WOODWORKER'S JOURNAL
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Classic Project

In this plan you'll find:

- Step-by-step construction instruction.
- A complete bill of materials.
- Construction drawings and related photos.
- Tips to help you complete the project and become a better woodworker.

Walnut Hand Mirror


GIFT SHOP

Walnut Hand Mirror
with Mother-of-Pearl Inlay

Our hand mirror—shown in walnut—makes a great gift. We've decorated the mirror back with a genuine mother-of-pearl flower inlay (see Special Techniques on page 35 for complete inlay instructions). Inlay is often thought of by woodworkers as being beyond their capabilities, but we believe you'll be pleasantly surprised at how easy the process actually is. Of course, should you prefer to leave the inlay off, the mirror still makes a great project.

To make the mirror just follow our simple step-by-step illustrations. Our method incorporates a router, a router guide bushing, and a template to rout the mirror glass recess, but you can also just trace the mirror shape directly on your stock and rout the recess freehand. The advantage of the template method is that there's no chance for a slipup, and once you've made the template it's easy to knock out as many mirrors as you like.

You won't find the beveled glass that our mirror sports at your local glass shop, so we've arranged for a mail-order source. The 4 in. by 6 in. oval glass is available from Floral Glass and Mirror, 895 Motor Parkway, Hauppauge, NY 11788; tel. (800) 647-7672. There is a $50 minimum order requirement, but at $6.20 per glass (order their part no. OV 46) you'll have enough glass for eight or nine mirrors. Using our template method, making even that many mirrors requires only a few hours (not counting the inlay work). If you'd like to save a little money, most glass shops can cut a flat (no bevel) oval mirror for under $5.

Step-by-Step

Step 1: Size your stock and lay out the mirror profile. We used a $^{3}/_{8}$ in. thick blank to lighten both the look and weight

54

The Woodworker's Journal

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Step-by-Step

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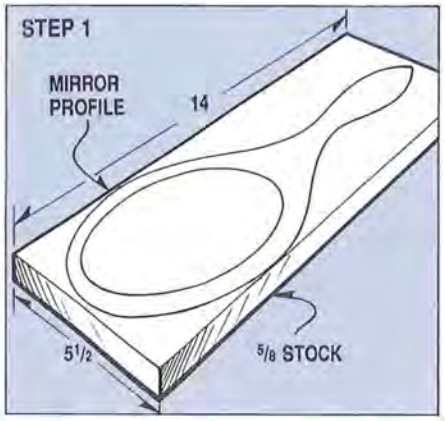
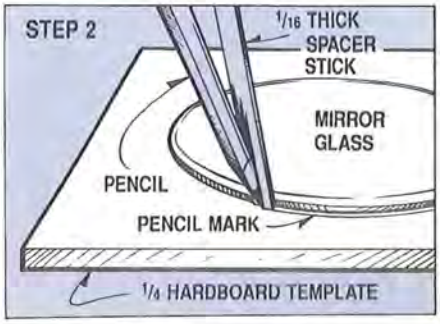
of the mirror, but 3/4 in. thick stock would also be fine.

Transfer the full-size pattern of the handle and the half-pattern of the mirror body to your stock. You can use carbon paper and trace directly from the patterns to the stock, or you can just make a photocopy, paste it onto some stiff cardboard, cut the profile out, and then trace around it. If you make the template,

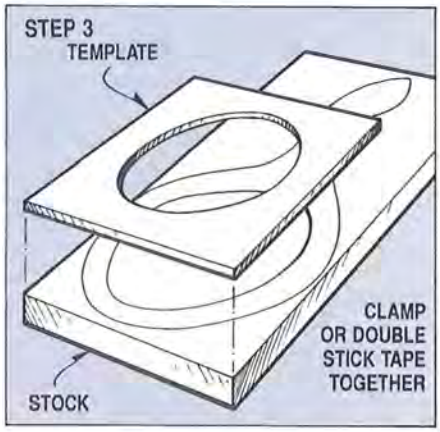


be sure to also cut out the center, since you need to mark the mirror glass position on the stock. When making multiples, a cardboard or hardboard template simplifies the task of transferring the profile to your stock. An easy way to get the full pattern of the mirror body is to just fold the photocopy along the center line, cut and unfold. Note that the contoured handle is for a right-hand grip. Reverse the pattern for a left-hand grip.

Step 2: Transfer the mirror glass profile to your template material. You'll need to size the template with respect to the size bit and guide bushing you'll use with the router, and an easy way to get the template right is to use a spacer when tracing around the mirror. We used a 5/8 in. diameter guide bushing with a 1/2 in. diameter bit, requiring that the template be 1/16 in. larger all around than the mirror recess. As shown, we cut a 1/16 in. thick spacer stick to use when tracing around the mirror glass. You can hold the pencil (make sure it's sharp) and spacer strip tightly together as you trace around the mirror glass, or if you find holding both a little difficult, wrap some tape around them. In either case, be sure to keep the pencil point flush with the side of the spacer strip as you trace around the glass.

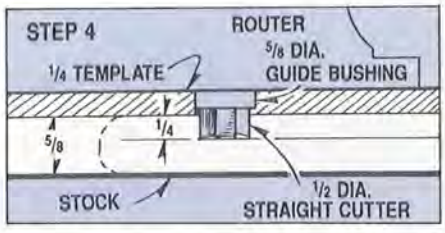


Step 3: Fasten the template in place. But first it's important that the template be centered on the mirror recess. Check the position of the template relative to the inside profile on the stock, and adjust if needed. If your template is large enough, you can use clamps to anchor it

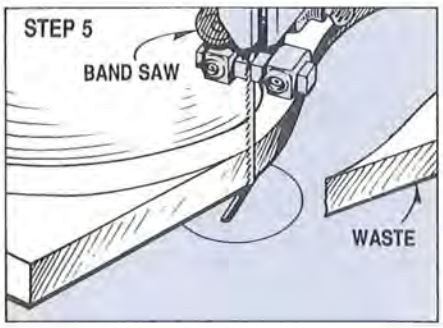


to the stock, but keep the clamps close to the corners so as to not interfere with the router base. Doublestick tape or countersunk screws are an option if the clamps interfere with the router.

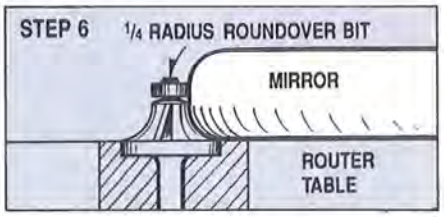
Step 4: Rout the mirror glass recess. Start at the center and work out. The 1/4 in. recess depth that we use allows the 3 mm thick mirror glass to be slightly inset. That way the glass won't get scratched when the mirror is turned face



down to display your mother-of-pearl handiwork. Achieve the 1/4 in. recess depth in two passes.



Step 5: Cut the outside profile. Use the band saw, handheld jigsaw or a coping saw. Use files to smooth any irregularities and remove the saw marks. It's important that the edge be smooth for the next step.

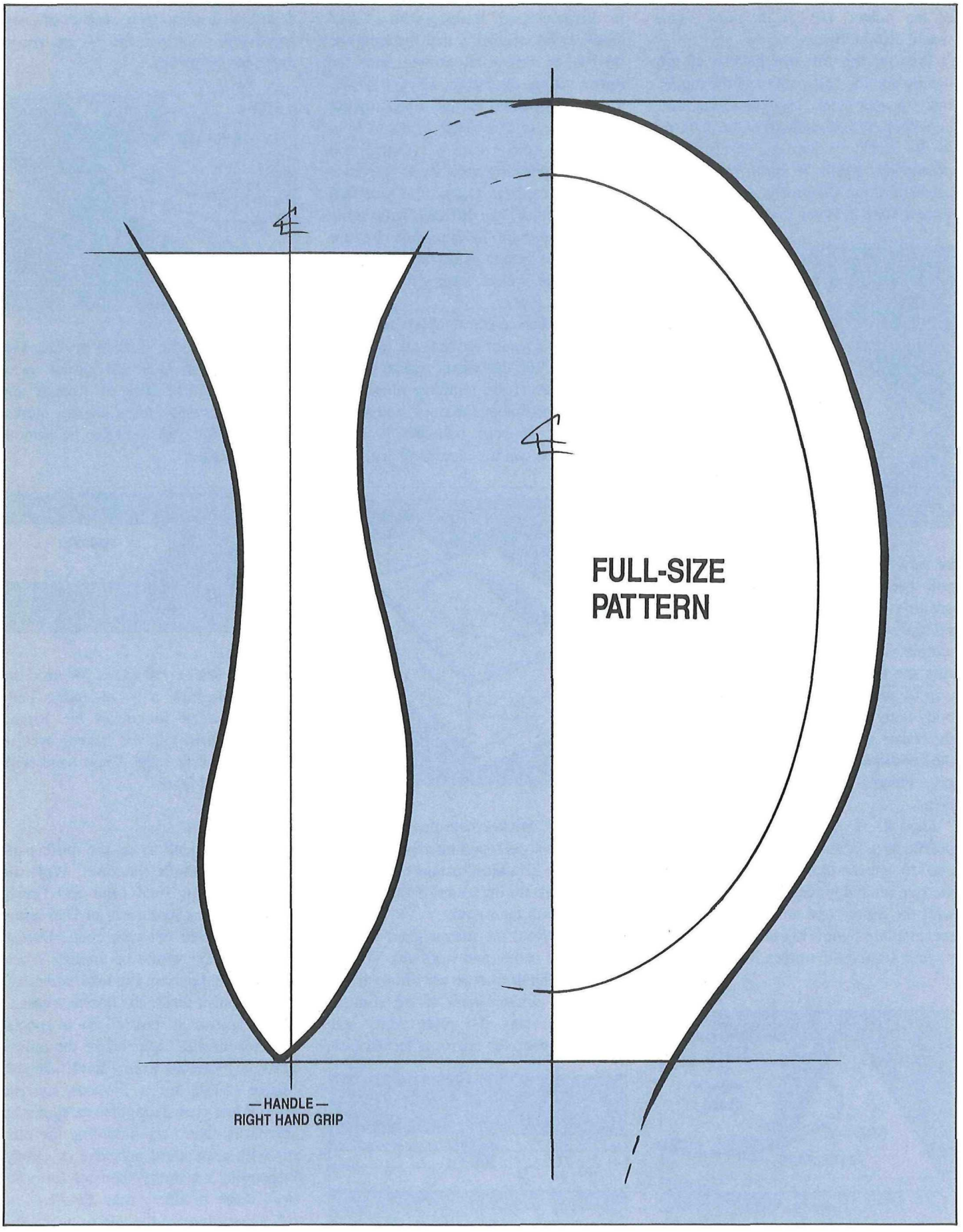


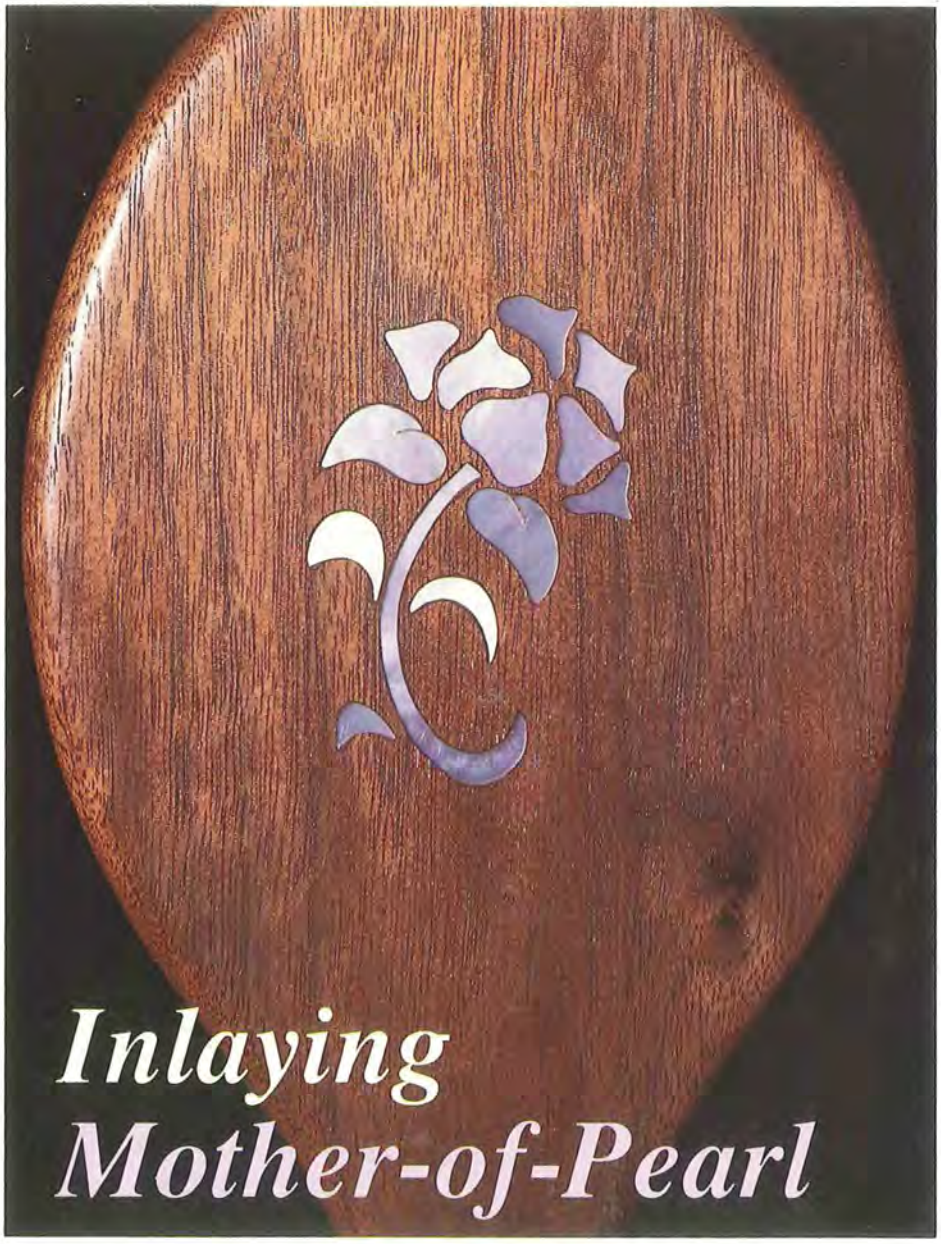
Step 6: Radius the edges. We used the router table with a 1/4 in. radius ball-bearing guided roundover bit. Round one edge, then flip the mirror over to round the other edge. Final sand with 320-grit sandpaper.

Finishing Up

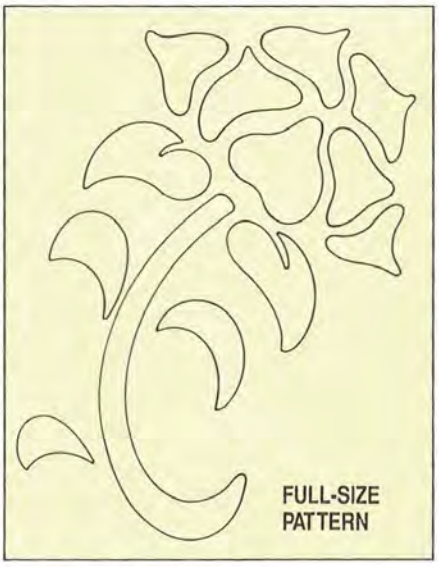
If you've decided to do the mother-of-pearl inlay, now's the time. With the inlay complete, final sand and finish. Our mirror has four coats of Deft spray lacquer, sanded between coats. Danish oil or tung oil would be another excellent finishing option. But take care not to get any finish inside the mirror recess.

Most glass shops also carry mirror adhesives. Don't try mounting the mirror with a standard adhesive or epoxy. Depending on their chemical formulation, these products may dissolve the reflective silver on the mirror back.


FULL-SIZE
PATTERN
—HANDLE—
RIGHT HAND GRIP



Inlaying Mother-of-Pearl



Mother-of-pearl is one of oldest and most attractive forms of inlay. Cut from the shells of pearl oysters, mother-of-pearl is actually layers of calcium carbonate—called nacre—the same material as the pearls. Depending on the shape of the shell and the way the layers are formed, a variety of brilliant iridescent patterns are created. Skilled artisans use these patterns to build complex pictures or create special effects, but even without regard for the natural patterns, mother-of-pearl produces stunning inlays.

Historically, inlay was already well developed in ancient Egypt 4000 years ago. The Chinese were also highly skilled in the use of mother-of-pearl to decorate furniture. More recently mother-of-pearl was popular in the 19th century, and during the Depression, when labor costs were low. Today, mother-of-pearl inlay is used mainly in jewelry and to decorate small boxes, high-quality furniture and musical instruments. Our Special Technique shows step-by-step illustrations for the mother-of-pearl inlay that decorates the back of the Hand Mirror project on page 54, but the general instructions apply to almost any inlay, whether pearl, bone, abalone, wood or metal. One cautionary note, though. Mother-of-pearl dust is a health hazard (see the Safety section).

Pearl inlay—or for that matter any inlay—is not a complex procedure. We tend to think of inlay as requiring artistic ability, but that is not necessarily the case. The art of inlay is in creating a design, not in the actual process of inlaying one material into another. When you have a design or a full-size pattern to work from, inlay is just a basic step-by-step procedure. You transfer the original pattern to the pearl, cut it out, trace the pattern from the cut pearl to your ground, rout the recess to accept the inlay, glue the inlay in place, and then sand smooth and finish.

Where traditionally inlay was very labor intensive due to the time required to mortise out the ground with hand tools, modern power tools have changed all that. The primary tool for inlay work today is the Dremel Moto-Tool equipped with a router base attachment. The router base essentially converts the Moto-Tool into a mini router, perfect for

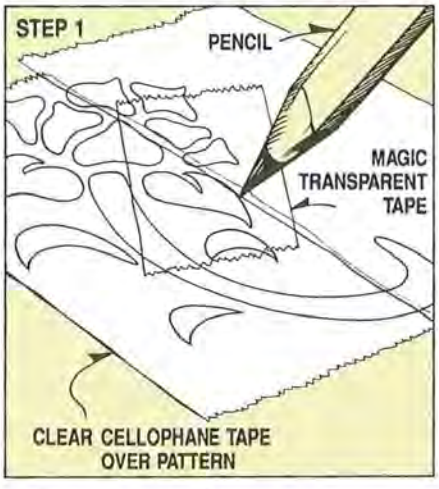
Dremel Moto-Tool and router base attachment.

all types of inlay work. The router base attachment also includes an edge guide for routing circles or straight lines, although the edge guide isn't used for the freehand routing that this inlay requires. Sources for the special tools and equipment you'll need to do inlay work, including a packet of mother-of-pearl sufficient for the hand mirror inlay, are given in the What You'll Need section.

As a rule, the inlay is done after the basic woodworking is complete but before the finish is applied, though there are exceptions to this. One common exception is where an inlay is used to decorate a panel in a frame-and-panel construction. Here the inlay work should be completed before the frame-and-panel are assembled. For our Hand Mirror project the inlay work is done after the mirror recess is routed, the profile is cut on the band saw, and the edges are rounded.

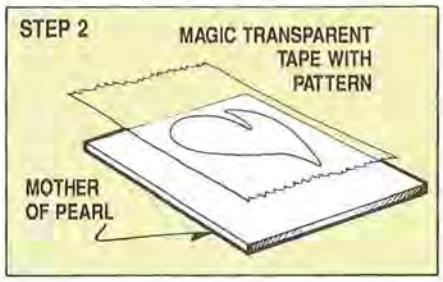
Step-By-Step

Step 1: Transfer the pattern. There are a number of techniques for transferring the original pattern to the pearl. You can use a pattern tracing stylus (see page 38 for ordering information) and carbon paper to copy the pattern directly to the pearl, or if you have access to a copy machine, you can make a photocopy, cut the pieces of the pattern out and tape them to the pearl.



But with our technique you can reuse the original pattern as many times as you wish, without damage. Start by taping over the original full-size pattern with clear cellophane tape as shown. You can use a wide packing tape, or standard 3/4 in. wide household tape. The tape will protect the pattern. To transfer each part of the pattern to the pearl, just place a small piece of Scotch Magic Tape over the part you want and trace the original pattern with a pencil. The Magic Tape has a surface that you can write on. We found that 1 in. wide Magic Tape was wide enough to cover even the widest section of the flower pattern.

Step 2: Locate the pattern on the pearl. Lift the piece of Magic Tape off the pattern and place it on the pearl. But don't just place the tape right smack dab in the middle of the pearl blank. Each of the pearl blanks will measure about 1 in.



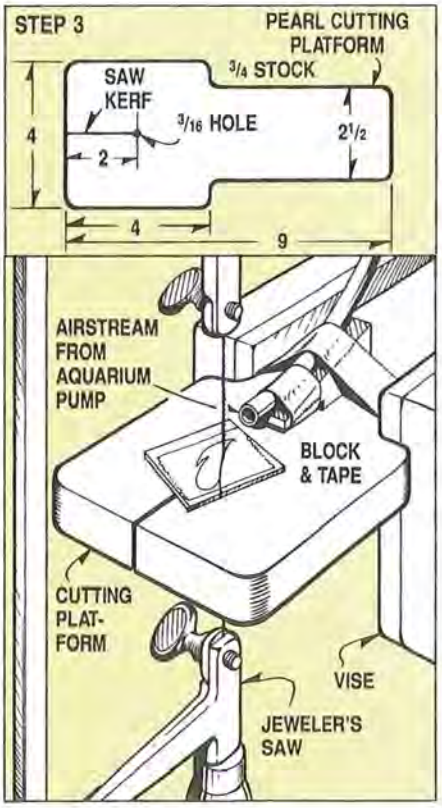
by 1 in. or larger, so by carefully planning the layout you should be able to obtain several flower parts from each pearl blank. The stem will be the trickiest part. Save the longest pearl blank for it. If your packet of pearl doesn't include a blank that's long enough for the stem, then you'll need to break the stem into two sections. But don't worry, after you are finished the joint won't be noticed.

Step 3: Cut the pearl (be sure to use a respirator). You have several options for cutting the pearl. If you own a scroll saw, then you'll probably want to use it. If you don't, you'll need to cut the pearl by hand, using the jeweler's saw.

First, make a cutting platform. The pearl cutting platform is similar to the platform used by jewelers. It's just a section of 3/4 in. thick board, cut to the shape shown. The long flats on either edge are for clamping the platform in a vise. An aquarium pump can be used as a blower. Place the pump motor unit on the bench and tape the flexible clear plastic hose onto the cutting platform so the end is directed at the cutting area. Use a small wooden block under the hose end to direct the air stream down and towards the hole. Without the aquarium pump, you'll need to remove your respirator and blow the dust away regularly to see the cutting line.

Learning to use the jeweler's saw and cutting platform is a little like learning to ride a bicycle. Once you get the hang of it you'll be surprised at how quickly the work goes. The trick to the technique is to keep the saw blade in the hole. The pearl is then advanced and cut a little bit at a time. The best saw position is with the handle under the platform as shown. The teeth on the blade will face down, or toward the handle, which utilizes the cutting action to hold the pearl firm to the platform. Your fingers are the best device for holding the pearl in place, but spring clamps come in handy if your fingers tire.

Since our pattern involved mostly curves, we used the fine jeweler's blades for the majority of the cutting. They are delicate and break easily, but with experience you'll improve. You may break several blades cutting your first inlay, but a few inlays later you'll probably find yourself changing blades because they're dull rather than broken. One of the keys to blade longevity is setting the blade tension. You need

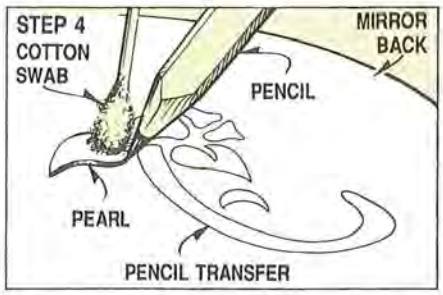


enough tension to keep the blade from buckling, but not so much as to place the blade under stress where it's liable to break easily.

One of the common mistakes made in cutting pearl for the first time is to treat the material as though it's more fragile than it actually is. The pearl can break, but it won't so long as you maintain a constant steady pressure on the piece while it's being cut, and use steady even strokes with your saw. Take extra care with the stem, which is the most difficult piece to cut because of its length.

Depending on your skill with the saw, after cutting the sections of the pattern you may need to make some final adjustments with a set of needle files. Just hold the pearl between your thumb and forefinger and file the edges of the pieces smooth. For an easier time fitting the pieces into your mortises, you can slightly bevel or undercut the edges with the files.

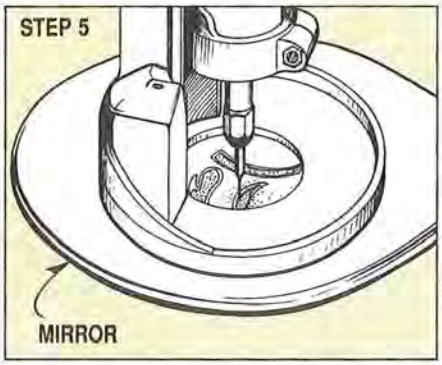
Step 4: Transfer the pattern to the ground (the material into which the pearl is inlaid). For our Hand Mirror, which is crafted in walnut, we found that a sharp pencil produced a line that could be clearly seen, although on darker woods, such as ebony or rosewood, you may want to first apply artist's Pro-white or a thinned white or yellow tempera paint over the pattern area. The Pro-white or light-colored tempera (both available from art supply shops) provide contrast for the pencil line, or if you use a scribe (see page 38 for ordering information), the darker wood shows as the line. It's



best to have the ground—in this case the back of the mirror—clamped securely to your bench top so it won't be moving about as you trace the pearl.

First position the elements of the pattern until you are satisfied with the placement. Compare your placement to the original pattern for accuracy. Then trace around the individual pieces, one by one. A cotton swab comes in handy for holding the small parts, where a finger would be too large. We traced with a sharp pencil, although a scribe is another option if you have one. With a sharp scribe you can get closer to the pearl, producing a more accurate line and probably a tighter fit of the pearl in the mortise. Remove each piece after it's traced to provide clearance for tracing the pieces that remain.

Step 5: Rout the mortises. Equip the Moto-Tool with the router base attachment and use the 1/8 in. collet to chuck



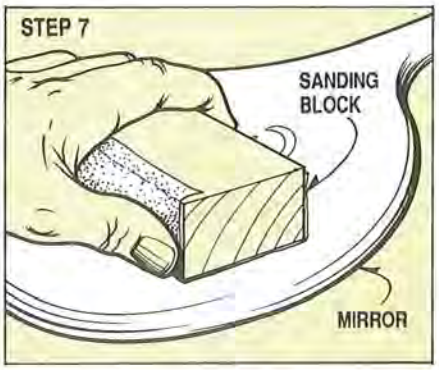
the 1/16 in. solid carbide inlay bit. The bit depth of cut is set just a hair under the pearl thickness, allowing the pearl to stand a little proud of the ground's surface. Note that on our bit we had to grind the end of the shank back slightly to get the proper depth setting in the collet.

Remove the center of each section first, working out toward the pencil or scribe line. Stop well back of the line and switch to the 1/32 in. inlay bit. Check that the depth setting is the same, and now rout almost to the line. As shown, the finer bit will enable you to get into the points of the flower petals and leaves. Note that you'll need to clear the dust regularly to see what you are doing. We found that the exhaust stream from the Moto-Tool cooling fan blades works great for this. Just position the tool to direct the air stream toward the area you are working on. Of course, keep your fingers clear of the bit.

Check the pearl sections in the various mortises. Depending on the thickness of your pencil line, you may or may not have a perfect fit. If you used a very fine pencil or a sharp scribe, you'll need to rout right up to the line. With a dull pencil, you'll have a proper fit when the mortise edge is a little shy of the pencil line. Check each piece of pearl and make any adjustments.

Step 6: Inlay the pearl. Any quick-set or 5-minute epoxy will do for inlaying the pearl. But first set aside some wood dust from the ground for mixing with the epoxy. If you don't have any dust, just sand a piece of scrap to get a small mound. You won't need much. This is an important step since it will fill any gaps around the pearl with a mixture that's nearly indistinguishable from the wood itself. Mix up the epoxy with the wood dust and spread a generous amount in each mortise. Make sure the entire bottom area of the mortise and all the corners are covered.

Press in the sections of pearl as shown. Don't dally here since the epoxy will start to set up. For larger patterns you may want to work on only a few parts at one time, or you can switch to a standard epoxy with 24-hour dry time. Press in the sections of pearl until they bottom out. The excess epoxy and wood dust mixture will be oozing out all around the edges, but don't worry about that now. You'll sand the excess off after it dries.



Step 7: Sand and finish. Once the epoxy is dry, wrap a block of wood with 120-grit sandpaper and start sanding. Sand the surface until the pearl is level with the wood. Next switch to 220-grit sandpaper, and then to 320-grit. Finish up with 400-grit wet-or-dry paper. If you are using a penetrating oil finish, apply a generous coat of the oil and rub it in with the 400-grit paper. The pearl should be shiny and lustrous at this point, but for an even higher sheen you can use a polishing compound.

Safety

Inhaling shell dust over a period of time (chronic exposure) is hazardous to your health. Mother-of-pearl and other shell dust is an irritant to your lungs and respiratory tract. Chronic exposure in shell workers is well documented, producing a condition aptly called "pearl lung."

Modern facilities working with shell have saws and other tools that use water, vacuum and filters to eliminate dust. If you don't have the means to eliminate the pearl dust from your shop, wear a respirator. Making one inlay will certainly not damage your lungs, but even a single exposure can prove irritating to some people.