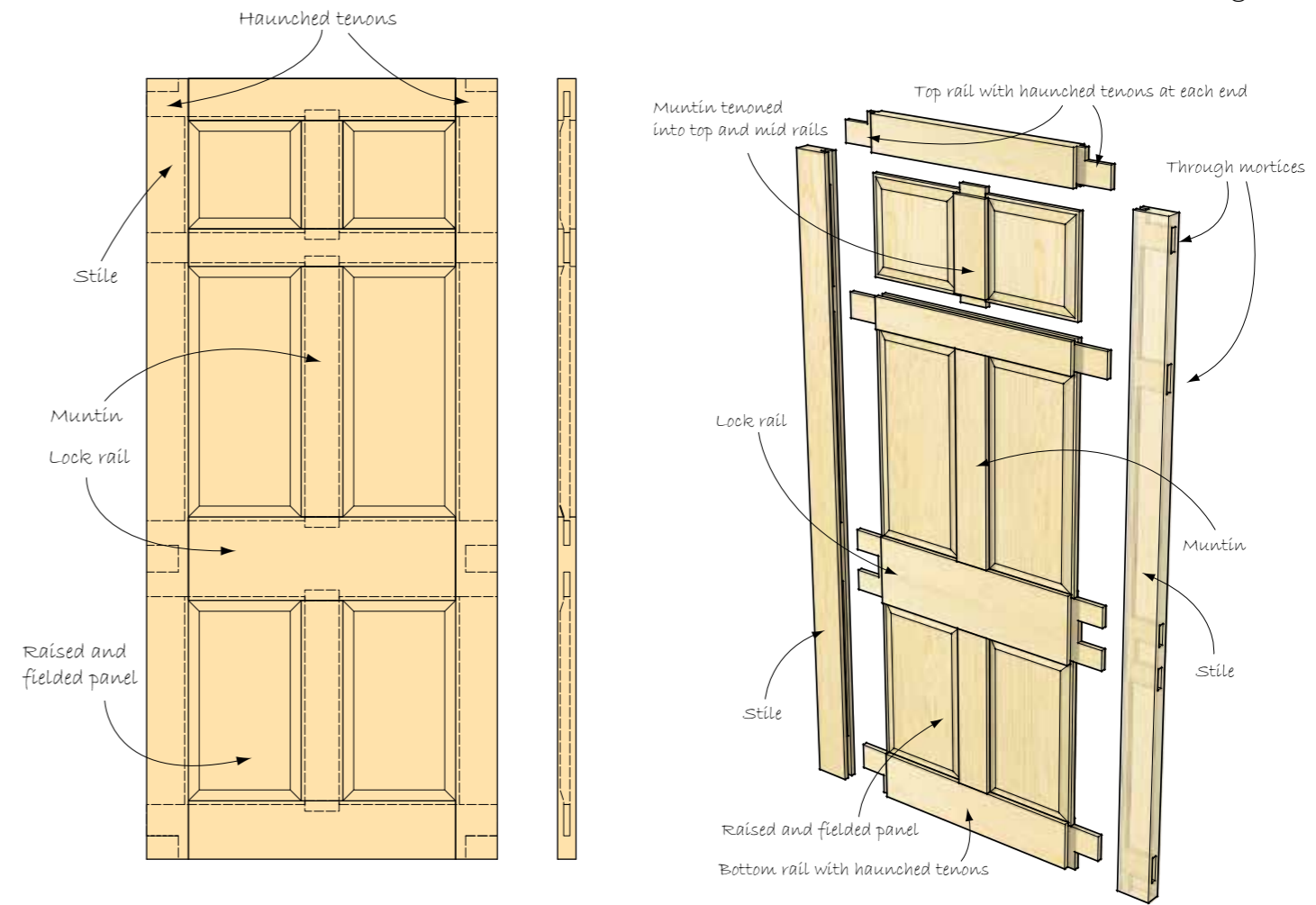




PHOTOGRAPHS BY MICHAEL T COLLINS



SIX PANEL DOOR, FRONT AND SIDE ELEVATION

# Create a simple panel door with basic hand tools

Our Man In America, **Michael T Collins** deals with the age-old problem of panel movement

**R**ight now the humidity outside my air-conditioned workshop is around 85% and climbing and all of the wood in my workshop is swelling. It's a fact: wood expands and contracts and when making furniture you have to account for these fluctuations.

Cabinet carcasses are generally constructed so expansion happens front to back, thus minimising the effect. A door made from long grain members is relatively static, while a panelled door is very much dynamic, expanding and contracting across its width with the seasons. So the problem is to fit a dynamic panel into a fixed

space, which seems like an exercise in futility.

Enter the panel door, which allows the frame to remain static while at the same time allowing the panel to expand and contract within a groove.

In *Woodworking Crafts* Issue 1 I showed you how to cut mortise and tenon joints. For this project, the mortise and tenons are laid out essentially the same way, but I am also going to introduce a few new techniques. The rails and stiles of this door will have a groove to accept a panel allowing for seasonal change. The mortises are going to be through mortises to add visual interest.

## Michael T Collins

British-born Michael has been working with wood off and on for 40 years. He moved to New York in 1996 and over the years, has made bespoke furniture, including clocks, inlay work, Adams fireplaces, book cases and reproduction furniture.  
**Web:** [www.sawdustandwoodchips.com](http://www.sawdustandwoodchips.com)  
**Twitter:** @sawdustandwood



## Making the frame

**1** If you are making two or more doors it looks better to have the grain of the rails and stiles flow through the piece, so cut them from the same board. Doing this also helps with colour; wood cut from the same board will generally have the same characteristics. Here you can see how the board will be cut for two doors.

**2** Having prepared the wood, mark the face side and face edge, leaving an additional 30mm horn at each end of the stiles; this will prevent the mortises bursting out when chopped. Leave about 10mm extra length on

the tenons. As you can see, here I have used a cabinetmaker's mark to orientate the pieces. I always fit doors to a cabinet, recording measurements directly from the opening onto 'story sticks'. When I started making furniture I used two story sticks, one for rails and one for stiles. Label them clearly – believe me, it will help you later! Record the maximum rail and stile length of the opening on the story sticks, then use the stile's width to mark the tenons' position and the rail's width to mark the mortise on the story stick. The next step is to mark the location of the groove and horns. At this point, you should have all measurements recorded on the story sticks.

## The tools

**3** It's time to add a new 'necessary tool': a plough plane. There are many varieties readily available online. I have two in my collection – an antique wooden plough plane and a Stanley 45 combination plane. The 45 offers greater flexibility allowing all manner of profiles to be cut while my antique wooden plough plane only cuts grooves. ➤





**Preparing the joint**

**4** By now you should be familiar with the process of making a mortise and tenon joint: using the story stick, mark the location and length of the tenons on the respective pieces. Here I have set the mortise gauge using the width of the chisel.

**5** Mark out the tenons on the rails, scribing round the ends, then set the rails aside.

**Chopping the mortises**

**6** Mark the mortise location using the same gauge setting. The only major difference with creating panel doors is that the mortises go all the way through the stiles. Using a pencil and the story stick, mark the mortise's upper and lower limits on both sides of the stiles.

**7** Take the mortise gauge setting and scribe the mortise location between these limits on the stiles. Because the stiles will have through mortises, scribe the location on the opposite edge.



**8** Start chopping the mortises about 1.5mm from one end with the bevel facing the direction of travel and chop out the mortise walking the chisel towards the end of the mortise; don't go all the way through. Repeat in the opposite direction – pay particular attention to keeping the chisel vertical. You can use a try square to help you.

**9** Chop halfway through and clean up by chiselling vertically down on the pencil lines. Only remove chopped wood here.

**10** Repeat the process on the other side – the reason for chopping from both sides is that you have a great deal of control at the start but no matter how hard you try, the chisel may miss the mark on the way out the other side; this method guarantees that the edges of the mortise will be crisp.

**Cutting the tenons**

**11** In the past I have sawn the shoulders first then the cheeks; however, because I will be planing a

groove on the inside of these pieces, only the cheeks are sawn initially. There are two reasons for this: a) if the cheeks are removed planing the groove would be difficult at the tenons because the plane's fence would not be supported and b) if the groove is planed first it would be hard to saw the tenon. Set the tenon stock in the vice at 45° and on the waste side saw down to the lines – rotate and repeat – saw out the triangle of wood at the bottom of the kerf.

**Planing the groove**

**12** The Stanley 45 has infinite adjustability but I am only concerned with three adjustments for this groove – setting the depth stop to 10mm using the width of the chisel...



**13** ... setting the plane's fence so that the cutter is positioned in line with the mortise and tenon ...

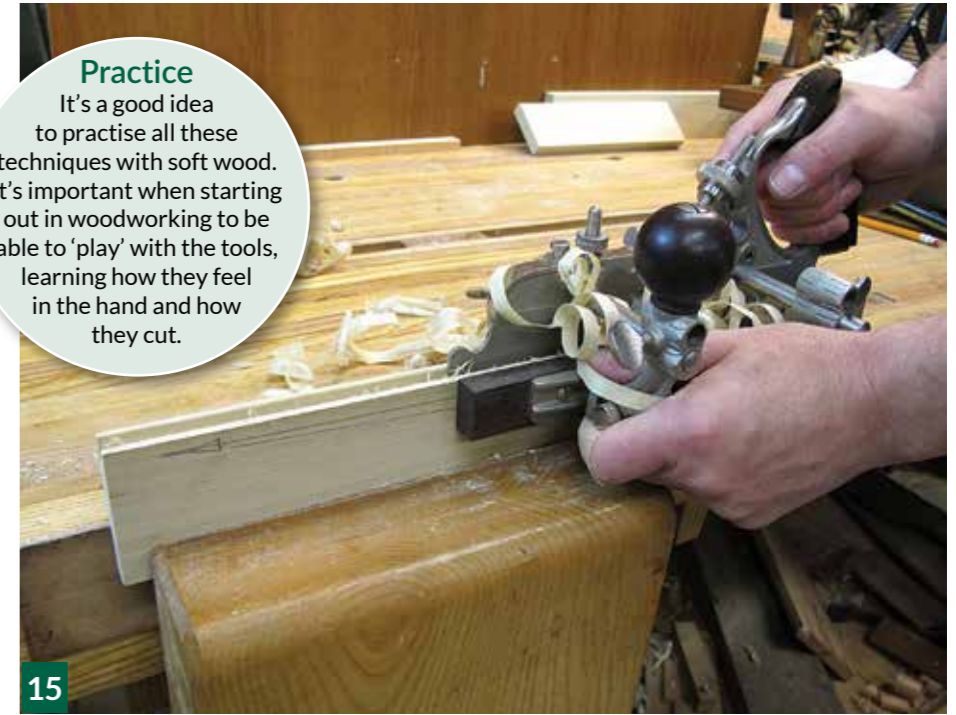
**14** ... and lastly, adjusting the cutter's depth; just like any plane, the setting of this will depend on the type of wood and the grain. You will need to experiment with this. Take it slow and adjust as needed. Better to take thin shavings and take longer than work quickly and shave off too much.

**15** Starting from the end furthest away from you, plane the groove, taking longer and longer passes as you approach the end nearest to you. The plane will stop cutting when the depth stop bottoms out. Try not to run the cutter on the wood during the backward travel – in hard wood this can dull the cutter. It's important to keep the plane vertical – any side to side angled movement may tear the wall of the groove making it unsightly. Ideally, you should plane in such a way that the grain is rising up away from you.

**Alternative method of cutting the groove**

**16** If you do not have access to a plough plane, use the mortise chisel to pare away the groove. Score the entire length of the rails and stiles with a mortise gauge, then, with the bevel down, pare away the groove, starting at the end furthest away. To slow the forward movement while paring, anchor your non-dominant

**Practice**  
It's a good idea to practise all these techniques with soft wood. It's important when starting out in woodworking to be able to 'play' with the tools, learning how they feel in the hand and how they cut.



hand on the wood while your dominant hand controls the forward movement. This method offers greater control and keeps both hands behind the sharp end!

**17** Once the groove is planed, and the cheeks are removed, the tenons will have a very thin piece of wood separating the edge of the tenon and the groove. Simply break this off and trim with a knife. Repeat this for the other tenons.

**The haunch**

**18** Because the groove extends the full length of the stile there is a gap at the top and bottom that will need to be filled. To hide this, the tenon will need to be cut, leaving a small section called a haunch. Approximate this by superimposing the tenon on the mortise.

**19** Then saw the tenon to just over size and test the fit. Pare away any excess until the fit is perfect. ▶





**NEXT MONTH...**  
 Michael will look at breadboard joints and continue adding to your woodworking skills

**Making the panel**

**20** Here I am going to make a simple raised panel from two pieces of oak (*Quercus robur*) using a rubbed joint, which was covered in 'Making a table top' in issue 2. Plane the mating edges of the pieces at the same time. This will create an almost perfect fit.

**21** Apply glue to one edge and rub the boards together until friction holds them in place. Once dry, plane the face side flat.

**22** We need to allow for seasonal changes, so cut the panel 4mm narrower than the distance between the bottom of the stile grooves. The height only needs be 2mm shorter – wood does not significantly expand

along the grain. Once cut, mark a chamfer around the panel and plane to just a hair under 10mm. We want this to fit the groove but not be too tight. Planing a chamfer will create a slightly raised panel.

**23** Apply finish prior to assembly and let dry. If applied after assembly, the finish can glue the panel into the groove. Assemble, clean up and finish. Dry fit the frame and check all the joints seat well.

**24** Apply glue to all mating surfaces, taking care to not get glue in the grooves. Reassemble, clamp and measure across the diagonals for squareness. Once the glue has dried, saw off the horns and tenons to within about 1mm and plane flush. Plane



off all markings. On small doors it's a good idea to chamfer the inside edge of the stile opposite the hinge so that it closes nicely.

**25** Careful layout, accurate cutting and patience will reward you with well-fitting joints. ■

