solar Express 2

SPRING PROGRESS - 1998

In This Issue:

Taking Atlanta by Storm!

by Jed Christiansen, Project Manager

Eighteen members of the *MaizeBlaze* team went to Atlanta, Georgia on the weekend of March 27-29 to attend the Sunrayce 99 Workshop. The workshop is held approximately one year before the actual race and is meant to help teams prepare for the upcoming challenges that await them. Teams also get a chance to see what the Sunrayce atmosphere is like and also size up the competition.

The first group of team members arrived on Thursday night. They spent most of Friday touring Lockheed Martin's Low Speed Wind Tunnel in Marietta, Georgia, the same wind tunnel used by Maize&Blue in 1993. They also visited a member of Maize&Blue, Alan Ristow, who is doing graduate work in photovoltaics at Georgia Institute of Technology (see page 3). The rest of the team arrived in Atlanta on Friday by way of University station wagons and plane tickets, courtesy of Northwest Airlines.

Friday evening was spent choosing our team name, (*MaizeBlaze*) and number (see article below). Saturday was spent discussing rules and finding out the preliminary race route (see page 3). In the afternoon, two parallel sessions were held. One room had aerodynamic and mechanical presentations, while the other one contained the battery, motor, and solar array presentations. We split up so that team members could get experience in the areas they were currently working on.

While thirteen team members drove back on Saturday evening, five stayed for Sunday's presentations. These dealt with team management, fundraising and logistics. Our own Ryan Smith and José Alvarez (Materials and Manufacturing Team Leader and Special Projects Director, respectively) made a great presentation on race logistics. Both Ryan and José shared their experience from the Operations Team for Sunrayce 97 with the rest of the workshop. Several teams approached us afterward and told us how much they appreciated the presentation. They mentioned that they had never realized the work that has to be put into the logistics for a race.

The Sunrayce Workshop proved to be a valuable experience for all involved, from the rookie team members getting their first taste of Sunrayce, to veterans who were able to see how new technologies could be implemented into the design of *MaizeBlaze*.

Selecting Number 2

by Jed Christiansen, Project Manager

Our first official act for Sunrayce 99 was to select our car's name and number. Although we were pretty sure *MaizeBlaze* would not be taken by any other teams, we were not as sure about our car's number. Originally the team had chosen the numbers 5, 7, and 50 as their choices. Unfortunately, we drew the 40th slot for choosing a team number, and were not sure if any of our previous choices would still be around. In the end we selected the number 2. It was chosen primarily because it is a small single digit number. However, the number 2 can be traced to our past, since *Sunrunner's* car number in GM Sunrayce 90 was 2. Michigan is the only team to have won two Sunrayce championships. Finally, Michigan also won two National Championships this year (hockey and football), and the number 2 was worn by Heisman Trophy winner Charles Woodson. Coincidence?

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Team MaizeBlaze in Atlanta

by Dave Jordan, Electrical Team Leader and Heather Nettle, Array Team Leader

As a new team member and team leader, I found the Sunrayce workshop to be an exciting, interesting, and sometimes surprising experience. The main point of interest in this year's workshop was the session on batteries, since this year Sunrayce will allow nickel-metal hydride (NiMH) batteries and many teams had questions about them. NiMH batteries are quite different than the traditional lead-acid batteries in cost, performance, and handling, so teams will have to relearn what they know about batteries in order to run NiMH.

Likewise, the motor session was quite interesting since New Generation Motors, the manufacturer of our motor from Sunrayce 97, introduced a new motor and controller system, which vastly improves both price and performance over their previous product offerings.

The array presentation instructed on the basics of array design; elements such as array layout, soldering of solar cells, a cost-effective method of vacuum sealing the array, and avoiding cell burnout. Reliability was highly emphasized over innovation, because "it's the car that doesn't break down that wins the race."

The presentation on the electrical inspection requirements was used to inform us of how to prepare the car's electronics for scrutineering for Sunrayce. What was stressed to us by Sunrayce was that the best electrical designs were also the simplest ones to implement. The Sunrayce personnel will also expect to see a greater effort on electrical safety for the drivers and the race crew. Beyond that, the teams are free to do whatever they need to, only being limited by their imagination and resources. I still have a few tricks up my sleeve so stay tuned...

Besides all the technical stuff, the Sunrayce Workshop weekend was a great opportunity to get to know the folks we'll be spending a lot of time working alongside over the next year and a half. The road trip, from Ann arbor to Atlanta and back, made for plenty of time to swap stories about past projects, toss around ideas (both good and bad), admire the landscape, and get excited about working together on *MaizeBlaze* for Sunrayce 99.

GATech and Lockheed Martin

by Russ Moerland, Strategy Team Leader and Heather Nettle, Array Team Leader

MaizeBlaze team members Russ, Ryan, Reuben, Heather, Chris, and Dave had the opportunity to visit Georgia Institute of Technology's University Center of Excellence for Photovoltaics Research and Education (UCEP) and Lockheed Martin's Low Speed Wind Tunnel while in Atlanta.

Alan Ristow, a team member from the '93 winning team Maize&Blue, is now a graduate student at Georgia Tech involved in photovoltaic research. Alan generously offered to give us a tour of Georgia Tech's facilities, which included an epitaxy lab and a solar cell testing facility. After the tour, Alan and a colleague, Parag Doshi, joined us for a fabulous lunch at the Old Spaghetti Factory.

While at Georgia Tech, we also met with Mike Ropp, a Ph.D. student at Georgia Tech, interested in starting a solar car team. We shared with him our experiences in running a team, then showed them our appreciation by adopting their team for Sunrayce 99. We are looking forward to working with GA Tech's team in the future!

The staff at Lockheed Martin's Low Speed Wind Tunnel graciously gave us a tour of their facility during testing of the C-130J. Joe Patrick answered many of our questions regarding their facilities and capabilities for when we will be testing there in 1999. We are very appreciate of their efforts to accommodate our needs!

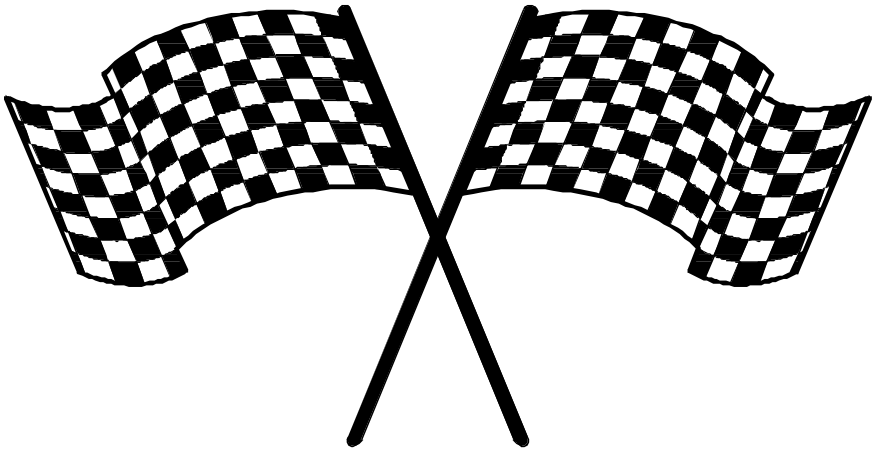
Heather, Russ, Alan, Parag, Ryan, and Dave

Sunrayce 99 Race Route

Back to the Beginning!

GM Sunrayce began in 1990 from Epcot Center in Orlando, Florida. The University of Michigan's entry, *Sunrunner*, went on to overwhelm it's competitors and cross the finish line in Warren, Michigan in first place. In 1993, the race began in Texas and ended in Minnesota, not far from where Jed Christiansen, our project manager, lived. The 1995 and 1997 versions of Sunrayce had teams trekking across the heartland of the country, starting in Indiana and ending in Colorado on both occasions. During Sunrayce 97 though, it became apparent to everyone that Sunrayce needed to choose a new, tougher course to challenge teams better. The folks from Mercer College, who help choose the race route, came up with a real winner. The route for Sunrayce 99 will be the toughest and longest route to date in any of the Sunrayces.

To start off, the route is a north to south route, completely new to Sunrayce and sure to add a new twist to car designs. The route is 1500 miles, and covers many different types of terrains, from the foothills of the Appalachians to the plains of Northern Florida to major metropolis' like Atlanta and Washington, D.C. The individual days are also longer, with Day 9 being the longest at 195 miles. What is not new is that the race is ending at Epcot in Orlando, Florida - a fitting conclusion to a decade of solar car racing.



Day	Begin	End
1	Washington, DC	Winchester, VA
2	Winchester, VA	Lynchburg, VA
3	Lynchburg, VA	Research Triangle, NC
4	Research Triangle, NC	Charlotte, NC
5	Charlotte, NC	Clemson, SC
6	Clemson, SC	Atlanta, GA
7	Atlanta, GA	Macon, GA
8	Macon, GA	Tallahassee, FL
9	Tallahassee, FL	Ocala, FL
10	Ocala, FL	Orlando, FL

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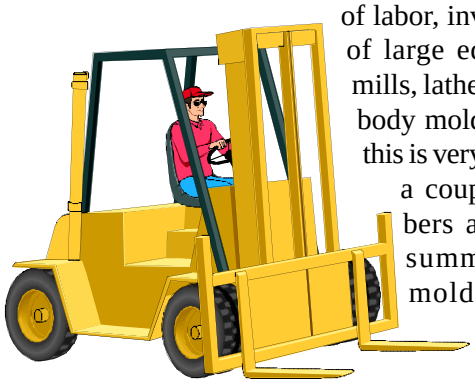
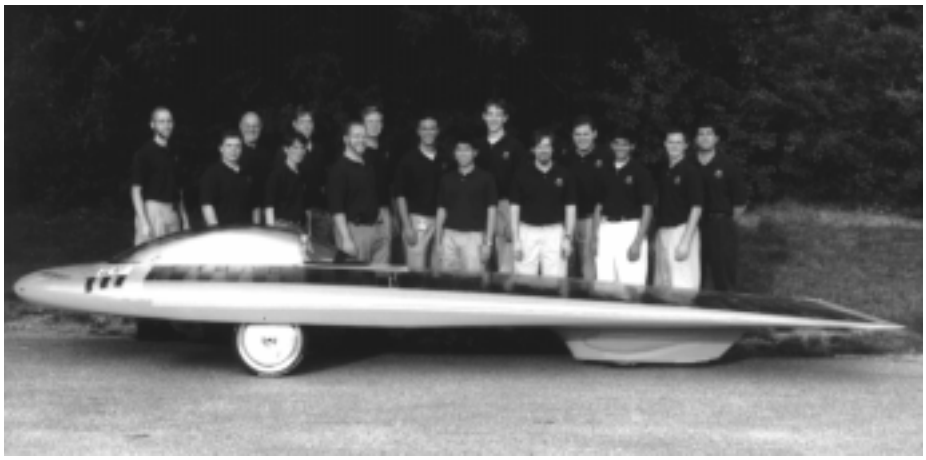
OUR NEW WORKSPACE

by Ryan Smith, Materials and Manufacturing Team Leader

The U-M Solar Car Team finds itself changing workspaces at least once per project. We have recently moved into our new workspace on Carpenter Road in Pittsfield Township. Moving into a new workspace requires a huge amount of labor, involving movement of large equipment such as mills, lathes, drill presses and body molds. Unfortunately, this is very difficult with only a couple of team members available over the summer. The body molds alone take six people to lift. The only other option is to rent or purchase a forklift, an expensive venture.



With our new move, we also gained new neighbors. One of our new neighbors, Bob Worthing, has been very generous in the use of his time, knowledge and equipment, including the use of his forklift. With the forklift, we can lift equipment with three people that would normally take ten to twelve people and a couple of back braces. Bob's company, Breasco, specializes in wire forming prototyping and production, wire forming machines and welding. We are very appreciative of Bob's help, and are excited to have gained such a supportive neighbor.



Team MaizeBlaze

Thank you to our Buy-A-Cell sponsors!

José José Alvarez

Marilyn Christiansen

Ulrike Klopfer

Ann & Robert Scherba

Herbert E. Smith

State Senator Joe Young, Jr.

Tucson Alumni Club

If you would like to become a Buy-A-Cell sponsor and receive your authentic Certificate of Sponsorship detailing where on *MaizeBlaze* your solar cell is located, send $100 to:
UM Solar Car Team
Attn: Jed Christiansen
3411 EECS, 1301 Beal Avenue
Ann Arbor, MI 48109-2116
All certificates will be mailed in April 1999. It's a great way to participate in a great event!

What are we doing this summer?

José Alvarez	*Director Special Projects*	*Internship: Coors Brewing Co.*
Chris Ancona	*Steering Systems Designer*	*SKF Bearings*
Rick Bodey	*Mechanical Team Leader*	*Internship: Altair Engineering*
Jed Christiansen	*Project Manager*	*Leadership 2017 Program*
Dave Jordan	*Electrical Team Leader*	*Caterpillar*
Jason Kramb	*Aerobody Team Leader*	*Chrysler Tech Center*
Jeremy Lapkin	*Business Team Leader*	*DLJ Securities Corp.*
Jonathan Mezzadri	*Business Team*	*Internship: Detroit Edison*
Heather Nettle	*Array Team Leader*	*U-M Ctr for Prof. Development*
Reuben Rohrschneider	*Vehicle Systems Coordinator*	*Internship: Altair Engineering*
Nader Shwayhat	*Head of Operations*	*Internship: G.M. Tech Center*
Ryan Smith	*Mat./Man. Team Leader*	*U-M Mat.Sci. PRET Program*

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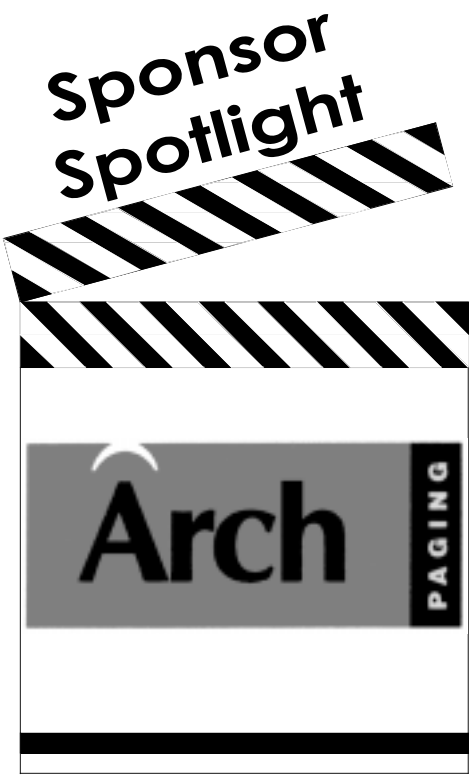

In this Solar Express, we would like to give a loud Michigan Solar Car Team "THANK YOU" to the folks at Arch Paging. Our team members are always on the move, whether working on the solar car or taking classes. Arch's brand new pagers have helped us stay informed at all times, even when we can't check in with the solar car office. The ability for the pagers to receive e-mail pages also allow us to give more than just a phone number. So far the team leaders who have been using them report that their team members can now check in with them through the e-mail paging system and there they don't have to wait until the weekly meetings to receive urgent updates. Now our project manager, Jed Christiansen, is also able to distribute all the information necessary to the team leaders for the next team meetings without needing to spend time emailing each individual team leader or trying to reach them on the phone. Arch Paging is recognized nationwide as a leader in communications. We on the team are proud to have them as a sponsor.

Although the Solar Car Team's primary goal is to construct an electrical vehicle, every team finds itself in need of specific manufacturing, logistics and support equipment which has traditionally been constructed by the team. The Alro Group, an Indianapolis based industrial metals supplier, has been a longtime sponsor of the team and has continued it's partnership with the team.

At the beginning of the *MaizeBlaze* project, the team found that it needed to construct many devices and thus initiated many projects that would not have been completed without the support of the Alro Group. To date, the team has either completed or initiated construction of the body-curing oven, a 450 sq.ft. electronics/array fabrication clean room, portable composites oven, support trailer sub-frame and hydraulic vehicle lift. Additionally, the Alro Group has provided alloy aluminum and alloy steel rounds, bars, plates and tubes necessary for the successful completion of the *MaizeBlaze* test chassis and race chassis components. Alro's extensive cutting and shaping facilities will, by cutting our aluminum wheel blanks to a near-net shape, reduced the team's time and cost involved in removing the excess material during manufacture. "Alro's diverse selection of both material sizes and alloys has allowed the team tremendous flexibility in design and manufacturing of the majority of our metallic vehicle components. We would have much more difficulty completing the car and other necessary projects without Alro's support," said Ryan Smith, Materials and Manufacturing Team Leader.

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We are in the process of updating our mailing database. If you wish to be removed from this list or have your address changed, please contact Jed Christiansen at (734) 764-2257.

Safety and Solar Car: hand-in-hand

by Dave Jordan, Electrical Team Leader

In the logistical nightmare that is designing and building a solar car, safety concerns can sometimes fall through the cracks. At least, that's what we were afraid of. We decided very early on that when the members of the *MaizeBlaze* team recount their fond memories to new members of future teams, scars should not be among the visual aids they use.

Since the beginning of the *MaizeBlaze* project, the team has had a Safety Officer hard at work making sure that all of the proper safety equipment has been obtained and is used and that team members are aware of how to both prevent and properly deal with emergencies. Hiroumi Kitajima, the team's current Safety Officer, has been working with companies like Singer Safety, Safety Services Inc., Encon Safety Products, Matarah Industries, American Allsafe, Badger Fire Protection, Spear's Fire and Safety, 3-M, Ansul, and Preventive Care, Inc., as well as the University's Department of Occupational Safety and Environmental Health to ensure that our workspaces are properly equipped with fire extinguishers, safety glasses, acid spill-control systems, respirators and protective clothing, first aid kits, eyewash stations, and other supplies to help prevent accidents and reduce the severity of those that may occur.

In addition to obtaining and maintaining the specialized safety equipment listed above, the Safety Officer is also responsible for making sure that tools and equipment are well maintained and safe to use, and for arranging any training that team members may need.