



The Sundial

IOWA STATE UNIVERSITY SOLAR CAR RACING TEAM UPDATE

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www.prisum.iastate.edu

Most Successful Raycing Season Ever for PrISUm!

by Justin Steinlage, Director of Photovoltaic R&D

After two years of hard work and dedication from team members, PrISUm Fusion rolled across the finish line in better position than any car in PrISUm's history. The 1st place finish in class, 2nd place finish overall, that Fusion earned at the Formula Sun Grand Prix in May was the start to an outstanding racing season for the team. Beating higher dollar teams like Michigan, Rolla and MIT, Fusion proved that being ready for a race can be more important than spending more money for your vehicle.

Our performance in May must have proven that to others, as many more teams were prepared for the race in July. After kicking it into high gear, almost all of the teams were able to qualify for the race, and many were in a position to put forth an impressive performance. Although out powered by most teams, even in stock class, Fusion maintained a presence in the North American Solar Challenge, coming in 3rd place in class and 11th place overall. This is the best finish Team PrISUm has ever received in class, and we are very pleased with our performance.

In addition to the exceptional finish that Fusion achieved, Team PrISUm was given awards for safety and sportsmanship, as well as an individual award. The safety award



Members of PrISUm signing Fusion at a welcome home reception in August.

was earned at the last chance qualifiers when MIT's car came into the pits on fire. Members of the Fusion pit squad were there with the CO₂ fire extinguisher before MIT had stopped their car, and immediately put down the fire. In fact, members of PrISUm were so willing to help out others throughout the entire event that the team was given the sportsmanship award as well.

Last, but not least, driver Ryan Ellis received the Esprit De Corps (spirit of the race) award for his

outstanding demonstration of helping others. During scrutineering, Ryan helped out the University of Texas at Austin to try to get their car qualified for the race, and during the race, when not driving of course, Ryan could be found cooking for anyone looking for a meal.

Overall, Team PrISUm is very proud of our performances with Fusion. We have spent a lot of time figuring out how to make our next car even more successful, and we look forward to raycing again in 2007. Thank you for your support of this amazing project, and we hope that you will consider renewing your support as we begin P9, the ninth solar car project of Team PrISUm!



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Director's Note

by Kyle Miller
Project Director

As the new Project Director for Team PrISUM and only a sophomore at ISU, I feel somewhat overwhelmed by the huge responsibility that lies before me. Over the past several months we have reorganized the entire team, setting up project timelines with the new team leaders and beginning to prepare for the rayces that await us. Although two years seems like a long time, NASC 2007 will be here before we know it.

Fortunately, Team PrISUM is coming off a high note. Fusion, which competed twice this past summer, earned two of the best finishes ever by a creation of Team PrISUM. This gives us a running start on the new project and a solid foundation to build off of. In fact, design progress has already put P9 slightly ahead of the Fusion timeline, and we are hoping to have a full rolling chassis before classes resume in August of 2006. This will give us plenty testing opportunities and chances to improve upon our designs before the 2007 Formula Sun Grand Prix, which is the first scheduled test for P9.

Fortunately, we will not have to wait to test some of the components of the new car until the next raycing season. Much of the design progress and upgrades to old-but-working systems will be retrofitted to Fusion for the Formula Sun event this coming summer. This will give us a chance to test some of the new equipment before P9 is capable of hitting the highway.

Overall, the team is very excited to be in the beginnings of a new project. This is especially true as we have hit the ground running. So grab a seat and join us as we design and build the next generation of solar raycer by Team PrISUM!

Electrical Update

by Jared Leonard, Electrical Leader

It's exciting to see so many new faces around the garage. After a great race this past summer, the fresh ideas from new members combined with the experience from our returning members promises the best electrical system PrISUM has ever built. We're only two months into the design of Team PrISUM's ninth car and the electrical team is already off to a great start.

Reliability is one of the biggest factors when it comes to building a competitive solar car. In NASC 2005; teams finished within minutes of each other after driving nearly 2,500 miles. Every second counts, and a single break down can burn twenty minutes or more.

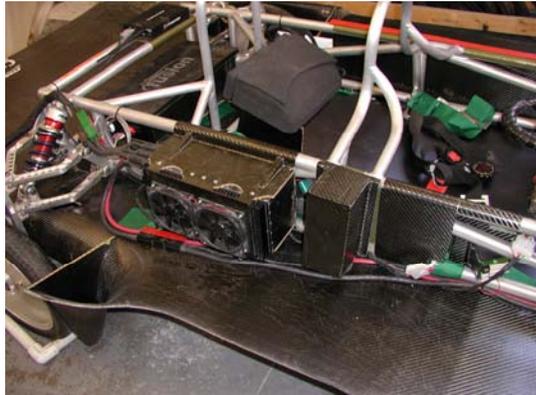
While Fusion was the best finishing car to come out of ISU it was still forced to stop on more than one occasion due to electrical problems.

To help prevent the same type of problems during the next NASC we plan to put P9's electrical system through a grueling battery of tests. It's one thing to build a circuit that works on a lab bench and quite another to build one that can withstand a 2,500 mile trip across the continent. To make this possible, we are working to complete P9's electronics by the end of this spring so that they can begin testing during Formula Sun 2006, giving us plenty of time for improvements.

Racing this past summer, Fusion's telemetry system was an invaluable tool in helping us find and correct potential problems with the electrical system. Our next generation telemetry system will be one of the areas to see the biggest improvements over Fusion's. We are working to develop new software to help us to better monitor and analyze the car's performance as it's driving. We will also, for the first time, be able to log telemetry data on the car itself. If there is a

problem and radio contact with the car is lost we will still have a record of how and why the electrical system failed. This should be extremely helpful, especially during the testing process.

In addition to the time input needed to make the next electrical system even better, the



Fusion's main electrical system. As you can, or more appropriately can not see, wires are all wrapped and panels are all neatly covered.

electrical team is going to need a lot of external support. This includes, but is definitely not limited to: wire, IC's, semiconductors, microcontrollers and custom PCB's. If you can help out the electrical team in any way, please do not hesitate to send me an email at leonardj@iastate.edu. Sponsors are what make this project possible.

I'm looking forward to working with the electrical team to build Team PrISUM's newest solar car. Check out the latest electrical updates in the next issue of the sundial, and online at <http://www.prisum.iastate.edu>. Thanks for your support!

Leadership of Team PrISUM

Project Director—Kyle Miller
Assistant Project Director—Amanda Helgeson
Photovoltaic R&D—Justin Steinlage
Mechanical Systems—Joe Krueger & Chris Stack
Electrical Systems—Jared Leonard
Outreach and Safety —Akshay Dave

Mechanical Update

by Joe Krueger & Chris Stack

Welcome to Project 9! After a great racing season with PrISUM Fusion, Team PrISUM has re-organized and is prepared for another design and build cycle. We are looking forward to the time that lies ahead of us and we are already off to a great start.

Following NASC 2005, we started the design phase of the PrISUM 9 project. In response to the great success this past summer, we will be keeping many of the same design elements as Fusion. These elements include the fully machined A-arms, and the non-structural shell. These aspects of Fusion worked out very well for the team, and we will be spending most of our time improving upon the present designs and getting the car completed as soon as possible.

Fortunately, there were no elements of Fusion that did not work, which means no complete redesigns. Nonetheless, every element of the car will be reworked and adapted to P9 to be lighter and better than its counterpart on Fusion. For example, our aero body can be made lighter by simply using a different type of carbon fiber (or even Kevlar) to make it.

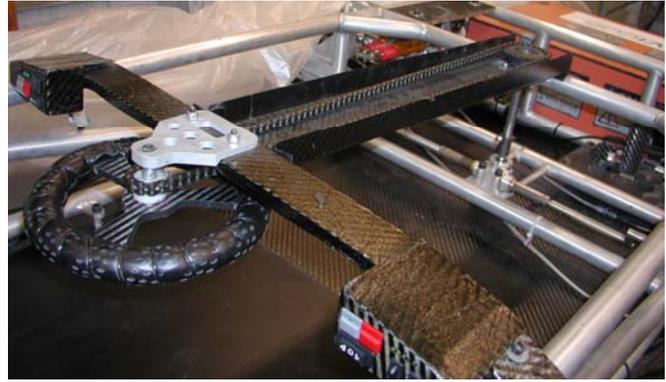
While the design process is concurrent, that is, many different car system designs are being worked on at the same time, the frame of the car was definitely one of the first items on the drawing boards. This early jump on design has given us a chance to analyze several different ideas for designing the new frame, and at this point in time, the frame we plan on using for P9 is completely designed and analyzed. Algor, sophisticated FEA software donated to the team, was used to do this analysis.

With the frame design being all but finalized, the aero-body is now through the initial design phases. This puts P9's shell in the initial phases of aerodynamic testing. Upon completion of the testing, the shell will be tweaked if needed to produce the optimal aerodynamic design for our car. PrISUM 9's suspension, which has gone through a small amount of evolution since Fusion, is also in its initial stages of design. It is currently being analyzed for strength and durability just as the frame was, and again, following this analysis, the design will be tweaked to produce an optimal design.

Almost all the other mechanical systems of the car, such as driver interface, steering, and brakes have entered the early stages of the design process. Over the next several months, P9's design will be completed and we will enter the construction phase of the project. We are already slightly ahead of the Fusion design timeline, and we plan on making good use of the extra time in testing. P9 is looking to be our most analyzed and tested car to date, which are two major factors in a successful race. Please stay tuned as we work through the ninth project of Team PrISUM, and attempt to once again race with the sun in 2007!



After months of hard work:



The race ready version of Fusion's steering system. This setup is very similar to what our last project used, only several machined and custom made parts make this system lighter and more user-friendly.



Fusion running the slalom in the Hilton Coliseum for the first time. Drivers reported significant improvement over Spectrum's handling performance during higher speed maneuvering.



Mech Team members Sarah and Hilda working on Fusion's show shell. Although the part looked acceptable coming out of the molds, we want to smooth out even the smallest defects on the show shell.

Team PrISUm's Most Recent 1st Place Stock Class, For 3rd Place Stock Class, North A



Fundraising Update

by Amanda Helgeson, Assistant Project Director

First, I would like to thank everyone who contributed to the Fusion project. Without your help, it would not have been nearly the success that it was. Now, as we leave Fusion and move on to P9, we come across the same issues we had with the last project: building a solar car requires a lot of money.

For our next project, we wish to build a car capable of competing with the top teams from this past year, which include the University of Michigan, the University of Minnesota, and MIT. While we had a solid foundation in Fusion, these three teams shared a luxury that we could not afford; they had solar arrays which allowed them to be competitive in the Open Class. Fusion competed in the Stock Class, due to the inability to afford a more expensive solar array, and we want to change that for this coming project.

For P9, the new car, the team would like to be able to afford to compete in the Open Class. The team would

Project Creation: PrISUm Fusion Formula Sun Grand Prix 2005 North American Solar Challenge 2005



like to be able to purchase an array powerful enough to compete with the top teams, enabling us to achieve a top finishing position in the next North American Solar Challenge. As for the other parts of the car, they can always use some improvement as well. The mechanical team is working on designing a car that is lighter, without compromising any strength, and the electrical team is currently designing a system which will be tested for reliability months before the car races down the road. All of these projects will help to make the new car a greater success than Fusion was.

In order to help the team achieve the goals set forth, we are once again asking for any contribution that individuals are able to offer. Without your support, we are unable to purchase the required parts needed to race a solar car. The team is thankful for everything that individuals have offered in the past, and we look forward to your continued support.



One Last 'Thank You' to the Sponsors of PrISUm Fusion!

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Dear Supporters:

Thank you once again for your amazing support of our project. With your help we have been able to bring Fusion to life! With only three months of the current project left, we ask you to once again consider supporting us in our journey to rayce with the sun. And finally, make sure to check up on us this May as we race in the Formula Sun Grand Prix 2005!

Sincerely,
Justin Steinlage
Project Director, Team PrISUM