TMSC

School Solar Challenge

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TASMANIAN
MODEL SOLAR CAR CHALLENGE

2025
REGULATIONS

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TMSC COMMITTEE

The Tasmanian Model Solar Challenge Committee is a voluntary body consisting primarily of University of Tasmania undergraduates, DECYP teachers, engineers and other past competitors and will hereafter be referred to as the TMSC. The TMSC is tasked with coordinating the Tasmanian division of the Australian-International Model Solar Challenge.

1. INTRODUCTION

1.1. Overview

The Model Solar Car Challenge aims to deliver first hand education to young people in the areas of Science, Technology, Engineering and Mathematics. The event has been designed to provide students with a practical learning experience in designing and building a solar powered vehicle, gain an understanding of the engineering processes involved and recognise the importance of renewable energy for a sustainable future. It also gives students an opportunity to work together as a team and demonstrate, apply and effectively communicate their ideas and learnings.

1.2. Interpretation of Regulations

The nature of the event is to promote learning and encourage thinking outside the box. Everything in these regulations is open for interpretation but please check with the TMSC if uncertain whether an interpretation may give an unfair advantage and be ruled against later on.

1.3. Contact and Correspondence

All correspondence should be emailed directly to the TMSC at miseli@utas.edu.au

2. ENTRIES

2.1. Competitors and Number of Entries

The competition is open to anyone currently studying up to and including Year 12 in Tasmania. There is no limit to the number of entries from schools, STEM organisations and private individuals. Multiple entries are permitted from a single team provided that at least one unique student can be assigned to each vehicle.

2.2. Original Work

Each team must design and build an original solar powered vehicle and not simply re-enter a car from a previous year. Teams are permitted adult assistance with more complex manufacturing processes, use commercially available components, or reuse parts from a previous car, but the overall design and construction must be original and the work of the students.

3. COMPETITION

3.1. Track Type and Racing Format

Racing will take place on a specially constructed track with a smooth-running surface. This will be either a 2-lane figure-8, with a low bridge at the crossover point, or a flat single-lane oval.

A start gate is located on the downhill slope of the figure-8 track and racing generally held over a single lap of approximately 100m in length. Competition on the oval track will take place as a pursuit race where cars start on opposite sides and travel in the same direction. Pursuit races may be started on the flat or a short removable downhill ramp and run for several laps.

The racing format will be decided by the TMSC and communicated to teams prior to or at the event. Earlier rounds are typically conducted as a series of round robin races and cars then ranked on their performance for a final knockout competition. Figure-8 races may be extended from a single lap to two laps in finals.

3.2. Winning Vehicle

On a two-lane track the winner shall be determined as the first to cross the finish line. In the case of a pursuit race the winner shall be the first car to catch the opponent or to complete a set number of laps. Either of these outcomes must be achieved without interfering with the opposing car or any track timing equipment.

If a car comes off the track at any point during a race then the opposing car shall be deemed the winner. If both cars fail to finish then the one that has travelled farthest will be awarded the win.

If a team believes they have been mistreated or lost due to an unfair incident, or advantage for the opposing team, they must report this to track officials immediately after their race. The TMSC will work together to resolve the issue and return their decision promptly. That decision will then be final and cannot be appealed.

3.3. Engineering Knowledge

It's important not just to design and build something that works but also have a good understanding of the principles at play. As such, teams may be required to complete a short, handwritten knowledge questionnaire during the event. This will aim to test depth of student understanding and consist of several questions based around the car and solar energy.

3.4. Awards and National Selections

The event's major trophies are awarded to the winning teams of the primary and high school knockout competitions. Awards are also presented to the other top 4 placegetters, fastest lap, best engineered car and other discretionary category winners. Top teams and several potential wildcards are typically then invited to participate in the national finals and compete against the fastest cars from other state competitions around Australia.

4. SCRUTINEERING

Upon arriving at the event each team must pass through scrutineering with their vehicle. Teams presenting a car that does not fully comply with these rules will need to make the necessary modifications or may otherwise not be allowed to race.

5. SERVICING

Vehicle modifications are allowed during the event but must remain within these regulations at all times. Cars may be checked and re-scrutineered at any time to ensure ongoing compliance. Teachers and mentors may provide guidance but only students are expected to carry out adjustments or repairs on the cars themselves.

Due to Health and Safety regulations, any substance classed as hazardous (solvents, liquefied gases, etc.) must be declared to and approved by the TMSC before being used during the competition. This does not include small quantities of commonly available lubricants and spray cans for the purposes of cleaning and/or lubricating bearings, etc.

6. CAR SPECIFICATIONS

6.1. Size Limit

The car must fit in a box, 500mm long, 150mm high and 320mm wide with the solar panel fitted in place. It must always stay within 190mm of the centre of the guide rail to ensure there's no interference with a car in the lane beside or with any timing equipment.

6.2. Source of Power

Cars must only operate on the energy provided by a silicon solar array during the course of a race. Designs must allow for the array to be easily installed and removed from the car in less than 1 minute. The array can either:

a) be one provided by the team with an active cell area of no more than 450 sq cm or
b) be one provided by the TMSC

6.3. Solar Array Weight

The solar array must weigh a minimum of 240g either on its own or combined with one additional unit of ballast. The array and any ballast cannot form any part of the car body, rolling chassis, driver's cabin, side panels or include any switches or electronic devices.

6.4. Panel Testing, Power Limit and Temperature Correction

Teams providing their own array will have this power tested on a lightbox and must supply scrutineers with a set of +ve and –ve connections that are easily attached to with a set of crocodile clips. Any panel exceeding 5.5W at standard test conditions (1000 W/m2 irradiance, 1.5 air mass, 25°C) will have a portion of the cells masked off to reduce the power to within ± 0.1W of this limit. A non-contact thermometer will be used during power testing and a temperature correction applied using the following formula:

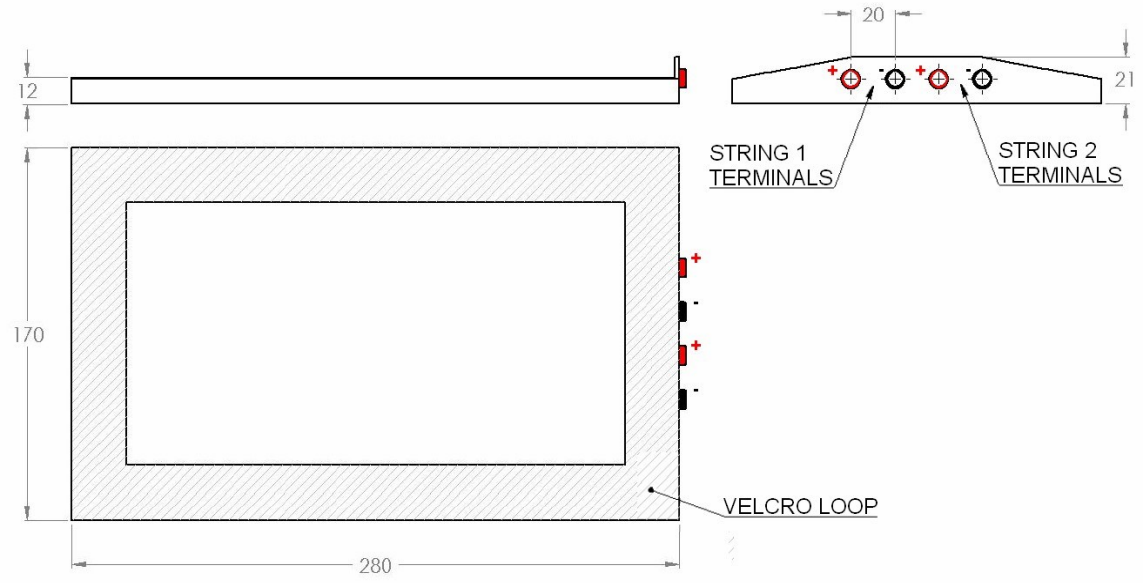
P corrected (W) = P measured + P measured x 0.004 x (°C measured – 25)

Any team found to have deliberately tampered with official tape after power measurement will be excluded from the event.

6.5. TMSC Arrays

Solar arrays provided by the TMSC will consist of a Scorpio Technology Number 26 solar panel mounted on an aluminium backing for protection. These have been standardised to weigh 240g ± 10g and produce 5.5 +/- 0.1 Watts of power at standard test conditions.

Arrays are approximately 276-280mm in length and 165-170mm in width. The height of the terminal end will be no more than 21mm and all other sides a maximum of 12mm. 25mm wide Velcro loop tape is available around the outer edge on the underside of the panel as a possible method of attachment to the car.



Arrays consist of two identical solar cell strings, each wired to a positive red (Jaycar PS-0406) and negative black (Jaycar PS-0408) 4mm banana socket terminal, and teams can connect these up in either series or parallel as desired. A typical electrical output of the two strings configured in series is given below:

Volts open circuit:	8.64V
Volts at maximum power:	6.88V
Current at maximum power:	0.808A
Current short circuit:	0.9A
Maximum power watts:	5.56W

6.6. Use of Electronic Devices
Electronics of any kind are allowed however the total capacitance of all circuitry must not exceed 5mF.

6.7. ON/OFF switch
Each car must be fitted with a commercially available ON/OFF switch.

6.8. Motors
Cars may use any type of motor/s but specifications of the make and model must be made available to scrutineers.

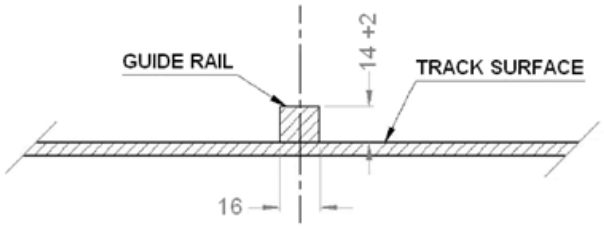
6.9. Wheels
Wheels must be at least 2mm wide and have a radius of at least 1mm on the running surface.

6.10. Cargo
Cars must have an enclosed space capable of fitting at least 20x ping pong balls, each with a nominal diameter of 40mm. This space must retain its shape and cannot have any air pass through with the balls removed for racing.

Teams must supply and their car carry an additional 200g of ballast when racing with an electronic device. This must be separate from any solar panel ballast, easily removable from the car and cannot perform any function other than act as ballast.

6.11. Side Panels
Cars must have two rigid side panel areas of at least 150mm long and 50mm high, one on each side, for attaching number stickers that can be easily seen by race marshals and spectators when racing. The curvature over this area can be no more than 20mm horizontally and 10mm vertically.

6.12. Steering
Cars must incorporate a means of steering around the track using the rectangular guide rail at the centre of each lane. This rail will be 16mm wide and 14-16mm high and track curves range from 3.5-5m in radius.



6.13. Driver
Each car must carry a driver to navigate the track. This occupant will be in the form of a 4.5” wooden manakin provided by the team. The driver must sit in a driveable, forward-facing position with a seat belt and 180° vision in the horizontal plane. A clearance of at least 5mm is required to any windscreen.