Say Hello to Phaëton

Over the course of the last 3 years, Team PrISUm has fully built and designed one car and is currently designing another one. We have raced in 3 races, attended countless outreach events and have had over 100 new members walk in and out of our doors.

Team PrISUm is now on its 12th project, Phaëton: A 3-wheeled space frame vehicle with a carbon fiber body. The mechanical team set out to create a thinner carbon fiber body and aluminum frame – decreasing our drag. The Electrical team set out to build a safer, more reliable electronic design – adding ground isolation, ribbon connectors, and enhanced battery module communication. This new faster, lighter and higher capacity car surpasses its predecessor Hyperion and is going to be team PrISUm’s most competitive design yet.

Our energy storage has upgraded to new Boston-Power batteries. These feature the same heat tolerances (60 degrees Celsius) as Hyperion but have a higher capacity (4KWh up from 3.5 KWh). Nearly the same solar cells from Hyperion will be used on Phaëton but will only cost 2/3rds the price due to a drop in solar-cell costs over the years. Phaëton will use the a new lighter Wave Sculptor motor controller (6000$ a piece) for converting DC to the 3-Phase AC signal that powers the same NGM motor PrISUm has been using for the last 15 years.

This is where my personal perspective comes into this story. PrISUm, in reality, is split between core members (those who try hard to make an impact or have been around awhile) and peripheral members (often new members who join the team; learning and growing from the core members). The magic of solar car is that you get to see people jump this band gap every semester. Everyone who has been on the team has had the chance to learn a little more about engineering, organizations and themselves. Myself, along with other directors, had the goal of facilitating this process as fast as possible. Now in the Fall semester of 2013, Phaëton will soon start taking shape. Stay tuned in for our progress!
Hyperion represents one of the most robust mechanical designs Team PrISUm has ever created. It has proven itself both on the road and on the track; bringing home the 2012 ASC Mechanical Design Award. So it is no surprise that Hyperion’s successor does not fall far from the tree when it comes to mechanical systems.

After much deliberation, the team decided to keep the three-wheel, rear wheel drive configuration from P11. The aluminum space frame construction surrounded by an aerodynamic wing, three fairings, and a canopy will be recognizable to anyone familiar with Hyperion.

The double A-arm suspension in the front, swing arm style rear suspension, rack and pinion/Ackerman steering system, custom lightweight aluminum wheel rims, and fully redundant hydraulic brakes are all making a return as well. These are all systems with thousands of miles of testing behind them.

By building off the success of Hyperion, we can be confident in the success of the new vehicle. But the comparisons stop there. Phaëton is leaner, meaner, and greener.

The frame has been made smaller and lighter, with a shorter wheelbase to improve handling. The heavy fiberglass of the shell will be replaced with lighter, stronger carbon fiber weave strengthened by integrated bulkheads. The body itself is shorter from nose to tail, much thinner and more streamlined than Hyperion.

These changes will result in a 15% increase in efficiency at cruising speed. The sides of the shell and the wheel fairings are optimized to ‘sail’ into crosswinds, reducing overall drag by an additional 20% in a 10mph crosswind. Our innovative active fairing system is new and improved, with a simple lever action replacing many feet of bike cable. The active fairings allow for very narrow airfoils when Phaëton is driving straight and open up to permit the wheels to turn when cornering.

Phaëton is more efficient than Hyperion on the road and can maintain a faster cruising speed. When the top shell does come off, a simplified and more intuitive latching system will allow the pit crew to quickly remove and re-secure the top shell.

Overall, the mechanical improvements combined with the upgraded electrical systems, will bring our team to the next level.

We are gearing up for a more successful racing season, and with luck, Phaëton and Team PrISUm will take home the American Solar Challenge trophy in 2014.
Using Outreach to Inspire Students

As a team, we like to promote that we are not just building a solar car; we are inspiring and building future leaders and engineers.

Throughout each project, we attend and host a large variety of outreach events. Many of these are designed around Science, Technology, Engineering, and Mathematics (STEM). As a team, we are primarily built around the engineering field, but we are also able to fully integrate other majors found at Iowa State.

In the same way, we are able to inspire young minds who come to see our car, no matter what they are interested in. It is a great experience for team members to be at our outreach events and see the wonder light up in children's eyes. Seeing what a couple of college students can do with a little free time and ingenuity shows them that they are never too young to start dreaming.

One of our most common outreach event activities is for teachers to bring their classes by our facilities to tour our office and garage. These are fun events for the children and we are constantly impressed with the number of questions they have and the depth of interest they show in what we do.

In addition to our tours, we will often travel with the car to large events. Some of our larger annual events include the Ames Car Show, Bald Eagle Days, Clubfest, and VIENSA. Often at these events it is the first time for people seeing our car; reactions vary from wonder to amazement, but we always leave people with something new to think about.

Every event the team attends is a new learning experience for the members. We will often have long conversations with random strangers about what it takes to build something like our solar car and we thrive as a team because of these interactions.

I'm Dan Bell, a graduate student at ISU, majoring in Human Computer Interaction. My duties on the team are secondary to the main business of designing, building, and racing a solar car. Mostly I focus on building and representing the team.

Last June I attended the 2013 Formula Sun Grand Prix with Team PrISUm. I spent much of my time taking photos, making food, running to various parts stores, and helping people cope with the record-breaking heat of Austin in July. This was my first race, and no amount of looking at pictures and video or hearing stories could have impressed upon me the importance what may simply appear to be a bunch of young people with fancy electric cars. I had to experience it for myself.

I spent about half of the race up in the timing booth along with one member of each team acting as the "eye in the sky". I relayed official information to our team regarding our progress along each segment of the 3.4 mile Circuit of the Americas Formula 1 track. I also relayed information about other teams - who was gaining on us, who had broken down, and so forth. It was in this booth that it really struck home that this race is a marathon, not a sprint. This race is about endurance - the heat, the stress on the car, drivers cramped in little cockpits, pit crews with nothing to do for hours then suddenly faced with a major breakdown - nobody could survive unless they worked as a team.

Competition took place out on the track. Cooperation was what I found in the racing pits, the garages, around the BBQ grill, and in the hearts of all those present. Recruiters and representatives from universities and corporations from around the world were present. They were drawn not just by an exciting race, but by the people that made it happen, people who distinguish themselves by going beyond the expectations of their teachers and families and set a higher standard for themselves.

Most teams are from educational institutions, and have active outreach campaigns. If they are like Iowa State, they are non-profit institutions and are dedicated to community service. New teams are forming, even in high schools. One US high school team is racing in this year's World Solar Challenge in Australia.

All teams proceed on the support of their communities, and return that investment beyond financial measure. The world-wide community of solar car racing has its roots in cooperative competition dating back to the 1980's. Over the last 25+ years, thousands of people have participated in FSGP and similar events. Solar car racing continues to influence another generation of leaders built through cooperation. Successful participants will ultimately spend their lives paying their experience forward to others. This is the true reward for all who have...
Stay up to date with the team

As we begin a new year, with new goals, we want to thank our sponsors who helped make 2013 a success.

Cash donations from sponsors like Boeing, Alliant Energy and Central Iowa Power Co-op help us cover our monthly expenses, costs of developing our circuit boards, and the extensive cost of caring for the team while on the race.

Product donations, like the foam donated to us by Coastal Enterprises to make our molds and the software licenses we received from Autodesk, which are imperative to our design phase, are the life blood of this team.

Our support from the university is also key. Besides the obvious value of the facility we work with, donations from the College of Engineering and our own Government of the Student Body helps us with our larger expenses, like race fees and

the cells for our array.

We also want to thank Iowa Energy Center who consistently value our project and support us each year with a generous grant donation. This goes a long way to cover the cost of our active outreach education initiative.

Our goals for this year are largely centered around getting the body and suspension fabricated and getting our car in working order. Additionally we have a special initiative to raise funds to purchase two new motors.

In the year following the completion of the Phaëton project, the American Solar Challenge will allow four-wheeled cars. Our current motor is heavy, less efficient, and almost 15 years old. We are looking to acquire two, which come at a cost of $20,000.

These new motors will give us greater efficiency, more torque, and the assurance that we will stay competitive for years to come.

We know that this team will always strive to be a top tier competitor in solar car racing and it is all possible because of the amazing sponsors and supporters we have.

So from all of us at Team PrISUm, I want to wish each and every one of you a huge thank you and promise that we will always work hard to make you proud!

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