as the intended window jamb, to the clamping blocks. They started at one end and carefully worked their way to the other, keeping the skin centered on the blocks and checking the final jig for bowing. Because any imperfections in the skin would telegraph through to the window jamb during glue up, Paul and Mullis checked that the skin was perfectly smooth. As a final touch, they waxed the skin with paraffin and smoothed the wax with steel wool. The wax keeps glue from sticking to the skin, so the finished jamb will pop easily out of the jig.

Assembling the plies—Curved jambs are built from four plies, each ³⁄₁₆ in. thick, about ¼ in. wider than finished width to allow for edge-jointing later, and a few inches longer than arc length. Paul and Mullis first sorted among the four plies and selected the best for the inside finished surface. They finish-sanded this face—a job that is much easier on a flat bench *before* glue up. They laid that ply face-down on the bench and on its back they drizzled aliphatic glue, each man releasing his artistic talents in a distinctive pattern of squiggles. They spread the glue to an even film, paying special attention to coating the surface along the edges. Then, they lifted the second ply onto the first and repeated the procedure until all four plies were glued. They clamped the plies by the edges to keep them together as a unit until clamped in the jig.

Clamping—Working quickly before the glue set, Paul and Mullis lifted the group of plies onto the jig and balanced it on the apex. Starting at the center, they laid a caul across the width of the plies, centered over a clamping block. They hooked one bar clamp under the chin of the block, snugged it down and then did the same with another clamp on the opposite side. Working as a team, one on each side of the jig, Paul and Mullis worked away from the center, clamping to each block with just enough pressure to hold everything in place. With the frame now held stable in the jig, Paul and Mullis went back and added two C-clamps, with a caul above and below, between each of the clamping blocks (drawing below). With all the clamps in place, they tightened them firmly, and glue flowed from every seam. They have found that only an even clamping pressure will give a fair arc. The key is to use lots of clamps and tighten them uniformly. The other men in the shop joked about Paul and Mullis hatching another peacock (photo below), and in fact, the radiating bar clamps did call to mind one of those strutting birds.

I returned the next morning to watch the plucking of the bird. Clamps were removed, scraped free of dried glue, and hung back in their racks. With the bench clear, Paul and Mullis laid the finished frame against the penciled layout marks. The frame had sprung to within ⅛ in. of the design width.

—J. Azevedo, a free-lance technical writer in Friday Harbor, Wash. Photo by the author.