



# The Sundial

IOWA STATE UNIVERSITY SOLAR CAR RACING TEAM UPDATE

Volume 8, Issue 1, Quarter 1, 2004

[www.prisum.org](http://www.prisum.org)

## A New Generation of Team PrISUm by Justin Steinlage, Project Director

As a member of PrISUm Spectrum, I would like to thank all of our sponsors for the giving me the opportunity to be part of this great project. This is by far the greatest experience that I have had at Iowa State, and I am looking forward to the next two years as part of the team. There is no place on or off of campus

working on, not just the theory, and gives meaning to what you have learned in class.

Second, team skills mean everything. With a project this large, it would probably take an individual twenty years to design and build all of the systems necessary to output a decent project. Having only two years

to accomplish this feat, we must recruit members of all majors and backgrounds, and organize ourselves in order to get everything accomplished. We must work as a team, and if

we fail to do so, we will not be successful.

Finally, we are here for many different reasons. We are here to better ourselves, and to prepare ourselves for the future. We are also here to accomplish a common goal with our peers, and to build our solar car family. We are here to help advance alternative energy. Last, but

definitely not least, we are here to design and build a solar car, and to represent Iowa State University, our sponsors, and ourselves in the American solar rayces.

Again, Team PrISUm would like to send out a big thank you to all of our sponsors and supporters, and we look forward to seeing you as part of our team as we begin the next generation, the eight project of Team PrISUm!



that I could have learned so much about so many different things. After being on the solar car project for the past two years, I have learned several things. First, attending class is never a favorite, but having somewhere to apply what you have learned in class changes everything. Working on the solar car gives an understanding of what you are

### Inside This Issue

Director's Note .... page 2

Electrical Update .. page 2

Rayce Day ..... page 3

Pictures of PrISUm Spectrum ..... page 4

Mechanical Update page 5

Our Sponsors..... page 6-8

## Director's Note

By Justin Steinlage  
Project Director

With the end of one project comes the beginning of another. We lose many past team members to college graduation, the inevitability of life here at Iowa State. However, we are fortunate enough to have a large number of past team members returning, and new team members, fresh to the college scene, joining the project.

I see new team members, looking to find a home at Iowa State University. Looking for a place to add to their college career, and give meaning to their time at ISU. Many of these new members have already made the solar car garage their second home, and have become part of the Team PrISUm family.

I also see 'old' team members, returning to the team to give it one more shot. These people have already found a place on the team, and return to the playing field as leaders, determined to make the most of the next two years of their lives. After being part of PrISUm Spectrum, these veterans know what must be done to be successful, and have been key in getting a good jump on the current project.

Putting these two groups of people together, we get the crew of P8, Team PrISUm's eighth solar car project. I look forward to working alongside this new team, and I am very pleased to see such a great group of people working on Team PrISUm.

I am very proud to be part of this team, and am excited to see what the next two years holds in store for us!

## Electrical Update

By Ryan Emerson, Director of Electrical Systems

Since returning from ASC 2003, we have set out to build a new solar car, and with it a new electrical system. ASC was wonderful opportunity to see the different approaches other teams used to engineer their systems. In the coming months we will be looking at some of those techniques as well our successes from our previous cars, to build the best electrical system possible for the next race. Currently, we are researching our options for motors, motor controllers, batteries, and of course, solar cells.

programming will be made easier with the use of HI-TECH Software's PICC-18 compiler, which HI-TECH has graciously donated to the team. It allows us to write the code for our PIC microcontrollers in C, rather than assembly. This makes the task of writing software for our custom electronics a much quicker and less complicated task. It also shortens the learning curve for new team members, which allows them to jump right into programming from the beginning.

We have just started the design processes and forming a new team,



Our next car, like Spectrum, will most likely use CAN (Controller Area Network) for its telemetry bus. CAN is used most commercial automobiles and in industrial manufacturing. Its ability to perform in these high noise and high temperature environments, in addition to our past experience, makes it a perfect choice for our next project.

The development of our CAN network and microcontroller

but I am excited with our progress so far. Our new team members have new ideas and have been eager to take on some of our more complicated projects. With new set of motivated team members and the knowledge veteran team members gained on past projects and this last summer, I'm confident we will be able build a great electrical system for PrISUm 8, and be ready to race ASC 2005!

## New Leadership of Team PrISUm:

**Project Director—Justin Steinlage**

**Assistant Project Director/Treasurer—Tina Tran**

**Mechanical Systems—Joe Krueger & Ryan Ellis**

**Electrical Systems—Ryan Emerson**

**Outreach Coordinator—Kira Campos-Anderson & Chris Hasselbrook**

**Strategy—Rezza Rahmani**

**Fundraising—Dave Matlock**

# Rayce Day

By Tina Tran, Assistant Project Director

The fresh morning air filled my lungs as I stretched during the clear Sunday morning on July 13, 2003. It was 6:30 am, and I was excited! The team was standing in front of the Chicago Museum of Science and Industry and the green lawn was filled with spectators, reporters, officials, and other solar car teams. We were overcome with a sense of happiness as we waited for press to take our pictures, and when we were done with the pictures we prepped ourselves for the adventure that laid ahead of us.

The team was excited for the start. “Aaaaand heeere’s Iowa States solar car, *Spectrum*, look at that beautiful car cross the start line at 9:12 am!” cried out the Official. This was the start of our journey down old route 66.

The first goal for the team was to make it to our first mandatory media stop by the end of the day. The first media stop for the team was in Springfield, IL. Every day of the race we had at least one or two media stops, and that day we only had one. On the way to the



media stop we stopped for a routine check-up of the car. The safety crew jumped out of the lead and chase vehicles to make sure the stop was in a safe environment. The head mechanic jumped out of the chase van to perform a quick check on all of the major components of the car. The first stop for the day consisted of 4 race crew members holding the array while the mechanic checked under the shell of the car. The average time for a routine stop was between 5 to 15 minutes. One of these routine stops was required every day, just to make sure everything was in proper working order. Stops were also executed if we had a flat tire, or if the car was behaving strangely. This stop lasted 13 minutes, and we were ready to hit the road once again by 11:00 am.

The next time the team needed to stop was 3 hours later. Since we didn’t have time to stop to get real lunch, we had already packed peanut butter and jelly sandwiches for that day. This was the perfect opportunity to eat. The sack lunch menu for the next 9 days was identical to this one.

As the team neared the goal for the day we spotted spectators.

Families poured out of their homes to see the solar cars pass by. Nothing seemed more exciting than seeing the excitement on the little kids’ faces as they pointed and jumped as our car passed by. We finally arrived to the media stop with an hour to spare. We set the array up to take advantage of the charging opportunity while we tuned the car. We found that the media stop was the best resting point. We set-up camp and worked on the car while the sun set. At 7:30 pm dinner was being started. By 8:30 pm dinner was ready to be eaten. That day seemed long restless. I helped finished changing the tires and tried to help out with the dirty dishes. That night we prepped the car for next day, and packed up our batteries for the nightly impound at 9:00 pm. Everyone was in the sleeping quarters by 1:00 am, preparing for the 5:00 am start the next day, and getting ready to do it all over again. I on the other hand couldn’t sleep that night. I was excited to see what was in store for all of us during the next 9 days!



## Pictures of PrISUm Spectrum:



## Mechanical Update

*By Joe Krueger, Co-Director of Mechanical Systems*

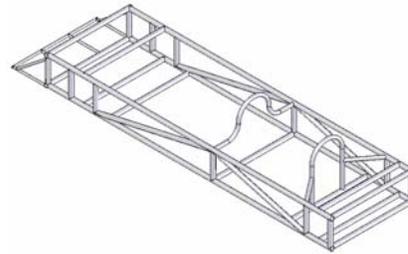
Thanks to a good design, and excellent construction techniques, PrISUM Spectrum's mechanical structure performed exceptionally well in this past summer's American Solar Challenge. With over 1,500 miles on the chassis, we have had no structural failures, and can see no signs of fatigue on our suspension parts, or the frame of our car. This news is very exciting, and we are looking forward to building a new mechanical system for our eighth solar car that is lighter and more durable than even Spectrum's mechanical system! In order to accomplish this feat, we must perform tests on our old solar cars, and research new technology to use on our new car.

Testing PrISUM Spectrum has been a major priority on our to-do list this fall. With the car suspension being broken in, and parts seeing their first major abuse, we must re-run efficiency tests on our car to make sure everything is still in top working order. We have already set up and executed a set of tests to measure the energy efficiency of Spectrum, and the results look promising. Although we are currently processing the data collected from our tests, a macroscopic overview of the tests tells us that Spectrum is aging well. This means that design features used on the last project can be tweaked and utilized on the current project, with a much higher confidence than if we were starting from scratch. This is a major benefit as we begin designing our eighth solar car.

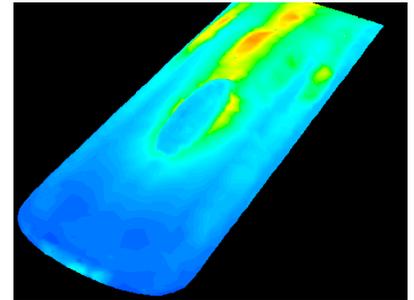
Research of new technologies is also high on our priorities at this crucial point in the current project. With completion of American Solar Challenge 2003, it is back to the drawing boards to design our next generation of solar car. Throughout this next project, we will be striving to continue Team PrISUM's heritage of designing state-of-the-art solar cars, using new, hi-tech materials and technologies to make our vehicle as energy efficient as possible. New materials that weigh less but have the same strength characteristics are constantly being sought, and with new materials becoming available almost daily, we are confident that we will be able to construct Team PrISUM's best solar car to date.

We are looking forward to designing and building PrISUM's eighth solar car over the next two years, and leaving the team with a solid foundation to build on!

## Start to Finish: Evolution of PrISUM Spectrum



Designing and modeling of body components and mechanical structure



Virtual testing of our aerodynamic shell and structural components



Making the models a reality by machining and manufacturing processes



Assembling of manufactured parts to get a finished product



RACING!

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