

Conquering the sun

For over 30 years the Bridgestone World Solar Challenge has inspired student teams to push the limits of technology to build a vehicle to travel across the Australian outback powered by the energy of the sun. Gurit is pleased to have been supporting the Western Sydney Solar Team with materials and in designing and optimising their latest vehicle, “Unlimited 2.0”.

3000 km across Australia

The competition traverses 3000 km across Australia’s unforgiving outback from Darwin to Adelaide with the only power source being the energy from the sun or recovered from the kinetic energy of the vehicle while underway and a nominal 5 kW hours of stored energy.

Teams must travel as far as possible until 5:00 pm each day where they will camp in the desert, wherever they happen to be. At the end of the seven day competition the team with the fastest time to Adelaide, or the team closest to Adelaide is crowned the winner.

Aerodynamic lightweight solar cars

The Western Sydney Solar Team entered the Challenger Class, where single-seat solar cars are designed to be fast, aerodynamic masterpieces. Strict size limits governed the maximum dimensions of the cars along with a 4 m² maximum solar array.

The Western Sydney Solar Team approached Gurit engineers seeking support with optimising

the roll hoop. In optimising the components engineers were required to adhere to strict rules which set aside minimum g-force strength requirements to ensure driver safety.

Composite engineering at its best

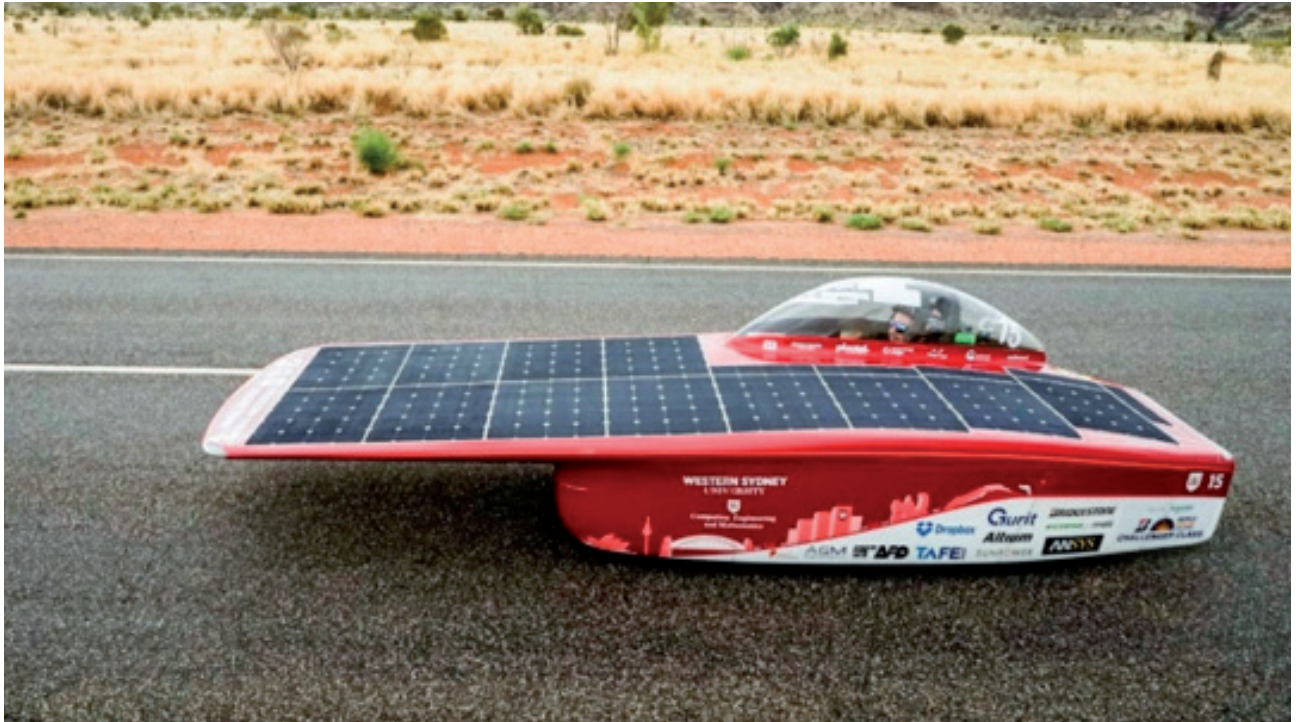
Gurit engineers undertook a topological optimisation of the roll hoop, which produced the most efficient design, capable of withstanding the minimum g-force requirements.

Where the first phase produced a model identifying the most efficient places to put material, in the second phase a size optimisation model identified how much material was needed to be placed in each area to ensure the no failure constraint was met.

However the degree to which the model was optimised made it unachievable for any manufacturer to produce the exact layout of the carbon plies. This issue was addressed in the third phase, ply cleaning, where virtual carbon tapes and patches compatible with the building method were created and added to the model.



Max Mammone
Team Captain Western Sydney Solar Team



Unlimited 2.0, Western Sydney Solar Team

Materials used for top performance

Construction of the solar car was undertaken using Gurit SC 110 high performance prepreg with RC200 carbon fibre for the outside shell and Gurit SE 84 prepreg for the remaining structural plies. Gurit Corecell™ M foam was used in areas subjected to impact and honeycomb core in the remainder of the structure for minimal weight.

The three-phase optimisation process conducted by Gurit Composite Engineering reduced the composite weight from previously 80kg to only 42kg, contributing only 19% to the total vehicle weight.

The Western Sydney Solar Team performed well in “Unlimited 2.0”, placing 6th in the Bridgestone World Solar Challenge 2017 despite some challenging weather conditions, and improved upon their performance winning the highly contested 2018 American Solar Challenge. The next World Solar Challenge race from Darwin to Adelaide will take place **October 13 – 20, 2019.**

This year Gurit is working with two Australian university teams in an advisory role and providing engineering design for the chassis and safety cell for the upcoming events. Gurit is thrilled to be involved in furthering the design of alternative energy vehicles and supporting these student engineers in gaining a firm understanding of advanced composite materials.