

Building an Unfeathered Paddle with a Wood Shaft and Carbon Fiber Blades

by Duane Strosaker

Choosing the Wood



Two 3/4" pieces of Sitka spruce laminated with epoxy for an unfeathered one-piece paddle.

For the wood shaft, Sitka spruce is best. It is light and strong, but it is also expensive and hard to find. Look for knot free wood with vertical grain. Also check that the grain runs fairly straight the length of the board. Position the vertical grain perpendicular to the paddle blades for strength.

I squarely plane my shafts down to 1 3/8" wide (front to back) and 1 3/16" thick (top to bottom).

Carving the Shaft



Laminating a piece of wood to the shaft in the blade area while it is still square allows for a deep curve where the blade is epoxied on.



Blade curve and blade templates made of thin plywood. Note the guidelines.

I like my blade to curve to a depth 1/4" short of reaching the opposite side of the shaft to eliminate flutter and coming back 1/8" short of reaching the center of the shaft at the tip to provide more power at the beginning of the forward stroke. To keep the blade area of the shaft strong but still light, I keep it 1/2" thick at the deepest part of the curve, which is halfway down the length of the blade.



The curved section cut out of the shaft where the blade will be epoxied on.

Use a bandsaw or jigsaw to cut out the blade curve. For final trimming down to the lines, I like to use a rasp and then scrape with a drawknife. Try to keep the blade curve square to the shaft.



The shaft marked for planning to round it.

For sort of an egg shape shaft that provides good indexing and is comfortable to push and pull, I mark the rounding lines $1/4$ " from the edges on the pushing side, $5/16$ " on the top and bottom of the pushing side, $7/16$ " on the top and bottom of the pulling side, and $3/8$ " on the pulling side



The four corners planed down.

After the four corners are planed down, plane down the newly formed eight corners evenly by carefully eyeballing it.



The shaft is rounded and sanded smooth.

The rounding of the shaft is continued with 60 grit sandpaper on a 12" long block of wood. Fine tuning of the rounding is done with 100 grit sandpaper folded and held in a curved position in the hand.



Hardening the shaft with the side of a screw driver to make it more resistant to denting.

Wet the shaft to raise the grain, and after it dries, sand the raised grain smooth with 220 grit sandpaper. Harden the shaft to make it more dent resistant by rubbing it hard with the side of a screw driver that has a round shaft. Use only one hand on the screw driver, because two hands is too much pressure. Very lightly sand again with 220 grit.

Seal the shaft with epoxy before attaching the blades. Apply one coat of epoxy, let it cure for at least 24 hours, sand smooth with 220 grit, and apply a second coat. Sealing the blade section of the shaft isn't necessary because it will be covered with carbon fiber.



Squaring the blade curve with levels.

Slide a level along the length of the blade curve to make a final check that it is square with the shaft. I like to scrape with a drawknife to make corrections.

Building and Attaching the Blades



The blade lay-up is wetted out with epoxy resin.

Wet out the lay-up for the blades with epoxy on wax paper on a flat piece of plywood. The lay-up at this point in the building process is two layers of 6-ounce carbon fiber. Remove the excess epoxy with a squeegee. After the epoxy has cured eight hours, place the blade template over each lay-up, and trace around the template with a nail to scratch a mark. Then cut the lay-up with scissors about 1/4" outside of the mark. Also, using a pen to mark the centerline on the smooth side of the blades helps with lining them up on the shaft.



Attaching the blade to the shaft.

While the blades are still flexible (before the epoxy has cured more than 12 hours), attach them rough side down to the shaft with thickened epoxy. Some weights or clamps are necessary to bend the blades to match the curved sections of the shaft. Make sure the blades are lined up square and even with the shaft. Using a level helps.



The back side of a blade after being epoxied to the shaft.

A fillet of thickened epoxy is added along the edge between the blade and shaft so the next lay-up layers will turn smoothly from the shaft to the blade.



The back of the blade after the tip reinforcement and a layer of carbon fiber have been added.

On the back side of the blades, reinforce the tips with a three-inch-wide carbon fiber strip. Then wet out another layer of carbon fiber over the entire back side of the blades. Use a squeegee to remove the excess epoxy. Add two coats of epoxy to the back of the blades to fill the weave and sand them smooth. Use 60 grit sand paper to trim down the edge of the blades to the mark scratched with the nail.



The wide blade is my Redondo Ridgeback Inshore design and the narrow blade is my Redondo Ridgeback Offshore design.

You can paint or varnish the blades and shaft, but I leave them unfinished. Either way, the wood shaft should be sealed with two coats of epoxy. For a perfect grip, lightly wet sand the shaft with 400 grit sandpaper, followed up with wet "0" synthetic steel wool.

As I final touch, I cover the transition between the blades and shaft (where the carbon fiber meets wood) with a coat of slightly thickened epoxy colored black with graphite powder. Warning: I've heard that a finish should not be applied over graphite powder.

Using the above methods, my paddles weigh around 32 ounces and are very strong.

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