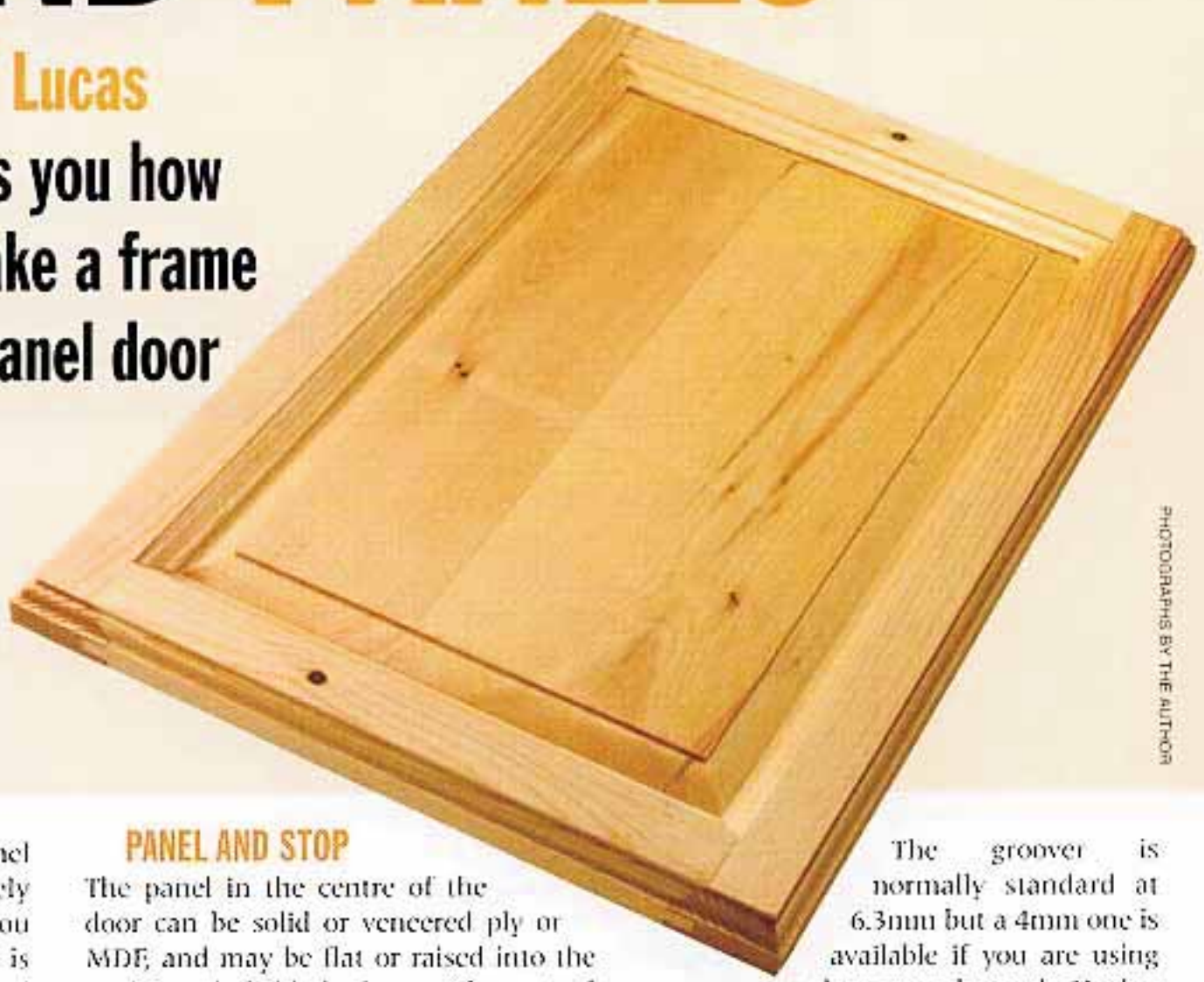
FRAMES AND PANELS

Geoff Lucas shows you how to make a frame and panel door



PHOTOGRAPHS BY THE AUTHOR

Profile scribing and raised panel moulding cutters are widely available and inexpensive if you buy them as sets. This means it is now possible to produce traditional framed and panelled doors to a professional standard with relative ease.

The cutters are manufactured in a wide-range of shapes and styles and are ideally suited for the ½in router as they tend to be on the large size (see **photo 1**). There is however a more limited selection available with ¼in shanks so this technique should be within the reach of router-users with a lower powered model. In this case you will require a machine with at least 750W of power. You will also need to work with extreme care to avoid overloading the router and its cutters.

For this exercise I am using a cutter set produced by Trend which consists of an interchangeable profile-and-scribe cutter and a separate profile cutter (see **photo 2**).

PANEL AND STOP

The panel in the centre of the door can be solid or veneered ply or MDF, and may be flat or raised into the traditional fielded shape. The actual mould varies from a plain bevel to an elaborate profile. The other edge of the panel is sized to fit into the groove that runs all round the inside edge of the door.

If you are making a cabinet with no centre divider to form a stop behind the meeting stiles of the two doors, the edges are usually rebated to form an integral stop (see **photo 3**). The only snag with this is that the two stiles now appear to be of uneven width, so use a bead cutter to form a false groove down the wider section and restore the balance (see **photo 4**).

PROFILE SCRIBING CUTTER

The profile scribing cutter is made up from several components, all of which are held on a precision arbor (see **photo 5**).

USEFUL TERMS

Before we start I will clarify the terminology of this job as many of the component names seem to be used rather haphazardly. The sides of the door are called stiles and as well as being strong enough to support the door they must be able to take any ironmongery in the way of hinges and catches. The top and bottom components are called rails, the top one may be parallel, or sometimes it is shaped into a cathedral or cambio pattern. If it is a big door there may be an intermediate stile which in this case is called a muntin. The rails are jointed into the stiles with a scribed joint which matches the decorative stile edge.

The groover is normally standard at 6.3mm but a 4mm one is available if you are using glass or mesh panels. Having cut the scribe on the rail ends the profile block and groover are rearranged to cut the matching profile and panel groove along the inside edges. Shims enable you to make fine adjustments to the tightness of the joint and make allowance for any subsequent sharpenings.

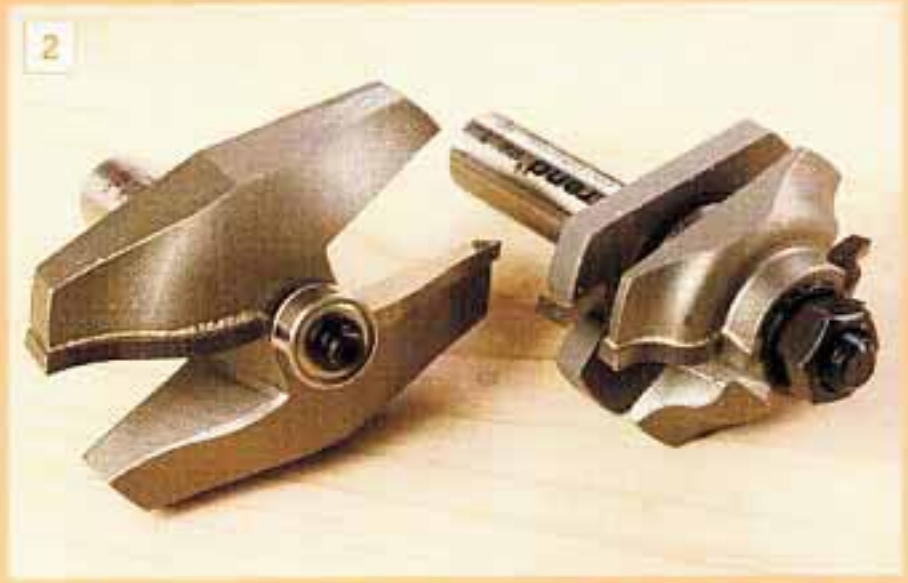
As you assemble the cutter make sure that each individual cutter is positioned at 90° to each other on the arbor to minimise vibration and produce a more even cut (see **photo 6**).

As the setting for this whole procedure is quite critical it is essential that your router is fitted with a fine height adjuster so that you can match the profile and scribe cuts perfectly (see **photo 7**). Also as the cutters are large, do ensure that at least three-quarters of the shank is gripped in the collet to resist the high rotational forces involved (see **photo 8**). You can also help here by using a lower speed for the very big cutters where the peripheral speed would otherwise be too high. You will need to reduce to something like 15,000 revs (see **photo 9**).

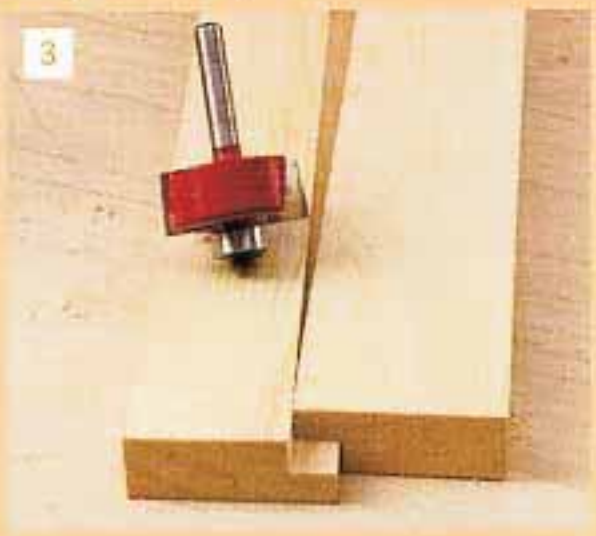
GOOD WOOD

Before you start, it is essential that the timber is good-quality and properly prepared by thicknessing to a constant dimension (see **photo 10**). The joints will never fit properly if

These cutters are produced in a wide-range of shapes and styles



An interchangeable profile-and-scribe cutter and a separate profile cutter



The edges are usually rebated to form an integral stop

Use a bead cutter to form a false groove

there is even the slightest variation in size. As the setting up procedure is very much trial and error, always prepare a couple of spare pieces to allow for a few practice cuts.

RAILS & STILES

The thickness of the rails and stiles should be in relation to the overall door size and will therefore affect the choice of cutter. Frames for larger or heavier doors need to be 20-24mm (¾-1in) thick, while 18-20mm (¾-¾in) is more typical for smaller cabinet doors. The width is usually around 40mm (1½in) though this may vary on the top rail if it incorporates any shaping.

The length of the rails needs to be calculated to allow for the stub tenon that is formed on either end. The cutter set I am using forms a 12mm tenon so the calculation is – **overall width of the door minus 2 x the width of the stile plus 2 x 12mm**.

This dimension has to be determind at this stage; you cannot trim it in any way once the profiles have been cut (see **photo 11**).

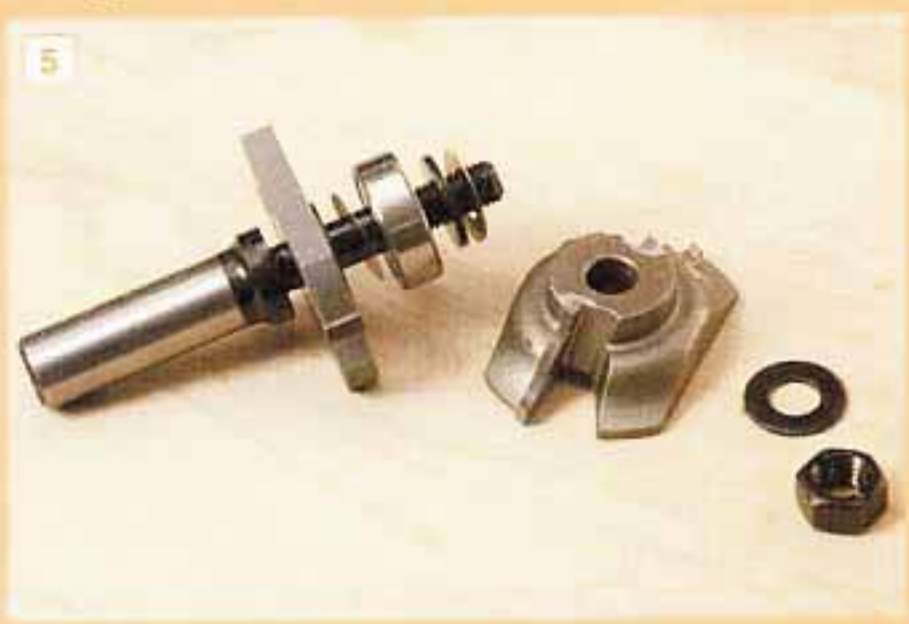
PREPARING FOR MACHINING

The actual machining process must be carried out using the router mounted in a table, you cannot do it safely or accurately enough using the router hand held. Connect the table to a suitable extractor to minimise the dust produced as you work, this is particularly important if you are using MDF.

At all stages use the hold downs and feather boards to control the work safely when it is in contact with the cutters, although please note that these guards have been removed for clarity in some of the photos. It should also go without saying that all adjustments and cutter changes are carried out with the router unplugged.

SEQUENCE

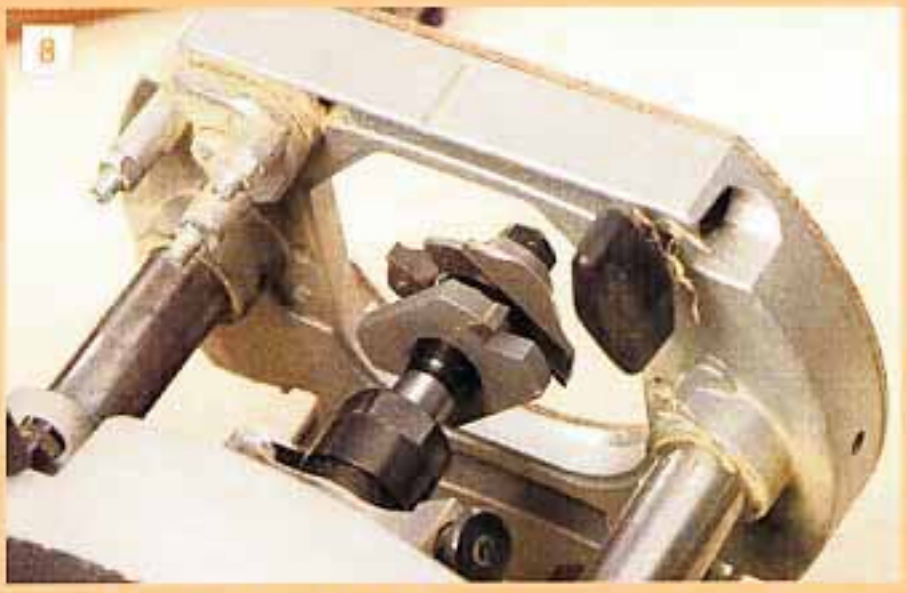
The normal sequence of operations is to start with the scribe joint on the rail ends and to ensure accuracy it is better to make up a guide jig for this purpose. Even if your table has a sliding table it is still better to use the jig as it also minimises end spelching as the cutter



The profile scribing cutter is made up from several components

Make sure that each individual cutter is positioned at 90° to each other

It is essential that your router is fitted with a fine height adjuster



Ensure that at least three-quarters of the shank is gripped in the collet

breaks through. The jig is just a piece of 6mm (¼in) MDF with a piece of 50 x 25mm (2 x 1in) stock glued on to one end to act as a stop. The only critical requirement is that this stop is at a perfect 90° to the edge of the MDF (see **photo 13**). Obviously this stop gets cut as it passes through the cutters, and you will need to cut the resulting profile away if you change the shape, so make the overall jig wide enough to allow for several trimmings.

Make sure the fences of the table are in line with the bearing on the cutter using a steel rule to line it all through (see **photo 14**). If the fences are adjustable as well, close them up to leave them approximately 2mm (5⁄64in) clear of the cutter.

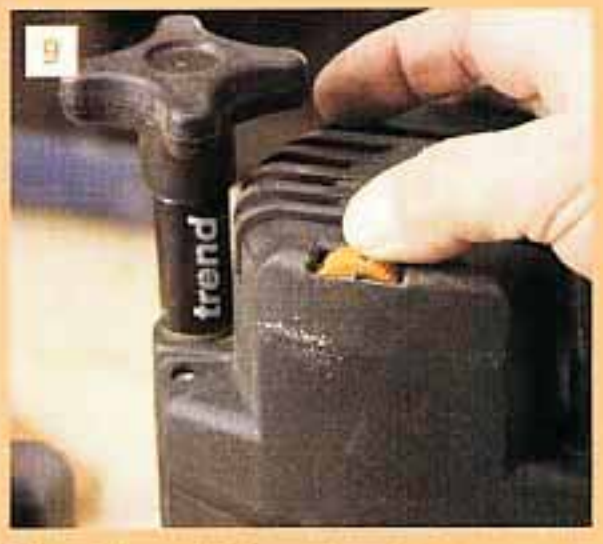
Set the height of the cutter to leave a minimum quirk on the moulding of at least 1.5mm (1⁄16in). If it is less than this the edge will be weak or lost altogether when sanded or painted.

CUTTING

With everything set and locked securely, clamp the rail to the guide jig making sure that both are tight up against the fence (see **photo 15**). Then slowly push the whole assembly through the cutter in a smooth action, without going too slow or the cutter will burn the timber (see **photo 16**). Make sure the edge of the guide jig stays in contact with the fence all the way through and keep cutting right into the end of the stop – this should prevent any breakout and the resulting joint ought to be really clean (see **photo 17**). Repeat the procedure on the ends of all the rails keeping them orientated correctly (see **photo 18**).

You can now rearrange the cutter set for the matching stile edge profile (see **photo 19**). This is best done with the router in situ using the spindle lock to help you undo the nut, but do remember to unplug first. Use the scribed rail end as a guide to reassembling it all, and then make a trial cut in a piece of spare material (see **photo 20**). You may need to insert one or two of the shims to tighten or loosen the joint, and then adjust the cutter height to leave the rail and stile faces flush.

Once all this is set, run the mould down the edges of each of the stiles and the rails



You will need to reduce to something like 15,000 revs

It is essential that the timber is good-quality and properly prepared

The machining process must be carried out using the router in a table

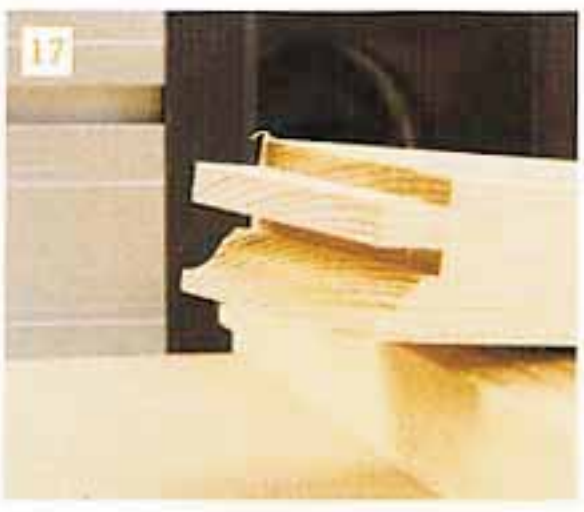
The length of the rails need to be calculated to allow for the stub tenon

The only critical requirement is that this stop is at a perfect 90° to the edge of the MDF

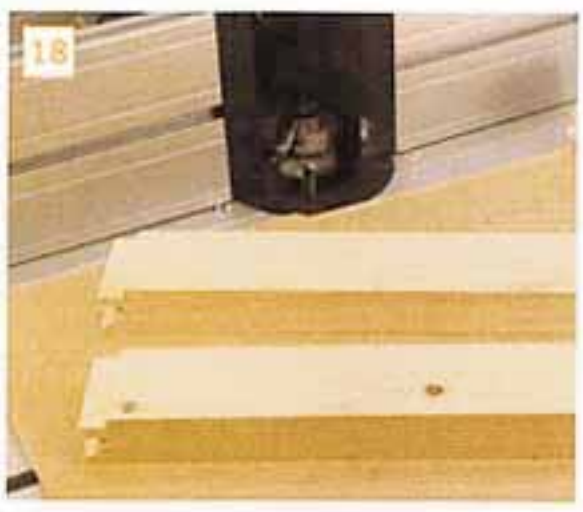
Make sure the fences of the table are in line with the bearing

Clamp the rail to the guide jig, making sure both of them are tight against the fence

Push the whole assembly through the cutter in a smooth action



Make sure the edge of the guide jig stays in contact with the fence



Repeat the procedure on the ends of all the rails keeping them orientated correctly

(see **photo 21**), making sure they are held firmly on the table or the groove will end up out of line with the edge. The rails and stiles should now fit together perfectly (see **photo 22**).

PANEL

The panel is next but there are a couple of important considerations here. Firstly, if you are gluing it up from several pieces arrange them in such a way as to minimise any cupping. This is normally achieved by alternating the ring orientation on adjacent pieces. Secondly, if the panel is solid wood you will have to make some allowance for it to move with changes in humidity. Any shrinkage and expansion will be greater across the width of the panel, so leave about a 3mm (⅛in) gap at either side and 1mm (1/32in) at either end. If you are using man-made panels where movement isn't an issue, allow only 1mm (1/32in) all round.

The panel-raising cutters are necessarily large in diameter so they may not fit through the aperture in your router table. If this is the case make a false table from a piece of MDF and bury the cutter into this to achieve the necessary height adjustments. If the aperture is big enough insert a suitable ring to ensure maximum support for the work (see **photo 23**). Also bring the fences up close as well and lock them tight. Revolve the cutter by hand before you switch on just to make sure there really is enough clearance (see **photo 24**). Level the fences through on the cutter bearing in the same way as the rail scribe.

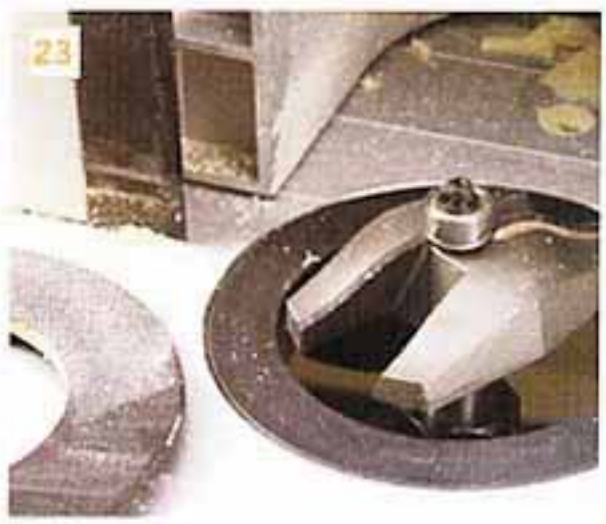
Now with the router slowed to a suitable speed for the diameter of the cutter, make a shallow pass across the two ends of the panel and then down the sides to remove any breakout (see **photo 25**). Keep increasing the depth of cut until the lip formed on the edge of the panel is a nice sliding fit in the grooves on the frame (see **photo 26**).

Use the scribed rail end as a guide to reassembling it all

You may need to insert one or two of the shims to tighten or loosen the joint

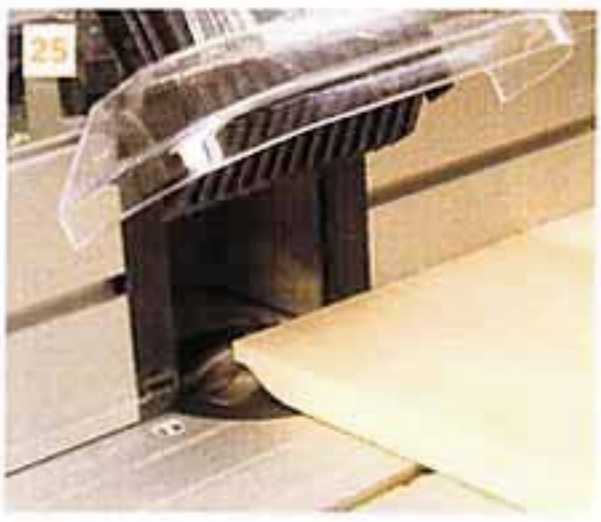
Run the mould down the edges of each of the stiles and the rails

The rails and stiles should now fit together perfectly



If the aperture is big enough insert a suitable ring to ensure maximum support for the work

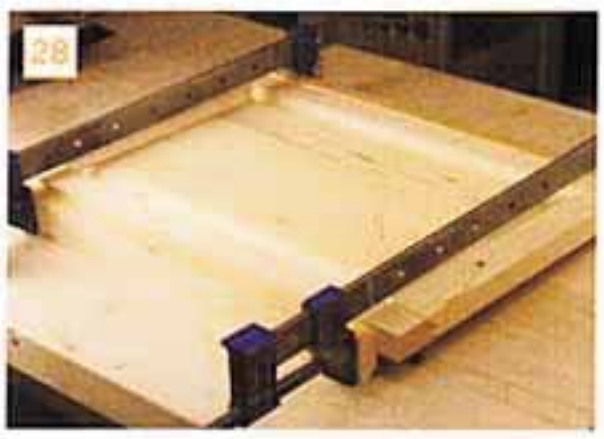
Revolve the cutter by hand to make sure there really is enough clearance



Make a shallow pass across the two ends of the panel

Increase the depth of cut until the lip formed on the edge of the panel is a nice sliding fit in the grooves on the frame

Make a trial fit of the whole assembly to check everything is in order



Glue the frame joints and clamp the whole thing together

A light sanding once dry will flush off the joints

Run a suitable complementary mould round the outer edge to make it appear a little lighter

ASSEMBLY/ASSEMBLING THE PANEL

Make a trial fit of the whole assembly to check everything is in order and that the panel will not stop the scribed joints from closing up (see **photo 27**). If everything is fine, glue the frame joints and clamp the whole thing together making sure it is square (see **photo 28**). You do not normally put any glue on the panel edges but leave it loose to allow for any movement. If too loose, use a tiny veneer pin or two put through the stile and panel from the back to stop it slopping about.

SANDING AND FINISH

A light sanding once it is dry will flush off the joints and remove any glue smears. You can leave it at that should you wish (see **photo 29**). However for most situations where a door is being hung, it looks better if you run a suitable complementary mould round the outer edge to make it appear a little lighter (see **photo 30**).

When you come to applying the finish remember to do exactly the same to both sides of the panel or you will set up differential shrinkage problems that will cause it to try and bow (see **photo 31**).