Sea Urchin Shell Ornament

by Kurt Hertzog

There are many ways to integrate shells into ornaments and other turnings. Seashells (such as urchins) in any size or shape and natural shells from chickens, geese, or ducks are available and easily used. The two biggest downfalls that I've seen people encounter when working with shells are that the shells fail as a structural element or there are adhesion failure problems when bonding finials or other decorative elements directly to shell material.

Over the years of working with shells for ornaments and other turnings, I've evolved a system that I think addresses most of the pitfalls of integrating shells and other fragile elements into turning projects. There certainly are other methods, but this technique works well for me to minimize material problems, reduce costs, and allow for selective assembly. The advantages that I see with this method are that it removes the shell as a structural member, eliminates all adhesive bonding to the shell, economizes on the use of larger-diameter materials, allows for mix-and-match component selection for best aesthetics, and lends itself to a production style of work. The example used in this article is a sputnik sea urchin shell, but the multipiece, assembled component ornament concept will work for most ornaments, whether they are made from wood, glass, shell, or other materials.

PREPARE THE SHELL

The sputnik sea urchin and other urchin shells are available in different sizes. The sputnik shells vary in color from white to cream with tints of purple. Other urchin species are available in green, blue, pink, violet, and other colors.

Depending on your threshold for perfection, you may want to closely examine the shell for damage before investing a lot of time working on the rest of the ornament pieces. Close examination of the shell will often find hairline cracks that will fracture now or in the future. Also, the sound of the shell can indicate a flaw. Any shell with a dull "thunk" has some hidden flaw and is one you should avoid. Nearly all of them will have an erratic, noncircular opening at both ends (see Fig. 1). One method to correct this is to make a tapered sanding fixture and attach abrasive paper to expand the opening until it's round. It works, but I find that the opening can be made acceptably round by using the sanding disk on a rotary hand tool (see Fig. 2). It will be fine-tuned later in the process when the finial bases are made.

FINIALS

For my ornament finials, I favor African blackwood. From my perspective, it has many advantages, such as being dense, accepting crisp details, being strong when straight-grained, and requiring no finish with proper sanding and


Fig. 1

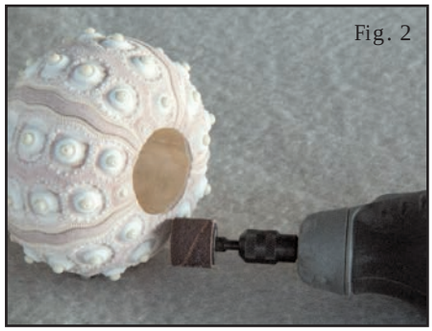


Fig. 2

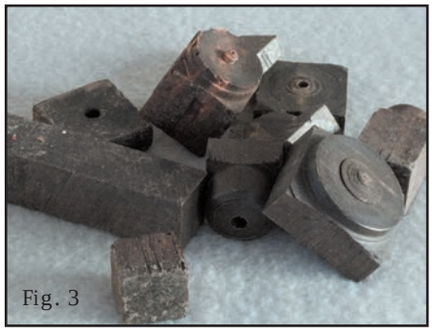


Fig. 3

buffing. The downside is cost. With blackwood currently costing over $10/lb. in quantity, I hesitate to use larger diameters and cut away most of it; therefore, I make the finials as assemblies. Each of the respective pieces is made from various sizes of stock only large enough for the specific purpose to minimize waste; however, I do try to match colors and grain (see Fig. 3). A piece of blackwood is mounted in a chuck, trued, and the bottom of the top finial "base" (the piece that will fit into the opening of the shell) is turned. There is a shoulder to rest on the top of the shell, as well as a bit of an inside "plug" to help block any flaws in that opening of the shell (see Fig. 4). With the shell already selected, there are no numeric measurements needed, since trial-and-error test fitting is just as fast and works just as well (see Fig. 5). The top finial base seating is tuned until I'm happy with it fitting well without snugness. A small amount of clearance is intentionally allowed between the shell and wood diameters to allow the blackwood to spin within the hole, but not rattle around. That way, the expansion and contraction of the wood over time won't crack the shell. Rather than grind off a bunch of spikes haphazardly, mark only those that will interfere with the seating of the top finial "base," and then grind the nubbin away only as much as is needed for proper seating; often, I only need to remove a small portion (see Fig. 6).

THE KABOB SKEWER "CONNECTING ROD" CONCEPT

I use a piece of bamboo kabob skewer to hold the many ornament component pieces together. You could just as easily use another material (such as doweling), but I find that the bamboo is light, tough, and inexpensive; bags of the skewers can be purchased in the cooking department of discount stores quite inexpensively.

A hole is drilled to pass the kabob skewer completely through the turning and the diameter is drilled to be a slip-fit to allow for gluing (see Fig. 7). You can measure if you wish or drill "close enough," and grab a skewer that fits properly. Remember, it should be a slip-fit with sufficient space for some glue.

Top and bottom finial "bases" are turned as much as possible when mounted in the chuck, then parted off and reverse-mounted in the chuck for final turning. The small inner diameter on each of them can be marred in the chuck, because it is internal only and won't be seen. Here, a toothpick is used to capture the bottom plug on separation (see Fig. 8). Both top and bottom finial bases are usually turned from different-size stock in order not to waste material, since the bottom hole is much smaller than the top hole.

TURN THE UPPER AND LOWER FINIALS

The ability to turn custom mandrels as needed is a worthwhile skill to develop. I used a scrap piece of oak to make a mandrel to turn the upper finial. The finial was already drilled for the kabob and that hole is used for the mounting on the mandrel (see Fig. 9). Unless the walls of your finial are thin or weak, you can cut the mandrel shaft size to be a snug press-fit. If it is too loose, recut another piece or wet the mandrel shaft before putting on the finial. Regardless of how you get there, the mandrel should securely hold the finial to be finish-cut, sanded, and finished appropriately. Care in creating the mandrel, including a shoulder to seat on for accuracy, allows the work to run true. Initially, the tail center can be used for the turning and then removed to allow full access for finish-cuts on the top, sanding, and finishing if desired. When running on a stub of a mandrel such as this, sharp tools and a light


Fig. 4

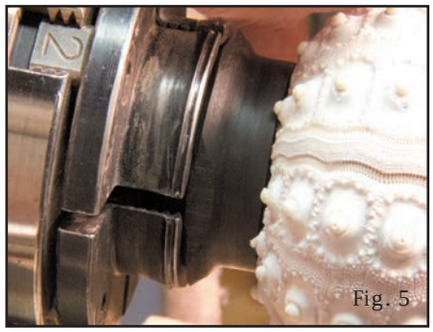


Fig. 5

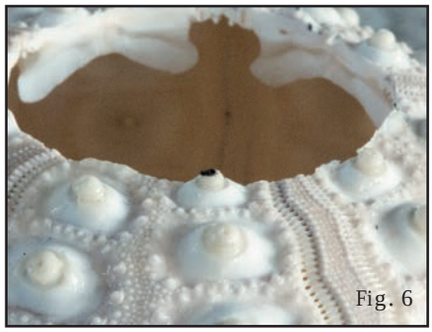


Fig. 6

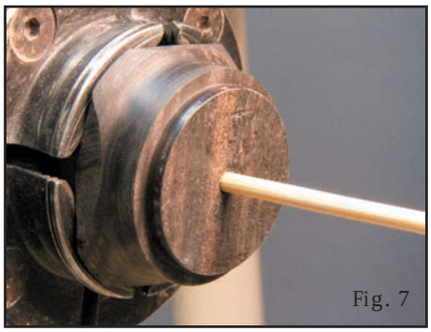
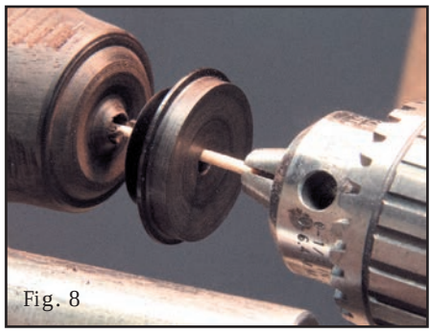


Fig. 7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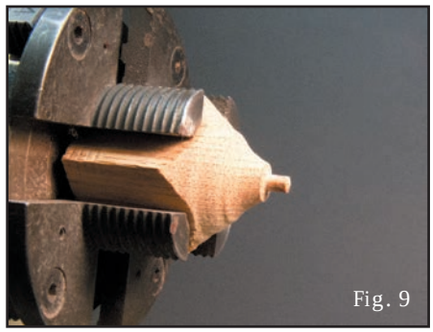


Fig. 9

touch are the keys and are good skills to develop regardless of your turning interests. At this point, it's time for a quick center drill and then drill for a hanging line (see Fig. 10).

LOWER FINIAL

Initially, the lower finial stock is turned round so that I can grasp it in the chuck and drill the "kabob" mounting hole on the true center. With that done, the finial is reversed and mounted for turning. I always turn the bottom finial with only a headstock mount—no tailstock in play. That allows it to run true and it has no incentive to flex because of tailstock compressive forces. However, traditional spindle cutting with that much unsupported length usually doesn't work very well, so carefully support the cut with your own "spindle steady." If you "squeeze" the work between the cutting edge and the finger spindle steady, there is no reason for it to flex—it only rotates between the two equal and opposing forces. It is less of a problem as you get closer to the headstock (see Fig. 11). Remember that this is a one-time mounting, so have sufficient stock exposed from the jaws to complete the process, because it is extremely difficult to reposition the material and have it run perfectly true on reclamping. Too much sticking out invites flexing and creates vibration issues; too little and repositioning is necessary and undesirable.

Work from the tailstock end toward the headstock, turning, sanding, and finishing in small sections as you go, thus leaving as much strength as you can for as long as you can. This is a one-way trip—get everything just the way you want it before moving on to the next section.

Work in small sections and work to completion while progressing toward the headstock (see Fig. 12). Though you can "free-form" finial creations, I find that having a plan in mind or on paper helps as you get closer to the headstock. Things to think about and plan for are the overall length, taper, features, and finished upper diameter where it meets the bottom.

READY FOR PARTING OFF

Remember, prior to this mounting, the blank was rounded to run true, mounted, and faced, and the kabob hole was drilled to a planned depth. I already know where the end of the finial must be to be properly assembled. Putting a protective shield around the turning allows for parting off without worrying about reaching over the lathe or having the piece damaged by falling. A small plastic tube held in place in a drill chuck or other contrivance in the tail center creates a "catcher's mitt." There is no hard contact between the finial and clear tube, so there is no need for the tailstock to rotate; the tube is only there to catch the finial and prevent damage when parted off (see Fig. 13). With the "catcher's mitt" in place, you can now focus on finishing up the details at the interface end of the finial. You can also support the tool properly because both hands are available to control the tool and make the separation. The finial is separated with a clean cut and is unscathed in the plastic tube (see Fig. 14). This is a fairly simple, yet powerful, concept. A simple plastic tube (cup or any vessel that can be held) is placed so that it surrounds the work as it is parted off and frees your hands (and your mind). Using this and the toothpick (or anything else) in a drill chuck to catch any piece with a hole when parting off has many applications in turning.

PUTTING THE PIECES TOGETHER

Take a look at all the parts of the ornament assembly: top finial, top finial base, shell (of any kind), bottom finial base,

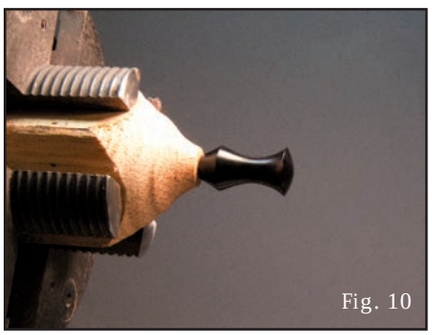


Fig. 10

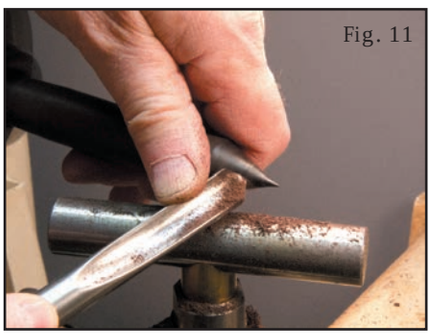
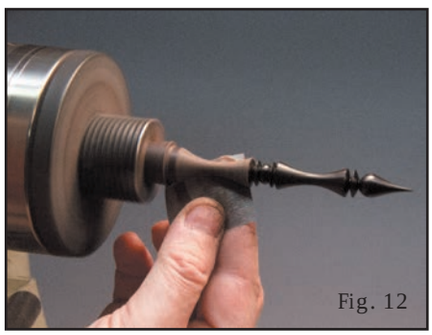


Fig. 11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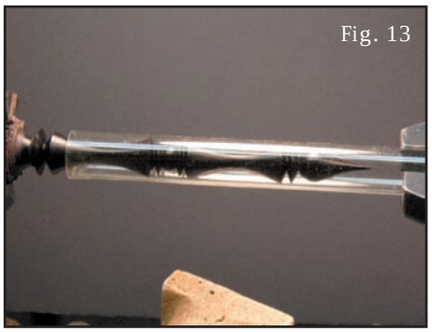


Fig. 13

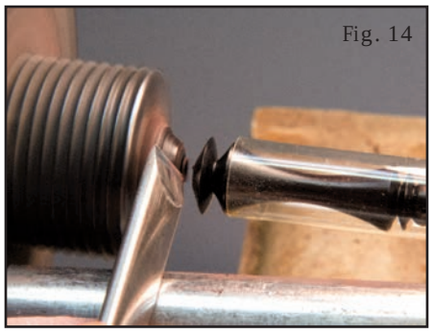


Fig. 14

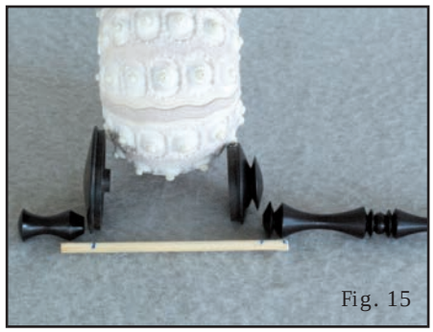


Fig. 15

and bottom finial (see Fig. 15). All the pieces will be held together with a piece of bamboo kabob skewer so that there is no wasted wood as there would be when turning little finials out of much larger-diameter stock.

There are only two glue joints that carry any load other than their own weight. The top finial to the kabob skewer glue joint carries the load of the entire ornament, while the bottom finial base glue joint to skewer carries only its own weight and the weight of the shell (see Fig. 16). You can see that the shell itself is glued to nothing and only sits on the shelf of the bottom finial fitting supporting its own weight, so there is nothing to cause problems with the shell other than external impact. You can see how component parts to mix and match can be made until you are content. Don't like the look of a piece? Make another. Before committing to glue, anything can be changed as you wish. Make a bagful of each of the various pieces and create ornaments on demand in a production-style mode.

THE HANGING PROCESS

Though many use threaded-in eyelets as part of the hanging system, I find them visually distracting and clunky looking, so I use fish line for the entire hanger system. Depending on the mass of your ornament, size the fish line appropriately; I use clear 2 lb. test line whenever I can, but if you need something stronger, use it.

There is a difference in size and clarity between 4 lb. and 2 lb. test lines. My goal is to have the hanging mechanism as invisible as possible and I'd like the fish line to disappear into the background, if at all possible, so that the ornament appears to float in space.

With the previously drilled finial hole sized large enough for the 2 lb. test line knot, cut off a length of line. After determining the desired loop size, tie a knot to help secure it in the hole when glued. A short length of line is left below the knot. I want the loose ends to bottom out in the hole, while the knot, a short way up from the bottom of the hole, is securely fastened in the column of glue. The knot acts as a mechanical obstruction to keep from pulling out of the glue bond in the hole. It never hurts to test-fit pieces; make sure that they fit as you wish before applying any glue. Sufficient loop? Knot deep enough in the hole? When you are content, it is time to make things permanent. The disadvantage to this method is the inability to change loop size or hanging material as can be done with a brass eye.

ASSEMBLY

I use epoxy for all the fastening on ornaments because I like the open time, the ability to fill gaps, and the long-term flexibility of the material. Bamboo kabob skewers are nearly impossible to cut cleanly, so I use this to my advantage—the raggedness can help fill gaps, as well as provide more face-grain surface for adhesion. Therefore, I intentionally crush both ends for the reasons mentioned. Originally, I used the parent finial material turned to a tenon and glued into the top. That developed into assembly with a dowel, then a thinner dowel, and now to kabob skewers. The kabob skewers (or something similar) are cheaper, smaller, and lighter, and are certainly strong enough for those turning beasty ornaments; they work well in all sizes of work.

With the ends crushed, why not use the kabob skewer as a mixing stick? It saves getting something else dirty and helps work the adhesive into all the fibers on the crushed end of the skewer. The kabob skewer is bottomed out in the top finial, twisted around to spread the glue, and set aside to cure. Care is taken to keep the area on the

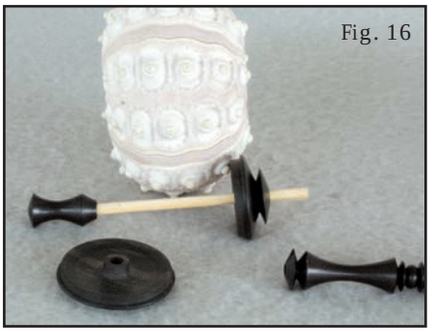


Fig. 16


Fig. 17


Fig. 18

bottom surface of the finial clean, because this will be a mating surface to the upper finial base. Good clean mating surfaces will help the visual appearance.

HIGH-TECH CURING FIXTURE

The weight of the finial keeps it seated while it cures, and by standing it straight up, there is little tendency for the kabob skewer not to remain centered should the hole be a bit large. The flared out fibers also help keep things centered (see Fig. 17). It is time to add the top finial base once the top finial has cured. Because the interface between the top finial and the top finial base is a visual interface, all adhesive is applied on the inside bottom. There is no load on this joint, so it only needs to be held in place.

FINAL CHECK

I do one final test-fit prior to the final glue-up to see if any interferences or kabob stick trimming needs to be done (see Fig. 18). Slide all the pieces together, being certain that the fits and finishes are as you wish. At this point, the only thing hard and fast is the hanging loop length and the currently assembled top finial. You could do the final dry-fit before this glue-up, but I like to get it done to maximize that curing time.

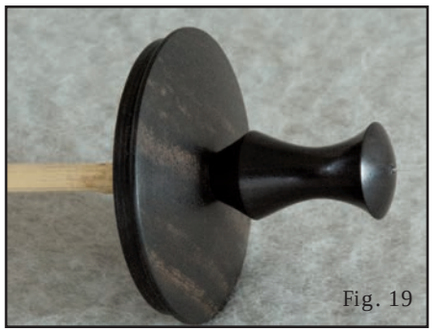


Fig. 19

The next piece to be assembled is the top finial base. This interface is a surface-to-surface mate; therefore, both surfaces should be clean and flat so that the seam is not noticeable. A slight bit of pressure on the joint while it is setting up isn't a bad idea and will help to keep the surfaces in intimate contact. Even though my frugalness has made me use two different pieces of wood to create this finial, it never hurts to line up the grain as much as possible while gluing. Attention to detail does make a difference (see Fig. 19).

My assembly fixture is a cardboard core from a copier paper roll. I also cut them down and use them for ornament shipping containers. Here is a short cutoff length with the spindle core in place. The shaft hole becomes a perfect device for positioning the ornament for the rest of the gluing and for letting it rest until cured (see Fig. 20).

Positioned with the upper surface of the top finial base resting on the paper roll hub hole, the shell is positioned and readied for gluing the bottom finial base in place. Glue is placed on the shaft below the pen mark so that it is all tracked inward, thus keeping the bottom interface surface clean. Since this glue joint only carries the weight of the shell, it doesn't need to have adhesive slathered all over; a good wetting on the shaft carried into the hole will work.

The bottom finial base is glued in place next. Once cured, the lower finial is glued in place. This glue joint carries only the weight of the lower finial—hopefully not much weight at all. Care is taken to put glue into the hole so that it is tracked deeper into the hole with none squeezing out and becoming apparent at the seam. I glue the two pieces of the bottom finial in two separate steps (see Fig. 21). You can do it simultaneously, but I find that I can focus better on the finial gluing when the lower finial base is permanently fixed. The hole in the finial is intentionally a bit deeper than the length of the kabob skewer so that it doesn't bottom out, and when glued, the lower finial can be lightly pressed to create an unnoticed seam. If you have slipped up in your planning and the skewer bottoms out, sand enough off the skewer before gluing on the finial.

When the lower finial has cured, the ornament is finished (see the main photo on page 50). The grain orientation between the top finial and top finial base was aligned when glued, as was the bottom finial to bottom finial base


Fig. 20


Fig. 21


Fig. 22

(no squeezing of the shell in this method). The urchin shell (or any other shell—big or small) just sits between the finial bases and is free to move as needed. The shell carries no load, has nothing glued to it, needs no strengthening or blown-in foam, and is loose enough so that any change in dimension in the wood doesn't stress it. Remember the grain orientation of the kabob skewer? There was virtually no movement in that direction and there was a slight clearance intentionally cut into the two bases to allow for movement.

OTHER SHELLS

This same concept of a "captured" shell works with a host of shells of different sizes. One of the mini-urchin shells is shown in Fig. 22 with no skewer used. The lower finial has a shelf for the shell to sit on. The lower finial itself has a thin tenon turned on the shaft that extends through the shell body. It is glued into a hole in the bottom of the top finial and the shell is only captured between these two finial shelves. The finial is a continuous piece of wood that happens to have a glue joint. There is no need to glue anything to the shell or worry about it breaking—other than impact damage.

REMOVABLE FINIALS

I don't usually have the need to remove finials, but sometimes it does make transport easier. In the past, my method has been to truncate the kabob skewer in the lower finial shell interface and insert a rare earth magnet. Rather than drilling a kabob skewer hole in the lower finial material prior to turning, I simply drill and glue in a short piece of finishing nail. The finial is turned in the same manner as the regular finial. At completion, the tenon size that fits into the interface is cut to length to bury into the interface with the nail already inserted. Now the magnetic force holds the lower finial in place. The cutoff length doesn't have to be perfect. It only needs to be close, but short, so that the two shoulders meet as you intended (see Fig. 23).

FINAL THOUGHTS

I think this method of ornament construction has a lot of advantages. It completely removes the shell from any load bearing; it doesn't require any "strengthening" stuff, such as foam or other material; and it completely eliminates any adhesive bonding to the shell material. The method allows for stress-free use of dissimilar materials. Every glue joint employs a face-grain to face-grain gluing. The reduction in wasted materials, ability to mix and match component pieces, and elimination of unsightly screw eyes and wire/yarn/string loops is certainly advantageous. The concept works on a variety of "captive" components, providing assemblies that aren't unduly stressed with moisture or temperature changes. Give it a try.

Fig. 23

SOURCES

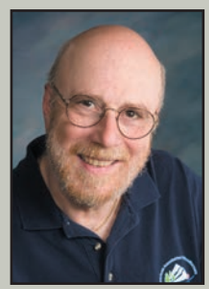
Sputnik Sea Urchin Shells
One source is Sea Shell World
4600 Cecile Drive
Kissimmee FL 34746
888-515-3103 (toll-free)–407-574-2887 (local)
www.seashellworld.com

Monofiliment Fishing Line
Local sporting goods store
Test for minimum visibility

Epoxy Adhesive
Local hardware store
Any quality brand
Five-minute two-part epoxy

Blackwood (or species of your choice)
Your favorite wood retailer
One source is Woodcraft
www.woodcraft.com

Kurt Hertzog



A professional woodturner, demonstrator, and teacher, Kurt Hertzog enjoys the continuum of woodturning, from making his own turning tools to photographing his finished turnings.

Kurt is a regular feature columnist for both *Woodturning Design* and *Woodturning* magazines, one of the five Council Members of the Pen Makers Guild, and a member of the Board of Directors of the American Association of Woodturners.

Kurt's work has been featured in the American Association of Woodturners "Rounding The Corners" Exhibit, and he has been published in *Woodturning Design, American Woodturner, Woodturning, Pen World,* and *Stylus* magazines. You can see his work on his website at www.kurthertzog.com.