



This addendum to the Fish article is a collection of alternative methods and enhancements.

Hollowing in slightly oversized chuck: If your sphere chuck is slightly oversized, so that the half fish blank goes completely into the chuck you can probably still use it. There are two potential problems: adjusting the blank in the chuck and getting a vacuum seal where the mouth is. To adjust the blank in the chuck, remove your tailstock center and use the flat face of the tailstock ram to push the half blank into the chuck as in Fig01.



Fig01: Aligning the half blank in the sphere chuck using the tailstock ram.

You can probably get a vacuum seal at the mouth (unless it's huge) by trapping a small piece of 2mm craft foam between the mouth area and the side of the chuck as in Fig02.



Fig02: Using craft foam to get a vacuum seal around the mouth.

Auto-centering waste block: It's not magic, but if you really have trouble centering, this could help. Make the waste block about 3 inches longer and cross cut it to length on the table saw so you have a flat perpendicular end. When mounting on the lathe, grip the waste block between the sides of the jaws as in Fig03. This should automatically center the waste block from side to side. Fig04 shows the longer nub required.



Fig03: Using a longer waste block and the sides of the jaws to automatically center the waste block.

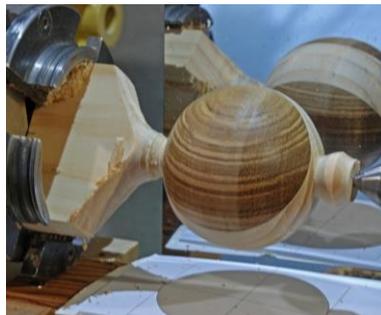


Fig04: The longer nub required.

Eye inserts: You can make the eyes of the fish more expressive (or more anthropomorphic) by using contrasting wood inserts. To make the eyes appear to look in a specific direction the darker wood representing the pupil needs to be off center. To do this with dowel stock, first size the dowel precisely. Mount a short section of the dowel (use a short section, being greedy on length leads to all sort of problems) in a chuck. Bevel the end of the dowel as in Fig05. Remove your tailstock center. Turn on the lathe at a moderate speed and use the tailstock ram to push a drill sizing plate down the dowel as in Fig06. As long as you don't get greedy and skip holes you can continue this process to make the dowel any size you like. Using the tailstock ram keeps the drill sizing plate perpendicular leading to more consistent size. The drill sizing plate also compresses the wood fibers somewhat. This is a feature, not a bug—as long as you put the glue in the hole, not on the dowel, the moisture of the glue will re-expand the wood fibers locking the dowel in place.



Fig05: Beveling the dowel end to make it easier to start the sizing plate.



Fig06: Sizing the dowel by advancing the drill sizing plate perpendicularly down the dowel.

Size pupil stock the same way. To drill for the pupil off center you can use a shim made of PVC pipe. Cut the pipe in half. You may need to bevel the edges on a sander. Mount the dowel and shim in a 4-jawed chuck with #1 jaws as in Fig07. The shim should be centered on a jaw. Use a drill mounted in a drill chuck to drill an eccentric hole for the pupil.



Fig07: Drilling an eccentric pupil hole using a shim and a 4-jawed chuck.

If you want to start from square stock, or have more control over how eccentric the pupil is, try this technique instead. Start by mounting a short section of stock between centers and turning a 1" or so long tenon suitable for gripping in #1 jaws as in Fig08. Determine how eccentric you want the pupil to be. You can calculate the maximum shift of center and still have the pupil fully contained. If D_1 is the eye diameter, and D_2 is the pupil diameter, then the maximum

you can shift the center point is $1/2(D1-D2)$. Mark the center shift on both ends of the eye stock. Be sure to shift in the same directions as both ends. Turn a new tenon about $1/2"$ long as in Fig09.

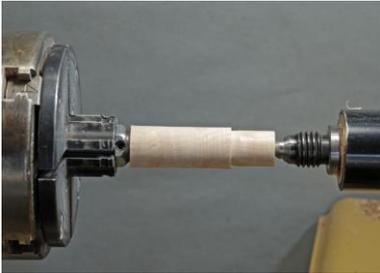


Fig08: Turning the first tenon.

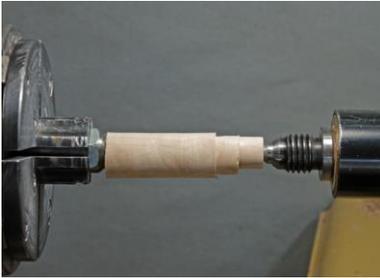


Fig09: Turning an eccentric tenon.

Now mount the eye stock using the eccentric tenon as in Fig10 and drill for the pupil. Glue in your pupil stock. After the glue has cured mount the eye stock using the axial tenon and turn the eye to size.



Fig10: Drilling for the eccentric pupil.

Mount your fish body in the sphere chuck centered on where you want the eye to be. Drill an eye socket with a Forstner bit that matches the eye stock diameter as in Fig11. To mount the eye stock first draw a line along the eye stock at the maximum eccentricity of the pupil. Mark on the sphere the intended orientation of the pupil. Put some wood glue on the walls of the eye socket (a bamboo skewer works nicely) and insert the eye stock at the intended orientation as in Fig12.



Fig11: Drilling the eye socket.



Fig12: Gluing in the eye stock.

Give the glue a chance to cure and then saw (or turn) the eye stock to length as in Fig13. Then turn the eye to the shape you want as in Fig14.



Fig13: After trimming the eye stock to length.



Fig14: Turning the eye.

Making a rounder mouth: If you don't like the mouth pointed at top and bottom it's possible to get a rounder looking mouth by turning two half-mouths centered on the temporary joints with the waste block. Mark the centers for the holes on the temporary joint line. Try to get them exactly opposite one another. You'll notice in the pictures that I didn't do a terrific job of this. By prioritizing the mouth at glue up the mouth looks okay, but the locations of the gills and eyes are off a bit. As the mouths need to be the same size to line up, start by drilling a $1/2"$ or so deep hole with a Forstner bit. Round over the edges, and purse and undercut the lips if desired as in Fig15. Then turn another half-mouth as identical as possible as in Fig16.



Fig15: The first half mouth



Fig16: After adding the second half-mouth.

Then hollow and assemble the fish body as before. The resulting mouth is shown in Fig17.



Fig17: Completed fish with rounded mouth.

If you want to add lipstick to the fish, first join two $1"$ long pieces of padouk or other red wood together with a temporary joint. Mount centered on the joint and turn to a cylinder. Clamp the primary wood that makes up the fish body blank together (before mounting to the waste block) and drill a hole the diameter of the padouk cylinder about an inch deep. Split the temporary joint and glue the half cylinders into the half holes in the blank. Then glue up into a waste block as in Fig17-1.



Fig17-1: A blank for fish with red lips.

Turn the half mouths as before. The result is shown in Fig17-2.



Fig17-2: After turning the pair of half mouths with red lips.

After assembly the mouth will look as in Fig17-3.



Fig17-3: Detail of a fish with red lips.

Attaching fins with dowels: If you use mini-dowels to attach the fins you can modify the profile of the fins to match the fish body rather than sanding flats. It's also a stronger joint. Bamboo skewers make a nice source for mini-dowels but they tend to be even less uniform in size than wood dowels, so plan on sizing them. You can do this the same way as sizing the eye stock. Chuck up the skewer in a chuck with the pointed end facing out and remove the center from your tailstock. Turn on the lathe at a moderate speed and use the tailstock ram to push a drill sizing gauge down the skewer, using consecutively smaller holes until it's the size you want as in Fig18.



Fig18: Sizing a bamboo skewer to make mini-dowels.

Cut out fins in the shape that you want, with an arc at the junction to match the fish body. Fins that attach to the body on the center line (dorsal, ventral, tail) should have an arc that matches the diameter of the fish body from edge to edge. Fins that attach on the sides (pectoral) should have an arc that matches the diameter of the original sphere.

For fins that attach to the center line, before sanding the fin to shape, clamp it in a vise

with the arc facing up. Use a V-shaped tool to carve or abrade a V-groove along the arc as in Fig19. Then drill a hole for the dowel in the middle of the fin arc as in Fig20. The V-groove should center your drill without using an awl first.



Fig19: After carving a V-groove along the arc of the fin.



Fig20: After drilling a hole for the dowel.

For pectoral fins, clamp the fin arc side up in the vise and carve a shallow concave groove as in Fig21. Ideally the groove would match the diameter of the body, but it's better to have the sides on the body and the middle off than the other way around. Then drill a dowel hole in the middle of the arc.



Fig21: After carving a shallow concave groove.

Hold the fins in turn up on the fish body and pencil mark the dowel location. For side fins make a starter dimple for the dowel drill with an awl. For fins on the center line, it's easier to start the drill if you make a small notch across body center line with a triangular file as in Fig22. Then your awl won't tend to slip off the center line into your hand. Drill dowel holes for all the fins.



Fig22: Notching the fish to make it easier to start the dowel drill with an awl.

Cut dowels to length (they'll go clear through the fish body so you don't have to be all that precise). Put a piece of tape on your work surface, and a few drops of CA glue on the tape as in Fig23. Dip one end of a dowel in the glue and insert it in a fin. Repeat for the other fins. To mount the fins, get some thick CA glue and all your doweled fins as in Fig24. Put some of the thick CA on the dowel and in the groove of a fin then mount the fin. Repeat for the other fins.



Fig23: The set-up for inserting dowels into fins.



Fig24: The set-up for mounting the fins.

Turned fins: If you wish you can turn the fins to shape instead of sawing and sanding. Follow the procedure used to make earrings (<http://www.davidreedsmith.com/articles/earrings/earrings.htm>). Fig25 shows a turned pair of pectoral fins. Fig26 shows a turned tail fin. Half of the other side of the tail fin made a dorsal fin. Alternately you could glue the opposite sides together so that the tail fin is contoured on both sides.

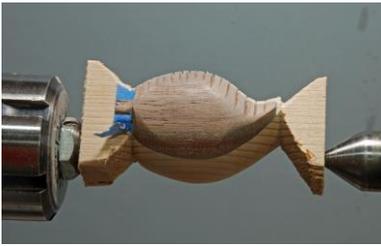


Fig25: Turned pectoral fins.



Fig26: Turned tail fin.