Duplicate Spindles by Hand

Getting good results at turned copies doesn't mean they all have to be exactly alike

BY KIM CARLETON GRAVES

If you're a furniture maker, duplicating parts on a lathe is as fundamental a skill as duplicating parts on a tablesaw. Hobbyists and small custom shops usually have only a few spindles to duplicate: four legs for a table, 16 front legs for a set of eight chairs. You are much better off doing this work by hand rather than on a mechanical duplicator. The results are superior because edges are crisper and shapes are better defined. Also, for small runs, handwork is almost always faster.

To demonstrate standard hand duplication, I've chosen a stool leg designed by my friend and client, Anatoli Lapushner, owner of Anatoli's Restoration in New York City. This design has four elements—the pommel, the large swell, the taper and the foot— that make it particularly challenging (see the left photo on p. 70).

Duplicate parts don't have to be identical. More precisely, only some dimensions must be identical. In this example, only the length of the leg and the placement of the mortises are critical. The turning can be less accurate. The human eye wants to see symmetries. If the major diameters and the vertical placement of elements are relatively close, no one will notice if you're off by 1/16 in. dia. or even 1/8 in. dia. Identical parts have a dead, cookie-cutter look.

Duplicating spindles is a simple procedure: Make a pattern, mill the blanks, transfer the pattern to the blanks and turn the work.

Make the pattern first

A full-sized pattern can be used to copy an existing spindle or to create an original one. Simply set, check and reset calipers and dividers against the pattern (see the photos at right). Also, you can hold the pattern against the rounded blank, like a story stick, to mark the position of turning elements. Another advantage is that you can compare duplicates against the pattern. If you compare duplicates to each other, any errors made in the early duplicates will be compounded in the later ones. I make patterns using a computer drawing program, but as an alternative you can use graph paper, a ruler, triangle, compass and French curve set.

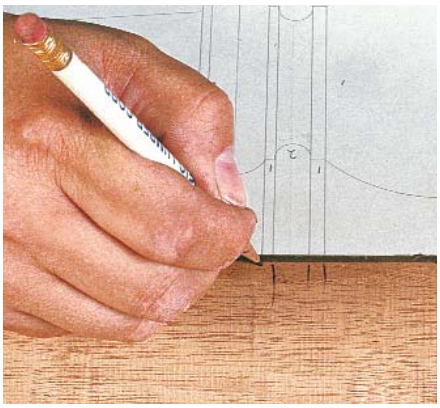
Paste the pattern, whether printed or drawn, to a thin but stiff piece of material. I use Masonite or lauan because it's cheap, and I usually have plenty of scraps. Cut the scrap into a rectangle so that the top and bottom of the drawing correspond to the ends of the scrap. Orient the drawing so that the end going into the headstock is toward your left. Draw "turning lines" for all of the major and minor diameters to function as a story stick, marking the position of the spindle's turned shapes on the rough blank.

Number the turning lines so that those with the same diameters have the same number. The spindle illustrated here has eight diameters. Holding your calipers against the pattern, match each of the calipers to each of the different diameters on the pattern. For easy reference when I'm turning, I put masking tape on all of the calipers to be used and number them to correspond to the numbers on the pattern. For the eighth diameter, at the bottom of the spindle, set a pair of dividers instead of a caliper. (The sharp point on the dividers will score the end grain of the foot, showing you where to stop the taper.) Altogether, for this pattern, you'll need seven calipers and one pair of dividers. With your pattern complete and your calipers set, you are ready to duplicate.

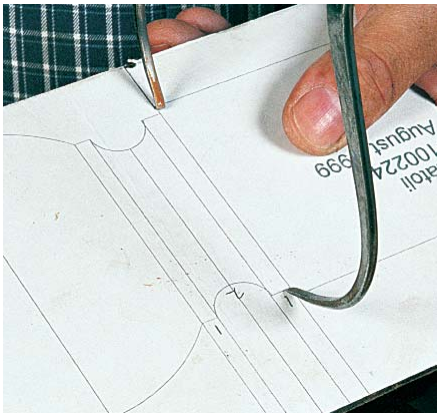
Mill the blanks

This design calls for 4-in.-thick mahogany. The thickest kiln-dried mahogany commercially available is 16/4, which is 4 in. in its

FULL-SIZED PATTERN IS THE KEY



This step is worth every minute. *Taking the set-up time to mark the turning lines prominently on the blank will help you avoid costly mistakes.*

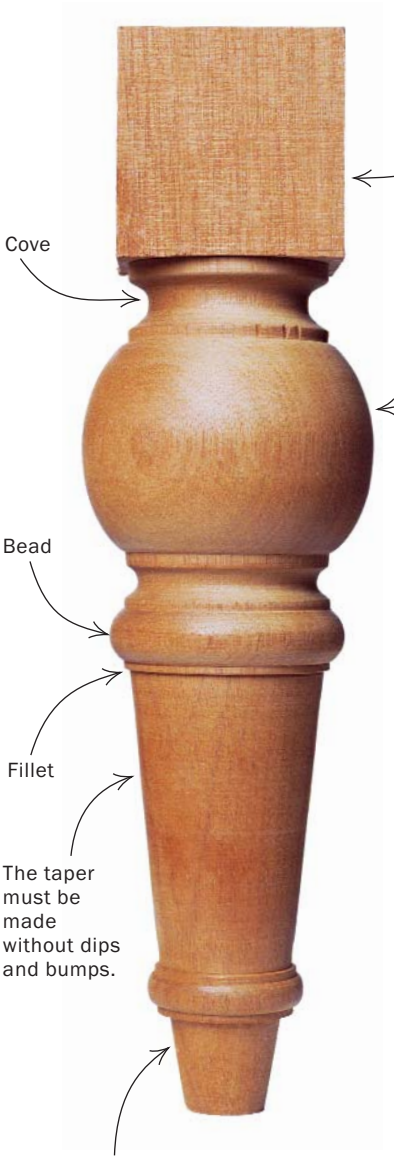


A pattern is a map and a story stick. *You can use a full-sized drawing of the workpiece to set calipers and to monitor your progress after you start turning.*

Make it simple with a system of numbers. *The author codes his calipers to correspond to different finished diameters on the workpiece.*

Photos, except where noted: William Duckworth; facing page (bottom): Michael Pekovich

SOME SHAPES PRESENT CHALLENGES



A custom straightedge. *The knife-edge of a mitered block of scrap will reveal high and low spots that need to be evened out. Backlighting helps.*

A fine rasp for delicate cuts. *Truing a tapered foot to fit into a brass caster is a good job for this tool.*

roughly milled state. However, to cut the pommel accurately, the blank must be jointed and planed square, so this project requires a larger blank that can be planed to the proper dimension. In addition, turning is easier if the blank is slightly oversized. I glue up 10/4 stock to get a 5-in.-square blank and, when possible, use the same board for both halves of the blank for a good color match.

Joint the raw stock and cut it to length ½ in. oversized. Glue up the blanks. Don't scrimp on glue or clamps. Once the glue is dry, joint and plane the blanks. It doesn't matter how oversized the blanks are, as long as they're square and the same size. Set a stop on your saw and cut all of the legs to the finished length. Don't try to part the legs to length on the lathe because they won't all end up the same, and length is a critical dimension.

Mark the centers on both ends of all the blanks, and mark the outline of the pommel on one of them. Cut the pommel's shoulders on the tablesaw, using a miter gauge with a stop. Cut out the pommel on the bandsaw, using a fence with a stop attached. Mark and cut the mortises. The blanks are now ready for turning. Mount the workpiece between centers and turn it to round. Watch the pommel—if you cut into it, the workpiece is ruined.

Transfer the pattern

Stop the lathe and hold the pattern against the blank. Then transfer the position of the turning lines to the workpiece. A quick flick of the pencil is all that is needed. Hold your pencil against the blank as you turn the lathe on and off, leaving pencil marks completely around the workpiece. Many experienced turners don't bother to stop the lathe. They simply hold the pattern against the workpiece while it's rotating and mark it. I stop and start the lathe because I've found that it's easy to damage the corners of the pommel when I don't.

Take the No. 1 caliper and—using a diamond-shaped parting tool—turn all of the No. 1 diameters. Don't put your finger through the caliper spring: If the workpiece catches the caliper, it could take off your finger. Continue parting with the remainder of the calipers. When you get to the No. 8 dividers, mark the end of the workpiece simply by touching the left arm of the dividers to the end grain. This scored line will show the size of the small end of the tapered foot. (Don't touch the right arm, or it might snap over onto your fingers.)

Determine a cutting sequence for the turning

Whether you are establishing your diameters or turning the workpiece, always make your most difficult cuts first. That way, if you make a mistake you can't repair, at least you won't have invested much time. This spindle has four risky cuts, so I perform them in the order of their difficulty.

The square shoulder next to the pommel—On the leg shown here, the pommel will be covered by upholstery. But ordinarily, the pommel and its shoulders are highly visible. If you knock off a piece of the pommel, you'll have to repair it or discard the piece. This cut should be your first part when establishing diameters.

The large, round swell—After roughing, turn this element first. If you cut too many times and flatten the shape, you won't have enough material to recover. As you turn, compare the work to the pattern. I mount the pattern right behind the workpiece, so I just have to glance up to see it. It takes a practiced eye to see that the turning is different from the pattern. (Strangely enough, it's also hard to see when they're the same.) When the pattern and turning look the same, stop. Resist the temptation to take one last cut.

The large bead and the bottom bead—The large bead should be cut next because you must remove the material of the swell to get access to the material of the bead. Don't move the tool rest. Finish the coves, then the fillets on the top half of the workpiece. Move the tool rest to the bottom half of the workpiece and cut the bottom bead, which is the fourth risky cut.

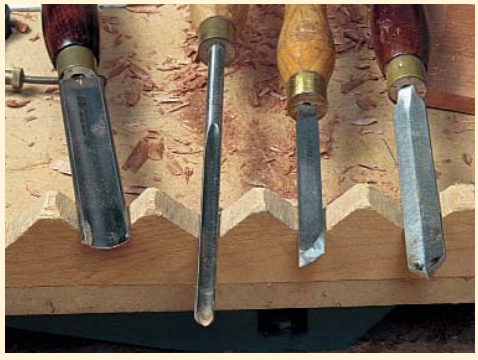
Once you have established the diameters for the fillets at the top and bottom of the taper, you can eyeball the diameters of the top and bottom of the taper. I hold a straight-edged pattern

Photo, this page (left): Michael Pekovich

Seven rules for duplicating parts

Concentrate on developing consistency rather than speed. If you work on consistency, speed will come. Some elements of consistency and speed are closely related. Here are my basic rules for achieving consistent results while duplicating parts on a lathe.

1. Go as fast as you can without making a mistake, and no faster. **Speed comes from establishing and maintaining a rhythm. Making a mistake takes you out of your rhythm and slows you to a crawl. Once you've established a rhythm, look for ways to be more efficient. Try to push yourself. Increase your pace. Maintain your rhythm.**



You don't need a wall-full of tools. *Gouges, a skew and a parting tool were the only turning tools used to make the legs for this article.*

2. Limit the size of your tool set. **Usually no more than three to five tools are needed for any given spindle—parting tool, skew, roughing gouge, one or two spindle gouges. Don't change tools unless you have to. Use one tool for different kinds of cuts (for example, I use a skew to turn the blank round and to turn beads).**

3. Limit movement of the tool rest. **The fewer times you stop to adjust the position of the tool rest, the faster the job will go.**

4. Use the same cutting sequence for each turning. **If you cut an element in three passes for the first spindle, cut it in three passes for subsequent spindles.**

5. Have enough calipers and dividers that you don't have to reset them. **These tools fall into the same category as clamps—you can't have too many of them.**

6. Learn to sharpen your tools freehand at the grinder. **Sharpening a tool shouldn't take more than 10 seconds.**

7. Power-sand where possible. **I mount sanding discs to quick-change bits so that I can change grits in seconds. Power-sanding is fast and also improves the finish markedly.**

Hand drill as power sander. *The author uses quick-change sanding discs in the final stages of shaping each leg.*

against the workpiece to see if the taper is flat (see the top right photo on the facing page).

You might suspect that the tapered foot is risky, but it isn't. Casters are forgiving in terms of sizing (length is more important than diameter) because they're held to the foot by screws. If you're trying to turn a tenon for a glue joint, size the tenon accurately by getting close with a skew, then finish up with a fine rasp (see the bottom right photo on the facing page). You can also make what's called a "go/no-go" gauge, so you know when you've just got it, by drilling the correctly sized hole in a piece of scrap.

Finish the work on the lathe

I usually power-sand the larger areas, then hand-sand the details. It's important that you don't oversand. It's easy to ruin the crisp details of a turning by rounding them over. As a last step, take a handful of shavings off the floor and hold them against the spinning work to burnish it, but keep your hands away from the sharp corners of the pommel.

You can apply a finish (shellac, lacquer or oil) directly to the work while it's spinning on the lathe, but never wrap a finishing pad around your fingers or your hand. If it gets caught on the spinning workpiece, serious injury could result. You can achieve a French polish by building up shellac or padding lacquer against the spinning work. □

Kim Carleton Graves designs and builds custom furniture, cabinetry and wood turnings in Brooklyn, N.Y. His web site (www.CWWing.com) features pictures of his work and includes helpful shop tips.