PHOTOGRAPHS BY MICHAEL T COLLINS

Making window sashes

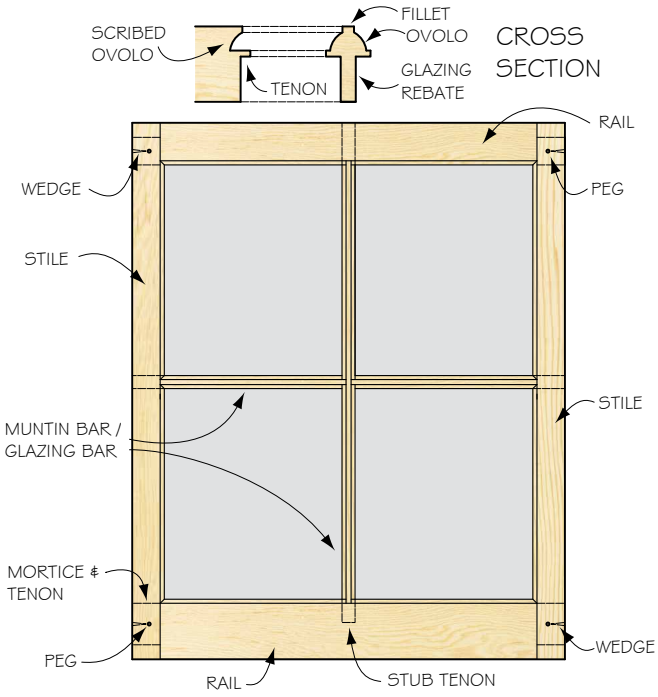
Michael T Collins enjoys a window of opportunity as he makes light of sash window construction

Of all the tasks of the joiner, perhaps no other has exacted the most skill and afforded the most income than that of the window sash maker. If you have never attempted to make a sash, I highly recommend it, if for no other reason than to test your layout, precision and organisational skills.

In this article I'll show you how to make a small, simple four light sash.

Parts of a window sash

Diagram 1 shows the basic parts of a window sash. General terms are: muntin bars, glazing bars (UK), muntin (US). ➤

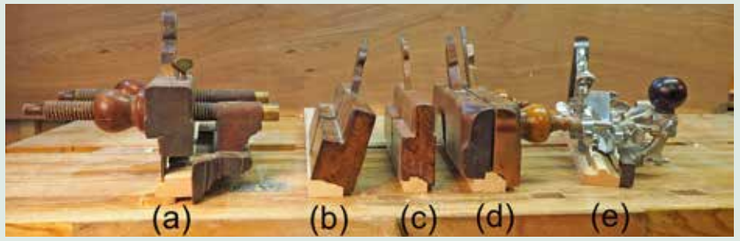


A brief history of the sash

There are various planes that can be used to make window sashes. The most common are the English sash moulding planes. Plane (**b**) shows a common profile available at the end of the 19th century.

English methods required at least two planes to produce the profile. First, the glazing rebate was cut using a sash fillister plane (**a**), then the sash profile cut with a sash moulding plane (**b**). To make the muntin bars, the process is repeated a second time, giving a four-cut method.

American planes (**c**), (**d**) and (**e**) were designed to be far more efficient and cut the profile and glazing rebate at the same time. They were called stick and rabbet planes. (In England they are called stick and rebate planes). Some of the stick and rebate planes are made in two parts with screws connecting the halves (**d**). These can be adjusted to change the width of the fillet.



In the image, the English plane (**b**) you often see a scratched line or 'spring' line on the end of the plane. The plane is held at an angle keeping the spring line vertical while planing.

For this project I am using a Stanley 45 combination plane (**e**).

It should be noted that American planes, such as a Stanley 45, are much harder to use compared to the English sash planes, as greater force is required to propel the cutters through the wood, and harder still if the grain is unwieldy.

The wood

1 Traditionally, window sashes are built with stable, straight-grain wood, pine being the predominant wood in the US. However, any well-seasoned, rot-resistant wood with straight, close grain will work. Here I am making use of a really old Douglas fir scaffolding plank. Always check for any metal when using reclaimed wood.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2 For the most stable wood try to pick quartersawn lumber. What you're looking for is wood that is knot-free, with end grain running perpendicular to the width of the board.

The mortise and tenon are the two basic joints in making window sashes, and throughout history the basic design of sash joinery is pretty similar both in the UK and US. Nearly all references agree that the joinery should be cut first before the moulding and glazing rebates are made.

The parts

Rip and cut the parts to slightly longer than final dimension – plane all stock to width and thickness. Stiles should be at least 25-50mm longer than window height to allow for 'horns' on both ends – even longer if you are going to have fancy upper sashes. Rails should be sized to be just slightly longer than the window opening width.

During this dimensioning process you will have discovered the way the grain runs – you want the grain to rise away from you.

Label the parts and mark the face and face edge clearly. Mark also the direction of the grain. If you get the grain right on one face it will probably be diving away on the other – hence the reason straightest grain wood is preferred.


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Dimensions and joinery layout

Create a 'story stick' with all the key dimensions of the rails, stiles and muntin bars. For this small window sash, the stiles are 30mm wide, the upper rail 40mm and the bottom rail 60mm.

I am using stock that is 40mm thick to match the width of my Stanley 45's cutter. This will give a 13mm glazing rebate, 9mm fillet and a 13mm ovolo profile.

The frame

3 Using the story stick, mark out the joinery locations. Transfer the joinery marks from the story stick to the rails using a marking knife and to the stiles using a pencil.

4 Using the sash plane, produce a short test sample – it does not have to be a complete length of moulding, but just enough to get the location of the fillet.
Note: remember that the face side of the moulding is inside the house. All planing is done from the face side.

5 Mark all the parts clearly.

6 From the face side, set the mortise gauge to the width of the fillet produced on the sample, in my case the fillet is 9mm. The distance from the mortise gauge fence to the nearest pin should be the total width of the ovolo profile determined from the sample. This way the intersecting mortise and tenon will fall exactly where the fillet is between the ovolo and glazing rebate.

Now, from the face side, mark the fillet width on the stiles (mortises) and rails (tenons).


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7 Chop both the through and stub mortises on the stiles.


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8 Saw the tenon cheeks on the waste side. Do not saw the shoulders as doing so would make it difficult to plane towards the end of the moulding, and sawing the tenons after planing would be difficult. Plane the sash moulding profile.


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9 The rail and stile mouldings can be planed by securing them in the vice. Alternatively, they may be placed between tail vice and bench dogs. Historically, joiners' benches were considerably longer than today's modern benches, enabling mouldings to be produced in great lengths – my bench is over 2m long and I can easily produce mouldings for most projects.

Using the sash moulding plane, apply pressure forward and into the workpiece to create the sash mouldings. Always start at the far end of the piece and take progressively longer shavings. Regardless of the plane you are using, it will bottom out when the moulding is complete.


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10 When you have planed all the frame mouldings, the profile can be burnished with the shavings produced. Now you can saw off the cheeks of the tenons and...

11 ...adjust the fit accordingly. Go easy and pay attention to the gauge lines.

12 cut the tenons to fit the mortises.

Coping the stiles

13 On the rails, at the mortise, cut through the ovolo about 9mm along the mortise.

14 Now pare away the ovolo profile to the end of the rails. ➤


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15 On the stiles, using a chisel and mitre block, create a 45° slope on the ovolo portion by the inner side of the mortise.

16 Use an in-cannel gouge of the same radius as the ovolo portion of the sash. The idea is that the scribed section of the stile cups over the portion of the ovolo you left on the rail.

17 Test the joint. From the front the scribed joint looks like a 45° angle.

The muntin bars

The muntin bars, or glazing bars, are 20mm x 40mm.

The vertical muntin is a solid piece running between the top and bottom rails and, depending on the dimension of the two rails, will have either through or stub mortises. My sash has a through mortise in the top rail and a stub in the lower rail.

Carefully chop the through mortise in the middle of the vertical muntin from both sides.

The muntin bars are very thin and planing them requires a device called a sticking board (sticking is the term used to plane mouldings).

A sticking board

18 A sticking board is a very simple device. From the photo and from the diagram it can be seen how a sticking board is made. A flat-head screw keeps the wood from advancing.

One side is planed and the piece flipped end-to-end and the other side planed.

Diagram 2 shows the relationship of the sticking board, using the four-cut method.

19 An alternative to making a sticking board is to batch-process the muntin bars by cutting a piece of wood 80mm x 20mm and then planing the muntins two at a time. Here I am holding the stock between bench dogs.

20 Once the planning is complete…


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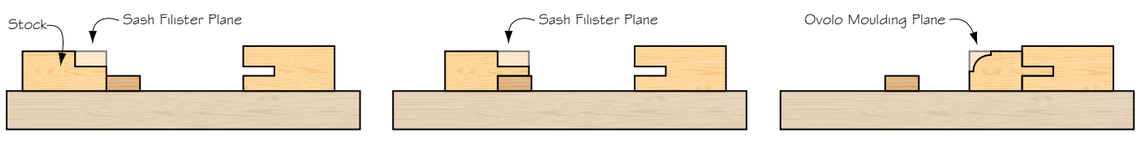
21 …slice the board apart using a cutting gauge. This is easily done as the board is only 3mm thick. Then plane the cut edge.

THE FOUR-CUT METHOD



Scribing the vertical muntin

22 With the muntin bars held in a bench hook, cut the shoulders of the tenon to length on both sides down to the fillet. In the image, I have highlighted the sections to be removed. Because I used a Stanley 45, the two shoulders, if viewed from the side, will be aligned.

With a chisel remove the cheeks from both sides of the tenons up to the shoulders.

23 All that remains to do now is mitre and scribe the muntin bar tenons to fit over the upper and lower sash moulding. This is a repeat of the method we used to scribe the stiles earlier, except we mitre and scribe from both sides.

Horizontal muntins

24 The short, horizontal muntins are measured and cut to length. The tenons that mate with the vertical muntin will have stub tenons about 9mm long.

Then the ovolo is mitred and scribed in the same way as the vertical muntin bars previously.

Putting it all together

25 Traditionally sash windows were never glued. To finish, simply clamp the sash together and then, with a chisel, create a kerf in the end of each tenon and drive a wedge in.

26 Additionally, strength can be achieved by using 6mm pegs through the tenons. On some of the older sashes I have the stub tenons were pegged with 2mm pegs.

27 Cut off all the wedged tenons...

28 ...and plane flush.

29 Now all that remains is to saw the horns off. The bottom horns on the upper sash may be shaped for decoration.

Prime, glaze, install and enjoy the view through your window sash, knowing that you have now produced something that few woodworkers have attempted. If you want to make a six or nine light sash, bear in mind that you will have to cope (pun intended) with a lot more organisation and precision – and at times frustration. ■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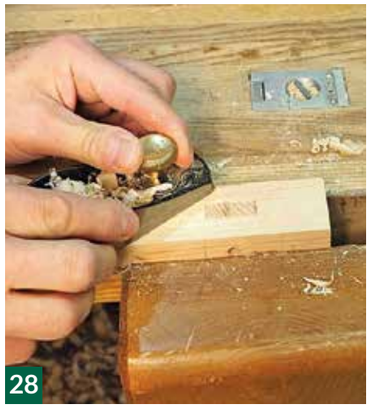
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