

Our Third Boat Trailer

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BOATS OFTEN LAST much longer than the road trailers made to transport them. Our home-made 15-foot sailing dinghy was completed in 1978 and it has now had three trailers made for it. The latest one, as shown in figure 1, was made a few years ago, the previous two trailers having both died from corrosion.

The first trailer was not galvanised and although it was painted externally the insides of the hollow section frame soon started to corrode. The end came after about 15 years when the longitudinal member collapsed while on the road. Fortunately the trailer did not actually break in two as the longitudinal member just buckled and dropped down until it was near the road surface. I recall that I left the boat and trailer on the grass verge then drove home and hastily made up two lengths of angle section drilled so that they could splint the frame with threaded rods clamping them each side of the buckled section.

The second trailer was of similar design to the first one but with the frame hot dip galvanised. Galvanising is not everlasting as the zinc coating progressively thins, I think for the same reason that sacrificial anodes bolted to steel boat hulls need regular replacement. This trailer frame remained free of corrosion for something like ten years, then started to corrode inside the hollow sections even though it remained mainly rust free externally.

I don't know whether this is because the galvanising is thinner on the inside – why should it be? – or is it due to damp being retained longer on the inside? I poked a rod down the inside of the hollow sections and was alarmed by the large quantity of loose rust that I was able to dislodge.

I decided that we needed a third trailer. Actually, when I cut up the frame of the second trailer for re-cycling, I found that even in the most corroded places there was at

least half the original thickness of steel remaining and you need to remember that a given volume of steel turns into about six times that volume of rust although in this case the amount of rust appeared even greater since it was in large loose flakes. Probably this trailer would have remained safe for a bit longer but I am not sorry that I chose to replace it.

My first requirement for a new trailer was that the frame at least would not come to a premature end due to corrosion. Since corrosion of the frames of my previous trailers had been almost entirely on the inside of the hollow sections, I decided to weld plates over the ends of the hollow sections so that water would not get inside. Where fasteners were required to pass through the hollow sections a sleeve was fitted through and welded into each side of the hollow section and there were four places where this was necessary. More than one person told me that the frame would still rust since water would always find a way in somehow. Time will tell.

I would say that at one time I was involved with electronic devices that were implanted within a human body. We fabricated the cases for these by welding thin sheet titanium

and I am not aware that they ever leaked despite many years in a wet and salty environment. Closing the ends of the hollow sections meant that the frame could not be galvanised since galvanising companies generally require vent/drain holes in all parts. I did not see this as a great disadvantage since it is not hard to keep the external surfaces of the frame largely rust free by occasional touching up of a paint finish, it is the inside surfaces that are the problem.

My other main requirement for the new trailer was that it should be easier and quicker to launch and recover the boat. Many boat trailers do have features to make launching easier, for example the trailer can extend well behind the axle to provide a ramp for the boat to roll up, or there can be a break-back section or there can be an integrated launching trolley. However, all these additions make the trailer heavier and more bulky for parking when the boat is not on it and they involve more metal work to keep free of rust. For safe braking on the road it is surely good to minimise the total towed weight and the more complex trailers can be a significant part of the total towed weight.

All my trailers have been of

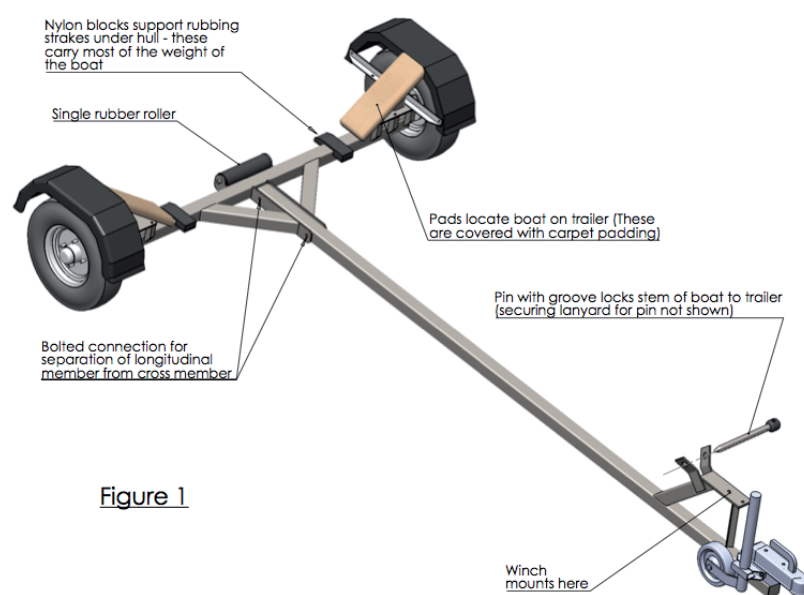


Figure 1

simple lightweight design but the first two were not particularly good for ease of launching and recovery of the boat, needing to be immersed under the floating boat during these operations. I guessed that it would be easier if I could reduce the trailer ground clearance to get the supports for the boat closer to the ground and also add a winch to the trailer.

I see no reason why the ground clearance of a boat trailer needs to be more than that of a car. For the last season we had the second boat trailer I did an experiment with a wooden board hinged under the trailer cross member, the bottom of the board being about 100mm above the road. Using the trailer for several months, including driving over speed humps, the bottom edge of the board never got a scratch. There is a further advantage of having a low trailer, at least with a cabinless boat, in that the deck of the boat can be low enough that you see over it from the central rear view mirror, particularly reassuring when reversing.

Figure 2 shows how I contrived to lower the ground clearance of the trailer using standard suspension units. It would certainly be easier if the manufacturer of the suspension units offered them with the mounting plate on the lower rather than the upper side of the box section that contains the swing axle and rubber inserts; however the demand is probably not enough to make that viable for them. If the boat had a steep Vee bottom, another way to lower the ground clearance would be to make the cross member a matching Vee form, I have seen that done for some power boats but it would not work with a boat shape such as ours. The ground clearance of my new trailer, loaded with the boat, is 145mm. From my experiment with the hinged board I could perhaps have made it even lower. The ground clearance of the Ford Fiesta motor car that we are currently using for towing the boat is about 130mm but I think most cars are a little higher than that. The ground clearance for our previous trailers was about 255mm, which is similar to many off the shelf trailers and is far more than necessary. The difference in

ease of launching and recovery with the lower trailer is significant. The winch I have fitted to the new trailer is smaller than most trailer winches but it easily pulls our boat over the single rubber roller which is fitted just behind, not above, the trailer cross member. Given any reasonable slipway, we now find it so easy to recover our heavy boat without immersing the wheel bearings that I wonder why people bother with complicated combi-trailers or break-back trailers for sailing dinghies.

A third, but less important, requirement for the new trailer was that it could be dismantled into sections. The longitudinal and transverse frame members are joined with two M10 stainless steel bolts, so can be quite quickly separated. I do use locknuts on these rather critical bolts. There are occasions when it is impossible to find adjacent parking spaces for car and trailer in a crowded car park, or even two non-adjacent spaces, but having the trailer demountable means that it can fit with the car in a single parking space (*see photo*). The longitudinal part of the frame lies mainly underneath the car and the rest sits behind the rear bumper; both parts can be chained to the tow bracket for security. This also means that we can usually ignore those car park signs that forbid the parking of boat trailers since I don't think anyone could object to a boat trailer in a car park if it is not taking up an extra parking space. Mind you, on one occasion when I felt public-spirited and thus parked with the trailer parts tucked up behind the car to free a parking space for another motorist, someone did not see the

trailer low down behind our car and bumped into it damaging one of the mudguards!

Another point is that this trailer, in common with our previous trailers, is light enough to be carried on a car roof rack. This has been useful when we have needed to make long journeys with an unloaded trailer, for example, we once cruised from Lechlade in Gloucestershire to Friesland in the Netherlands then collected the trailer from Devon and transported it to Friesland on the roof rack to take the boat back to Devon.

An unloaded boat trailer can bounce around when towed and it makes reversing difficult if it is too low to see it through the rear view mirror. I would add that if you cannot carry your unloaded boat trailer on a roof rack, DCA member Alastair Law tells me that you can reduce the bouncing by reducing the tyre pressure.

To fabricate the frame for our new trailer I used my milling machine and metal turning lathe for some of the parts and a local blacksmith/welder did the welding for me since my own welding equipment is really only suitable for thin sheet metal.

If you don't have machine tools available you could get by with just a small angle grinder and perhaps a small pillar drill to prepare the steel for welding. Fitted with one of the thin cutting discs that are now available, a small angle grinder will easily cut the steel sections needed for a typical boat trailer. I think I wore out a couple of cutting discs making the new trailer but they cost only a pound or two each. Eye protection is of course essential when

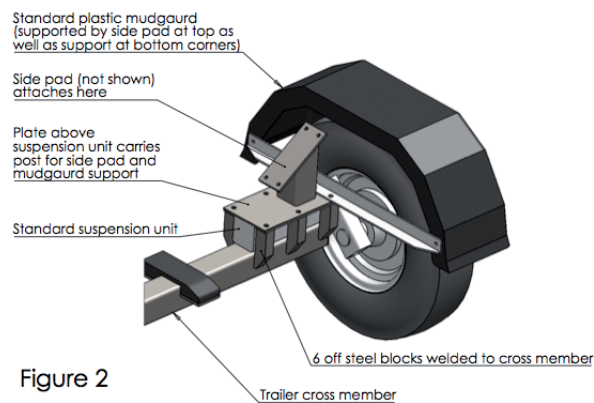


Figure 2

using this kind of tool.

Our boat was built with a hole right through the stem near the waterline so that the boat could be simply and securely attached to a boat trailer using a pin through this hole. Our first two trailers did not allow for this method but it is incorporated with the new trailer.

The post on the trailer to which the winch is attached also carries guide plates to locate the stem of the boat and these are bored so that a 20mm steel pin can be threaded through to secure the boat to the trailer. The winch rope terminates with a snap hook that engages loops in each end of a short length (about 150mm) of rope that is threaded through the hole in the stem of the boat. The securing pin has a slot in it (just visible in figure 1), which allows the pin to be inserted through the stem of the boat with this short length of rope in place and the winch hooked on. This means that when recovering the boat from the water the securing pin can be fitted with the winch still connected to the boat. Once the boat is secured with the pin, the winch hook is detached but the short length of rope remains in place ready for the next launch. The winch rope itself is a high strength Dyneema-cored rope which does the job fine.

We have now used this trailer for a few seasons and it has been generally satisfactory. We had to get used to the method of securing the front of the boat with a pin through the stem and it does need care to get the boat in just the right position on the trailer for the pin to pass through, I may fit a suitably positioned stop to help with this. The single roller at the back of the trailer does not turn as freely as I would like. Alastair has told me how to improve that by fitting a copper pipe sleeve through the roller rather than relying on the rubber running on a metal axle. Unfortunately, I do need to touch up the paint on the trailer after only a few seasons use. I did use high quality paint epoxy primer then 2-part polyurethane top coat, each about £50 for a 1-litre pack, but maybe in a few spots I did not take enough care to de-grease the steel before painting. I think the frame should ideally be grit-blasted before painting.

I understand that shortly after I finished making my trailer it became illegal to take a home-made trailer on the road in the UK unless it has been officially inspected and given a CE mark. This does not apply to trailers made prior to the legislation (29.10.2012) and I would not know if it applies to an older trailer that has been refurbished, perhaps even extensively refurbished with rather a lot of newly-made parts. This new legislation does not rule out making your own boat trailer since the inspection for a CE mark for a small un-braked trailer, together with getting the required manufacturer's plate made up, costs something in the region of £100.00 and you will be spending far more than that to make almost any boat trailer. Steel section for the frame is quite cheap but brought parts such as wheels and suspension units, welding consumables and paint all add up then finally comes the certification cost (and I suppose the cost and inconvenience of getting the trailer to the official inspection centre). Making your own trailer may not save you money but it should produce a trailer that properly fits your boat and that may well be easier to use and longer lasting than one you could buy ready made.

Finally, mild steel box section is not the only material that could be considered for the frame of a boat trailer. There was some discussion of trailers on the Home Built Boat Forum and someone showed pictures of their nice trailer home-made from aluminium alloy extrusions. Mild steel is cheap, readily available in a huge range of sections, easy

to fabricate by welding and with good design it is largely immune to fatigue failure but a suitable grade of aluminium alloy could be lighter and it largely avoids corrosion.

The high strength grades of aluminium alloy, with the right heat treatment, can be as strong as mild steel and much lighter but they have only about half the stiffness. Strength and stiffness are two different things in engineering but both are desirable properties for the frame of a boat trailer. An aluminium trailer is likely to need larger sections than a comparable steel one in order to be stiff enough, but it should still be lighter than the steel one. Heat treatment is critical to the strength of most aluminium alloys and welding will affect strength in proximity to welds. The most readily available grade of high strength aluminium is grade 6082 with T6 heat treatment. This material loses something like 70% of its yield strength in the vicinity of welds, this is the reason that the trailer mentioned above had bolted or riveted joints, not welded joints. Stainless steel could be another option for trailer making; stainless steel box section does exist but it is not as readily available as mild steel or aluminium alloy box section. It is expensive, but it would be very long lasting and it has similar strength and stiffness to mild steel. We used to use a lot of it when I was involved in building superyachts. Titanium, nicknamed unobtainium, is another material we used quite a lot of in building those superyachts and it would make a lovely everlasting boat trailer, but perhaps best painted with something like tar if you didn't want it stolen. *JP*

