Step-by-Step Window Sash Construction

In this step by step example for window sash construction, we used the following:
· CMT Window Sash Set (Item No. 855.801.11)
· stile cut 1-3/8" thick
· rail cut 1-3/8" thick
· scrap stock

The CMT Window Sash Set was designed ideally for the construction of windows in 1-3/8" stock, however, variations as narrow as 1-7/64" can be used. Stock thicker than 1-3/8" exceeds the milling range of the cutter. Remember to adjust your measurements and cutting depths according to the wood thickness you use. We suggest making a trial joint in scrap stock according to the following steps before milling all of the cope and stick profiles.
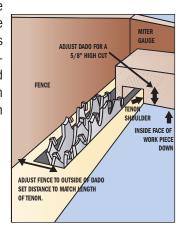
STEP 1

Cut your stiles, rails, sash bars, and muntins to the width and length from 1-3/8" thick stock. Here's how to calculate the lengths of your parts, using an 18x24 window with 3" wide rails and stiles as an example.
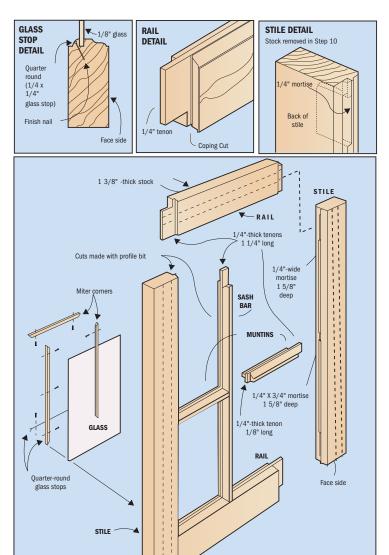
First, cut the stiles to the full height of the window (24"). To figure rail length, subtract the combined width of the stiles (6") from the finished width of the window (18"). To this number (12"), add the length of two tenons (1-1/4" + 1-1/4") and 1/2" (for the coped joint). So, for our example we cut the rails 15" long. Cut the sash bars and muntins 3/4" wide and calculate their lengths as you did the rails. (Plan to cut 1-1/4" long tenons on both ends of the sash bar and muntins; you'll trim the muntin tenons that intersect with the sash bars to 1/8" long later.)

STEP 2

Mark the face side of your workpieces (the inside surface or your window or the most-viewed side of your door). Also, mark the outside edges of the rails and stiles, and place marks centered on the rails and stiles where they intersect with the muntins and sash bar, and on the sash bar where it intersects with the muntins.

GLASS STOP DETAIL
1/8" glass
Quarter round (1/4 x 1/4" glass stop)
Finish nail
Face side

RAIL DETAIL
1/4" tenon
Coping Cut

STILE DETAIL
Stock removed in Step 10
1/4" mortise
Back of stile

1 3/8" -thick stock
STILE
RAIL
1/4"-thick tenons 1 1/4" long
Cuts made with profile bit
1/4"-wide mortise 1 5/8" deep
Miter corners
SASH BAR
MUNTINS
1/4" X 3/4" mortise 1 5/8" deep
GLASS
1/4"-thick tenon 1/8" long
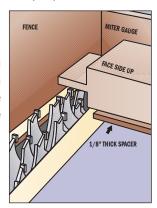RAIL
Quarter-round glass stops
Face side
STILE

STEP 3

To cut 1-1/4" tenons on both ends of the rails, sash bars, and muntins, install a full-width dado set in your tablesaw and adjust it for a 5/8" high cut. Position the saw's fence 1-1/4" from the side of the dado set farthest from the fence. Place the workpiece on the tablesaw face down with one edge against a miter gauge, and one end against the fence. Make the cut in multiple passes .
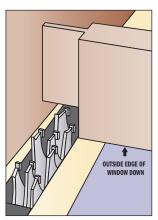
STEP 4

Position the rail, sash bar, or muntin face side up on the tablesaw. Place a 1/8" spacer between the workpiece and tablesaw top and make the same cut as described in the previous step. Your tenons should be 1/4" thick.

MITER GAUGE
ADJUST DADO FOR A 5/8" HIGH CUT
FENCE
TENON SHOULDER
INSIDE FACE OF WORK PIECE DOWN
ADJUST FENCE TO OUTSIDE OF DADO SET DISTANCE TO MATCH LENGTH OF TENON.

FENCE
MITER GAUGE
FACE SIDE UP
1/8" THICK SPACER

STEP 5

Complete the tenon cuts on the rails by placing them outside edge down on the tablesaw. Make multiple cuts with the dado set 5/8" high as before.

OUTSIDE EDGE OF WINDOW DOWN

STEP 6

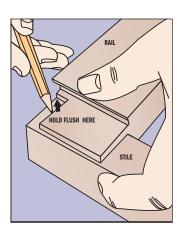Install the coping bit in your router table. Place the face side of the rail on the table and adjust the coping bit up so the tops of its cutters contact the tenon. With the fence adjusted so the coping bit cuts 1/4" past the tenon shoulder, cut both ends of the rails, sash bar, and muntins. (For a 1-1/4" long tenon, set the fence 1-1/2" from the cutter tip with the tip rotated to its farthest distance from the fence.)

STEP 7

Mark the positions of the mortises on the stiles by using the tenon that mates with it. First, stand the stile inside edge up on a work surface and position the rail to mark the length of the mortise. Then, rest the rail on top of the stile to mark the mortise width. Use the same steps to mark the position of the mortises that hold the sash bar and muntin tenons.

Cut the mortises 3/8" deeper than the length of the tenons. The mortise in the sash bar will go completely through it.
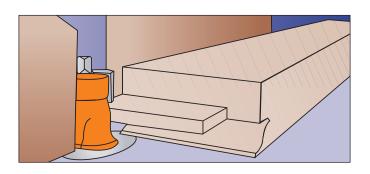
STEP 8

Install the profile bit in your router table and adjust it. With the face side down, mold the inside edges of the rails and stiles.

RAIL

HOLD FLUSH HERE

STILE

STEP 9

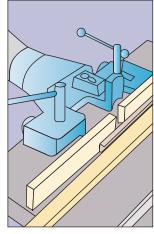To perform the same operation on the sash bar and muntins, clamp a secondary fence onto the router table. Make this fence from 1-1/4" thick stock, and position it so the sash bar and muntins slide snugly between it and the main fence.

STEP 10

Mold both edges of the sash bar and muntins. Use pushsticks to pass the stock between the fences.

Use a fine-toothed saw to remove the small amount of material on the outside end of each stile mortise and in the Stile Detail drawing on page 12. If you make more than one window or door you may want to set up a router table with a straight bit to do this more quickly.
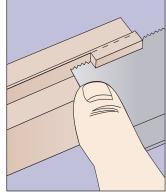
Now's a good time to trim the muntin tenons that intersect the sash bar. Cut them to 1/8" long.

STEP 11

Assemble the project without glue to check it for fit and squareness. Disassemble, apply glue to all mating surfaces and clamp. Check for square again before the glue sets up.

STEP 12

Install the glass in the rabbeted openings on the back face of the door or window. Each pane should be 1/8" smaller in width and length than the rabbeted opening it fits into. Mount the glass in place with glazing points and glazing putty, or with quarter-round strips of wood mitered on their ends and nailed down.