OPTI DN -- The Plank

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The plank is the suspension system for the boat. It needs to flex in a gust and flex when the boat hits bumps. The plank should be stiff enough to keep from hitting the ice when the boat is sheeted tight in a high wind. As a rule of thumb, the plank should flex 1-3/4 inches (45 mm) under the weight of the skipper.

Plank flex is measured using an adjustable square or ruler. Measure the height of the plank from the floor in the middle. Stand on the plank and measure the height again. The difference should be at least 1-1/2 inches (38 mm) and not more than 2 inches (51 mm). The following show three examples of the plank thickness, using different thicknesses and woods. The wood and the number of layers make a big difference.

Table 1. Three planks, all seven inches (178 mm) wide.

Skipper Weight Lbs (Kg)	**Wood layers (in inches) ¼ inch = 6 mm**	**Deflection In (mm)**
70 (31.7)	ash ¼ inch; pine ¼ inch; oak ¼ (2/3 of plank width)	1 – 5/8 (41)
90 (41)	ash ¼, pine 1/2	1 – 7/8 (48)
110 (50)	ash ¼, pine ½, 1/8 ash (1- ½ wide) and 1/8 pine rest of width	1 – 5/8 (41)

If the plank is too soft, another thin layer of wood is required. If the plank is too stiff, then the width can be reduced to as little as 5 -1/2 inches (140 mm), the front and back can be carved into an airfoil, or both.

I like three layer planks and here is how I make them. Opti planks are 2 meters long, or 6 feet – 6.6 inches.

The top layer should be a strong wood. Ash or birch or other hard woods are best for this layer. Pine will work as will douglas fir. If you can find a very straight piece and a millwright to re-saw it, you can get him to cut it into one or two boards 7 inches wide and ¼ inch thick. I can never find boards with straight enough grain, so I buy a good board at least one inch thick and long enough. I then use a table saw and cut it carefully into 5/16 inch (8 mm) thick strips as wide as the board is thick. I will tell you how to edge-glue it in a minute. After edge gluing, the piece is planed to final thickness.

The middle layer and sometimes the bottom layer can be a softer wood, such as pine, poplar or white fir. You can find these at any lumber store. I found 5-1/2 by ¼ pine in the trim section of Home Depot. If you are heavier, then using a hard wood on the

bottom is a good idea. The hard woods on the top and bottom can make a thinner plank. Soft woods including pine mean the plank should be a little thicker to get the same stiffness.

If any boards are not wide enough, then you must edge glue them to make the right width boards. Put a piece of wax paper down on your work table so you don't glue anything to the table. Lay out the pieces or strips to make the full sized board. I like to have an inch or so (30 mm) extra length at this stage. Pull the pieces together and put filament strapping tape on one side to hold them tight. I like to have a little tape hanging over the ends and fold it so I can get it off later. You should use a piece near each end and another piece every six inches or so.

Using the tape like a hinge, I fold the first board over so the touching-edges are visible. I then paint the edges with epoxy, then I repeat with the next one. After I have them all, before the epoxy sets, I paint the edges again with a thick coat epoxy filled to mayonnaise consistency with a medium density (or high density, if no medium is available) filler.

I then lay the board flat on the table (taped side up) and lay wax paper on top. Short scrap pieces of wood are put on top and then clamps or weights put on the scrap. Gallon jugs filled with water make great weights. So do zip-lock bags of sand, dumbbell weights. At least four clamps which will hold the plank to the table will be needed later. If you don't have them, 2x4 and long bolts can work.

A word about glue: I use West ® Brand epoxy from the Gougeon Brothers. Epoxy is expensive, but it is waterproof, fills gaps very well, and does not require much clamping pressure or as perfect a fit. Other glues can work, but must be done more carefully to be strong. Epoxy is a two part system which is mixed, and starts reacting. For a while the glue is spreadable, then it gets warm and turns into hard plastic. The epoxy parts are designed by a chemist too stay soft for a certain "working time." For some pieces, a longer working time is a good idea. If your shop is cool or cold, the working time can be extended. Heat speeds thing up. Everything needs to be in place when the epoxy cooks – off. Fillers include milled polyester fiber (flocking), cabosil or silica, or any of the medium or heavy fillers sold by WEST ® or other boat supply place.

If you have two or three pieces to edge glue, and you can work fast, you can stack them on top of each other to cure. Let them cure over night. If you are in a hurry, three or so hours in a warm room is usually good enough for the next step.

Now you are ready to glue the strips together to make a curved plank. It is important to not warp your plank as you build it, so use a level to make sure the pieces are even before you start!

Make a building jig by cutting eight 10 inch pieces of 2x4 on a table saw. Two should be 2-1/4 inches wide and two should be 1-1/2 inch wide. Lay out your table and mark two lines 10 inches from the center of the plank layout, two more 12 inches from the ends of the plank, and two at the ends of the plank. Sit the two bigger blocks next to the middle

lines and make sure their tops are level. The two smaller blocks go on the other lines. Use a hot glue gun to hold the blocks in place. Screws work, but the hot glue gun is easier.

Put wax paper on the blocks and by the end lines so nothing gets glued to the jig. Trim the boards to the right length plus at least ½ inch. If one or two are a little too wide, you can fix that later. Get your weights and clamps ready. Think about how you will hold the edges together. Spring clamps, electric tape, shrink wrap, and small c-clamps all work. Or you can make clamps with scrap and some bolts.

Lay the bottom board on the jig. Paint the top with epoxy. Paint the bottom of the middle layer with epoxy. Before they cure, cover one of these painted sides with a thick layer of filled epoxy. If you have one, use a glue-squeegee to make little ridges of the filled epoxy. Mix in small batches and use lots! Lay these two boards together. Paint the top of the middle layer and the bottom of the top layer with plain epoxy, then spread filled epoxy on one side. Stack the third layer on top. Now clamp the ends of the boards to the table. Add clamps or weights over the blocks. Use spring clamps, or small clamps or tape to hold the edges together and straight. Let cure over night.

Trim the ends to the correct length. Lay the plank on edge and hand plane until there is a nice edge. Check stiffness. If the plank is too stiff, use the hand plane to round out the front and back edges. Keep working until the stiffness is right.

You probably will find some gaps in the edges. Use epoxy with a little thickener to fill the gaps.

Put a coat of epoxy and/or three coats of poly urethane or paint on the plank to finish. Now it is ready for hardware.