

Suzuka Dream Cup 2005



Suzuka, Japan
5th - 7th August 2005

Report 1 - Monday 1st August

Since early in 2005, the Melbourne based Aurora Vehicle Association has been preparing the Aurora 101 solar car for two competition events; the 2005 Suzuka 'Dream Cup' and the 2005 World Solar Challenge. The closeness of these two events on the calendar has meant that the improvements to the solar car has had to suit both events.

The Aurora 101 solar car was first designed to race in the 1996 World Solar Challenge. Although it crashed early in that event the design principles embodied have proven to be extremely competitive in the world of solar car events.

In 1999, Aurora 101 won the WSC, the first Australian team to do so.

A major change was made to the car in 2001 and 2003 and on both occasions Aurora 101 finished second to Nuna in the WSC, each time increasing its overall performance.

In 2002 Aurora 101 made its first visit to Suzuka, set the fastest lap of the race but failed to contest the second heat. In 2003 Aurora 101 became the first and only solar car to complete 50 laps in a 4 hour heat. In 2004 under typhoon conditions Aurora 101 again set the fastest race lap and finished fifth overall.

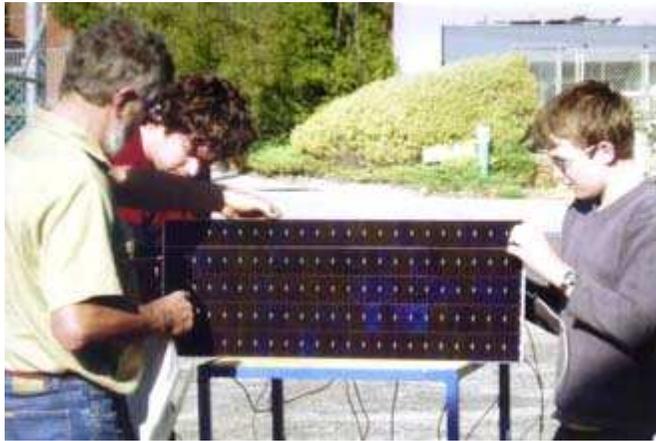
Special preparations have been made for improving the performance of Aurora 101 for 2005.

1. Full Triple Junction Gallium Arsenide Solar Panel

Aurora 101 has 25 solar panels making up its solar array. For 2005 15 of these were upgraded to triple junction gallium arsenide solar cells. Already 10 of the panels were of this specification.

Aurora purchased solar cells from Emcore in the USA, although these were originally made by Tecstar, a company bought out by Emcore. Some of these cells were unmeasured so Aurora undertook a major exercise to test each cell for grading purposes.

We commissioned Gochermann Solar Technologies to make the 15 new solar panels. Aurora's team strategist Peter Pudney designed the new panel configuration. The cells are shingled to maximise the working area and the panels use the non reflective texture unique to this company. The total solar panel area is slightly less than 8 square metres. Our objective is to achieve 1900 watts for the total solar array compared to the 1600 watts of the previous panel.



Shane Good, Tom Baker and Todd Palmer testing a new Gochermann solar panel



The new solar array under test in Melbourne's winter

2. Reduction in Solar Car Weight

The Suzuka event favours light weight solar cars and the top Japanese entrants have been substantially lighter than Aurora 101. For 2005 every part of the Aurora solar car has been reduced in weight. Ten kilograms was gained in making a new construction solar array including the benefit of lighter weight adhesives from 3M. The structural members are now composite clad polystyrene supplied and shaped by RMAX. All composite materials and resins have come from Huntsman Composites.



Paul Jolly cleaning out the lower body shell



Polystyrene spars supplied by RMAX



Darren Trafford strength testing polystyrene beam



Start of new framework for the top of the car

A total weight reduction of 20 kg has been achieved resulting in a vehicle weight for Suzuka [with an 18 kg battery pack] of 165 kg.

3. More Powerful Motor Controller

Our supplier, the Queensland based company Tritium, has supplied an improved motor controller which can deliver 40% more power than the previous model. In addition they have taken steps to increase its temperature sensitivity and facilitated external cooling measures. We have a relay activated reset feature and 'reverse gear'. Reverse is limited to 5 kph and the horn is intermittently activated when reversing.

4. New Electrical System

The electrical system has been renewed through the activities of Bosch. An IMC supplied CANSAS system has been included in order to increase the precision of energy usage measurements and reduce weight. A new telemetry modem is installed, much smaller than our previous design.

All electrical functions have been located on the left side of the solar car for ease of checking. A new module of switches is installed and an extra AERL supplied power tracker added.

A special cooling system has been installed for the motor controller with an external low pressure exit. A special cooling duct has been installed for the Kokam supplied lithium polymer battery pack in the right hand front corner of the solar car.

5. Other Changes

The suspension has been lowered for improved aerodynamics and handling. For this event the car will have Dunlop Solarmax tyres

New seat covers are fitted. Light weight kevlar brake lines are installed, A new head bubble painted with the design of the Australian flag is used.

The car is painted in a new colour scheme, blue and white.



Wheel motor with surface mount magnets



Therese McArthur working on the lowered suspension



Part of the Aurora team with the unfinished 2005 Aurora 101

Going Faster at Suzuka

The event is hoping for better weather conditions than 2004.

With sunny conditions we expect that the race record will be beaten.

Top qualifiers will have lap times under 4 minutes

Aurora 101 achieved 50 laps in a 4 hour heat in the 2003 event with an average lap time of about 4'47. We expect the leaders to improve to an average lap time of 4'35 - 4'40 achieving a possible 52 laps in a 4 hour heat.

The Aurora Team for 2005 Suzuka 'Dream Cup'

Aurora's team will consist of 7 people. They are David Fewchuk, Jack McArthur, Tom Baker, Derrick Rodgers, Dan Evans, Therese McArthur and Darren Trafford. For the last three this will be their first time at Suzuka. Dan and Therese , at 16 years of age are the two youngest members of the team.

We look forward to meeting Nobuyuki Kishi from the Yomiuri Shimbun who has assisted us so well in making the detailed arrangements for this visit.

Kiyoshi Yoshioka from Nippon Express has looked after the shipping arrangements for the solar car and has advised that it will be delivered to the Suzuka race track on 2 August.

Aurora has come to meet its many Japanese friends and to compete hard.



The 2005 Aurora 101 solar car almost finished prior to shipment to Suzuka