

Hints on Designing/Building Your Trailer

Recently, I bought an old boat (with an old trailer that carried the boat on its chines). I decided that the first thing that I would do would be to make the trailer easy to use and **self loading** - obviously so I could rig the boat when no other helpers were available. Having a trailer that WORKS for your purpose will make life SO MUCH EASIER. Also, I felt that supporting the boat on the chines was damaging it, especially as it was of plywood construction and less robust than a fibreglass boat.

As a back story, I had sailed PT's for around 4 - 5 years way back in 1982 - 86 when I was in my late teens. So I kind of had a good idea of what I needed and had also vaguely kept up with trends As my late father had continued sailing (mostly PT's) right up until around 2017.

So lets get started. This info is based on talking to a lot of ex-colleagues that are still at the forefront of PT sailing, and taking lots of measurements and using my mechanical knowledge from my trade as a fitter & turner and also being involved in the 'Automotive Design & Engineering Industry' for 35 years.

The first thing that you will need to do is choose the basic design layout/starting point for your trailer. Please discuss the below suggestions with a reputable trailer supplier/manufacturer and study your relevant State Regulations (for lights etc....) before getting stuck into this project.

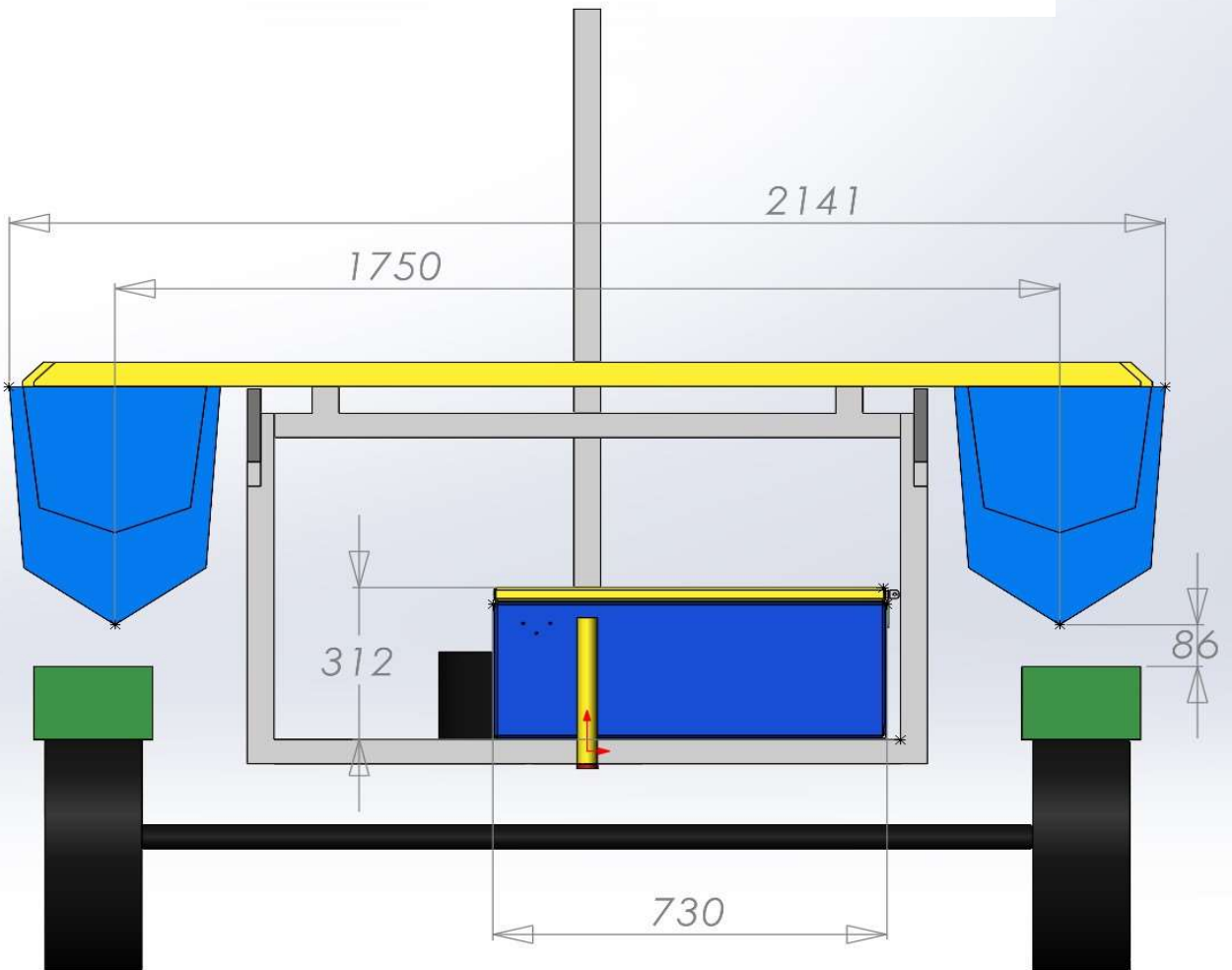
Choosing wheels/tyres and suspension

It is desirable to choose wheels/tyres that are readily available. If you are travelling a long way from home and have problems or multiple punctures or something, it is handy that maybe a fellow colleague is able to help you out of a difficult situation, and having a common wheel/tyre combo would be wise in this case. **Wheels - 13" HT Holden/Torana 5 stud pattern (or Ford)** seem to be the smallest/most common wheel/tyre combo around with a 155/65/R13 tyre.

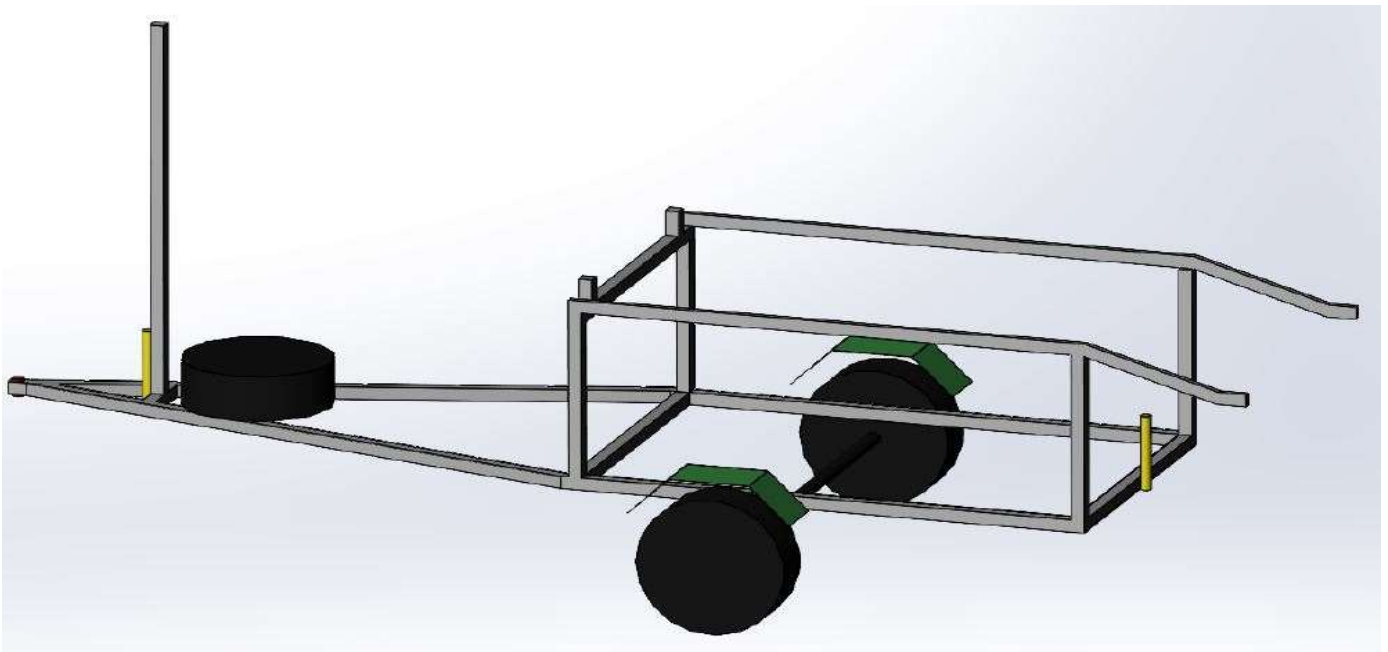
The position fore-aft of the axle will determine **tow ball load**. Tow ball load should be around 5-10% of trailer weight. With a single boat, this may be in the 20-40kg range. This can be measured with simple bathroom scales, but make sure you take into account the bits and pieces that will go into the sail/boat box and their approx. locations fore-aft (as this will be a little unknown when you are designing the trailer from scratch). A trailer with little or no weight on the tow ball will tend to sway (something that you will want to avoid).

We would also like to keep the frame as low as possible for ease of loading. Leaf springs are the most common and simplest way to go. The ride may be harsher/bouncier and the chassis will need to be higher than my preferred suggestion of **Torsion suspension**. Torsion suspension allows a slightly lower chassis height, smoother ride and perfect for light loads (up to around 750kg). I suspect the PT trailer to be in the vicinity of 400kgs. There should be approx. 75mm of clearance (mudguard to tyre in a "fully laden condition" Thus the reason for keeping the chassis and mudguard heights low. The trailer will not require brakes if the load remains less than 750kg in most - if not all states.

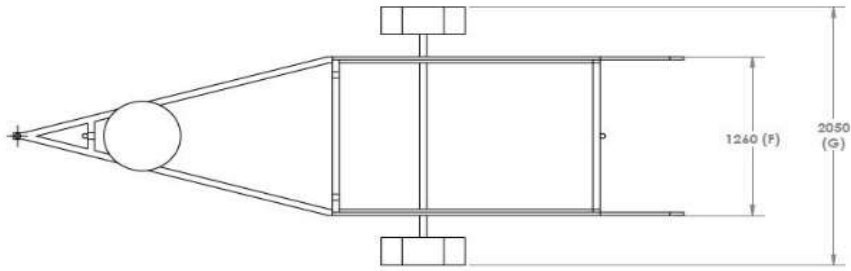
Next, we will need to decide on the chassis width in conjunction with the **track** (or width of the wheels from side to side). I'll discuss the chassis later, but for now, the basic premise is that the track should be as wide as possible (within reason) to give the trailer stability when cornering. Trailers have been known to tip over with a track that is too narrow. I would suggest the track (which is measured from centre to centre of the tyre - when viewed from the back) be the same as the hull centreline (which is around 1750mm). The total width from mudguard outside to outside need not be quite as wide as the max hull width, so I would suggest (dwg 3 - G - 2050mm max). Whilst talking mudguards, plastic ones are available and may be a good idea to combat the corrosion of trailer bits & pieces.



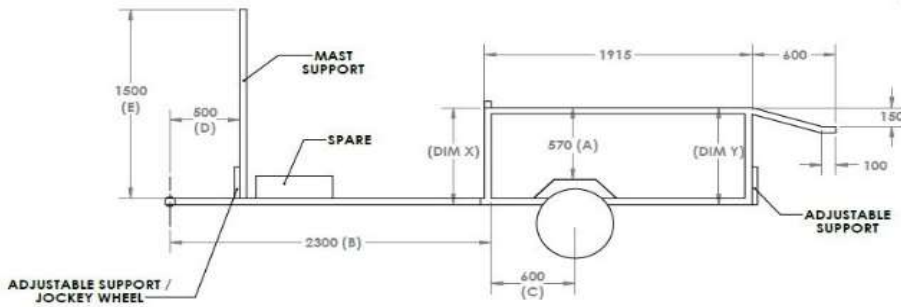
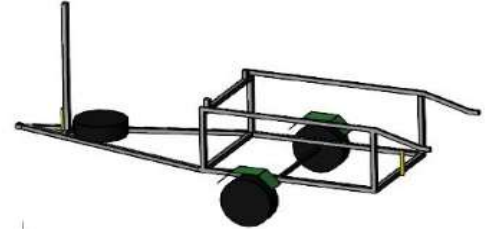
Drawing 1: Chassis dimensions



Drawing 2: 3D model



Drawing 3: Top view



Drawing 4: Side view

Frame Dimensions

The above diagrams show the approx. dimensions that you will require. I'll work alphabetically through the numbers with brief explanations.

A. Is a critical one. 570mm from the top of the mudguard to the top of the skid (or the underside of the beams). This will give you around 90mm clearance from mudguard to the chine of the hulls. Dim X will be a calculation based on the mudguard height off the chassis whilst dim Y can be 50mm - 100mm less than X. This will help with the loading height at the rear (not having to lift the boat too high).

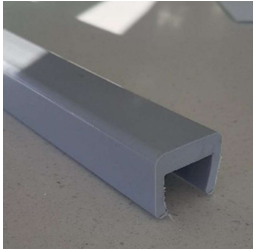
B. Is also very critical. 2300mm will be about the closest that you should aim for so that your tow car can turn full lock without the boat striking the rear of your car.

C. This dimension is a bit of trial and error. 600mm is a good place to start in positioning of the axle for-aft. This will dictate the tow ball load. Having the rest of the trailer built and loaded with the boat and all accessories, and then lastly locating the axle is the absolute A+ method but 600mm will be close.

F. 1260mm. This is the width of the inside of the hulls (with some clearance). This is the width you will require for the top of the frame for the skids to be attached to. The distance across the rear beam is wider than the front.

Loading "Plastic Skids"

Roxom Boat Trailer Parts have a nice plastic skid section available to suit fitment to 25mm wide box/rhs sections. This will cost around \$70 and are available from (www.roxom.com.au). Be careful when loading your boat - that you only lift the rear of the boat to the skid height. Too high and you will risk damaging the chine of the hull on the mudguard (as the front of the boat will pivot downwards and possibly strike the mudguard and cause damage to the chines. Another matter worth considering is sliding of the front beam along the skid. Unfortunately, the dolphin striker bolts are awkwardly positioned right where we don't want them. Consider some sort of U-shaped plate or similar to protect the skids from the striker bolts digging in (only for travel/loading purposes). Some people use dome head bolts to attach the striker, but I would not recommend, as the hex drive can be easily rounded and then cause problems to undo, etc....



SKID



LINCH PIN



OVER CENTRE CLAMP

Tieing your boat down

I like the use of over centre clamps (pictured above) for ease of tieing down your boat. Many tie down methods have been employed over the years. Swinging latches that hook over the beams or maybe 'tube within tube' might be the go or just normal tie down straps. I also used linch pins (pictured above) to very good effect. A lateral (sideways) locating mechanism front/back or both may be a good idea to protect the edges of the decking during the rigors of travel. The dolphin striker may work well at the front for this? Your imagination is the only limit.

Front Mast Support

The position of the front mast support will need to be carefully checked in conjunction with the car/s that you intend to tow with. The tailgate should be operated through its range to check clearance (fore/aft) and also at full open max height to ensure it doesn't contact the mast and put a nice dent in the tailgate. Dimensions "D & E" are approx. starting points. Tie down methods for masts are numerous and maybe be as simple as rope or ocky strap, but make sure to manufacture attachment hooks of some sort. You may wish to make a double/triple saddle if you wish to carry a spare mast to big events a long way from home.

Rear Mast Support

The rear mast support will need to be mounted to a removable section to allow the boat to be self loaded. This section may be a slide in piece or maybe a pivoting section that rotates downwards. It's also a good idea to incorporate the locating and locking of the rear beam of the boat into this item.

Sail/Boat Box

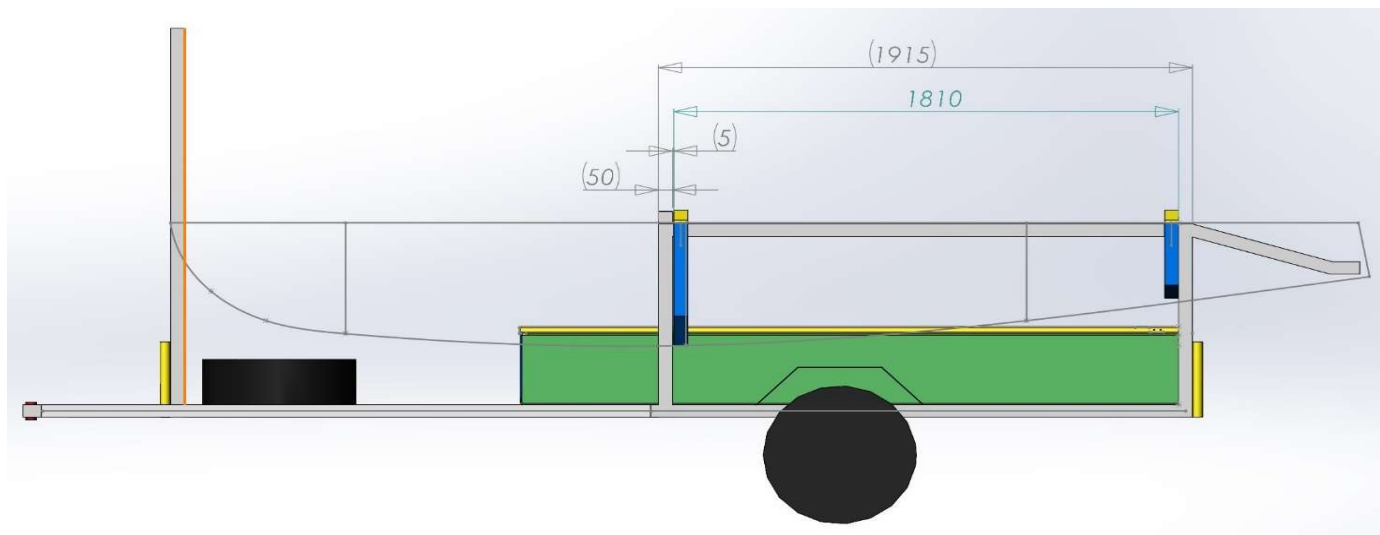
The boat box could be made from a variety of materials such as plywood, fiberglass, aluminum, stainless steel to name a few. Obviously, avoid mild steel for its rust characteristics. You may want it to be long enough to store you sail, in which case 2.4m in length will be needed. Some rubber matting or similar should line the box to help avoid damage to fragile rudders and foils. Bear in mind the lack of height to be able to lift a hinged lid whilst the boat is on the trailer. Maybe a lid that can be removed from the hinges may suit or possibly an additional rear access door or just make sure the hulls are always the first off or last to be loaded onto the trailer.

Beach Trolley

A smart position to carry the beach trolley (which you will require for self loading) I believe is right alongside the boat box. Removable trolley extension handles would be required to make it compact.

Jockey / Spare wheel

A jockey wheel is nice but not really required with such a light weight trailer. A drop down support/foot in lieu of a jockey wheel is a good idea. Something similar may be required at the back for self loading the boat (when not hooked to the car) to stop the trailer tipping up but this depending on the tow ball load! Consider mounting the spare wheel horizontally near the front of the trailer for best access and easy/constant reminder to periodically check the spare for pressure and the tyre perishing from old age. Horizontal handles to lift the trailer from the tow ball and for maneuvering is a good idea.



Drawing 5: Mounting locations - beams

The beams are approx. 1810mm max. apart (fore-aft). Allowing for 50mm box section frame and around 5mm clearance for padding/carpet gives us the 1915mm dimension shown above.