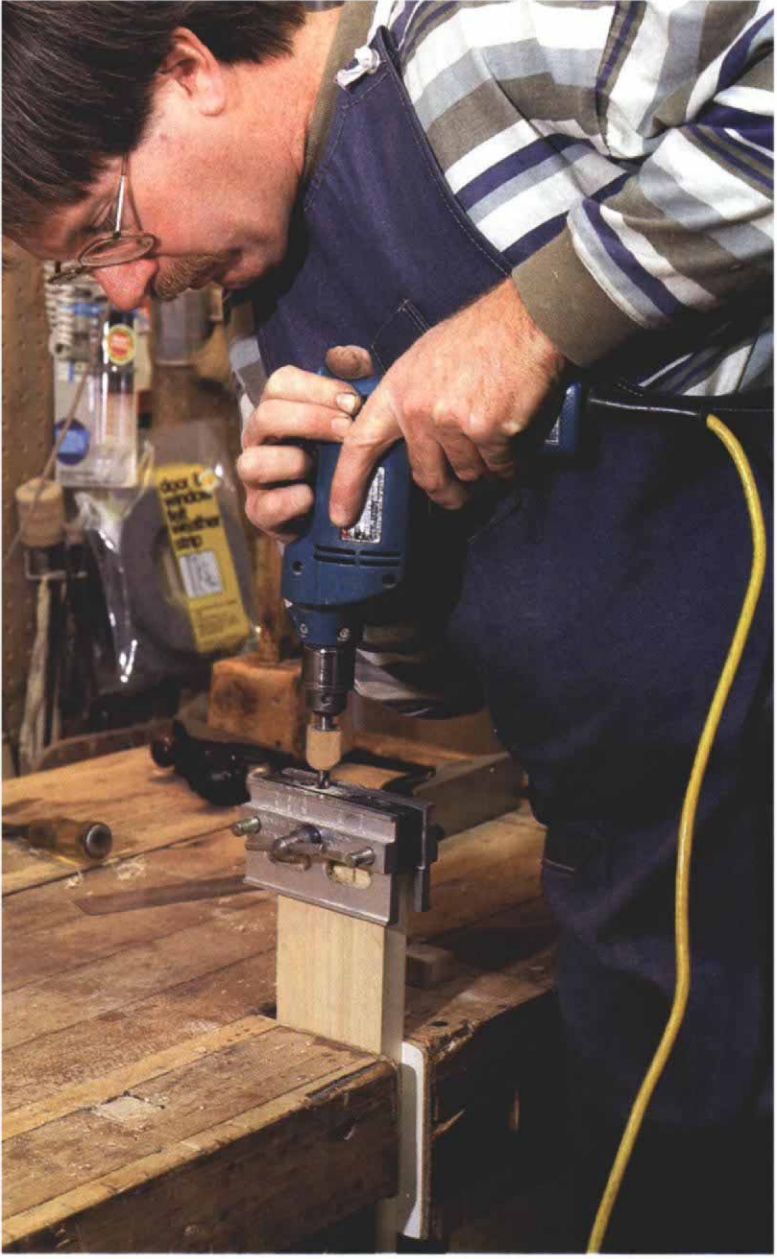
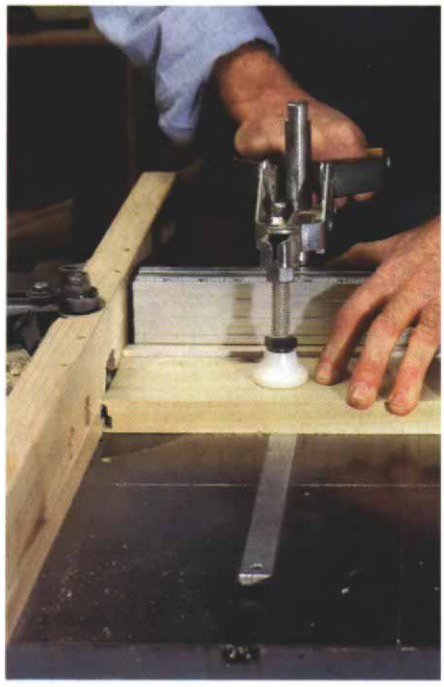
Making Storm Windows

Wood storm windows look better and seal tighter than mass-produced aluminum and vinyl units

by Rex Alexander



The doweling jig aligns the holes. After marking the dowel locations on the end of this rail, the author clamps the Dowl-It jig onto the workpiece, chucks a homemade stop on his brad-point bit and drills.



Coping rail ends. With the workpiece clamped flat against the shaper table, rabbet and ogee profiles are cut into the end of this rail. The pencil marks on the end of the workpiece show where the dowel holes were drilled.

There's no doubt about it. Modern aluminum and vinyl storm windows on an old house are ugly. They don't look right. They're not appropriate. And often, they don't even work right. So when David and Lulu needed storm windows for the old house they remodeled, they asked me to give them a bid for custom-made wood storm windows.

Despite the cost—my bid for 58 storm windows was double that of aluminum and vinyl—they went with wood. Wood storm windows help to preserve the beauty of traditional windows, especially for an older home. Also, because they are custom fit and full size, they eliminate drafts.

First, I had a few decisions to make—Before I proceeded with a prototype for the project, I had to make a few choices. What kind of wood should I use? Should I go to the expense of buying a sash cutter for my shaper or just use a rabbeting bit in my router to rout a place for the glazing? What kind of joints should hold the storm windows together? Finally, what kind of weatherstripping should I use inside the finished storm windows?

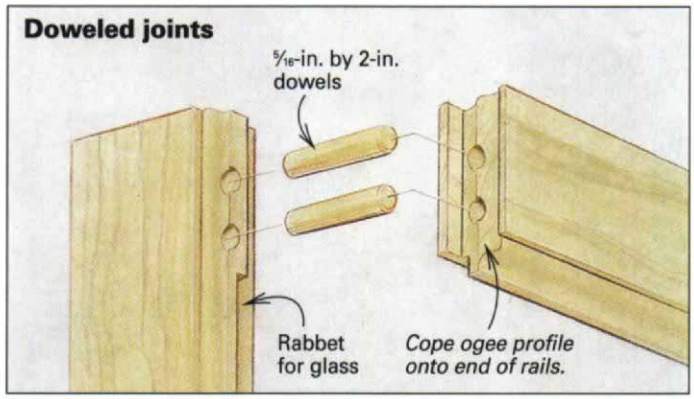
For the stock, I decided to use kiln-dried yellow poplar. It machines well with little tearout, paints beautifully and is fairly stable. Poplar is also lightweight, which is a real consideration because these windows will be hoisted in or out twice a year.

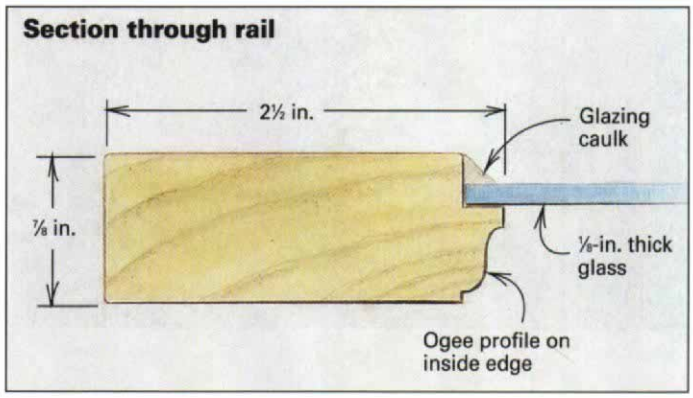
After doing some research (looking at old storm windows), I decided to order a sash cutter that cuts an ogee profile and the rabbet for the glass all at once. I bought the reversible window sash cutter for my shaper from MLCS (800-533-9298), which also makes the same cutter for a router. Both are $100. By using the reversible sash cutter, I could shape the inside edges of the stiles and rails, then remove the rabbeting cutter, raise the sash cutter and shape (or cope) the ends of the rails. When the male-female profiles were joined, the two would fit snugly.

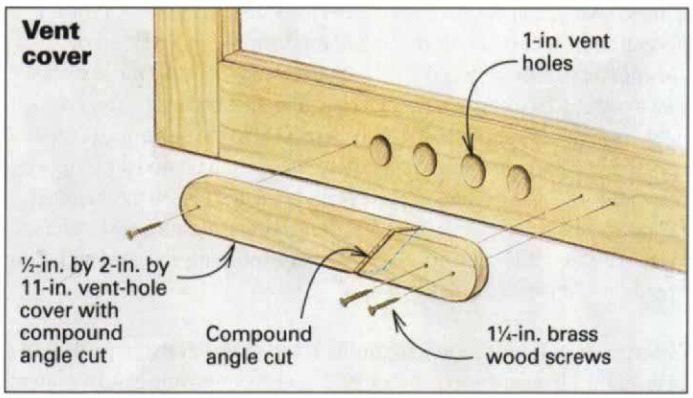
As for the type of joint, I could have used mortise-and-tenon joints, but to keep the storm windows flush with the outside trim on the house, the storm windows had to be ⅞ in. thick, which wouldn't have left enough meat on each side of the tenons for my taste. I also could have used biscuits, but because I run probably one of the only shops in the country without a biscuit joiner, I eliminated that alternative. I could have used galvanized drywall screws, but I wanted the finished windows to show quality and craftsmanship.

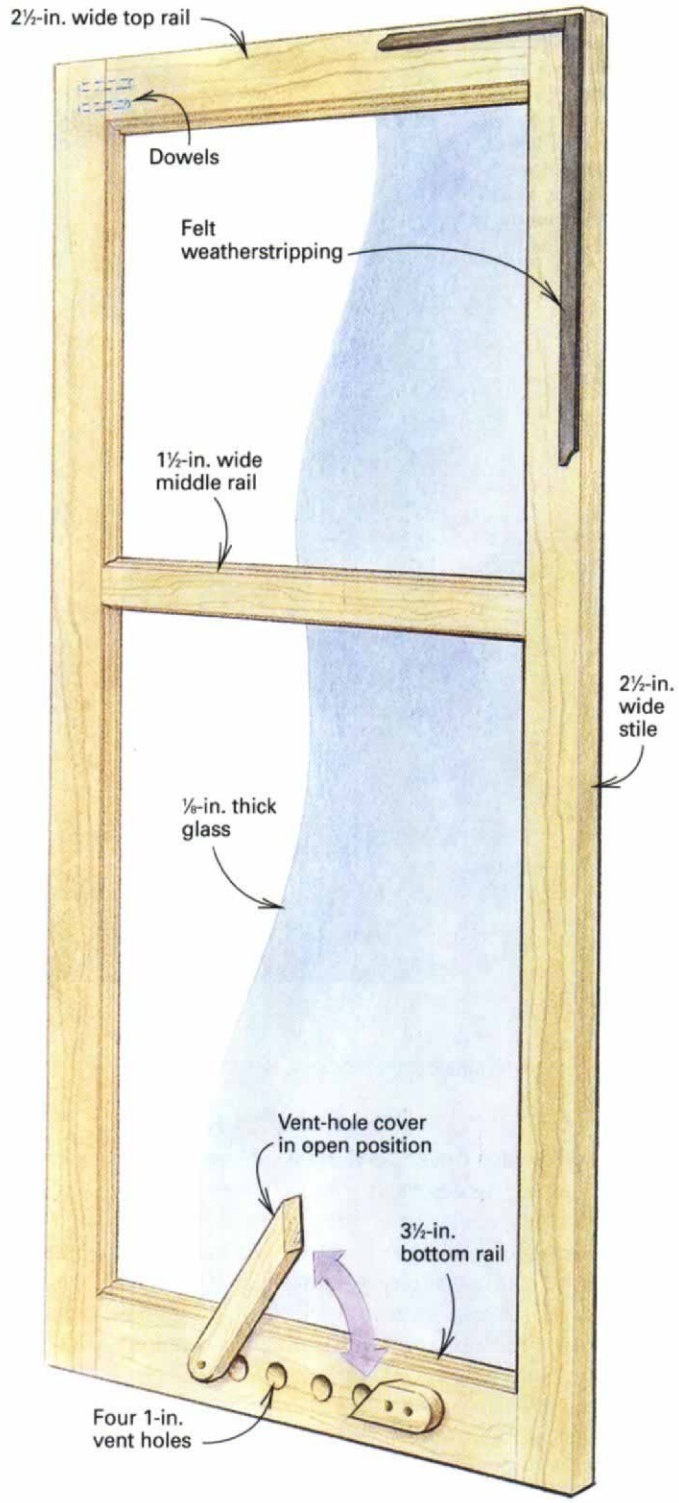
I decided to use doweled joints. I'm comfortable with doweled joinery. And doweled joints are strong. Although the storm windows wouldn't see a

Custom-made to be durable and tight fitting. *Made of ⅞-in. thick yellow poplar, the storm window is shaped with an ogee profile on the interior side of the glass openings and with a rabbet on the outside to hold the glazing. The middle rail matches the point on the window where the double-hung sash overlaps. The bottom rail contains four vent holes, covered by a pivoting wood cover that seats tightly into a compound angle cut.*









lot of stress, they would be moved around. That movement, combined with the weight of the two large panes of ⅛-in. glass they would bear, made doweled joints my choice.

Finally, I chose old-fashioned felt weatherstripping over foam-rubber weatherstripping for the insides of the storm windows. The felt wicks water away from the window, rather than absorbing it the way foam rubber does. Also, felt doesn't get brittle or flake off and so lasts longer than synthetics. The felt is available at most hardware stores.

The first step was measuring the opening and checking for square— Before I took out my tape to measure the window openings, I checked the top of the opening with a framing square. If the opening was out of square, I marked the widest point and then measured from the sill to that mark to get the length measurement. I measured the width at the top, middle and bottom of the opening.

I used the widest and longest measurements to determine the size of the storm windows. I would do the final trimming once the windows were complete. After measuring all the windows and noting their peculiarities on a map of the house, I built a prototype window to help organize the sequence for building.

Each storm window would be divided by a rail at the same point on the window where the double-hung sash overlapped. Each window would have an ogee profile on the inside. Also, each would have four ventilation holes in the bottom rail, which would be covered with a closable wood hatch on the m-

Drawings: Dan Thornton

Pounding the pieces together. The author assembles the pieces of a storm window after his son Philiip applies the glue. Before the glue sets, the assembled window is clamped tight.

side of the window. It's important to be able to vent storm windows to let moisture escape.

Starting a production run for 58 storm windows—Once I got the 350 bd. ft. of yellow poplar I needed, I rough-sized all the stock. The poplar was delivered in 12-ft. lengths, which enabled me to get two 6-ft. pieces out of each long plank. I crosscut all the longer lengths for the windows first; the heights of the two window sizes I would build were 70⅝ in. and 56½ in. The width of the outside rails and stiles was 2½ in. to match the window sash the storm windows would cover (drawing right, p. 105). Also, the frame needed that much width to support the weight of the glass.

Next, I went down my cutting list to determine the most efficient crosscuts for the remaining planks, which included cutting out 2½-in., 1½-in. and 3½-in. rail pieces for the top, center and bottom rails respectively.

I always end up with some warped stock, so I saved the most severely bowed pieces for the smaller rails. I set these pieces aside so that I could later joint out the warp. I would use the thinnest material for the ½-in. by 2-in. by 11 in. ventilation-hole covers (drawing bottom left, p. 105).

Finally, I joined one edge of each piece and ripped all of them to size. I made sure to keep all the stock crown side up and the stock organized by size while the windows awaited assembly.

Dowel holes are drilled before rails are coped—I use a Dowl-It jig (800-451-6872) to drill dowel holes. Using a 5/16-in. brad-point bit and a homemade stop collar, I can move right along with the joinery (top photo, p. 104).

At the same time I was marking out for the doweling, I marked out for the vent holes. I made up a dummy rail board that has a center mark and four other marks spaced 2 in. apart. From a center mark on the drill press, I could line up each of the four vent-hole marks and drill using a 1-in. Forstner bit.

After drilling all the dowel holes, I coped the ends of all the rail stock first. I used a back-up block against my miter gauge as I pushed each piece through the shaper (bottom photo, p. 104), which prevented the rails from splintering as they exited the cutter. After the rail stock was cut, I prepared the shaper for cutting the stile and rail edges. This entails lifting the bits off the spindle, installing a bushing that comes with the set, and reinstalling the ogee bit and rub collar. With this profile cut on the end of a rail, it meets the reversed profile on the stile, and the match is tight.

Waterproof polyurethane glue holds it together—Everything was ready for assembly. To glue the joints, I spread liquid polyurethane glue over them and swabbed glue into the dowel holes. I used polyurethane because it is waterproof, expands into crevices as it cures and retains some elasticity.

Polyurethane glue reacts to the moisture in wood. If the moisture content of the wood was below 8%, I dipped the dowels in water before inserting them in their holes. After inserting the dowels, I wet the edges to be glued with a damp rag, applied the glue and assembled the frame (photo above). Next I checked for square before pipe-clamping the window together.

Once the glue cured (two hours to five hours), I block-planed the small variations between the rails and stiles and cleaned up the ends. I cleaned both sides using a random-orbit sander and 120-grit paper.

Because of the ⅞-in. thickness of the windows, the rabbet from the sash cutter didn't leave as deep of a reveal as I needed for the ⅛-in. thick glass and the glazing compound. So I deepened the rabbet by using the rabbet bit in a plunge router fitted with a rub collar, cleaning corners with a butt chisel.

Making the vent-hole covers—Next I cut the stock for the vent-hole covers into ½-in. by 2-in. by 11 in. pieces. With a scratch awl, I marked and drilled the holes for the brass screws that hold the covers in place. I rough-cut the corners off each end of the vent-hole covers on the bandsaw. Then, using a belt sander in a holding jig and 120-grit paper, I finished rounding off the pieces.

Each vent-hole cover is two pieces divided by a compound angle that allows the two to mate together (photo top right). To make the compound cut on the vent-hole cover, I set my miter gauge at 52½° and the table-saw blade at 45°. I cut this compound angle 8⅝ in. from the end of the cover.

Placing both cover pieces over the vent holes equal distances from the ends and edges, I screwed the vent-hole cover into place with #6, 1¼-in. solid-brass wood screws. I took them off for painting and screwed them back in place after the windows were installed.

Prefitting comes before priming and glazing—It's a lot easier to prefit these units before the glass and glazing are in and paint applied. I started by getting my sawhorses, extension cord, circular saw with a sharp blade, power plane, block plane and ladder set up at the house.

I inserted the top of the window into the opening first (photo left). That way, the bottom of the storm window sticks out so that it can be marked for trimming off the 3½-in. wide bottom piece. A bit sometimes had to come off each side, depending on how close I had made them.

To get the bevel I needed on the bottom of the storm window, I set my bevel square against the blind stop at the windowsill. Then I transferred this angle to the bottom edge of the storm window. I adjusted my circular saw to match the angle on the windowsill and made my cut.

After prefitting the window, I took it out and primed it. Depending on the type of glazing compound that I used, I applied either linseed oil or latex primer (for more on glazing windows, see *FHB* #99, pp. 65-67). Because I had decided to use a polyurethane glazing caulk, I primed the windows with a latex primer.

At this point I took the windows to my local glazier. After cutting the glass, he ran a flat bead of polyurethane glazing caulk onto the rabbet and pressed the glass into this before pointing in the glass. Polyurethane glazing caulk adheres to any dry surface and does to a pliable rubber consistency that won't crack. Next, the glazier used the caulk gun to run a flat bead around the window where the glass meets the frame (photo bottom right).

After applying a top coat of paint, I nailed felt weatherstripping around the outer edge on the inside of the storm windows. The windows were then positioned into their openings. I used four zinc-plated steel turn buttons to hold each window in place. □

Rex Alexander, a custom woodworker who lives in Brethren, Michigan, specializes in cabinets and staircases. Photos by Steve Culpepper.

Fitting the windows. Positioning the top of the window first shows how much has to be trimmed from the sides and the bottom rail, which is 3½ in. deep to accommodate the windowsill bevel.

A compound angle ensures a tight fit. Shaped from an 11 in. piece of poplar and cut at a compound angle, the small end of the vent-hole cover is secured with two screws to the inside of the storm window.

Polyurethane glazing caulk means fast glazing. After the glazier pointed the glass in place, he glazed the window in minutes using a caulk gun and a tube of polyurethane window-glass caulk.