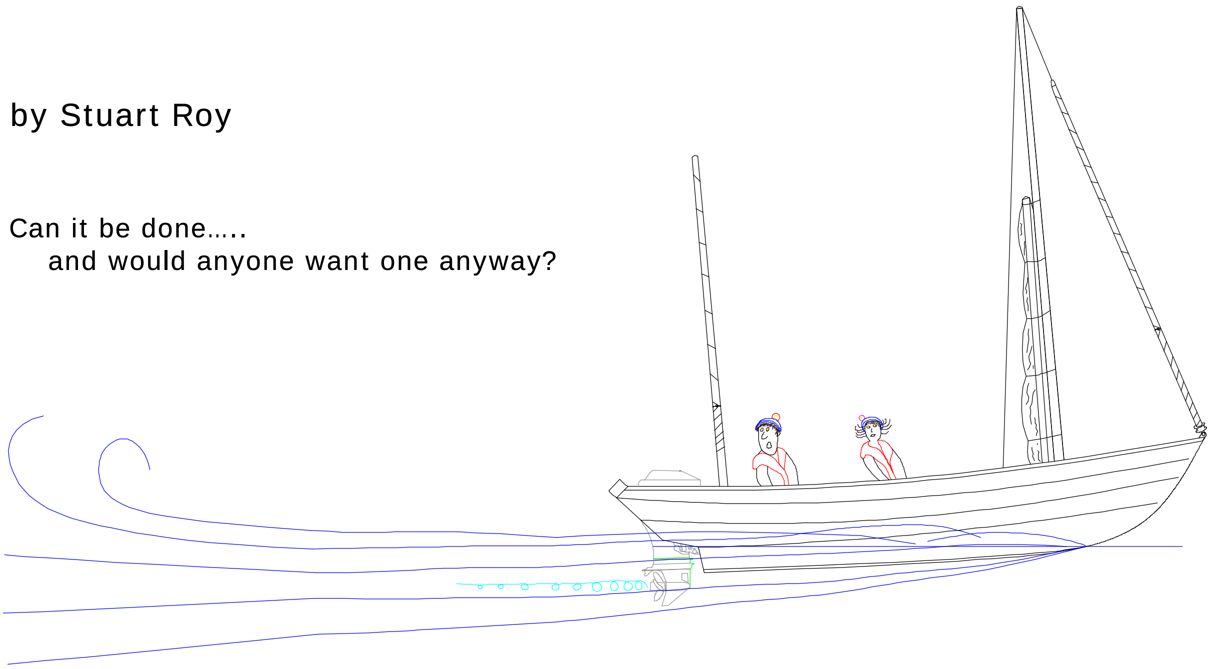
The 20-knot Drascombe

by Stuart Roy

Can it be done…..
and would anyone want one anyway?



During my eleven years of Drascombe ownership I had absolutely no doubt that I had the right boat. It was practical, fun to use and ideal for the type of family sailing I did at the time. But as a naval architect I did on occasions, when sailing back against a foul tide, find myself thinking a number of "what if?" questions about the performance, handling and features. This inevitably led to time being spent on sketches for enhanced or "improved" versions, which of course never got built anyway!

Years later I had completely forgotten about the design for a 20-knot Drascombe until I was looking for some interesting designs to display on my web site, www.yacht-designer.co.uk . Rolled up and hidden away for almost 20 years was an almost complete proposal drawing for a planing motor-sailing dinghy in the style of a Drascombe, dated October 1983.

So did I just put a bigger engine on a sketch of a Drascombe, do a few calculations and conclude that the boat could achieve a target of 20 knots? Unfortunately it is not quite as simple as that. The Drascombe hulls are essentially displacement types, which means that they are shaped to move through the water pushing the water aside as they go along. This is the most efficient way to travel at sailing speeds. If a large engine with much more power is used on a displacement hull it will push the boat harder but the water cannot move aside quickly enough and energy-absorbing waves begin to form at the bow and stern. In addition it is usual to see the stern tending to sink down into the trough formed behind the bow wave, an effect that naval architects refer to as "squat".

In these circumstances no amount of power will make the boat go any faster with the boat's limiting hull speed in knots being approximately 1.34 times the square root of the waterline length in feet, or 2.43 * √LWL(m). This means that a Drascombe Lugger is unlikely to be able to achieve much more than 5.2 knots and a Coaster 5.7 knots. The only way out of this situation is to design the hull to generate dynamic lift so that as the boat goes faster it can end up skimming across the water rather than displacing it, in the same way that a heavy stone can be made to skim across the water if the shape of the underside and the angle of the throw are right. This idea of getting the boat to skim over the water rather than displace the water is of course the phenomenon of planing, which was discovered by the Rev. C M Ramus in 1872. He used a flat-bottomed sea-sled type model, which incidentally can be seen in the Froude museum at the Haslar experimental facilities near Gosport.

But although a Sussex clergyman had shown with his models that high speeds on water were theoretically possible, it was not until suitable engines were available some forty years later that planing under power became a reality. These lightweight engines were developed primarily for use in cars and aeroplanes and were adapted for marine use. Then in 1928 Uffa Fox established that planing under sail was also achievable, as demonstrated by his design for the International 14 dinghy “Avenger”, one of the first boats to use the newly invented and much more powerful Bermudan style rig.

Clearly, to make a boat plane there needs to be plenty of power available, but that in itself does not get the boat to lift out of the water. The boat must be relatively light so that any dynamic lift created can have a beneficial effect. The hull must also be designed in such a way that a slight bow-up trim angle will be generated as the power is applied. This is achieved by incorporating V-shaped transverse sections in to the bow area under the waterline, so that when a powerful engine pushes the boat along, the bottom of the boat will trim upwards and become an angled plane to the oncoming water, hence the term “planing”. But it is still necessary to overcome the problem of the stern sinking in to the hollow following the bow wave and dragging the stern. A solution is to incorporate a deep transom with plenty of immersed area. This provides sufficient buoyancy to prevent squat and with a straight run aft, lift will be generated whenever there is some bow-up trim.

The shape of the bottom also needs to be considered. At planing speeds a completely flat horizontal bottom panel would produce extremely uncomfortable slamming if the boat had to cross any waves. So a V-shape is normally used for all the bottom sections, the angle of the V from horizontal being termed “deadrise”. Lower deadrise angles mean a flatter V, which requires less power, but gives a more uncomfortable ride. Consequently, offshore powerboats tend to have deep-V type hulls with deadrise angles in excess of 25 degrees, which give a softer ride but require much more installed power.

A further development of a planing hull design is the incorporation of a system of spray rails, with which the designer tries to limit and control the shape of the planing surface. A small surface area will produce less drag from skin friction and hence greater speed potential. In addition a wetted surface shape that remains largely symmetrical and balanced when the boat is heeled in a banking turn will provide the helmsman with good control at high speeds.

So the principal ingredients that need to be incorporated into the hull design for a 20-knot Drascombe would be i) a light hull, ii) plenty of power, iii) V-shaped underwater sections at the bow, iv) sufficient immersed transom area, v) a straight run aft with shallow V section shape, and vi) a system of spray rails. Can all this be done in a Drascombe?

My design proposal starts with a boat that is 6.2m long, with a waterline length of 5m, a beam of 2.1m and a draught of 0.35m. Overall, it is approximately Longboat sized, but has more of the proportions of a Lugger – that means that the length-beam ratio and the beam-depth ratios are those of the Lugger. This provides a wider and deeper boat than a Longboat, with opportunities for a suitable shape for the planing bottom and sufficient freeboard to avoid spray being a problem at speed. The stern has also been widened by 30% to accommodate a larger engine and provide the necessary buoyancy in the hull to support the weight of such an engine, as well as giving sufficient immersed transom area to achieve the hydrodynamic conditions for planing. The rig is close to that of the Longboat with 15.3 square metres (165 sq. ft.) of sail area split between the jib, main and mizzen in the ratio 25%, 60%, 15%. But, to allow the larger engine to tilt sufficiently, so that the propeller is clear of the water for sailing, the mizzen mast has been offset to port, as in the Dabber.

As a light hull is one of the list of six requirements, the metal centreboard has been replaced with a light GRP foam-sandwich foil, which should improve sailing efficiency to windward and counteract to some extent the drag from the wider stern sections. The rudder and stock assembly, which would only be used when under sail, would be made from aluminium alloy or carbon fibre. Both the rudder and centreboard have been mounted slightly further forward in the boat to create the space needed for the larger engine. The hull moulding and its inner lining forming the seats have remained essentially the same as they are already considered to be strong enough to take the additional dynamic forces from operating at planing speeds. It is tempting, however, to look at carbon fibre spars, now that these have become a well-proven technology after their development for windsurfers and racing yachts more than a decade ago.

To provide plenty of power a modern 4-stroke outboard engine of 50hp has been chosen for its efficiency, smooth-running, quietness and good power to weight ratio. Typically the weight of such a unit would be around 92kg making it about 65kg heavier than an auxiliary outboard used on a Lugger or Longboat – an extra load equivalent to one more member of crew.

The underwater sections at the bow of a Drascombe are already suitably V-shaped to promote the trim angle required. But the rocker or underbody line which is normally a gentle curve round the bottom of the boat, has been changed to a continuous run downwards to the internal transom on which the outboard is mounted. By this position the bottom of the hull is not flat, but a shallow V with sufficient immersed area for good planing performance. The deadrise angle there is 16 degrees, which should be a good compromise between ride comfort and the need for more installed power. It is thought that the visible plank lines, which are such a feature of a Drascombe, would act as spray rails to some extent, so only one additional spray strip has been fitted – on the main chine line. This consists of a little wedge with its lower face angled downwards by about 5 degrees to ensure that the water breaks away at that point to limit the size of the planing surface.

The internal transom is fitted within the counter stern of the boat in the same way that the outboard mounting pad is set within the boat in most of the Drascombe range. Beyond this substantial internal transom, the counter sweeps upwards in the usual way to preserve the aesthetic appeal of a Drascombe. Within this space between the internal transom and the end of the counter stern there is sufficient room to tilt the 50 hp outboard so that it is clear of the water for sailing.

Sailing performance is undoubtedly going to be adversely affected by the additional wetted surface area, deeper sections aft and large blunt transom. This loss of performance would be most noticeable when beating to windward, except that a genuinely "aerofoiled" section shape for the centreboard would increase the side force available, perhaps reducing the leeway angle and improving the pointing. Downwind in a blow the broad deep transom may well promote skimming, giving the conventional hulls a run for their money.

Under power the proposed design should easily achieve the target of 20 knots. The established performance prediction methods used by naval architects would indicate that power of 24.4 kW is required for 20 knots and a 50 hp engine can provide considerably more at 36.8 kW, giving a theoretical maximum speed of 23.5 knots. Of course these calculations assume perfectly flat-water conditions and an optimal propeller match. Air resistance, particularly from ahead and cross winds, is neglected. Nevertheless, despite the limits of the performance predictions, this design proposal does look as though it is technically feasible and planing speeds could be achieved in a Drascombe-style boat with the appropriate hull modifications and sufficient power.

The more difficult question remains – would anyone want one anyway?

For many years, the only way to get a good Drascombe was to buy a new one, or a nearly new one, if you could find one. Now, with many thousands of examples afloat, the second hand market is extremely well populated with good boats. Prospective owners who are prepared to travel can choose between many excellent examples right across the price range. This means that sales of brand new boats are having to compete against second hand boats offering a substantial price reduction for virtually the same specification and able to provide just as much sailing satisfaction.

The only way to sell new boats in this situation is to "outdate" the ones on the second-hand market by offering new features that are not available on the older boats. By offering a high-speed version a wider market could be created with the opportunity to sell more boats, without strong competition from existing boats.

When the Drascombes were first marketed, the designer John Watkinson, and the team at Honnor Marine were quite rightly promoting the boats as strict one designs with few licensed builders, a decision that has ensured an excellent reputation for quality and high resale values. Now, in a new millennium, times have changed and there are a growing number of Drascombe style boats, "tributes" and developments. One fine example is the "Caboteur" by Jean-Louis Grenier and there have also been a number of small yachts built in the style of a Drascombe, with an unmistakably similar sheer line and the distinctive planking features on the topsides.

In recent years a number of "get home quickly" sailing cruisers such as the Macgregor 19, the Macgregor 26 and the Odin 820 have come on to the market. These planing motor-sailers have become very popular, indicating that beating the foul tide and getting back to base at a previously arranged time are important to today's boat owners.

Whilst participants undoubtedly enjoy the Drascombe rallies with the chance to cruise unhurriedly in good company, it could be a benefit to have a more powerful rally safety boat for the rally coordinator. This could act as a towing boat when required. Alternatively the coordinator in his 20-knot Drascombe could be sent forward to the next landfall to secure the berths and order the meals! Arriving first could be one way to ensure a hot shower – but then what happens if everyone gets a 20-knot boat?

For years I drove around with a Drascombe car sticker firmly attached to the rear window. "The sail that becomes a way of life" became part of our lives just as it has for many other families. The trouble with a 20-knot Drascombe is that it just isn't part of the Drascombe ethos – if people want to go fast they should get a powerboat. And anyway, if it is not designed by John Watkinson and built under licence, it would not be a Drascombe at all! But having said that, who can say what prototypes the innovative original team of Watkinson, Westell and Churchouse would be trying out in some quiet Devon estuary if they were still together today? I would suggest that a high speed Drascombe would be just one of those prototypes.

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Stuart M Roy, November 2002

Email: SMR@yacht-designer.co.uk