2026

Tasmanian Model Solar Challenge, version 5, July 2026

TMSC Boat Kit Instructions

AERIUS
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TasNetworks

THE ROYAL INSTITUTION OF NAVAL ARCHITECTS

A Brief Introduction

Thanks to the generous support of Tas Networks, Aerius and the Royal Institution of Naval Architects, a free entry-level kit of parts is again available to help schools and individuals starting out in the solar boat challenge. This kit provides all the key components required to participate in the 2026 event at very little cost.

The aim of this competition is to design and build a model solar powered boat to travel along a purpose-built race pool in the shortest possible time.

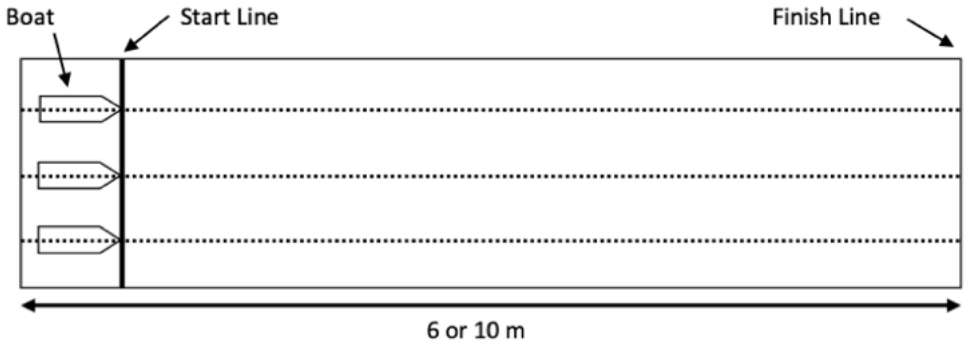


Figure: The competition pool will have 2 or more guide lines for boats to follow and race side by side

These instructions will provide some information to assist you. It's recommended that students, teachers, parents and other mentors have a bit of a read-through before getting started. Participants are encouraged to carry out some additional research before starting on their own design and you'll find plenty of examples of boats from past events on the TMSC Facebook page at:

www.facebook.com/media/set/?set=a.752439693343840

Model solar boats are typically made from a very lightweight and buoyant material such as XPS/styrofoam, foam trays, balsawood, recycled polystyrene, plastic bottles, milk cartons, etc. This choice is left up to you and is part of the design process. You're free to make modifications to the components in this kit, use only certain parts or even make/source your own.

A short video clip of a top-performing entry made from this kit can be found at this link:

www.facebook.com/tassolarchallenge/posts/pfbid0NfSayT7Z88s1owzMAJz74SJT74x6i3WAjpA8ySMHQX5vtsbqoGjtKd2rXUkJbuXhl

Key Rules

The main rules for the 2026 Tasmanian event are:

- There are two age divisions. One for children up to Yr6 and the other from Yr7-Yr12.
- Boats cannot be longer than 550mm and must not be any wider than 300mm.
- All boats must race earlier rounds using a 6V solar panel issued by the TMSC. Teams are permitted to use an alternative panel in later knockout rounds as long as the cell area is less than 350 sq cm.
- Boats in the primary school division must use a motor that costs no more than $12 AUD. There's no cost restriction in the secondary division.
- Boats must have a way of following the pool guide wires. Each lane will have its own line suspended at 200mm above the water surface.

Please download the full set of rules for this year at:

www.tassolarchallenge.org/regulations/

For younger students it may simply be a case of completing a boat that will make it to the finish line. Older students are typically better equipped to attempt some more advanced designs that can really push the limits in performance.

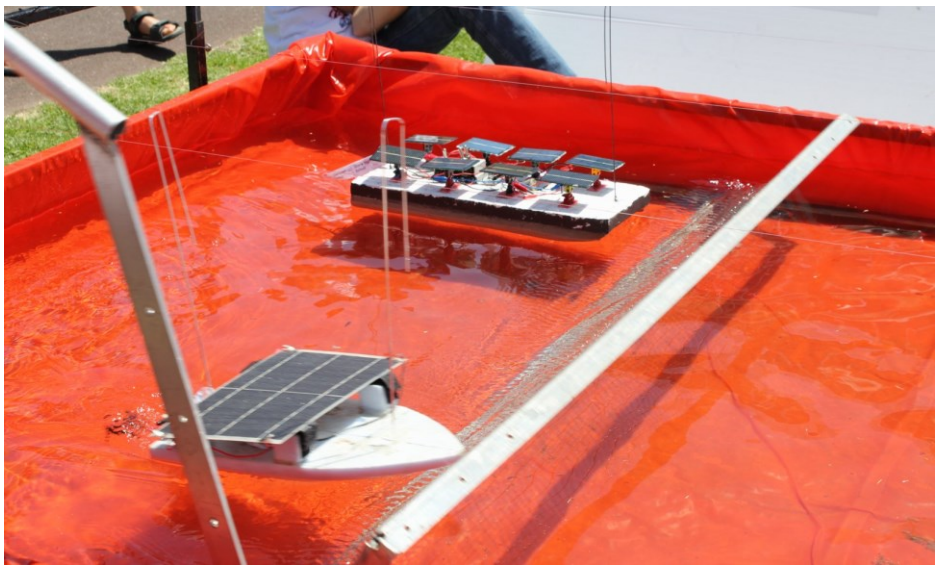


Figure: A couple examples of boats shaped from styrofoam or polystyrene

A Few Quick Design Considerations

Some of the key areas to take into account when designing a model solar boat include:

- Hull Type - Planing vs Displacement Hulls. Planing hulls are intended to skim over the water and are capable of obtaining much faster speeds at higher sun levels. Displacement hulls push water around the boat and are more efficient in overcast conditions.
- Mono vs Multi Hull - Catamarans and Trimarans are typically more stable.
- Buoyancy - The boat must be able to support its own weight, including the solar panel, without sinking.
- Surface Finish - A smooth, water-resistant hull will help reduce boat drag.
- Weight - Boats that weigh less accelerate more quickly, are faster due to displacing less water and need less power to plane.
- Shaft Angle - The angle of the propeller shaft determines how much thrust goes into lifting the boat up out of the water and how much drives it in the forwards direction. There will be a balance between the two that optimises boat performance.
- Solar Panel Tilt - Solar cells produce the most power when facing the sun at 90 degrees. Tilting the panel may give a power advantage but can also make the boat less stable or catch more of a headwind to slow it down.
- Solar Panel Shading - Accidentally shading even a small section of the solar panel can drastically lower its total power output.
- Stability and Weight Distribution - More stable boats are less likely to roll over and sink. An unbalanced boat that's too nose or tail heavy will affect how it floats on the water and performs.

Kit Components

This kit contains many similar components to the JUNIOR SOLAR BOAT KIT available from Scorpio Technology. In fact, we include a Scorpio SM403 motor due to its excellent performance for under $12 (the cost limit in the primary division).

A list of the included parts is given below. You'll become more familiar with these as you go through the kit and start building your boat.

- 1x SM403 solar boat motor (valued at less than $12)
- 1x Yellow plastic propeller shaft tube
- 1x Carbon fibre propeller shaft with 2-bladed propeller
- 1x Silicon rubber coupling piece
- 2x Carbon fibre guide poles
- 1x TMSC 6V 5W solar panel (80g, 270mm x 130mm)

Figure: A layout of the key components included in the TMSC boat kit

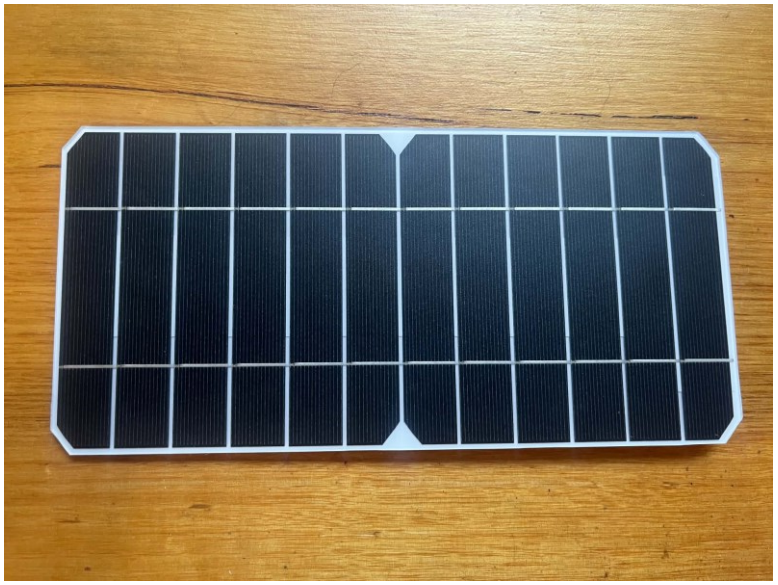


Figure: The new TMSC solar boat panel is approximately 270x130mm in size

Kits in 2026 now include a new 6V 5W solar panel. These are a low-cost panel which make it possible for the TMSC to supply one to each team and helps keep the competition accessible to everyone. Please note that all teams will need to use this panel in the earlier rounds of the 2026 event. If you're using an older kit or your own set of parts then please get in touch so we can organise getting a panel out to you.

Some Additions

It's possible to use a better solar panel to power your boat in the later knockout finals. Here's a bit more information about sourcing your own, upgrading your kit motor or adding an electronics maximiser.

Solar Panel

Many different solar panels were once used in events across Australia. Teams were measuring and making up their own panels by sourcing and combining smaller modules, even bare solar cells. The goal was to produce the lightest and most powerful solar panel while keeping under the allowable size limit.

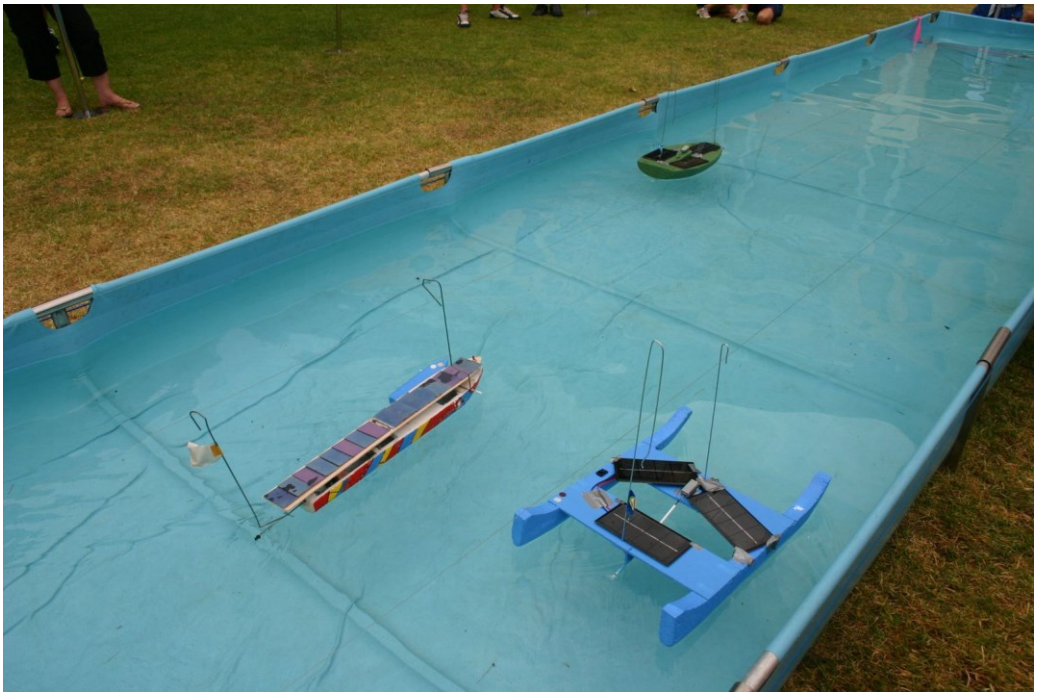


Figure: Examples of some different solar panels that teams used to race with

You can still do this but there's now an easier option. Scorpio Technology in Victoria and Kitesite in NSW offer panels designed specifically for the solar boat competition. The power output of these is hard to beat since they're made using good quality solar cells and have the area set right up to 350 sq cm limit. They're also designed to be very light weight and use only a pair of thin fiberglass/polymer sheets to encapsulate the cells. The final result is something that's a bit lighter and more powerful than our new standard TMSC panels.

The three panels worth considering are listed below. Scorpio Technology's SOLAR26 has the best specifications but they're also the most expensive.

SOLAR26
Supplier: Scorpio Technology www.scorpiotechnology.com.au
Cost: $117
Specifications: 5.5-6W+, 50g, 250x160mm. Two 3.5V strings of cells for series or parallel wiring

SP60B
Supplier: Kitesite/Kite Magic www.kitesite.com.au

Cost: $65
Specifications: 5.5W, 70g, 250x160mm. Two 3.5V strings of cells for series or parallel wiring. Marginally heavier and less powerful than the SOLAR26.

SP60F
Supplier: Kitesite/Kite Magic www.kitesite.com.au
Cost: $43
Specifications: 5.5-6W+, 100g, 280x150mm. Two 3V strings of cells for series or parallel wiring. Good power output but heavier than the other two panels.

Purchasing your own panel will give you total control over how to wire up and use it but not everyone will be in a position to get their own. For these finalists the TMSC will provide some alternate panels. These will come wired with a set of mini female spade connectors that fit directly onto the SM403 kit motors. If have another type of motor then you'll need to use a set of male spade or crocodile clips to connect to the panel.

Figure: Any other panels supplied by the TMSC will come with mini spade connectors that fit directly onto the kit motor terminals

Motor Upgrade (Secondary Division)

Winners of the past three secondary competitions have used the motor included in this kit. This doesn't mean that a better motor wouldn't have improved their performance but rather demonstrates that the design and build quality of the boat itself is what's most important. Top primary school boats can often outperform high school teams even if their motor isn't as good.

There are plenty of options for students looking to upgrade their boat motor but the most common one used is the German-made Faulhaber 2232. This is the top-performing option in the model solar car event and readily available here in Australia from Scorpio Technology ($133.64). It weighs approximately 20g less than the kit motor and is up to 20% more efficient at peak power.

Electronics Maximiser

An electronics controller, often referred to as a maximum power point tracker, maximiser, optimiser, or starting-current multiplier, can drastically improve the performance of a model solar car. These boards help deliver more power to the motor at a greater range of loads and shaft speeds which is particularly useful when a car accelerates from a standstill.

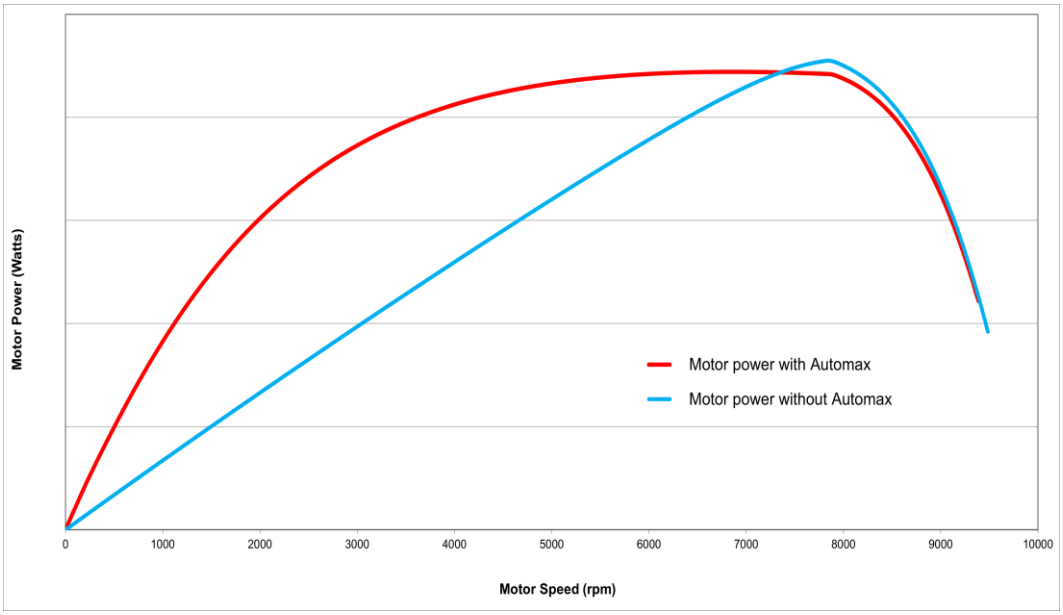


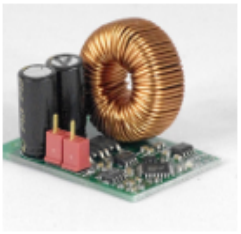
Figure: An electronics controller like the Automax isn't 100% efficient but can deliver more power across a greater range of motor speeds

The effectiveness of such a controller is less clear in the boat event since top speeds are reached far more quickly and the propeller is already free to spin in the water at the start line. The added weight of such a controller is also much more significant in relation to the overall weight of a solar boat (<300g) compared with that of the cars (>700g).

Adding a controller may be a bit advanced for younger participants but high schools might like to investigate this a little further, especially if a motor like the Faulhaber 2232 is being used. There are a couple of electronics options we recommend from Scorpio Technology and they are as follows:

1) The Automax ($133.73) which comes fully assembled and continually tracks the maximum power point of any connected solar panel.

2) The Picaxe 08M2 Solar Panel Controller which must be self-assembled and soldered together but costs much less ($30.61). It's a great lower cost alternative and provides students with an additional learning experience in electronics and circuit board assembly. Just be sure to ask Scorpio to send you the pre-programmed Picaxe chip unless you're interested in playing around with loading the program onto the microcontroller yourself.



AUTOMAX SOLAR MPPT

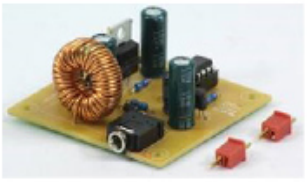
Code: AUTOMAX

AutoMax is a computerised Maximum Power Point Tracker.

This unit holds the solar panel's output voltage at its Maximum Power Point voltage regardless of the load conditions. Assembled and tested.

Includes Deans Micro plugs.

$133.73



SOLAR PANEL POWER CONTROLLER (SPPC)

Code: PICSPPC08M

The *PICAXE08M2 SOLAR PANEL POWER CONTROLLER* controls a solar panel's output voltage to its maximum power point voltage irrespective of load. This results in the transfer of all the available solar panel power to the load. Depending on the load characteristics this circuit can provide a significant multiplication of the current available from the solar panel into the load.

For a motor this means increasing its torque, especially useful when a car is accelerating from a standing start. This feature also allows a motor to start and operate at a much lower light intensity than is possible with the motor directly connected to the solar panel.

The unit automatically sets the appropriate control voltage on start up.

While it was specifically designed to operate with a Scorpio No. 26 Solar panel it will operate with any solar panel that has an open circuit voltage between 7.0 volts and 10.0 volts and a short circuit current between 0.1 amp and 1.0 amp.

***PLEASE NOTE**: The PICSPPC08M2 is supplied with a blank PICAXE chip, that requires programming. A PICAXE download cable (PICUCAB) is required. Pre-programmed chips are also available on request when ordering.*

$30.61 (1-19); $28.47 (20+)

Figure: Scorpio's two electronic controller recommendations

Being a boat competition there's going to be a chance of the electronics getting wet and shorting out. This can ruin the controller so you may want to look at how to protect against this happening or at least minimise the risk.

Tools Required

Some of the basic tools recommended to assist you in completing your boat are as follows:

- Paper, ruler and a pencil/pen/marker
- Scalpel or stanley knife
- Sandpaper
- Hot glue gun and glue sticks
- Scissors
- Serrated knife (ie steak or bread knife) or hacksaw
- Scales - to compare materials and weigh your boat

Other equipment may also be required depending on the choice of hull material and complexity of design. For example, a hot wire foam cutter may make it easier to cut and shape a hull made from styrofoam or polystyrene. A 3D printer may be used to make up specialised parts like hydrofoils, motor mounts, guide pole anchor points, etc.

Teams looking to purchase their own solar panel or use a different motor will likely also need some soldering equipment to wire everything together.

Kit Assembly

In this next section we'll take a look at how the kit parts go together. Knowing this you'll then be able to have a think about how to include them as part of your own design.

A quick overview of the entire setup is given in the example below:

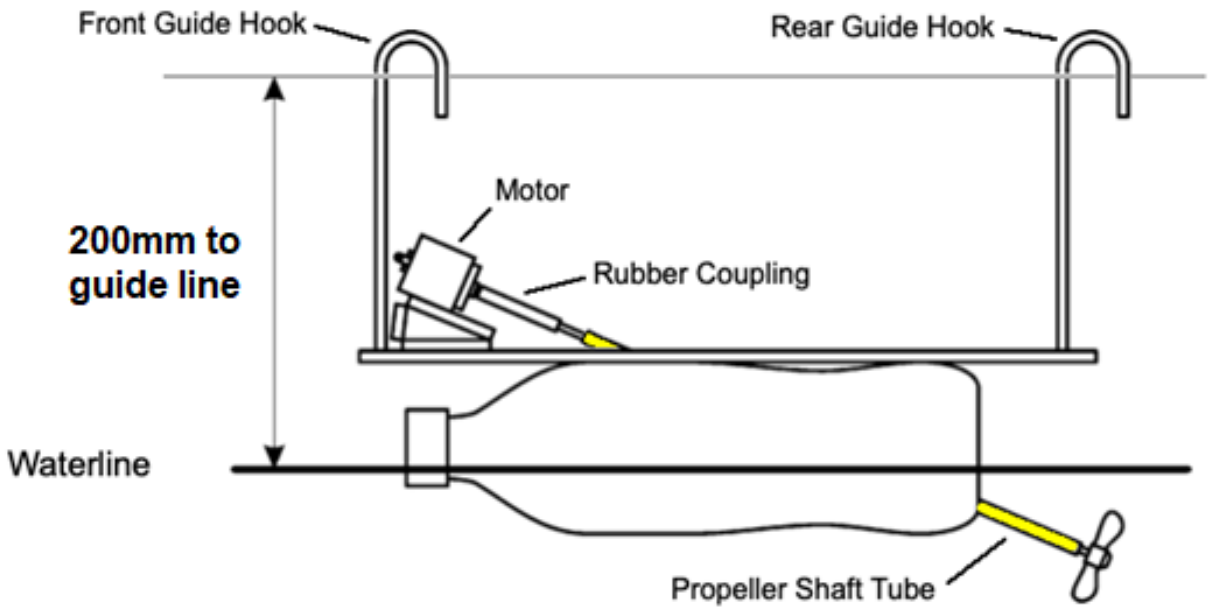


Figure: The kit as part of a recycled bottle-based design

Yellow Shaft Tube

The yellow tube in the kit has had a short white plastic bush inserted at each end. This helps reduce friction as only the very ends are then in contact with the spinning propeller shaft.

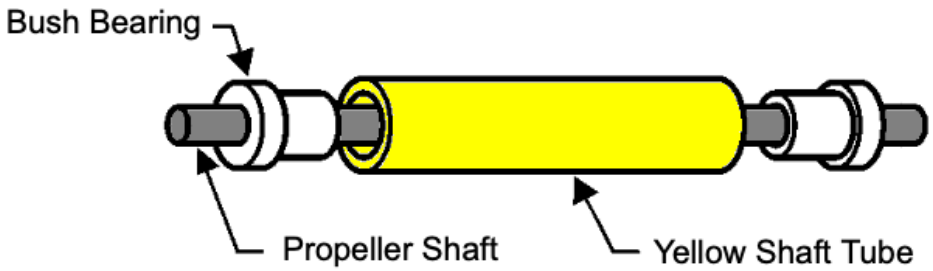


Figure: A diagram showing an exploded view of the guide tube with bush inserts

This needs to be fitted to your boat in such a way that ensures the propeller ends up being submerged in the water. A thin wooden skewer is often enough to make a guide hole through the bottom or rear of any polystyrene or styrofoam design. Balsawood or plastic will need a scalpel or knife to cut a hole or slot for the tube to pass through. Whatever the design, fit the yellow tube at an angle and position you're happy with. A small amount of hot glue is most commonly used to hold it in place.

Figure: An example of the yellow tube pushed through the back of a styrofoam hull

Make sure that the tube remains perfectly straight. Any bend will start applying pressure on the propeller shaft and affect how easily it can spin. Also be careful if you plan on shortening the tube. You'll need to insert a new bush where you make the cut or the shaft will otherwise wobble around since it'll have far too much play. You can either try to recover the white bush out of the section that's been cut off or contact us about getting a replacement.

Propeller Shaft

The propeller shaft consists of a 2.5mm diameter carbon fibre rod. This is significantly lighter than the steel one supplied in Scorpio's JUNIOR SOLAR BOAT KIT and will help reduce the weight of your boat.

The shaft is approximately 80-90mm longer than the yellow guide tube. This should give plenty of length for the propeller to reach the water. Teams interested in shortening the shaft can easily do this by removing the silicon coupling and making a cut. Younger students may require an adult to help them with this.

Use a fine-bladed hacksaw, serrated knife or even a Dremel cutoff wheel but avoid pliers or side cutters as these will crush and split the carbon fibre. Clean the end up with some sandpaper or a file after cutting.

CAUTION: Any cutting or sanding of carbon fibre should be done in a well-ventilated area outside or under an extraction fan in a workshop. Consider using a dust mask to help reduce the risk of inhaling any airborne carbon particles.

The forward thrust and vertical lift created by the propeller will vary according to the angle of the shaft. The diagram below shows how the magnitude of these forces will change with angle.

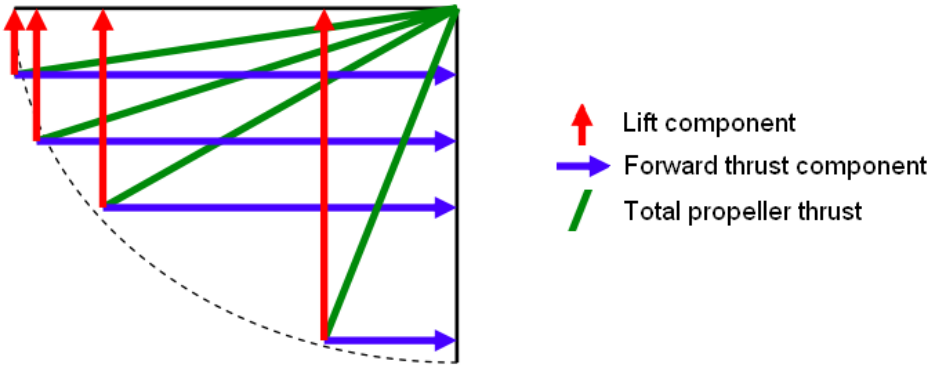


Figure: Lift and forward force will vary with the angle of the propeller shaft (green line)

Looking at this you may come to the conclusion that a perfectly horizontal propeller shaft gives the most forward thrust. This is technically correct but how would it be implemented without submerging or dragging the motor through the water? A small angle is instead more practical and only slightly reduces the forward thrust. Some lift can also be beneficial to assist with planing. Teams may like to experiment with different angles and determine what works best for their particular design.

Propeller

A 2-bladed propeller is included and comes fitted to the shaft. These are sourced from either Scorpio or direct from China and both versions give virtually identical performance. It will be up to teams to ensure their propeller spins in the correct direction on race day. If not, this is easily fixed by switching around the wiring polarity on the motor terminals.

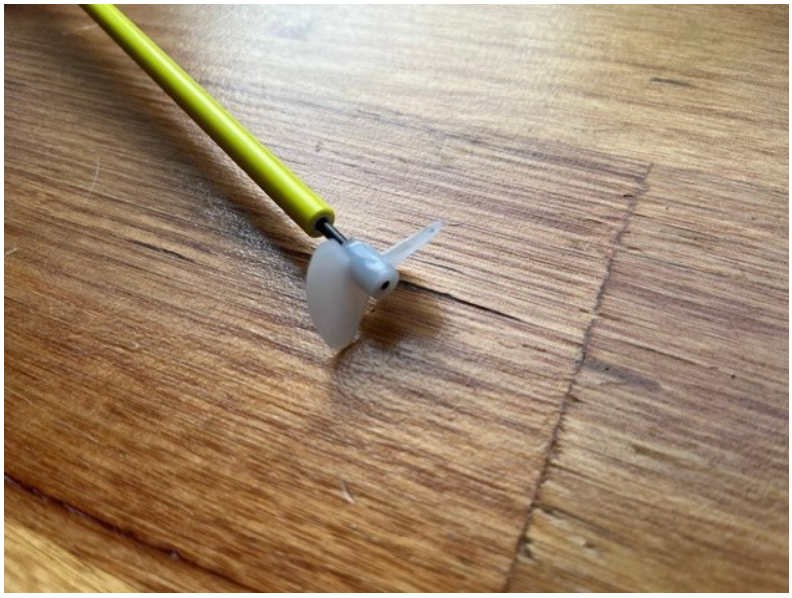


Figure: Each kit is supplied with a 2-bladed nylon propeller

The kit propellers give some great baseline performance and many top boats have used them in the past. Better options are almost certainly out there but we'll leave this up to you to investigate. Ian Gardner in Victoria has performed static thrust tests on various props and this is the first bit of data we'd recommend having a look at. You may be able to find information on this online or otherwise contact us for some more details.

Shaft Coupling

A short piece of silicon tube is supplied. This connects the motor and propeller shafts together and provides sufficient grip strength without any slippage.
Teams using a different motor and propeller combination, a gearbox or an electronics maximiser may need to consider switching to a more rigid or even solid coupling capable of transferring higher turning forces.

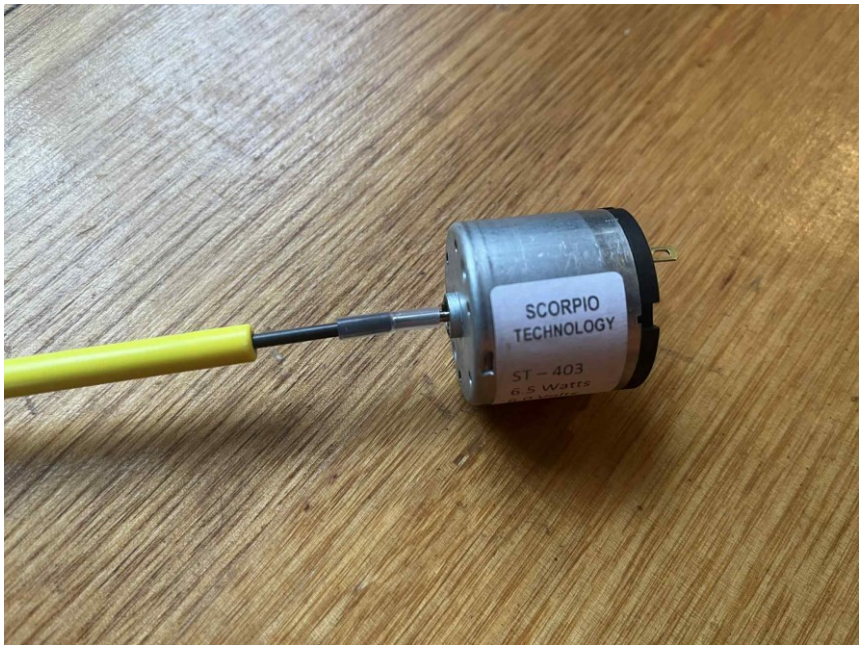


Figure: A short piece of transparent silicon tube connects the motor and propeller shafts together

The two shafts must be perfectly aligned to minimise any power loss. Shaft misalignments or shafts at different angles should be avoided if possible. Also make sure there's a clear gap between the coupling and the stationary motor face or yellow tube. This is important since any contact or rubbing against these will slow or evening stop the motor from spinning altogether.

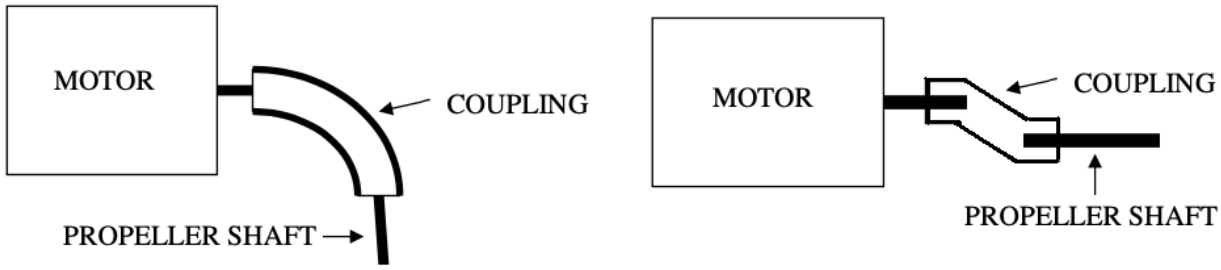


Figure: Two examples where shafts have not been aligned

Motor Placement

The kit motor weighs approximately 80g. This is the single heaviest component and will make up a significant proportion of your overall boat weight. Placing this too far forward or too far back can make your boat nose or tail heavy. Teams often try to correct any imbalance by adding counterweights as an afterthought. Looking through photos from past events you'll notice numerous boats with large nuts, washers or even coins added for balance.

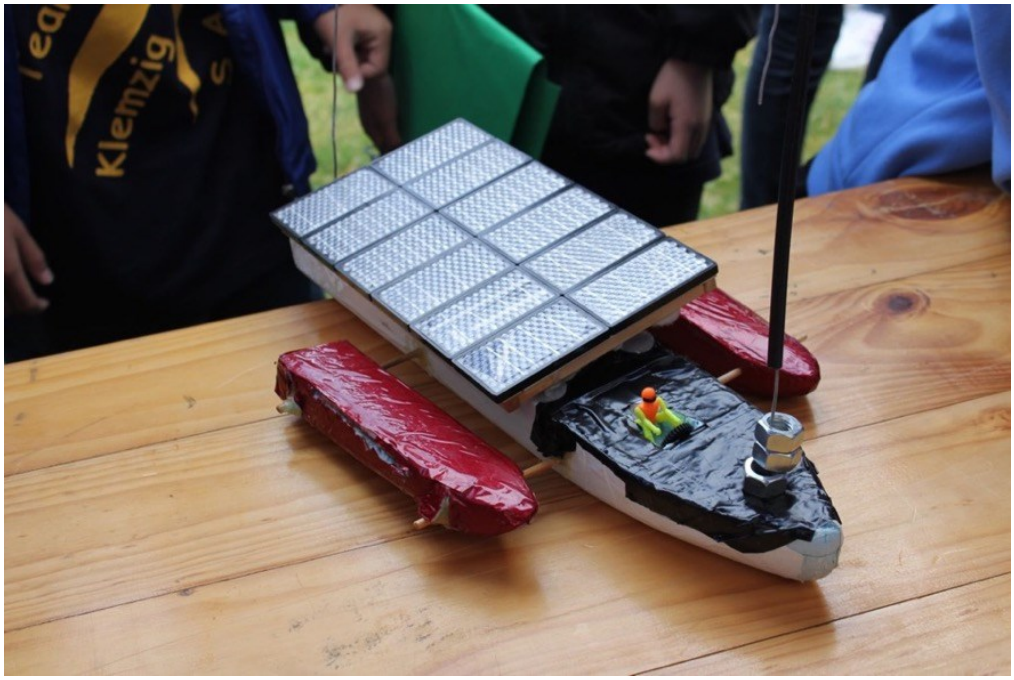


Figure: An example where several large nuts have been added as a counterweight

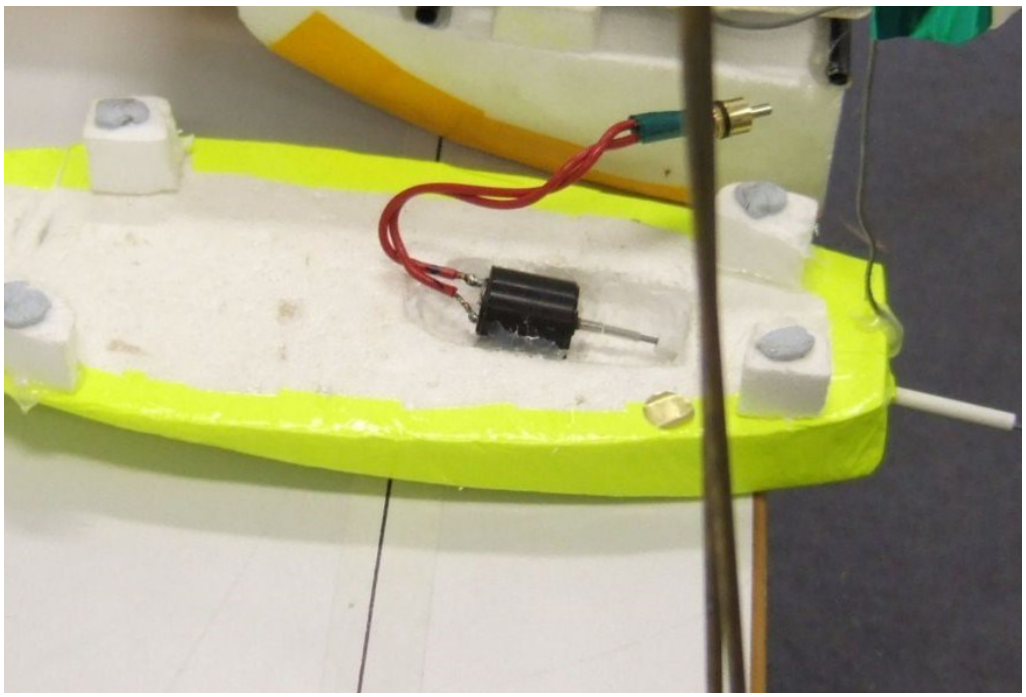


Figure: A small amount of hot glue might be all that's needed to seat and hold the motor in place

Adding weight for balance should be avoided at all costs if you want to make your boat as light and fast as possible. It's therefore recommended that teams consider the balance of their boat at a time when it's still easily adjusted during the build process. Sit your boat in a sink or tub of water and move the motor and solar panel around before deciding on their position.

There are several ways to secure the motor in place. Perhaps the easiest and most common method is by hot glue. This works well but doesn't allow the motor to be moved or adjusted again unless breaking it loose. Another option might be to instead attach it to a motor mount by tape, cable ties, rubber bands, etc. This mount can then be fixed in place but the motor itself still be removeable and free to adjust.

Guide Poles

2x guide poles are provided in the kit. These are used to help guide the boat along the length of the race pool. The guide lines consist of fishing line and are spanned tightly between the pool ends at 200mm above the water.

Some designs may get away with using just a single guide pole at the front of the boat. This would help save on some boat weight but needs to be tested. If there are crosswinds on race day then even one of these boats will likely need a pole at the rear or you'll risk getting blown sideways and off course.

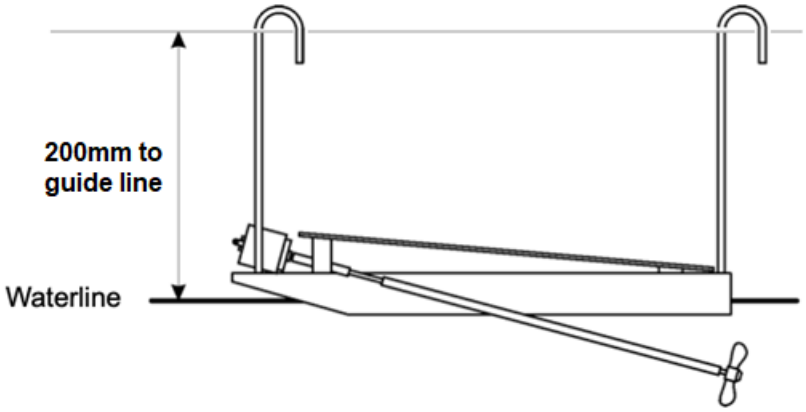


Figure: A boat diagram with front and rear guide poles attached

The poles come in approximately 250mm lengths and teams may need to shorten them to suit their particular design. The front and rear may also need to be different lengths depending on where they're attached and how the boat sits on the water. If the poles are left too long then the hook will never engage with guide line but too short and the boat will be left hanging from the line, either slowing it down or preventing any movement at all.

Figure: The hook at the top of the poles is intended to slip over the guide line

It's recommended that teams only cut down and attach their poles after having completed the rest of the boat and tested how it sits on the water under full race weight. Teams may also need to allow for some further adjustment to account for different heights when the boat is in motion. For example, a boat that planes will likely sit higher on the water when racing. Poles can be cut down as per the propeller shaft with a hacksaw, serrated knife, Dremel, etc.

Have a bit of a think about how to attach the poles and whether these should be glued in place or made detachable. Removable guides will make the boat much more compact and easier to store away or transport. Just be careful that the hooks are attached rigidly enough to remain at 90 degrees to the guide line. You don't want them accidentally twisting and start acting like a brake.

It can be a good idea to bulk up or add some extra material where the poles get attached. This makes the anchor points a lot stronger and more robust. Styrofoam designs might simply use some excess material that's been left over when cutting the hull to shape. The following example shows a boat where the team has used a bottle cork.

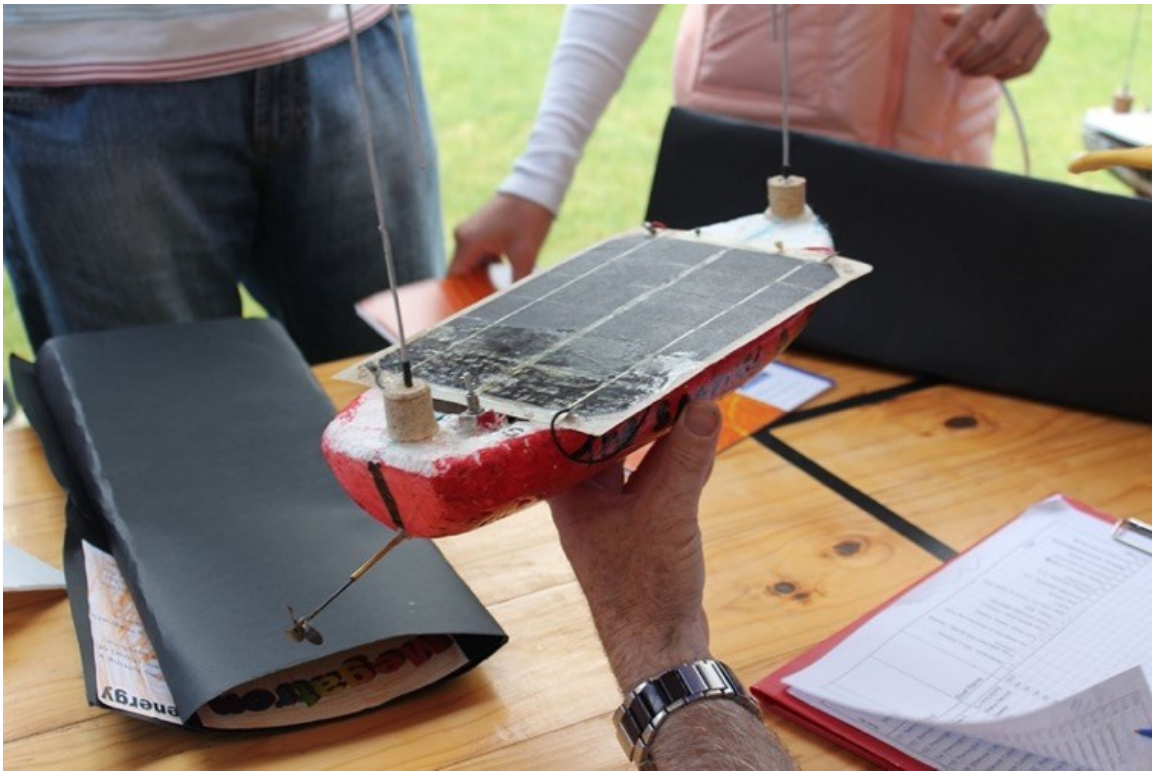


Figure: An example where a bottle cork has been used to help anchor the guide poles

Solar Panel Placement

The TMSC solar panel now being used in earlier rounds weighs approximately 80g. Its placement plays an important role to the overall balance of your boat. Teams may like to investigate its orientation and also shift it forwards/backwards to see how this affects balance and performance. Most panels are just held in place using velcro so it's just a matter of moving the pads around.

If you intend on using a different panel in the later rounds then you'll need to design your boat to be compatible with both types. This is easy if you've gone ahead and purchased your own.

If you're not buying one and instead relying on what's being supplied then you might like to cut out and use a piece of cardboard of the same size. The SOLAR26 and SP60B panels are both approximately 250mm x 160mm wide.

Please note that many designs end up with a raised motor so there's no flat surface for the solar panel to sit on. This problem is usually solved by adding some extra blocks to support the panel as seen in the following example. You may need wider or additional blocks so your boat can support different types of panels.

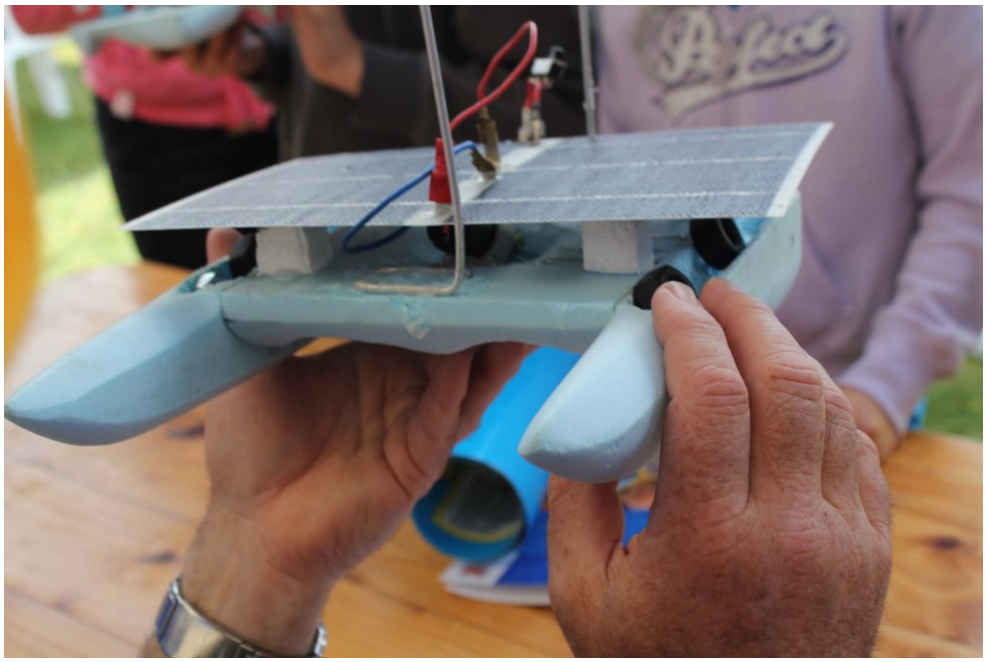


Figure: Extra blocks are often required to raise the solar panel above the motor

You're free to fit your own solar panel in any way you like (tape, Velcro, blue tack, rubber bands, screws, hot glue, etc). Teams given a panel for the finals will however need to attach this using the accompanying Velcro strips.

Panel Tilt and Shading

Individual races are run for only a few seconds at a time and in a straight line. This means that the position of the sun isn't going to change from start to finish. It's sometimes possible to take advantage of this and tilt the panel towards the sun to produce more power. The impact of this will be most significant during morning races when the sun is still lower in the sky. There will be little to no difference once the sun climbs to almost directly overhead around midday.

Be careful as steep solar panel angles can raise your boat's centre of gravity and make it less stable. Such orientations can also act as a sail and catch the wind causing the boat to slow down or be blown off course.

Teams should also be very careful not to shade any part of their solar panel. Shading even a small section can drastically affect the amount of power it will produce. Designs should ensure that the only possible shadows on the solar cells, if any, are limited to those of the thin guide poles.

Cell Temperature and Panel Covers

Solar panels produce around 0.5% less power for every 1°C rise in temperature. This means that a cold panel will generate significantly more power than a hot one. Light weight boat panels will heat up very quickly when left out in the sun and can easily reach over 40°C even on a 20°C day. This results in approximately a 20 x 0.5% = 10% loss of power where an otherwise 5W panel will drop to 4.5W!

Students should take a note of this and consider remaining in the shade or having a panel cover to help prevent it from heating up whenever they aren't racing. Even just sitting a piece of paper over the solar cells while waiting at the start line can help.

Top teams have occasionally taken this to the next level and used ice or cooling sprays to gain an edge over their competition. Such practices are permitted but please be careful not to damage your panel in the process.

Hull Design, Weight and Materials

Many different hull designs can be seen across the marine industry. These have all been engineered with a specific purpose in mind. Most can be classed as being either a planing or displacement-type design and teams are encouraged to do some research on this before starting on their solar boat. You might like to check out the following pdf as a starting point:

www.tassolarchallenge.org/wp-content/uploads/2024/10/Boat-Design-1.pdf

Pure displacement hulls like canoes or large cargo ships are designed to move efficiently through the water at relatively low levels of thrust. The most efficient designs will have smooth rounded curves for least resistance and a minimal wake. How fast these can travel is largely governed by the hull speed equation which relates to the waterline length of the boat. Speeds plateau at around this point even if you increase the propeller thrust.

Planing hulls like speed boats are designed to generate lift and move the boat over the top of the water much more quickly. Parts of these designs tend to be less rounded and may even have steps to help boats plane at lower powers. Such shapes however make them slower and less efficient at low speeds when planing isn't possible.

Planing requires a certain amount of power and flat bottom hulls typically require the least. Such designs are most commonly seen on inland lakes, swamps and rivers where the water is generally calm and flat. Most open-water speed boats are V-shaped for rider comfort and stability in wilder conditions but this isn't much of a concern in the model solar boat competition.

The following video shows a solar boat race where planing occurs:

www.facebook.com/tassolarchallenge/videos/807747836993806/

Such boats can cover the length of the race pool in 3-4 seconds in full sun. If there isn't enough sun then there won't be enough power to plane and a displacement type design will be more efficient.

Weight is super critical in solar boat racing. Every extra 5-10g will slow you down and teams should be aiming to make their boat as light as possible. Top boats can weigh under 300g including the solar panel. A set of scales (ie electronic kitchen scales) are incredibly handy to compare weights of different materials and designs.

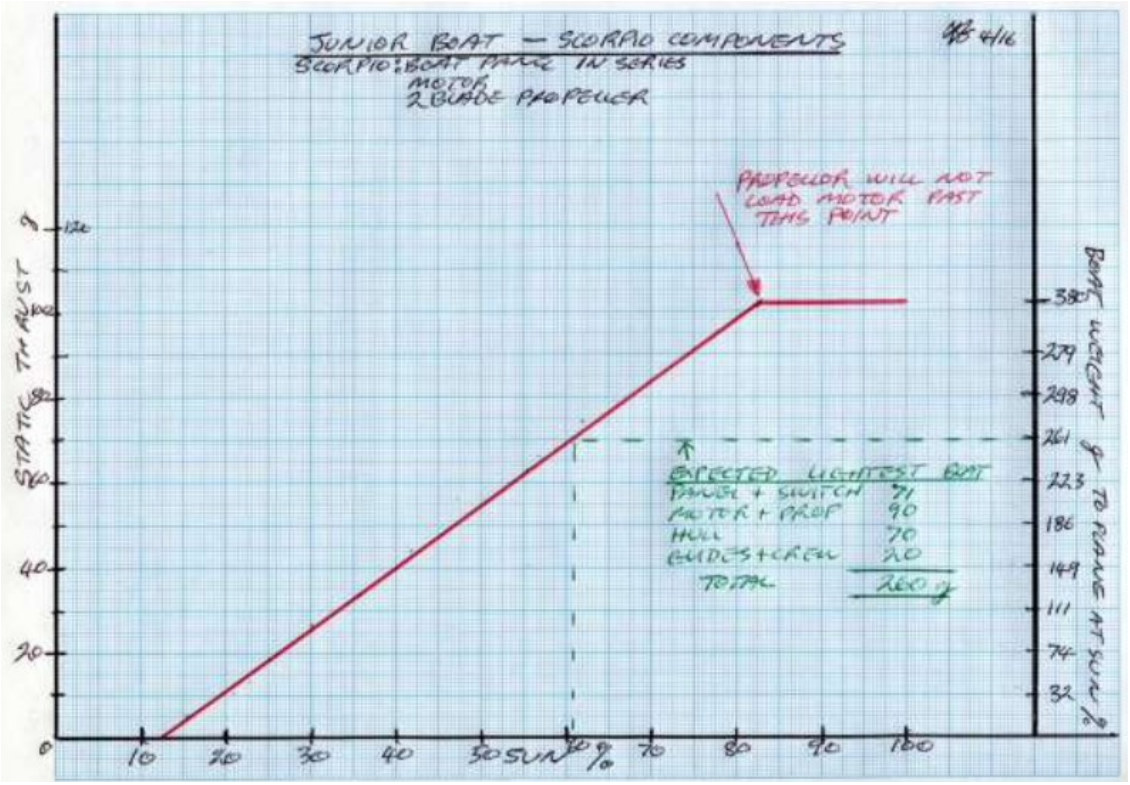


Figure: A plot relating how much sun % is needed for boats of different weights to plane.

The above plot comes from a solar challenge expert in Victoria and looks at how boat weight affects the amount of sun needed for it to plane. The lighter you can make your boat the less sun is required. The lightest expected boat here comes in at 260g but something under 200g could even be possible with a SOLAR26 panel and the components in this kit.

The most common light weight material used in the boat competition is Styrofoam or XPS foam. This comes in large sheets of various thicknesses and is generally used as an insulation product in the construction industry. This can be cut and sanded to any shape and hollowed out to reduce weight even further. You can also cut it into strips to make a multi-hull design like a catamaran or trimaran.

XPS typically comes in thicknesses of 10-50mm and large 2.4 x 0.6m sheets are available from some Mitre 10 trade centres. Or you can grab a smaller 1.2 x 0.6m one from Bunnings. They have 30mm sheets for under $20 which should give you enough material for a whole classroom of boats:

www.bunnings.com.au/bastion-1200-x-600-x-30mm-xps-multi-use-foam-board_p0461085

You can cut one of these sheets up into twelve 400mm x 150mm rectangular blocks and students then design from there. Scorpio Technology also stock conveniently-sized Styrofoam blocks if you're already doing an order from them anyway.

Styrofoam can be cut with a scalpel, utility knife or other sharp blade but a safer and cleaner option would be a hot-wire cutter. Some schools are using one like this:

www.hobbytools.com.au/proxxon-hot-wire-foam-cutter-bench-model-thermocut/

This Proxxon unit is perhaps one of the best quality products out there but does come at a considerable cost. Perhaps worth it if the school intends on building solar boats for several years or can use the device for other activities but similar, lower cost alternatives are also available from eBay and work nearly as well:

www.ebay.com.au/itm/388069493055

Foam trays like those seen in the meat section of supermarkets are also an option. Scorpio stock several sizes and the following example was made from a 14 x 11 inch tray. These "meat" trays are available from elsewhere but you'll normally need to buy them as a large pack of 50+ pcs.

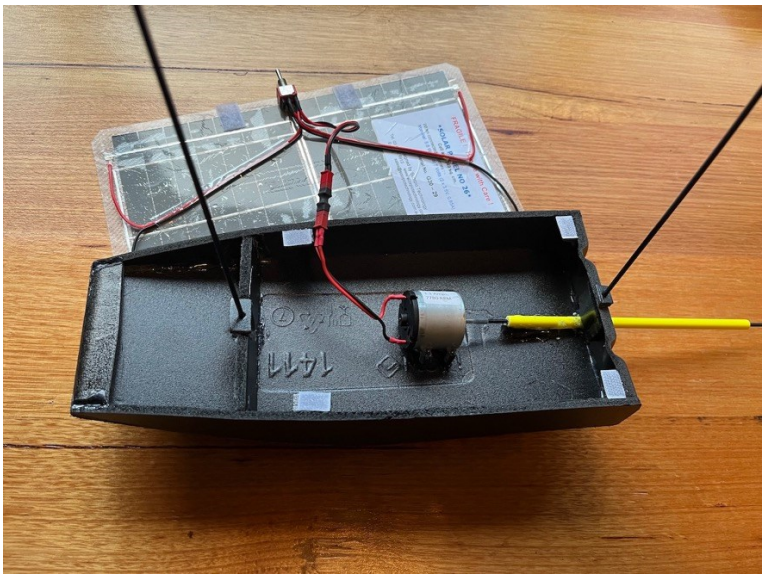


Figure: A 14 x 11 foam tray was used to make this example boat

Another couple of very light materials worth considering are balsa wood and depron. Recycled materials also offer a zero-cost option and there's often an award presented to the boat that's made the best use of these. Polystyrene packaging is similar to Styrofoam but less dense and won't sand as well to give a nice smooth finish. Plastic bottles are often used to form the basis of a catamaran type design but a way of connecting the two hulls and mounting the motor will be needed.

Some materials require special glue, waterproofing or a coat of paint to give the best results. Styrofoam designs generally start out as a larger block and are then cut down, shaped and hollowed out. These will need very little glue whereas boats made from thin balsa or foam sheets will instead need much more to stick everything together.

Hot glue will work well on a lot of materials to hold the motor down in place. Be careful as too much may melt a hole in thinner sheets of foam.

Solar Panel Wiring

The new mandatory panels come wired with two mini spade connector that slide directly onto your kit motor terminals. There is no on/off switch included (to help minimise weight) and you can reverse the rotation of the motor by simply swapping around the wires. These panels have a single string of solar cells connected in SERIES and will run your kit motor in most conditions. Down to what light level will depend on how freely your boat shaft spins.

Not only are the panels from Scorpio Technology and Kitesite/Kite Magic lighter and more powerful but they also come with two independent strings of solar cells. These can be connected together in SERIES or PARALLEL. In PARALLEL you can still get the motor spinning at very low sun levels even when this is no longer possible in SERIES.

The propeller is included in the kit truly only optimises your boat performance at a small range of sun levels. You would likely need to swap it out with a few other sizes to get the best result across all light conditions. The added benefit of being able to switch these solar panels between SERIES and PARALLEL is that it now gives two optimal sun level regions per propeller. This would help cut down on the different number of propellers needed to get the absolute best out of your boat across all conditions.

Please see Scorpio Technology's "SERIES and PARALLEL" pdf for some details on wiring up your own panel like this:

www.tassolarchallenge.org/wp-content/uploads/2024/10/Solar-Panels-SERIES-and-PARALLEL.pdf

This covers the wiring based on a SOLAR26 panel but the same principles apply to any two matching solar cells or strings. Any finals panels provided by the TMSC on race day are wired according to SECTION 4 and use a 3-position (ON-OFF-ON) double-pole double-throw switch to easily switch between series and parallel. Such a switch is available from both Scorpio Technology or your local Jaycar. You can also see from the file's test results how the panel configurations affect propeller thrust at different sun levels.

If you're looking for the mini spade connectors that fit onto the kit motor terminals then you can buy a pack of 10 from Scorpio or grab them in packs of 15 or 100 from Jaycar (sold as Phone Type Crimp Lugs).

High school teams looking to investigate the use of an electronics unit will need to insert this between the solar panel and motor. The maximiser instructions will give you a bit more information but the end result should make the wiring simpler (this device needs the solar panel to always be in SERIES).

Testing

The best way to see how your boat performs is to test it is in a race-like setting across several metres of water. It will be possible to test and make small modifications on race day itself but bigger changes will likely need you to have done some testing before the competition. This might not be possible for everyone but there are still a number of ways to test your boat even if you don't have a boat pool. We'll go over this in some more detail in the next update of these instructions but our number one tip is to fill up a sink or tub and simply see how your boat is

sitting on the water. Does it float as intended? How is its weight distributed? Is the propeller submerged in the water? Are the poles set at the right height for the guide line? Are there supports to give a flat surface for the solar panel to attach to?

Summing Up and Further Help

These instructions have been put together to cover the basics of how a solar boat can be built for the 2026 competition. Some extra information and tips have also been included to hopefully help you along the way.

Some of the simplest entries can be put together in just a couple of hours while more complex designs will take much longer. For a bit of further information please head on over to the Tasmanian or Victorian websites. Our facebook page also contains plenty of photos from past events which may give you some ideas.

Ian Gardner's Boat Design Guide offers a comprehensive read for anyone wanting to get their teeth stuck into some of the more technical aspects of model solar boats:

www.tassolarchallenge.org/wp-content/uploads/2024/10/MODEL-SOLAR-BOAT-HELP.pdf

This is now an old file where many of the propellers, motors and solar panels are no longer used (or exist) but it still covers useful topics and test setups that remain relevant today.

Or feel free to contact us. We're more than happy to answer any questions about the rules, kits or anything else Challenge-related. We can sometimes even send someone along to your school if you need any extra help getting started.

Good luck and we look forward to seeing you on race day in Term 4!

Tasmanian Model Solar Challenge

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