

SOLAR EXPRESS

POST-SUNRAYCE ISSUE

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WSC HERE WE COME!!

The World Solar Challenge (or WSC for short) is the world championship of solar car racing. This grueling event winds through the outback of Australia, and attracts the fastest solar cars from around the world, from both private and collegiate teams. Right now we are preparing for WSC both by making improvements to MaizeBlaze, and planning the logistics for our trip to Australia.

There is so much to planning our trip to Australia, that a third of the team is devoted to it. The operations team is busy finding ways to get MaizeBlaze and the team to Australia, and contacting stores in Adelaide for supplies once we get there. Customs, foreign vehicle regulations, metric fittings, and trying to understand that Australian accent are only a

few of the problems the operations team has had to deal with in our planning.

MaizeBlaze has received a facelift for Australia as well. Different regulations between the World Solar Challenge '99 and Sunrayce '99 has prompted a change in array shape, improved technology for the batteries and solar cells, and lighter components. Read more about the efforts of the engineering and strategy team on page 3.



All of these changes and preparations are costly, so we would like to thank our sponsors for making it possible for us to participate in the World Solar Challenge. A tech-

nologically advanced vehicle is impossible to make without the financial and engineering support of industry leaders. Thank you for being part of team MaizeBlaze.

Go Blue, mate!



Dale Patterson

Chris Deline

Now introducing: the two newest members of the University of Michigan Solar Car Team- Dale Patterson and Chris Deline. The two newcomers joined the team to help out with Australian logistics. They will be dealing with shipping, travel, food and lodging in Australia.

WSC at a glance

Dates: October 17-26
Route: Darwin to Adelaide, Australia
Miles: 3010 km (1870 mi)
Number of competitors: 42
Number of Countries represented: 11
Expected travel and logistics cost: \$84,000
WSC homepage: <http://www.wsc.org.au>

Solar Troubles

by Heather Nettle, Electrical Engineer

As many of you know by now, Sunrayce '99 was plagued by lack of sun and an abundance of rain. This combination was disastrous for *MaizeBlaze* which did not handle the wet well.

Our encapsulant was a one-part silicone conformal coating that was sprayed onto the cells. Since the array was shingled, it was very difficult to completely seal the array and fill in the gaps between the cells. This is where the first of our rain problems comes in; we had some holes in this encapsulant that allowed some of the water to get under the solar cells. By itself, this would not have been a problem. Unfortunately, it turns out that the latex caulk we used to attach the cells had not fully dried. Once the caulk had absorbed some of this water,

it became mildly conductive. This became a source of power leakage, eventually reducing our total power by over 50%.

This had been a sobering lesson for our team. We are rebuilding the array for the race in Australia. This array will have many changes from the first. We will be using a different method for attaching the solar cells to the substrate. We will also be building a flat array, rather than shingling the solar cells. We will use a different encapsulant, and a different method for applying the encapsulant. We are also using higher efficiency solar cells. All of these changes, along with some already proven technologies, will help us to excel in the World Solar Challenge.

Tales from Sunrayce

by Jed Christiansen, Race Manager

For those of you that saw coverage of Sunrayce 99, you probably know that the race would have been more aptly called "CloudCrawl 99". The only day where we had more than half a day of mostly clear skies was the Rest Day in Atlanta. Literally every day we raced had overcast skies, broken only by thunderstorms. Despite one of the best fields of cars ever, the race was extremely slow.

Unfortunately, *MaizeBlaze* wasn't able to finish as well as we hoped: 17th out of 29 teams. A materials problem in our array limited the meager power we were already getting from the array to just a fraction of what we should have seen. Post-race testing showed that the materials problem wouldn't have been an issue if only the array had managed to stay dry. Other than our array, the car worked perfectly. We had no blown tires, telemetry worked without fail, and our electronics worked flawlessly.

Sunrayce was certainly an interesting race, though. For the first time, we were pulled over by a police officer in South Carolina. He was just curious about the strange car going through his town, and let us go after about 30 seconds. (Thanks to Wayne Watson, Sunrayce

Regulations Manager, for helping to make the officer realize the urgency of a race!)

Other cars had other mishaps: the University of Minnesota car ran into their Lead van on wet roads, and at least two other cars were hit with minor body damage by other drivers on the road. Some days were essentially spent entirely in cities. For example, there were more stoplights and stop signs on Day 4 of Sunrayce 99 than the entire Sunrayce 97 Race Route! If the race had just been a bit sunnier, it would have made the competition quite a bit faster.



Chip and Dale greet the team at Disney World

SOLAR
EXPRESS

PRE-SUNRAYCE
EDITION
1999

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Strategy Department

by Russ Moerland, Strategist

From a strategy perspective Sunrayce 99 was a qualified success. Our vehicle, with exception of the array, performed flawlessly. We were able to accurately model everything but the misbehaving array, which proved to be a moving target. The telemetry system proved an invaluable tool for gauging how much further we could push our car, this became very obvious as the cloud cover and rain on day 1 forced us to make a quick adjustment to our strategy.

Looking towards World Solar Challenge we are researching an optimal racing strategy. The telemetry system will be greatly simplified due to decreased data acquisition requirements as well as changes in the rules that make it advantageous to minimize power draw. To meet this we are looking at acquiring several RS-232 capable radio modems.

On the communications and weather front, we are working with a contact in Australia to secure the necessary licenses for our radios as well as

antennas for our meteorology gear. Once again Quorum Communications is providing us with hardware to allow our PCs to download the latest weather pictures from the satellites. We are still looking for someone to provide us with two more VHF radios to allow long range communications with all of our vehicles.



MaizeBlaze, cruising into Atlanta

Meet MARVIN

By Dave Jordan, Crew Chief

The hours to WSC are ticking away and we're always looking for ways to improve the car for the race. A new solar array is in development to power *MaizeBlaze* toward victory on the Stuart Highway. We recently acquired a pack of silver-zinc batteries from Eagle-Picher as well, to reduce our battery weight and improve our performance. Other refinements are underway to improve the car's aerodynamics and weight.

MARVIN is another step toward achieving our goal. A recently-declassified top-secret project of the electrical team, the Michigan Advanced Realtime Variable Input Network is a multi-purpose system for monitoring and controlling the car. Using equipment supplied by Keithley, Parallax, and K & F Electronics and a little bit of creativity, we have achieved greater flexibility in implementing our strategy. Among other improvements are a new cruise control, a much-

streamlined telemetry system with reduced power consumption, and improved driver readouts.

MaizeBlaze is also being prepared to meet the harsh environment of the Australian Outback. High temperatures and rough terrain are just two hazards we will face during WSC. The body of the car is being heat-treated to withstand the scorching sun (of which we hope to see a lot), and the structure has been modified to increase its strength to cope with cattle grids and other hazards of the wilderness highway. WSC rules differences from Sunrayce are also forcing us to make a few other changes. When *MaizeBlaze* next appears, it will have a different array shape, as well as a new "shark fin" on top of the canopy to meet the height requirement!

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UNIVERSITY OF MICHIGAN SOLAR CAR TEAM

Ten Years Under the Sun

Buy-A-Cell Program

The University of Michigan Solar Car Team is celebrating ten years of successful racing with our fifth-generation car, *MaizeBlaze*. We will be competing in Sunrayce '99 across the East Coast in June 1999 and World Solar Challenge '99 across the Australian Outback in October of 1999.



To make a run for what could be our third national championship, we need your help! By "Buying" a Solar Cell for *MaizeBlaze's* solar array, you will be directly contributing to the success of our team. Your contribution also signifies your commitment to education and environmental objectives.

We hope that you will Buy-A-Cell and join the winning Michigan Solar Car Team tradition!

BENEFITS OF THE BUY-A-CELL PROGRAM

- CERTIFICATE WITH A MAP OF THE PLACEMENT OF YOUR SOLAR CELL ON *MAIZEBLAZE*
- SUBSCRIPTION TO SOLAR EXPRESS, THE SOLAR CAR TEAM NEWSLETTER
- RECOGNITION ON THE TEAM'S SUPPORT TRAILERS

We are also offering a special student's Buy-A-Cell package for \$25. Please call the Solar Car Team Office for more details.

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SPONSOR SPOTLIGHT:

MDSI

by Jed Christiansen

Manufacturing Data Systems, Inc. (MDSI) has been one of the biggest and best sponsors of the MaizeBlaze project. The company's Co-Founder and Chairman, Chuck Hutchins, is the biggest Michigan Solar Car Team fan in existence, and has sponsored the team since 1993. The financial resources they provided have been incredibly important in constructing and testing MaizeBlaze.

The MaizeBlaze team is also very grateful for the support and encouragement that Chuck has given us over the years. He attended Sunrayce 99 with the team, and we also hope to see him in Australia. Chuck has been critical in

contacting additional sponsors for our World Solar Challenge efforts. Through the good times and the bad, Chuck's support of the MaizeBlaze team and all of our team members has been incredible and unwavering.



MDSI is known for factory automation software and services that increase manufacturing flexibility and agility by bringing the power of PCs and open systems to the factory floor. MDSI's software provides a platform for integrating production equipment with corporate design, planning and information systems to enable computer integrated manufacturing (CIM). You can find them on the web at www.mdsi2.com.

ALTAIR



by Reuben Rohrschneider

Altair Engineering is one of the team's long standing sponsors. For the past three projects they have been providing software and engineering services to the team. In addition they take team members for summer internships.

The software that Altair provides to the team gives us the tools to efficiently analyze all aspects of the vehicle's structure and aerodynamics. Altair's HyperWorks suite of software includes pre and post processors: HyperMesh, MotionView, HyperGraph, and analysis tools: OptiStruct, HyperOpt, Hyperform, and OptiStruct/FEA. This software has been used by the team extensively in the design process and has allowed us to generate more efficient parts. We were able to reduce the weight of our wheels from 6.5 pounds to 4.5 pounds by meshing the design space with HyperMesh, using OptiStruct to find the best material distribution and then using OptiStruct/FEA to run detailed analysis on the final design. Altair also provides our team with SuspensionGen which we used to analyze the behavior of the front suspension and steering system in our vehicle.

Altair Engineering also provided technical support when the part that needed analysis was too large or complex for our computer resources. The composite primary structure of our vehicle was a large model that required a large number of resources to analyze. Altair provided both computer time and engineering time to help us ensure the accuracy of our analysis. Engineering and computer time were also provided for computational fluid dynamics (CFD). The CFD model helped us improve the aerodynamics of the vehicle and decide where to put ventilation ports.

In addition to software and technical support, Altair also hired Rick Bodey (mechanical design leader) and myself as interns for the summer of '98. This proved invaluable to the team in the training that it provided us and the additional analysis that we were able to do using Altair's resources. This helped our team run the entire race without any mechanical problems. Rick Bodey is now a full time employee at Altair Engineering.

I would like to thank Altair Engineering for all the support that they have given team *MaizeBlaze* over the past two years.

Just in time for the World Solar Challenge...

It's Solarwares!



This is the team's polo that has been a staple over the last few years. The dark blue polo is made by Outer Banks and is 100% cotton, with maize embroidery on the left breast. The embroidery is composed of a Michigan "M" and "Solar Car Team" stitched just underneath it.

Price: \$20.00 all sizes

Quantity: _____

Sizes: M, L, XL, XXL



Become part of the team with the official Solar Car Team Qualifying Shirt. This XX shirt is the same as those worn by team members at the Regional Qualifiers in Milford, Michigan. The front of the white shirts have the team logo silkscreened on them. The back of the shirts have "University of Michigan Solar Car Team" in dark blue with the teams official number (2) in dark blue on a yellow background with dark blue edges (left).

Price: \$10.00 all sizes

Quantity: _____

Sizes: M, L, XL, XXL

In 1989 a group of University of Michigan students responded to a challenge sent out by General Motors for student teams to create solar powered vehicles. Ten years and two national championships later, the MaizeBlaze team is commemorating the tenth anniversary of the formation of the Solar Car Team with this fine China plate created for the team by Collegiate Classic China. Only a limited number of these plates will be made available, so get yours today!

Price: \$50.00

Quantity: _____

The Solar Car Team also has a poster commemorating its tenth anniversary. The posters are 15" tall and 36" long. Please add \$2 if you wish for your poster to be autographed by the entire team.

Price: \$3.00 (non autographed)

Quantity: _____

\$5.00 (autographed)

Quantity: _____

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Payment only by check or cash (team pays shipping)

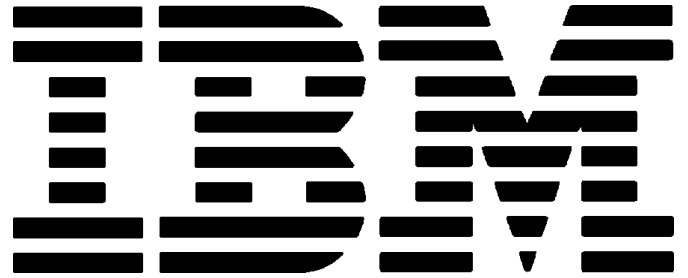
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