SOLAR EXPRESS

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The Official Publication of the University of Michigan Solar Car Team

In this issue:

Kansas City Alumni : Thank You!

by* Jed Christiansen, *Project Manager

The entire Race Crew from Sunrayce 97 would like to send our thanks to the Alumni Club of Kansas City. Day four of Sunrayce 97 ended in Kansas City and was followed by the race's rest day. John Jenks and other Kansas City Alumni Club members met us at the end of that day and served us absolutely delicious steak dinners.

From the perspective of a race crew member, that dinner really helped lift our spirits. We had just been through four days of tough competition and everyone was looking forward to the rest day ahead of us. It was then that we were met by Kansas City's University of Michigan alumni club with wonderful dinners and that great Michigan enthusiasm and pride. They really helped the team relax and get motivated for the rest of the race.

So once again, thank you to the Kansas City Alumni Club. Your generous dinners and company were sincerely appreciated by all of us.

What about Wolverine ?

Some people wonder what we did with our last car, *Wolverine*, since Sunrayce 97. Below is a list of some of the events where *Wolverine* has appeared.

ECOFEST Parade - New York, New York

Huron High School - Ann Arbor, MI

Detroit Edison Commercial Shoot - Detroit, MI

Look out for more information concerning where *Wolverine* will be in the next Solar Express.

Team Reports *from the MaizeBlaze Team Leaders*

Mechanical Design Team Up and Running

By Rick Bodey

The Mechanical Design Team for *MaizeBlaze*, the University of Michigan Solar Car slated to enter Sunrayce 99 and World Solar Challenge '99, is off to a great start. The team is responsible for the design and implementation of the mechanical systems for *MaizeBlaze*, including the chassis, front and rear suspension, brakes and steering.

As always, the challenge facing the Mechanical team is to work within space and weight limitations without sacrificing structural integrity and performance. The team has already risen to the challenge once, designing a front suspension for the 1997 vehicle, *Wolverine*, that fit in an area greatly reduced from that of its predecessor, *Solar Vision*. Other challenges, such as designing a steering system that forgoes the use of a steering wheel, are also being surmounted. The addition of dedicated, hardworking new team members is helping to ensure that *MaizeBlaze* will be a top contender for 1st place in Sunrayce 1999.

Electronics Team Smartens Up 'Blaze

by Dave Jordan

The electrical team is making steady progress working on the tasks that previously comprised both the Electronics and Power teams. This is my first Solar Express article as I assume the role of Electrical Team Leader, and the electrical sub-teams are on schedule and working hard. The microelectronics group is currently researching various approaches to making *MaizeBlaze* the "smartest" car in Sunrayce and the World Solar Challenge, providing all the functionality we could hope for. The discrete electronics group, meanwhile, has more or less finalized the design for the "brainless," fail-safe backup system that will keep us running if the processor goes down.

On the power side, we are excited by Sunrayce's new rule allowing nickel-metal hydride and nickel-cadmium batteries. While we are still acquiring battery samples for testing, it looks like a NiMH pack will be running 'Blaze. The solar array group is nearly finished with researching solar cells,and as soon as a preliminary upper surface design is finished for the car's body, array layout will begin. We are researching various motor options at present, and hope to choose motors and begin performance testing soon.

In accordance with the overall team vision, we plan to implement a system that will be efficient and reliable, run from start to finish, enhance our team's performance, and keep our drivers safe.

Design Teams Merge, Coordinate

by Reuben Ray Rohrschneider

With design work now well underway and deadlines approaching rapidly, the design teams are working well together. This is important, as interaction between the design teams is necessary to insure that all components of the car work together correctly. Already many compromises have been made between the different design teams. Instrumental in this process is the strategy team and its use of the performance equation. For each proposed compromise we calculate the time difference that the change will make in our overall race time. This provides a quantitative basis for our decisions.

Our nearest team-wide deadline is that of the test chassis. The manufacturing of the test chassis is scheduled for early March of this year and we hope to complete it by September. This allows us enough time to build the vehicle and get testing miles in before winter. We build the test chassis for several purposes. First, It improves the manufacturing techniques of the team. This is important because most of the team members haven't had prior machining or manufacturing experience. The second purpose of the test chassis is to provide an opportunity to test designs. We perform extensive tests on the vehicle to check our structure and the handling characteristics of the vehicle. This gives us plenty of time to make design changes if necessary and to optimize the structural components before the race vehicle is slated to start construction.

With the design freeze for the test chassis rapidly approaching, my work for the next month is well defined. All the parts in the car must be assembled in Computer Aided Design (CAD) and tested for clearance through their full range of motion. Once this is complete, the team will be ready to build the test chassis.

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Manufacturing Team Fabrication Equipment

By Ryan Smith

The Materials and Manufacturing Team is currently completing designs for several pieces of equipment to facilitate the construction of MaizeBlaze. Currently completed equipment includes a custom solar cell encapsulant testing device and a "flexible" oven controller for monitoring and controlling our new ovens. Thank you to Wahl Instruments and Omega Engineering for their donations leading to the completion of these devices.

Designs have been completed for our three new forced-air ovens including a 1300 cubic- foot body curing oven, a 45 cubic-foot portable composites oven (which will be brought to both Sunrayce and World Solar Challenge) and an 8 cubic-foot environmental chamber for testing the temperature response of our battery pack.

Additionally, the team has begun searching for donations of manufacturing equipment necessary to fabricate many of MaizeBlaze's complex metal and composite components. Equipment which we are in immediate need of includes:

- 3-Axis CNC vertical milling machine (needs to be hand operable)
- Cut-off bandsaw (minimum 8" diameter clearance)
- 25kW generator (240V)
- Lathe (with power feed and 12" diameter capacity)
- 10" disk sanders
- 6" dual-stone grinders
- 2HP vacuum pump
- Arbor press (7" throat, 14" height)
- Air tools (grinders, drills, ratchets, cutting disks)

If you or your company know of any source of the above equipment, or would be willing to make a tax-deductible donation to the solar car team, please contact Ryan Smith, the Materials & Manufacturing Director (smithr@engin.umich.edu).

Strategy Team Update

by Russell Moerland

The Strategy Team is well underway in preparing for Sunrayce and World Solar Challenge. After Sunrayce 97 we decided to do a complete rewrite of the vehicle simulation and telemetry software. This is currently occupying most of our efforts. Improvements include: new solar array, motor and battery models; a new interface and designed to easily accommodate different solar cars, including our competitors.

We have also begun work on the communications system for the upcoming races.

Shortly after classes end we hope to be performing a survey of the Sunrayce route. Thanks go to Datron Technology for sponsoring a CSV-2 optical fifth wheel again, which we use for surveying the route.

In The Next Solar Express

More Team Reports

A Recap of the Sunrayce '99 Workshop

Description of Sunrayce '99 Race Route

Launch of Buy-A-Cell Program

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