

Edge & Surface Treatments

by Nick Engler

Routers were developed to cut moulded shapes in wood. Although their workshop role has expanded (greatly) during the last century to include joinery and other operations, moulding is still what they do best. They remain the chief woodworking tools for edge and surface “treatments” – cutting decorative shapes.

Before we get into the techniques for making decorative moulded shapes, let’s review these shapes and how they’re combined. In many woodworkers’ minds, this is muddy water. Open any tool catalog to the router bit section and you’ll find whole pages of shapes, all in a jumble. But don’t worry. There is some order to this chaos.

Despite the profusion of mould-

ing bits, there are really only three shapes in decorative woodworking:

- Bead (convex curve)
- Cove (concave curve)
- Flat (straight line)

Every moulding, no matter how complex, is comprised of beads, coves and flats. If you had only three router bits – one for cutting beads, one for cutting coves, one for cutting flats – you could still produce any shape of moulding, no matter how intricate the shape.

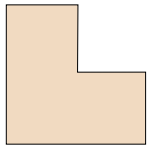
PRO TIP

Safe Small Profiles

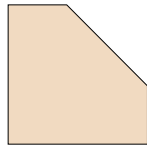
Small ($\frac{1}{2}$ " wide or less) profiles and edge treatments can be dangerous to run. To avoid this, use a two-step process. By preparing a slab of wood the appropriate thickness of your profile (let’s call it a $\frac{1}{2}$ " x 10" x 24" piece of cherry) you can safely run the profile on one long edge, then head to the table saw to safely cut off the thin edge piece. Then head back to the router table and repeat the process. It adds a couple of steps, but it also adds a lot of safety.



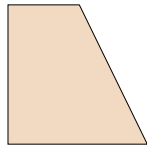
Basic moulded shapes



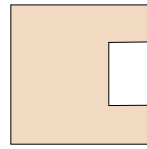
Fillet or listel
Use straight bit



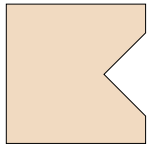
Chamfer
Use chamfering bit or V-bit



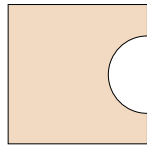
Bevel
Use chamfering bit or V-bit



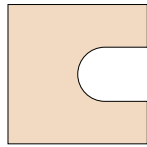
Flat-bottom groove
Use straight bit



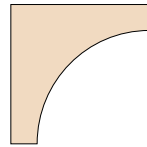
V-groove
Use V-bit



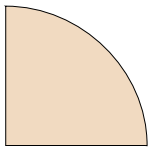
Flute
Use fluting bit



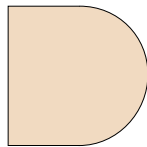
Round-bottom
Use fluting bit



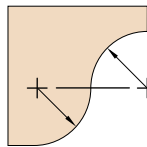
Cove or cavetto
Use cove bit



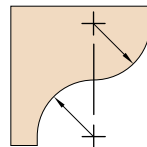
Quarter-round bead
Use roundover bit



Half-round bead or astragal
Use beading bit for small beads, nosing or roundover bit for large beads



Cyma recta
Use ogee bit (centers of curves are aligned horizontally)



Cyma reversa
Use ogee bit (centers of curves are aligned vertically)

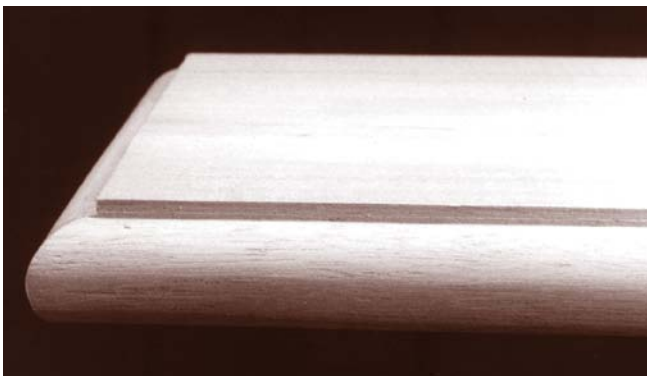
Basic Moulded Shapes

Of course, there's a little more to it. Each of these three main categories is subdivided into a few basic moulded shapes that can be cut with a common bit. All mouldings are variations or combinations of these basic shapes, shown in the illustrations above.

There are no hard and fast rules dictating how you combine these

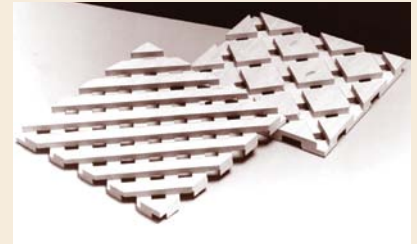
shapes or how you use them. However, you may find these guidelines useful:

- Consider where people will stand when viewing the shapes and present these features at an angle that makes them easy to be seen and enjoyed.
- Vary the shapes in a complex moulding – don't just repeat the same shapes over and over. The clas-



This tabletop will see a lot of use, so the woodworker who made it cut a thumb-nail moulding in the edge. This relatively simple shape preserves the strength of the edge, while a more complex shape would weaken it and the edge would soon show the wear.

TIPS & TRICKS



Two Sides of Grooves Make Pretty Decorative Panels

Cut a set of grooves in a board that are parallel to each other. Make each groove a little more than half as deep as the board is thick. Then turn the board upside down and cut another set of grooves at an angle to the first set. Where the grooves intersect, they will create openings. The size, shape and spacing of these openings depends on the size, shape and spacing of the grooves.



Simple Cock Beading

Cock beading is a simple edge detail that can dress up doors, drawers and much more. But cutting this detail on a door panel can be a lot of work. The simple option is to run a quantity of 1/8" hardwood through your router table adding a bullnose detail to one edge. Then, simply glue this edging to your panel. Presto – simple cock beading.

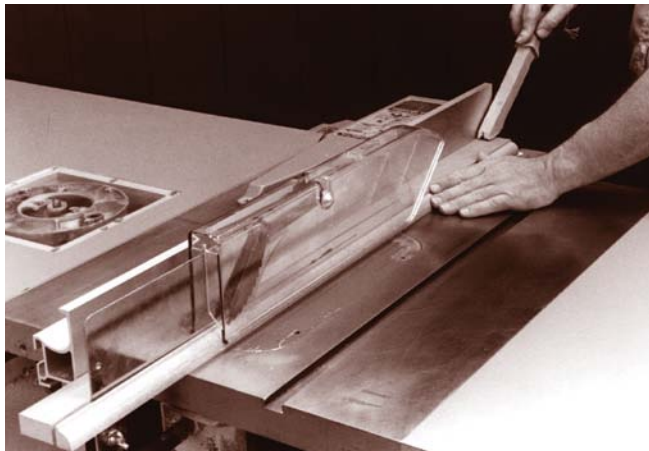


When you're ready to shape your workpiece, first cut the end grain along the ends ...



... then cut the long grain along the edges.

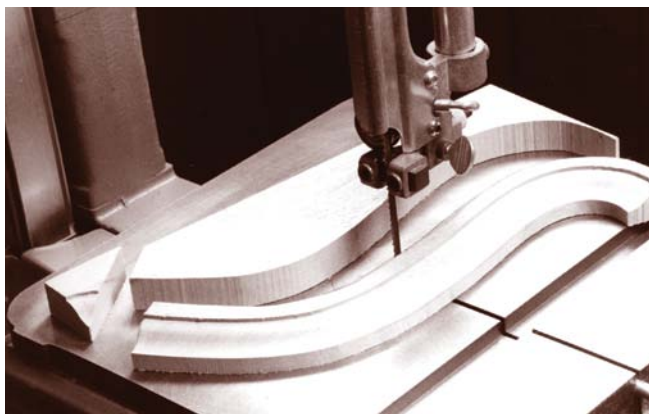
To make an applied moulding or picture frame stock, cut the shape you want in the edge of a wide board, then rip it to the proper thickness, which I'm doing here on my table saw. Don't try to rout a shape in narrow stock – it may chip, splinter or kick back at you.



This safety consideration also applies to making curved mouldings, such as a classic "goose-neck" moulding. Cut the inside curve in the wide moulding stock, sand it so the curves are fair, then rout the shape in the edge.



When you've shaped the inside edge of the stock, you can cut the outside edge to free the moulding from the piece, as I'm doing here with my band saw.



tic bead moulding, which incorporates a cove and a bead, has been a favorite of cabinetmakers for hundreds of years – you hardly ever see a moulding with a double cove or a double bead.

- To make mouldings more dramatic, use sharp, crisp transitions between the shapes. Make the curves and flats meet at distinct angles, or you can use fillets to separate shapes.

- If the structural strength of the piece is important, use simpler shapes.

Once you have designed a moulding, you need to plan how you'll make it – what bits to use, how many passes you'll need to make, etc.

Then, consider how to incorporate the moulded shapes in the project you're building. You have two choices: You can cut the shapes into the surfaces of the structural parts, or you can make separately shaped parts (mouldings) and apply them to the piece.

Each of these choices has trade-offs. If you make applied mouldings, you may not be able to match the wood grain and color of the larger piece, but you can use moulding to disguise seams and joints. If you cut the shapes in a large structural piece, you don't have to worry about matching the wood, but you do have to worry if the shape will weaken the piece. Choose whichever moulding design works best for the piece.

Cutting with the Router

Woodworkers usually shape the edges of a piece. The reasons for this are both aesthetic and practical. Because the edges often trace the outline of the project, shaping the

edges emphasizes and enhances the design. Also, the edges are easier to cut than the faces.

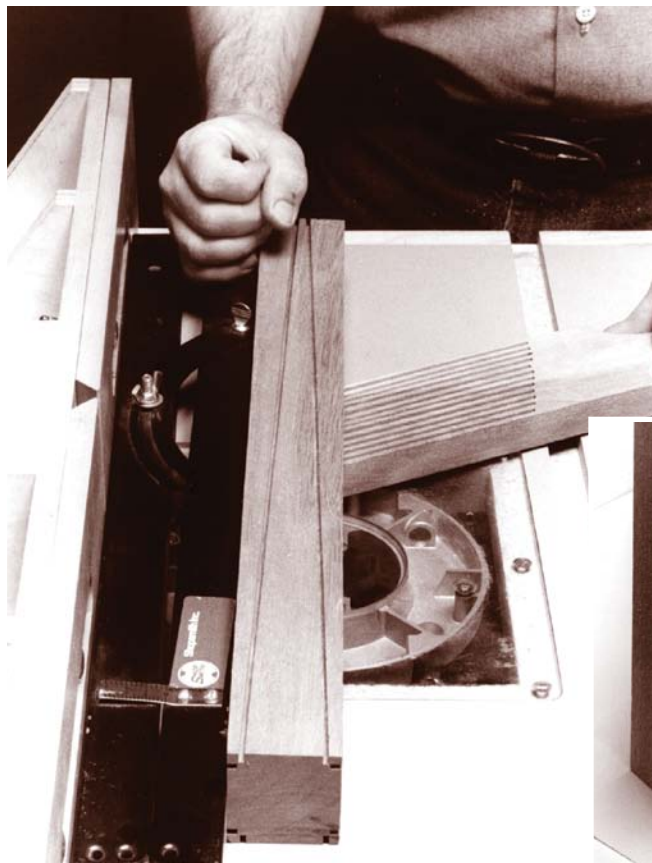
The technique for routing moulded edges is simple and straightforward; there's little here that hasn't already been explained in previous chapters. However, a few additional considerations are worth mentioning.

Before you rout a shape in a straight edge, make sure that the edge is as smooth and even as possible. Joint it and remove all the mill marks. If the edge is contoured, make sure all the curves are "fair" – smooth and even. Because one of the purposes of a moulded shape is to emphasize the edge, the shape also will emphasize any imperfections in the edge.

When you're ready to shape the piece, cut the ends (end grain) first, then cut the edges (long grain).

Cut the large parts with a hand-held router, and cut the smaller parts on a router table. With very small parts, leave them attached to a larger board, rout the edge of the board, then cut the parts free. This last technique is particularly important when making mouldings. Most mouldings, when ripped to their final dimensions, are too slender to rout safely. The cutting action of the router may actually tear the thin stock apart.

If you use a large bit such as a panel-raising bit, slow down the speed of the router. The larger the bit, the slower you should run the router – otherwise the bit may burn



When cutting straight grooves, you can use a variety of jigs to get a decorative effect. Here, a tapering jig produces a pattern of angled grooves in a table leg. The grooves create the impression of a tapered leg, even though it's straight.



TIPS & TRICKS

Subtle Refinement

Edge treatments don't have to be complicated to be effective. A simple roundover bit or chamfering bit in the right locations can soften the look and feel of a piece of furniture, adding an extra level of elegance. And either of these bits work well with a bearing guide in an easy-to-manage trim router.



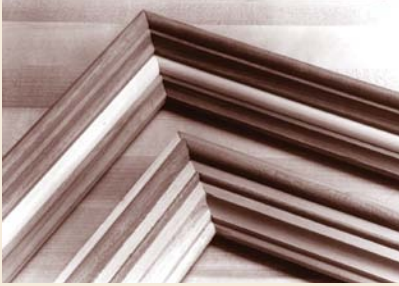
Keep That Piece Clamped Down Tight

Whenever you're routing something, make sure that either your workpiece or your router is stable and secure – they can't both move. If you choose to move the router across the work, clamp the work to your bench. If a clamp interferes with the operation, rout up to it and turn the router off. Then move the clamp to an area on the workpiece that you've already cut and resume routing.

Back-routing (Also Known as Climb-cutting) Can be Tough

Occasionally you must back-rout a piece to reduce tear-out. This means you are cutting with the bit's rotation, rather than against it. It's much more difficult to control your work this way, so be sure to take shallow cuts and feed very slowly. Keep the router and the work steady, making sure the bit doesn't chatter.

TIPS & TRICKS



Layers Can Help if You Want Complex Mouldings

Instead of making multiple passes to create a complex moulding, just glue up several simpler shapes. The easiest way to do this is to “lamine” the shapes – or build them up in layers. But you can also “join” the shapes by cutting dados, rabbets or grooves in the moulding stock, then glue smaller strips of wood in these joints. The strips that you glue together don’t have to be the same species – you can use contrasting wood, if you want.

How Much is Enough?

To make sure the collet is safely gripping a router bit, insert $\frac{3}{4}$ " of the length of a $\frac{1}{4}$ " shank bit into the collet and insert a full 1" of every $\frac{1}{2}$ " shank bit.

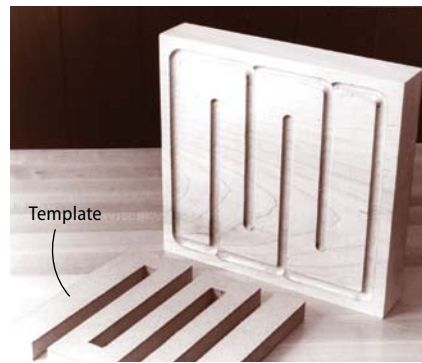
Bits Pull Double Duty

Most edge-profile router bits are designed to be run in a specific orientation to the edge. However, if you’re looking for an unusual alternative, don’t hesitate to think in a different dimension. By running the wood past the bit in a vertical rather than horizontal attitude, the profile is changed subtly. And you get two profiles out of one bit.

the wood. If you can’t vary the speed of the router, you shouldn’t use bits larger than 2" in diameter. Even bits larger than $1\frac{1}{2}$ " can be troublesome.

Surface Treatments

In addition to cutting edges, you can create a variety of decorative shapes in the face of your workpiece. Surface treatments can be cut pretty



Some surface grooves are simultaneously decorative and practical, such as the groove around the perimeter of this cutting board. Not only does it collect liquids, but the groove also adds visual interest to an otherwise uninspiring piece. To make this groove, cut a template from hardboard and secure it to the cutting board with double-sided tape. Then you can cut the groove using a guide collar and core-box bit, keeping the collar firmly pressed against the template.

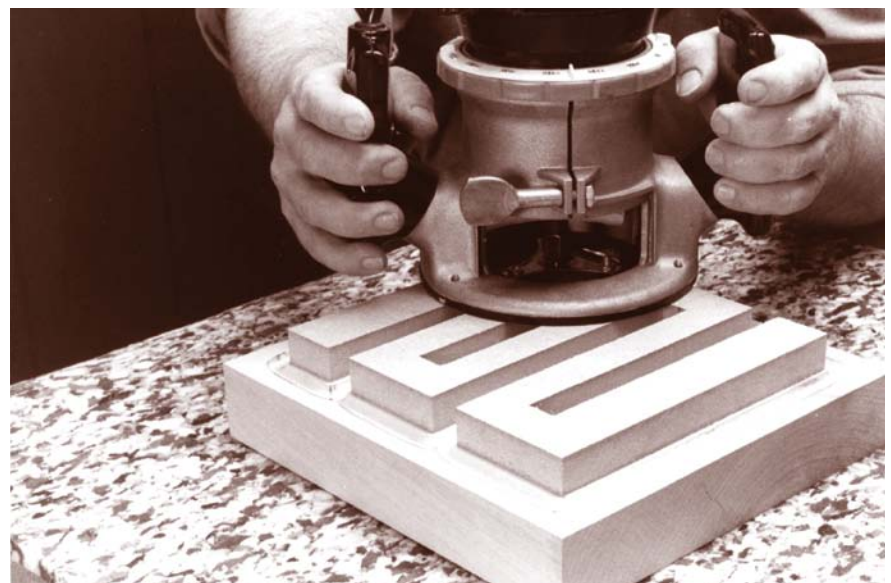
easily with either a hand-held or a table-mounted router fitted with either an unpiloted or a point-cut bit.

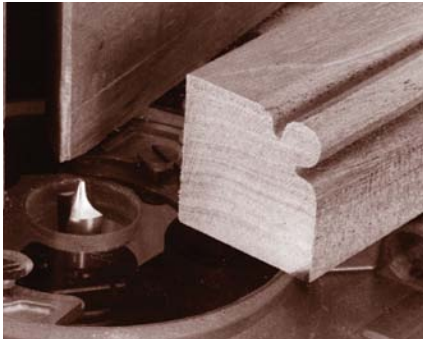
The most common surface decoration is a simple groove – flat-bottom, round-bottom or V-bottom. If the groove is straight, use a straightedge, fence or miter gauge to guide the cut. If the groove is irregular, you’ll want to use a guide collar and a template.

For decorative grooves with a more-complex geometry, you can make multiple passes – or use a more-complex bit. For example, by making multiple parallel passes with a point-cut roundover bit (sometimes called a “beading” bit), you can form cock beads and reeds. Or, you can make cuts with a veining bit or a round-nose bit to create flutes. Also, a point-cut ogee bit will rout a wide groove with a double-ogee shape.

Making Complex Mouldings

When you produce complex mouldings, you often make multiple cuts, combining edge and surface treatments. It isn’t difficult, but there are

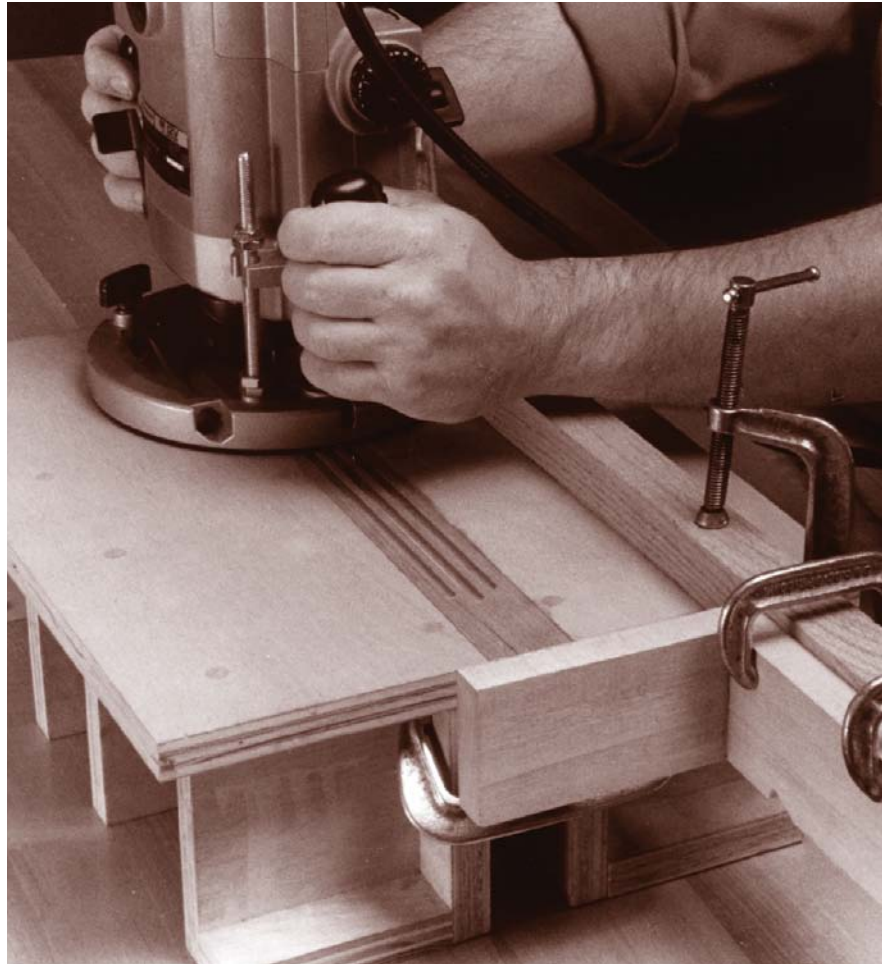




Make multiple passes with a beading bit to create decorative reeds and beads in the surface of a board. Because the beading bit is actually a small point-cut quarter-round bit, each pass cuts a 90° arc – one-quarter of a circle. Half-round beads require two passes. The corner bead or reed on this table leg requires three passes because it is three-quarters round.



Point-cut bits with a complex shape, such as this pilotless ogee bit, cut a broad groove with an interesting shape. The sides of the grooves are mirror images of each other.



A flute is just a half-round groove – the opposite of a half-round bead. Often, it's blind at one or both ends. Use a veining bit to cut the flute and a straightedge to guide your router. If the flute is blind, it helps to have a plunge router. Attach stops to the straightedge to halt the cut when the flute is the correct length.

tricks to help you.

- First, you will need to decide which router bits to use to cut the different shapes. Often this is more of an art than a science. There may be three or four bits in your selection that will produce a single shape. Knowing which one will work best is a matter of experience.

- Second, when you know which bits you're using, carefully plan the cuts. Each cut should leave enough stock to adequately support the workpiece during the next cut. If possible, make small cuts before large ones, and remove stock from the interior or middle of the surface

before taking it from the sides.

- Third, when you make each cut, use constant, even pressure to feed the work (or move the router) and keep it firmly against the guides. If the pressure isn't constant or if the work wanders slightly, the cut may not be even. If the problem continues over several passes, there may be considerable variation in the moulded shape along the length of the board.

- Fourth, make more moulding than you think you'll actually need, because if you run short, it will be difficult to reproduce the exact same setups you went through.

Inlaying Banding

You can decorate wooden surfaces by cutting shallow mortises and filling them with inlaid strips of veneer, patches of marquetry and parquetry, slabs of mother-of-pearl, strands of wire and so on.

Because these inlaid objects often are small and intricately shaped, cutting mortises to fit them requires precision. Not only must the shape be correct, the depth must be accurate and absolutely uniform. That's why one of the best tools for making these small cuts is the router.

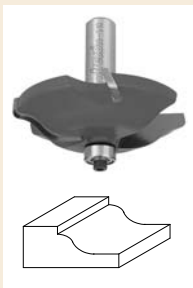
Perhaps the simplest type of decorative inlay is the inset wood

A BIT OF ADVICE

These bits are great when using your router to make edge & surface treatments.

Panel-raising Bit

This bit combines two small wings (which cut downward to shear the top edge) with two large wings (which shear upward for a smooth finish). It's ideal for creating decorative tops and should be used in a router table.



Beading Bit

These bits add an attractive profile to furniture and millwork. They can be used to cut all kinds of material – plywood, hardwood and softwood. They're also available with steel pilots or bearings for similar designs.



Table Top Bit

This bit, designed with sharp curves, helps you generate a strong, uplifting edge, creating a bold effect on all kinds of furniture.



banding. These simply are ribbons of wood sliced from a board or a sheet of veneer.

They also may be made up of several contrasting colors of wood, forming long strips of marquetry (designs that are made with multiple pieces of wood arranged with the long grain showing) or parquetry (multiple-piece designs with the end grain showing). They are usually straight, but they also may be curved.

To inlay straight banding, first measure its width and thickness. Then rout a shallow rabbet, dado or groove to fit it, using either a hand-held or a table-mounted router. After cutting the recess, just glue the banding in place. For more details,



Cut recesses for banding with the same setup you would use to cut simple rabbets, dados and grooves. If the workpiece is small, cut it on your router table using a fence to guide the board. If the workpiece is too large to handle on the table, use a hand-held router and clamp a straightedge to guide the router. Either way, a straight bit is the best choice.



check out the photos at right.

If the inlaid materials are fairly thick, you'll want to rout a recess that is slightly shallower than the inlay is thick. This will make the inlay "proud" when you glue it in place – meaning it will protrude slightly above the surface of the wood. After the glue dries, scrape or sand the inlay flush with the surface.

If the inlaid materials are thin, you risk sanding through them if you mount them proud, as explained above. Instead, you will need to rout the recess to precisely the right depth. Use dial calipers to measure the thickness of the inlay, then carefully adjust the router's depth of cut to match.

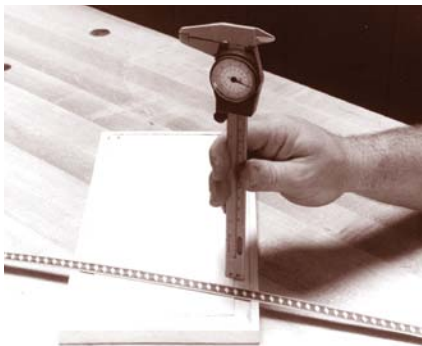
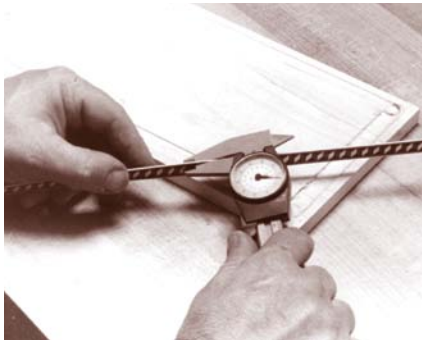


Next, test-fit the banding in its recess. When you're satisfied with the fit, spread glue in the recess and press the banding in place. Wipe away any excess glue, place a piece of wax paper or plastic wrap over the banding and clamp a straight, thick board to the piece over the covering. The board helps distribute clamping pressure evenly, and the covering keeps it from sticking.

When the glue is dry, remove the board and the covering, then scrape away any glue that remains on the surface. But be careful you don't scrape too deeply – you don't want to scrape through the banding.



Some banding inlays simply are thin pieces of wood ripped from boards or cut from sheets of veneer. You can make these simple bandings in your workshop, using a saw or a knife. Other inlays can be intricate pieces of marquetry. These are made by arranging different colors of wood in geometric patterns, gluing them together and slicing them into long ribbons. You can make these yourself, too, if you have the patience, but there are many ready-made marquetry bandings available from mail-order suppliers.



When inlay materials are thick, you can rout a recess to make the inlay "proud," then sand it flush. When inlay materials are thin, you risk sanding through them if you mount them proud. Instead, use calipers to measure the inlay thickness, then adjust the depth of cut to match.

DADO & RABBET JIG

This jig simplifies the set-up and the operation necessary to make repetitive cuts. Just lock the board between the base and clamping bar, then guide the router along the bar. The stock doesn't move, so you don't have to worry about controlling a large piece of wood, and the straightedge doubles as the clamp, so the set-up is very simple.

The jig is just two pieces of wood (a base and a clamping bar) with the sizes determined by your needs. Make the base from $\frac{3}{4}$ " plywood and the clamping bar from a hard, dense wood such as oak or maple. The bar should be fairly thick so it doesn't bow when tightened. I crowned the top and bottom surfaces of my clamping bar, making it $\frac{1}{32}$ " to $\frac{1}{16}$ " thicker in the center than at the ends. Even though the bar flexes, the clamping pressure remains even.

To use the jig, position the stock on the base under the clamping bar. To do this quickly and accurately, it helps to make a positioning gauge from a scrap of thin plywood or hardboard. Lock the bar down on the base and place the scrap so that one edge rests against the side of the bar. Rout all the way through the scrap, creating a strip about as long as the bar. The width of this strip is the distance from the edge of the router to the bit's cutting edge.



Use the positioning gauge to align the stock underneath the clamping bar. The edge of the gauge indicates the inside edge of the cut.



This jig also is a timesaver for making identical cuts in multiple parts. To make multiple identical cuts, such as the cheeks and shoulders of tenons, clamp a short fence to the base to position the parts.

