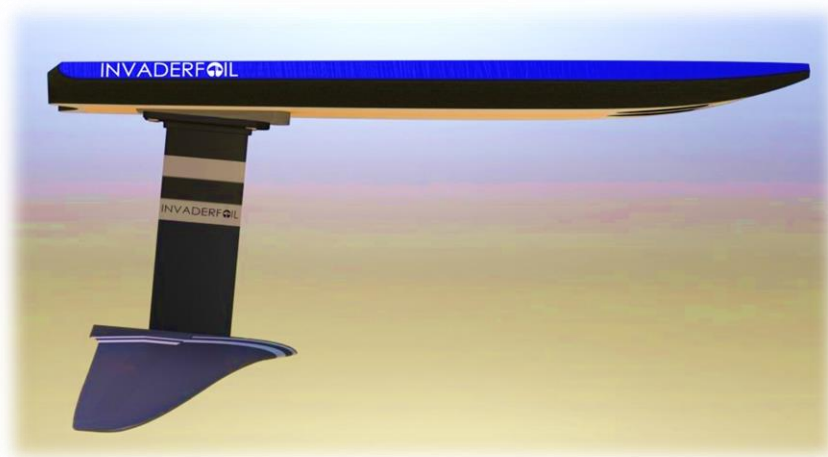


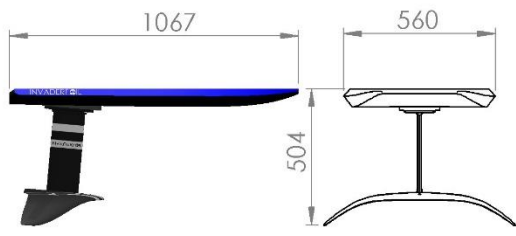
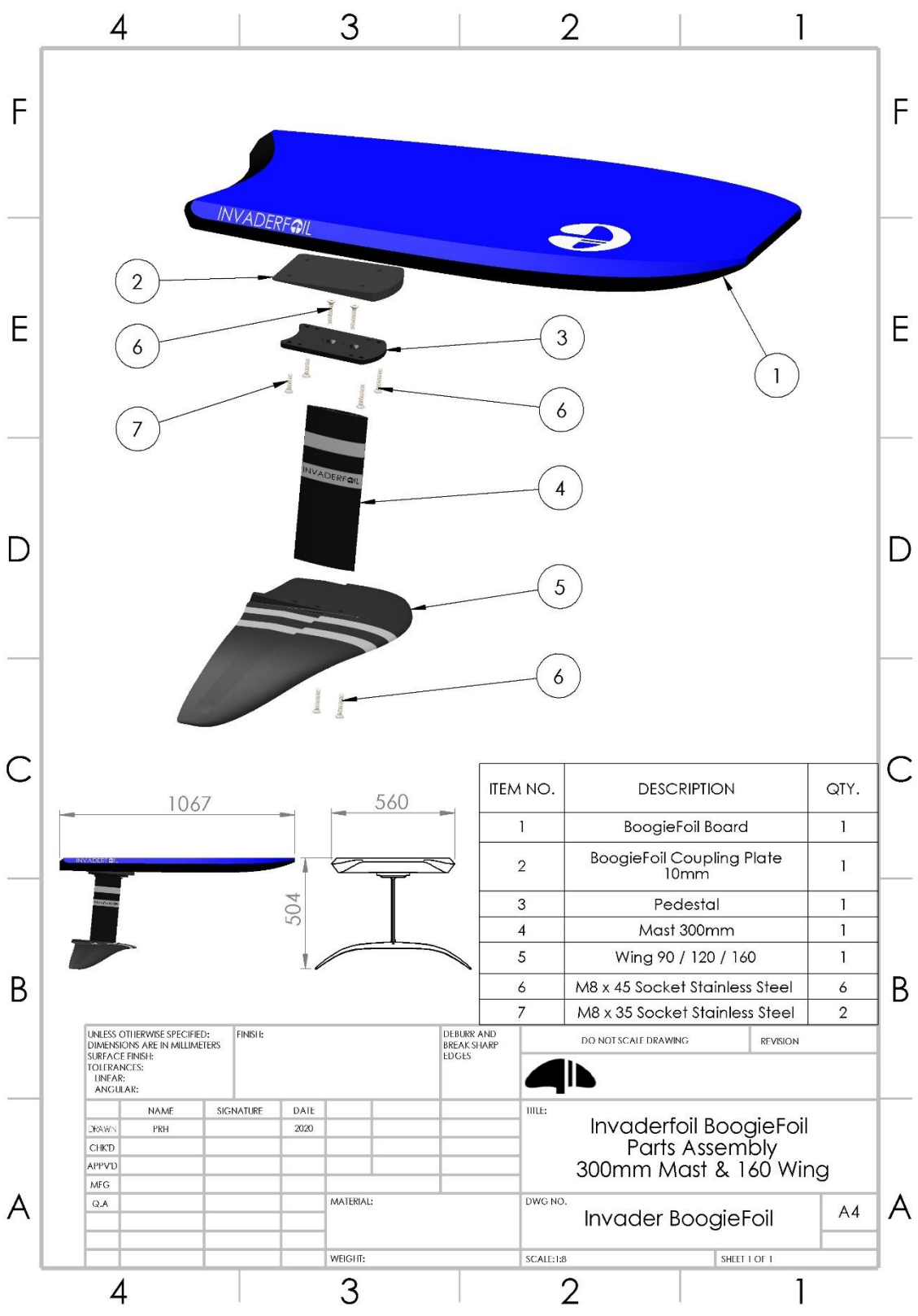
# INVADERFOIL

## DIY BOOGIEFOIL BOARD

WEEKEND PROJECTS – HOW TO MAKE A BOOGIEFOIL BOARD



INVADER HYDROFOILS INSTRUCTIONALS



ITEM NO.	DESCRIPTION	QTY.
1	BoogieFoil Board	1
2	BoogieFoil Coupling Plate 10mm	1
3	Pedestal	1
4	Mast 300mm	1
5	Wing 90 / 120 / 160	1
6	M8 x 45 Socket Stainless Steel	6
7	M8 x 35 Socket Stainless Steel	2

UNLESS OTHERWISE SPECIFIED: DIMENSIONS ARE IN MILLIMETERS SURFACE FINISH: TOLERANCES: LINEAR: ANGULAR:				FINISH:	DEBURR AND BREAK SHARP EDGES
DESIGN	NAME	SIGNATURE	DATE		
CHK'D	PRH		2020		
APP'VD					
MFG					
Q.A					
				MATERIAL:	
				WEIGHT:	

DO NOT SCALE DRAWING	REVISION
	
TITLE: <b>Invaderfoil BoogieFoil            Parts Assembly            300mm Mast &amp; 160 Wing</b>	
DWG NO. <b>Invader BoogieFoil</b>	A4
SCALE: 1:8	SHEET 1 OF 1

# How to Make a Boogie Foil Board for Your Invader Hydrofoil

## What Materials You Will Need

1. A normal cheap Polyethylene Bodyboard, even an old creased one will work perfectly. Make sure it doesn't have stringers or reinforcements in the core as you will likely be cutting through these.
2. A 220mm wide x 20mm thick x approx 750mm long wood plank. We recommend Paulownia or Obeche wood. Something that is strong but light and soft enough to drill through.
3. Thickening agent to mix into the epoxy, like Cabosil / fumed silica.
4. Non-powdered nitrile gloves.
5. Spa bond 340LV fast cure marine / aeronautical grade two part epoxy for the inserts.
6. Marine grade liquid penetrating 2 part epoxy. I use Flowcrete Ivory 340/5/LV with slow hardener.



**Tip:** Do not use the supermarket 2 part epoxy unless it states marine grade... it degrades with time in the water and eventually crumbles, letting your inserts pop out of the board.

**Tip:** Try to use a Polyethylene (PE) foam core bodyboard. EVA is possible but challenging to cut out without an electronic device like a router. The photos of the blue bodyboard are EVA and I had to re-



sharpen my knife numerous times to remove the foam.

The PE core is the easiest to slice out and bend without damaging the rest of the foam core. PP and EPS are not good options at all due to their texture.

7. 38mm cookie cutter drill bit.



8. Hand drill and Dremel with tiny drill bits.

9. 2 small self-tapping wood screws.



10. 4 x stainless steel pronged T nuts.

11. 4 x 35mm M8 stainless steel bolts. Make sure the bolts are longer if you use a thicker jig. Your plank is 20mm thick and the vinyl is around 5mm.



12. Liquid quick release.



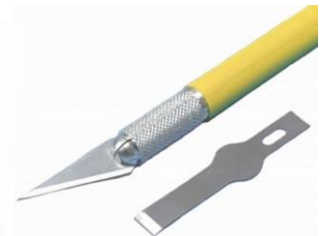
13. Modelling clay.

14. Small stiff sheet of plastic or vinyl (an off cut of a vinyl flooring plank works well). Something approximating 5mm thick is a decent stiffness.

15. Plastic squeegee (bought or made from a yoghurt tub lid).



16. Plastic measure cups and spoons.



17. Craft knife/scalpel.

18. Sharp knife like a carving knife or a router to remove a portion of the body board foam.



19. Wooden tongue depressors.



20. Paper cups or old yoghurt tubs.

21. A roll of paper towel.
22. Acetone.
23. Rubbing alcohol/surgical spirits.
24. Respiratory mask with organic vapor filter.
25. Your home made jig to ensure the inserts remain straight and in alignment whilst the epoxy cures.
26. Cotton wool.
27. Plastic to cover your work surface.



## Method

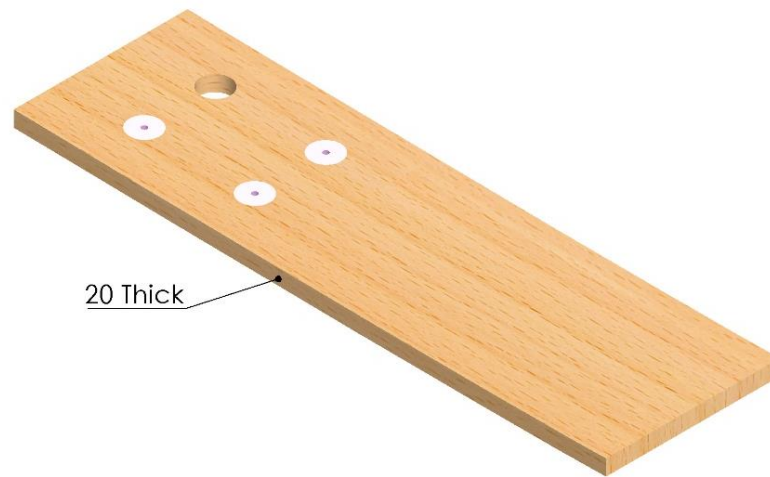
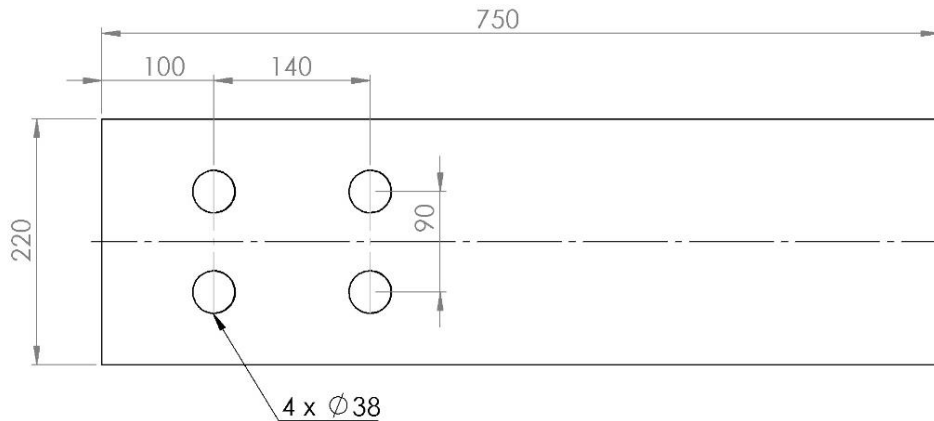
### Wood selection

Paulownia is usually used to make wooden Paipo Belly Boards and Alaia Surfboards. It is lightweight and strong and stands up well to marine conditions, however if you are unable to source it, as I was, you can use Obeche wood. It's not as light or as easy to drill out, but it is still soft enough to work with without making the job too strenuous. Before purchasing the timber, check with your supplier what marine friendly options they have.

### Wood Work and Inserts

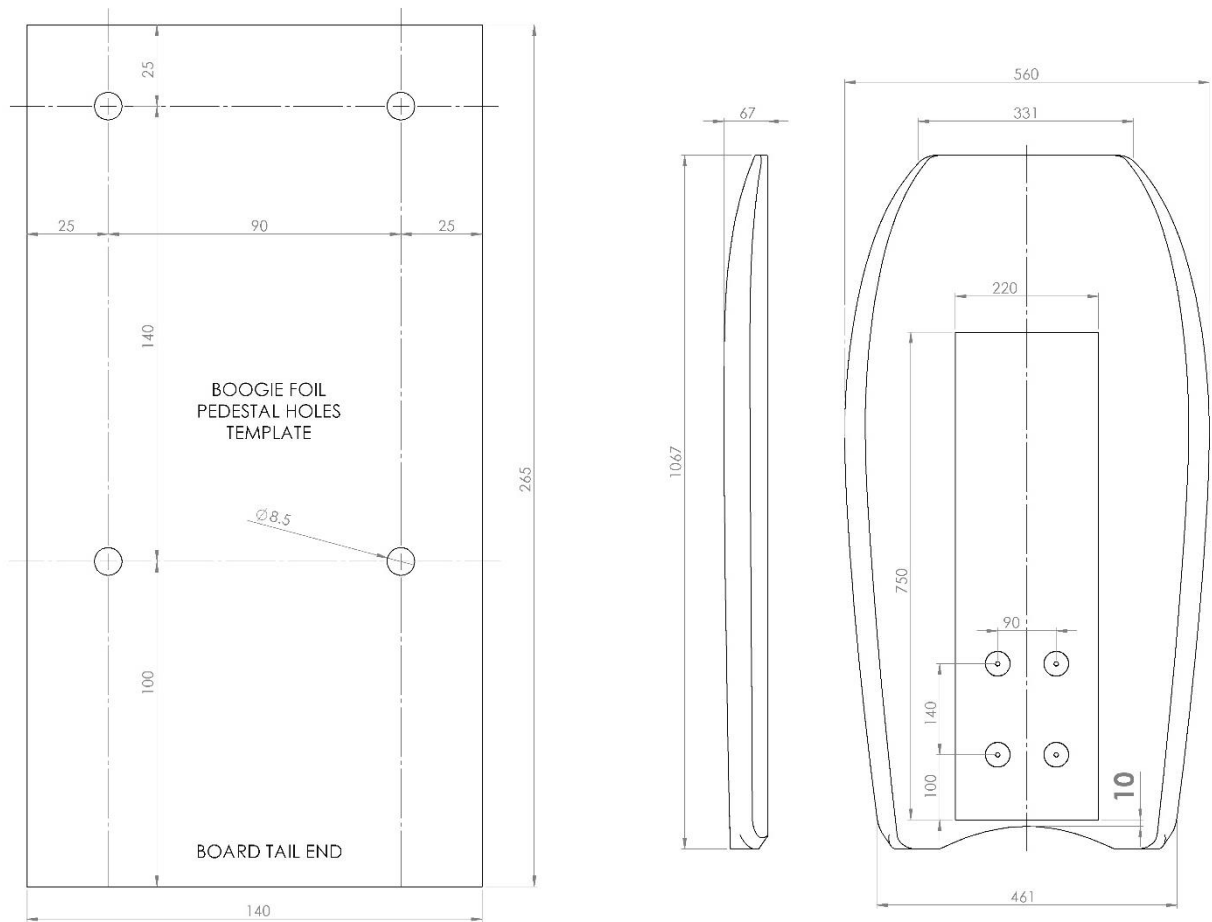
Your wooden reinforcement plank does not need to run the full length of the bodyboard, but it is good to have it long enough to prevent your body board from bending or creasing at the front. I added an extra piece to extend my insert on my proto type but one length is best. I found the nose of the board "bounced" too much whilst on foil, making steering and direction control a bit tricky.

1. Depending on the size of your board (for adults or kids) adjust the length accordingly. There is no exact science here so a good guide is  $\frac{3}{4}$  the length of the board.



2. When selecting your wood, you may be lucky enough to get an off cut from your hardware store with some left overs they may have. If they have ripped the plank and cut it to your desired length, you do not need to sand it or shape it.
3. Using the pedestal placement dimensions drawn below, mark out your insert hole positions and mark the crosshairs on your plank.
4. Line the hole positions up at the one end of the plank and mark your 4 cookie cutter holes positions.
5. The pedestal holes template below is the same one you will use for your jig.

- Place your plank on a sturdy trestle or elevate it off your work surface to avoid drilling into your work bench.



- Using your 38mm cookie cutter drill bit, drill out the 4 marked holes in your plank.

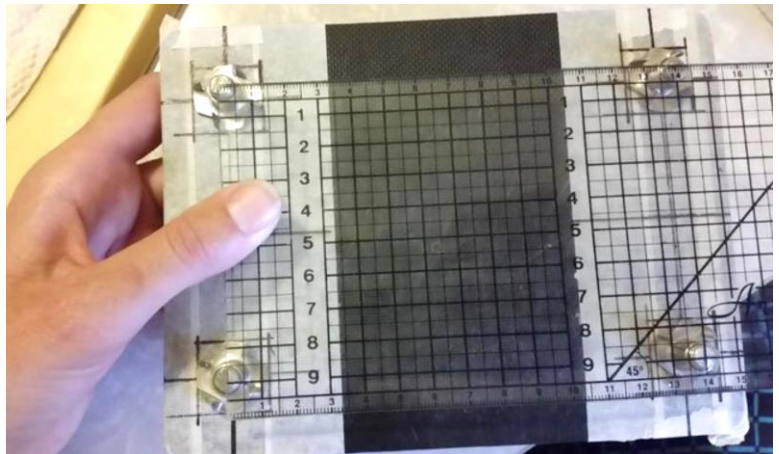
## Making your jig

- Get an off cut of a vinyl floor tile/plank and mark out your pedestal holes. The vinyl should be a similar size to your template dimensions above. If your hardware or flooring shop can cut the tile to the template size that would be ideal, but you can also use a jigsaw or a hacksaw to make it the correct size.
- Using the template dimensions, mark off the drill hole positions. Mark the cross hairs on the jig too, which you will then use to line up with the cross hairs on your plank.
- Place masking tape or white labels over the area where the holes will go. Extend the tape to the edges of your vinyl tile. Mark the holes with large cross hairs so your drill holes are precise. Make the crosshairs run from end to end and side to side. Mark the cross hair lines on the edges of the vinyl too.



11. Drill out your 4 holes with an 8mm drill bit. They must be exact so use a pilot hole with a smaller bit if you need to. (Remember to clamp the vinyl down so your drill doesn't get stuck).
12. Now tape over the entire area with clear, wide packaging tape so that your jig won't stick to the epoxy and that your cross hairs are covered but visible. Cut through the taped over holes with a scalpel (you don't have to make it perfect, just pop it through in a cross so your bolts can slip through easily).

13. Place your 35mm bolts' thread in the quick release agent and let them dry on a paper towel. Do **NOT** put the T nuts in the quick release.



14. When the bolts are dry put washers on each of them and slip them through the holes and screw your 4 T nuts (prongs pointing at you) onto the bolts at the centre of each crosshair.

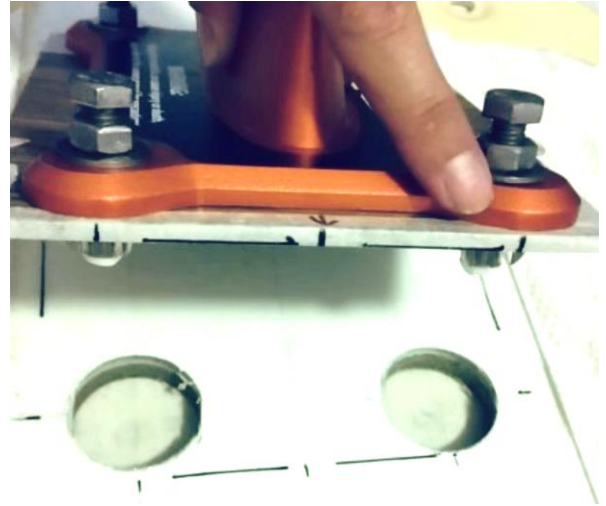
15. Measure the distance between all your bolts to be 100% sure you have 90mm wide x 140mm long. This cannot be slightly off so take your time to be sure the T nuts cannot move.

16. Take your plank and place your vinyl jig over the holes and line up the cross hairs on your board with those on your jig. If your jig is bigger than the original board holes



template you will need to draw lines on the board to extend the points marked out during your cookie cutter preparation.

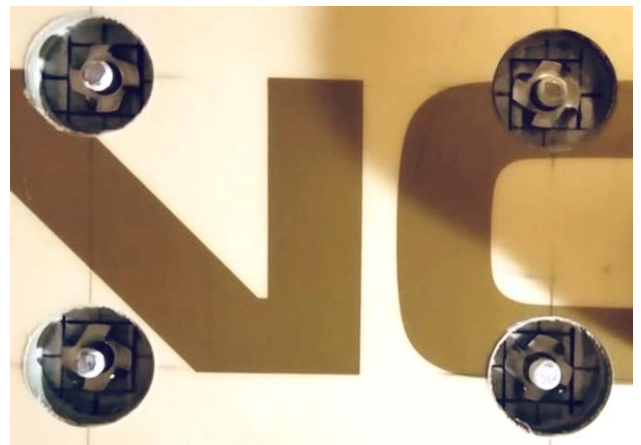
17. The photos I have used here are from a skim board conversion but the procedure is identical to place the inserts. You will see that I originally used the vinyl jig with the pedestal, but you only need the vinyl if it is stiff. I also added nuts to alter the length of my bolts so they ended flush with the board rather than poking out (it gives a level finish which is not too important for the body board).



18. Place the jig onto the plank and line up all your crosshairs. Mark the lines on the board at the exact line up points clearly in pencil or pen. You can remove all other pencil marks off the plank if you wish but this side will be face down into the boogie board. Make sure you keep the points marked to line up your jig.

19. Secure your jig to the plank with 2 small self-tapping screws into the wood. You can drill tiny pilot holes with a Dremel.

20. Now with the jig fixed to your plank, flip it over and double check the T nuts each sit in the centre of their respective hole. Your bolts should either be flush with the plank or longer... not shorter. Flush is best for a level finish as you can level the epoxy by skimming over the tip of each bolt.



21. If you are happy, place the plank on a flat surface so you can fill the holes.

22. Mix your Spabond or thick 2 part epoxy (marine grade) with a tongue depressor. I like Spabond as the color changes when the two parts are mixed properly making it easier to know when it's fully blended.

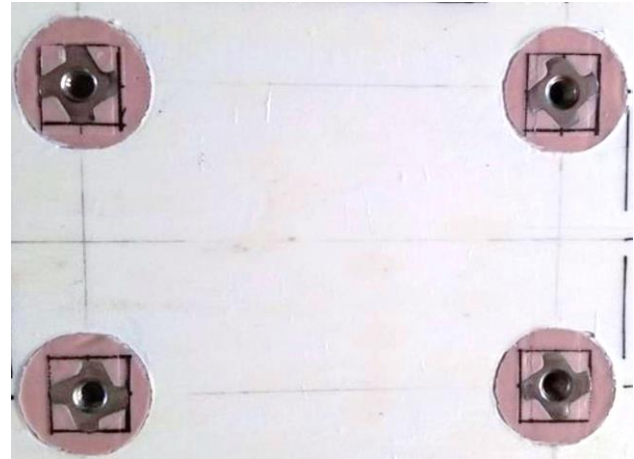
23. Split a tongue depressor into two and squish the epoxy into your holes. Try to fill between the prongs of the T nuts and add more epoxy as you fill the hole to the top. Poking the epoxy up and down tends to push out air bubbles so play a bit with each hole so you are happy it is thoroughly glued up before moving to the next hole.

24. Mix small batches of epoxy at a time.

25. Try to leave the epoxy level with the plank surface when the hole is filled. You can spatula it with the tongue depressors to level it nicely. If your bolts stick above the deck level you will need to try to level the epoxy whilst working around the bolt. Once cured you can trim any excess down, but try to get it as level as possible with the plank of wood.

26. Once the holes are filled leave it level to cure for an hour or so.

27. Check if the epoxy is hard. Once hard you can remove the jig by carefully unscrewing the bolts from the holes. The epoxy must not still be gooey or you will ruin the thread. Your quick release should allow you to unscrew each bolt, having left a perfect epoxy thread behind with your inserted T nuts.



28. Leave the plank to continue curing.

29. Trim off any epoxy that sticks up after removing the bolts and sand it flat with the plank if necessary so that your deck has a smooth surface to attach your foil to. The T nut side does not matter, but you want the other side to be level with the wood for the best foil attachment.

## Boogie Board Adaption

30. Remove the leash attachment and leash from the board.

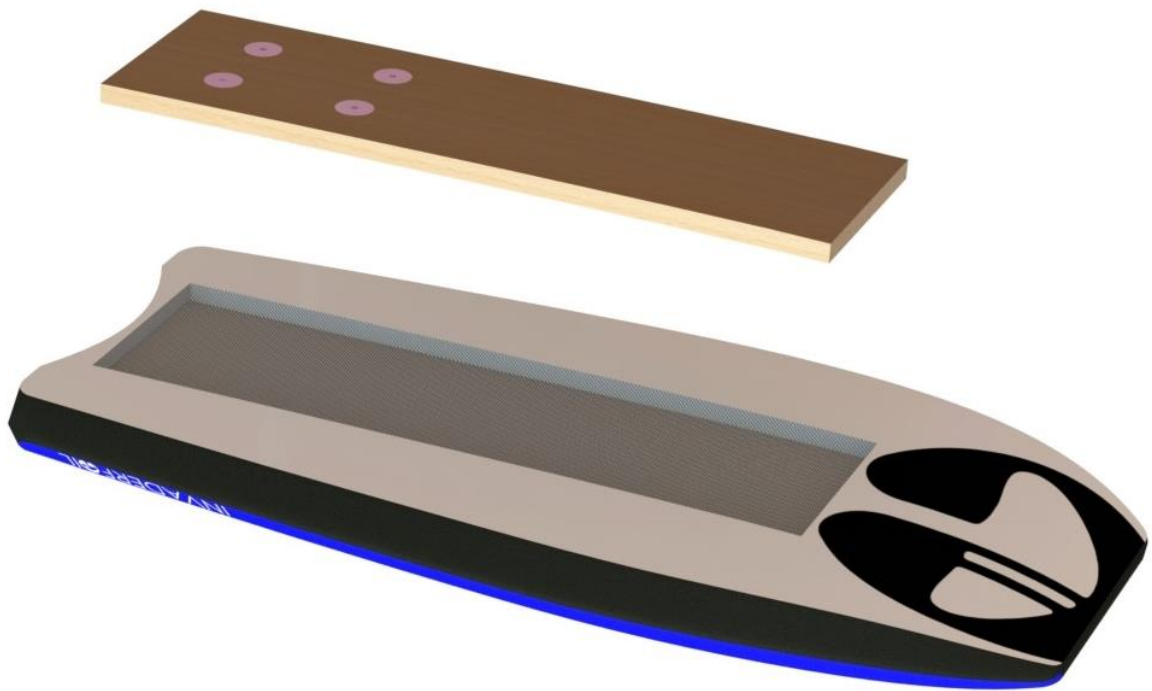
31. Cut out the rectangular outline of your plank on your body board using a scalpel or craft knife. Keep it flush with the plank size, you are literally dropping the plank into the hole you are about to make.

32. Leave the very tail piece of the board intact so your body will still be against foam and not wood. You only need to keep the very outer skin at the edge. No more than half a cm at the thinnest point. If you are not using a router you may need to cut this rear piece off and set it aside to glue back on later, but try to keep it attached to the board if you can; the end result will look better.



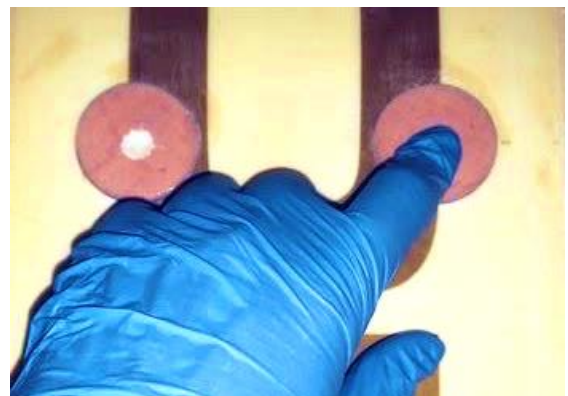
At the time of making my first board, I did not have a router and ended up using a very sharp carving knife to fillet out the foam, so if you don't have the listed tools, normal kitchen utensils can work too to slice out the cavity.

33. Once you have removed the rectangle of foam check that your plank fits into the hole and that it sits flush with the foam base. You don't want it to sit proud or below the deck level. If it sits too low, use some of your slivers of foam to fill the gaps and level it off.



34. Once happy, take the plank out and plug up the holes of your inserts on both sides with some modelling clay so they won't let any epoxy in.

35. Wipe the plank down with the rubbing alcohol to remove any dust or grease. Make sure your pencil marks are all rubbed out too.



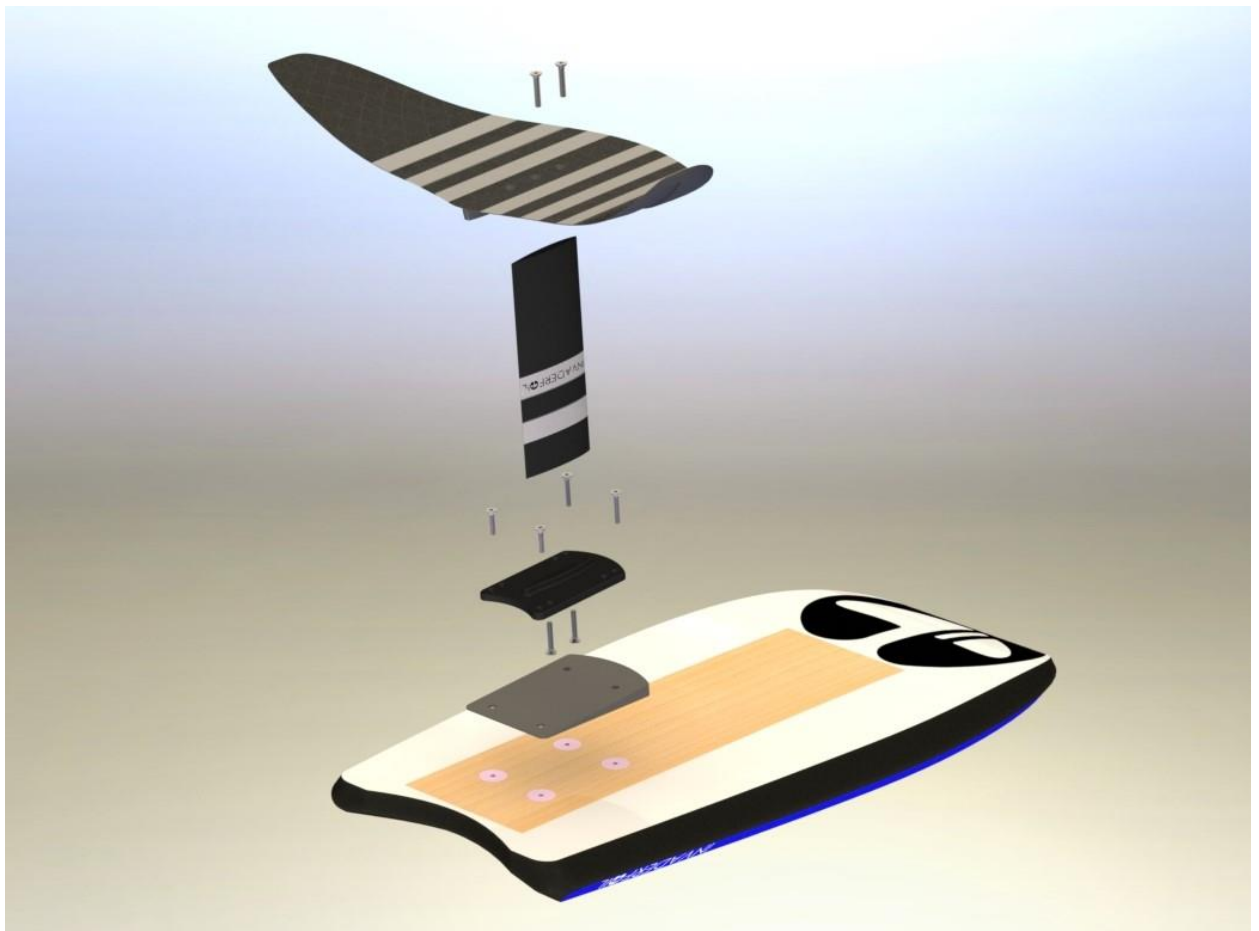
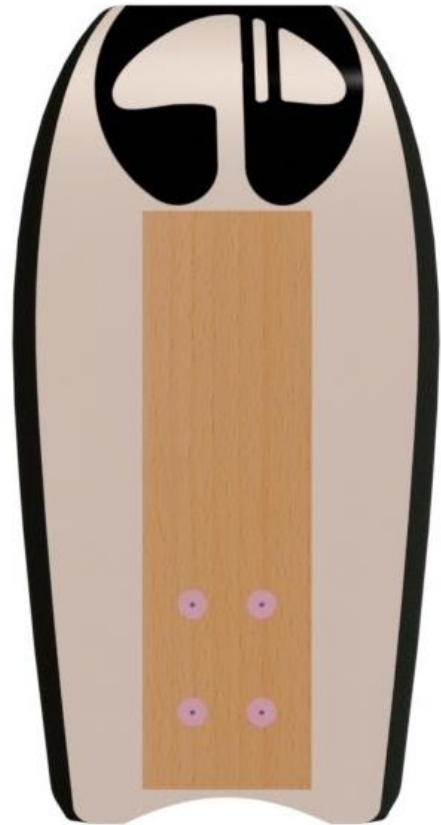
36. Mix your Penetrating epoxy thoroughly before adding your thickener to the mixture. Add small quantities of thickener at a time until you have the right consistency. A bit like cake mixture (not too runny but not stiff either). Smear a thin layer over the underside of your plank (***the underside shows the T nut inserts***) and along its edges and set it aside. Pour the epoxy mixture into the cavity, over the entire surface of your cut out section. Smear it up the sides too so your plank drops into the pool and is sealed totally.

37. Drop your plank, epoxy side down, into the cavity while it's still wet (check your inserts are to the rear of the board and not the front).

38. Press the plank down into the cavity. The epoxy should ooze up. Spread any excess epoxy to fill any cavities on the edges and then add a layer or two of the penetrating epoxy to the top to seal the wood off. It tends to soak in so give it a good coat or two with your squeegee or gloved hands.

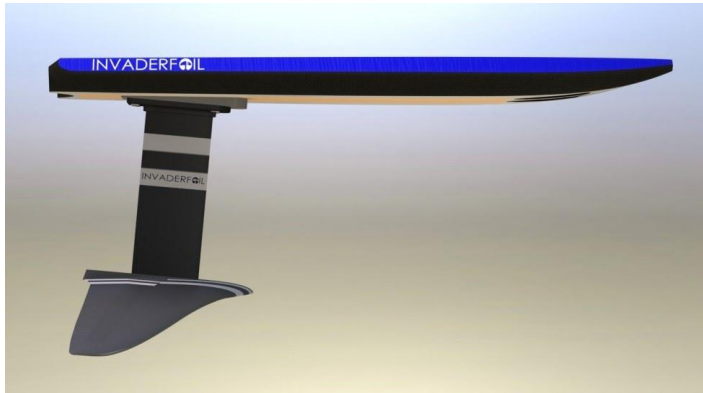
39. Leave it to cure overnight.

40. Once cured, take a milkshake size plastic straw and push through the modelling clay in the inserts whilst twisting. The clay should come out in the straw. Sometimes it takes a few attempts. Squeeze and roll the straw and the clay will worm it's way out the straw. If you don't have a straw use a toothpick and make circles around the thread until the clay comes up.

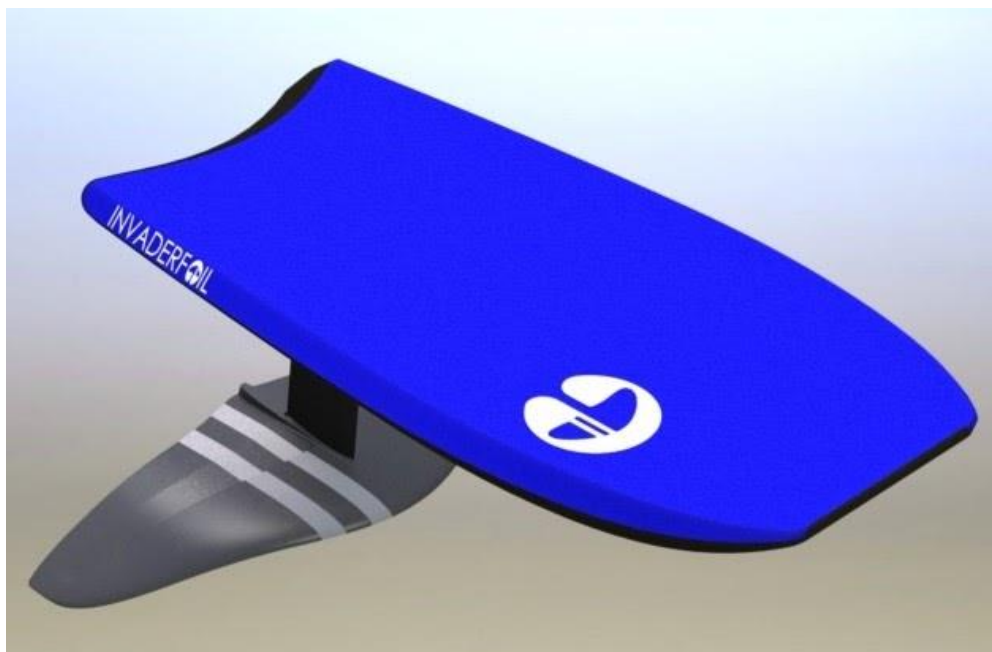


## How to Assemble Your Boogie Foil.

1. Assemble your pedestal and 300mm mast.



2. Bolt your pedestal and the wedge buffer plate onto your board with the wedge thin end toward the rear of the board.



3. Take your Invaderfoil wing (120 or 160) and attach it directly to your mast using the front 2 holes.
4. Grab your body board fins and you're ready to Boogie Foil!