DESIGN
Your Own Motor Boat

Continuing his series on designing an environmentally-friendly motor boat, naval architect Ian Nicolson develops the mid-section.

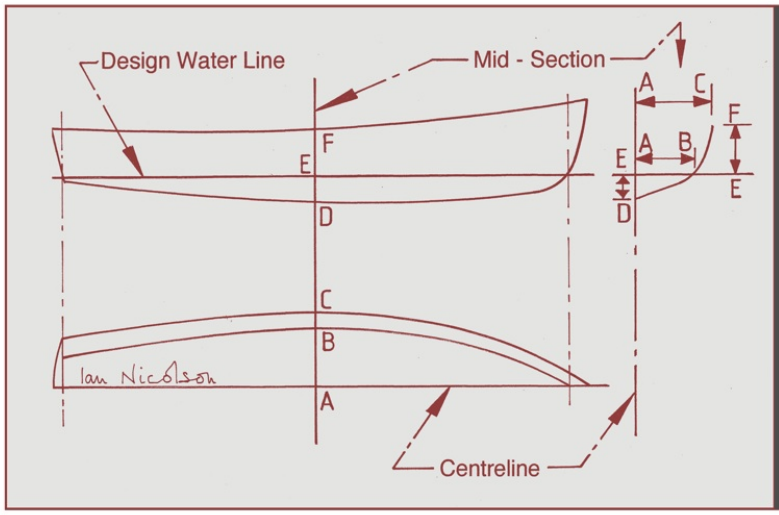

Figure 1: *Once the elevation outline, the waterline and the deck line have been finalised, the mid-section is drawn using the establishing point at A to E as shown on the drawing. On the right is the midship section plotted from these six points. The width of the waterline is A-B, the width at the deck-edge is A-C, the height at the deck edge is E-F and the depth below the waterline is D-E.*

The mid-section of a boat is the view at half her length looking aft. It is easy to rough in on the lines plan once the basic elevation and plan views have been drawn – as described in the last issue – because we have three exact points on the section. Figure 1 shows how we get the distances off the centreline and the distances above and below the Design Water Line for the deck edge and the width at the Design Water Line.

We also know from the elevation the height where the midship section meets the centreline. Having established these three points, we have two choices:

1: We can accept them and draw in the midship section and once we like what we see, we can harden in the line.

2: We can decide we do not like what we see and make a change which has to be reflected in the elevation or the plan view or both.

At this stage, some designers agonise long and hard, making changes galore and sometimes coming back to the original shape, sometimes altering the elevation and/or the plan lines. The late Alfred Mylne II seemed never to have second thoughts and he drew lines plans with the swift certainty of a master craftsman.

At this stage, we have only three points on the curve of the midship section. The way the line goes between these points can vary considerably, as Figure 2 shows. A naval architect will select the final curve bearing in mind the need for easy progress in spite of low power propulsion, the requirements of the accommodation and a good appearance. Sometimes, ease of construction will be a factor and also the way materials can be coaxed into shape.

When designing an easily-driven motorboat with a titchy engine, the designer has stability problems because the waterline beam amidships must be narrow. A cunning way to get around this disadvantage is shown in Figure 3. Here there is a knuckle just above the Design Water Line so that when the boat heels a little, the extra hull width is quickly immersed and suddenly there is a valuable increase in stability.

When assessing the stability, the designer notes the difference in volume between the immersed wedge and the emerged one which are shown cross-hatched. The greater the difference in area between these two shapes, the better the stability. Here, the area on the right is appreciably bigger than the area on the left. the area on the right is going into the water and here the buoyancy is pushing upwards, tending to shove the boat back upright.

Some shipwrights will protest that this knuckle is a hard shape to build but they are too pessimistic. When building in wood, one just fits an external stringer – a longitudinal