

THE SOLAR FLARE



October 2013



2013 Principia Solar Car Race Team

2014 Here We Come!

By Kali McKee

Two questions I hear all the time are, "How long does it take to build a solar car?" and "How long does a solar car last?" As summer comes to a close and we dive into the fall months filled with classes and homework, the team celebrates the end of one car and the beginning of another. Ra 7s, the silicon cell, manta-style beauty modeled after her almost identical sister Ra 7, ran her last race in the 2013 Formula Sun Grand Prix this past June. Placing 4th overall, Ra 7s is now retiring after racing in the 2011 World Solar Challenge, 2012 American Solar Challenge, and the 2013 Formula Sun Grand Prix. Ra 7s will spend the rest of her years traveling the USA to a variety of outreach events and will be used for testing and driver training around campus until the completion of our next solar car.

Principia Solar Car is happy to announce that the team is well into designing our next car, Ra 9. As many know, Ra 9 will have a completely different

body structure, four wheels, and new mechanical and electrical systems. The team will not be releasing images of Ra 9 designs until the designs have been finalized. Meanwhile, team members have been busy researching new systems and techniques and are finalizing preparations for the construction of the body mold and plug.

This newsletter is a special edition! The following articles are from each of the 2013 Formula Sun Grand Prix race team members telling about their "race experience," along with a special from faculty advisor, Steve Shedd.

We look forward to a very busy year and plan on having Ra 9 completed and ready to race in the 2014 American Solar Challenge this coming summer. Keep an eye out for updates and photos on our website and don't forget to follow us on Twitter and Facebook in order to get live updates on what the team is doing!

2013 FSQP Timeline

Day 1

Move into pits

Scrutinnering:

Mechanical

Electrical

Battery Protection System

Body and Sizing



Day 2

Visit from local students

Scrutinnering:

Driver Egress

Driver Weigh-In



Day 3

Final Race Prep

Scrutinnering:

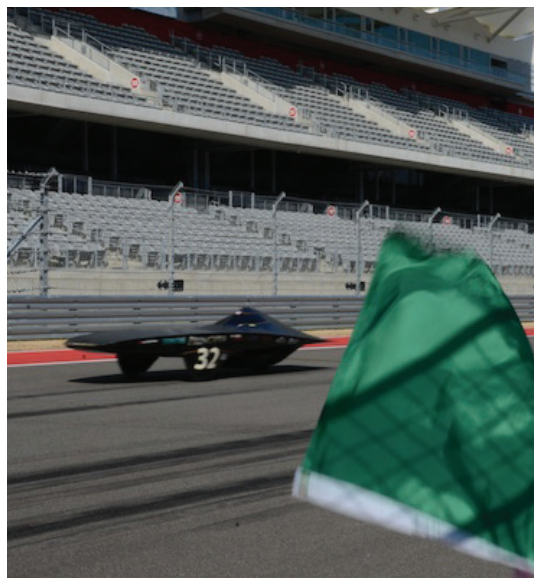
Dynamic Testing



Day 4

First Race Day

In 5th place with 56 laps



Day 5

Second Race Day

Drove another 54 laps

In 5th place overall



Day 6

Final Race Day

Voted "prettiest" car

Placed 4th overall!!!



Students Without Limits

By Steve Shedd

This August I started my 18th year as one of the faculty advisors of Principia College's Solar Car team. I've been thinking a lot about Solar Car lately after hearing an NPR piece on graduate schools a week ago. A female college graduate was telling the interviewer that she didn't know it at the time, but the institution she chose for her undergraduate work severely restricted where she could go to graduate school.

She named off multiple graduate schools including MIT, Stanford, and UC Berkeley that she had no chance of getting into because her bachelor's degree was from Miami University of Ohio. The interviewer accepted this and kept on going. What struck me was that every graduate school she mentioned – without exception – was one from which a Principia graduate (on Solar Car) has received an advanced degree. I think much of this is based on Principia's conviction that each student is truly without limits.

I've known for many years that we have great students at Principia. With Solar Car's exposure, lots of people all over the world know we have great students too.



Steve Shedd, 2011 World Solar Challenge

I have hundreds of great stories from Solar Car but two of my favorites are:

- We brought our 7th Solar Car (Ra 7) down to Texas for the 2008 race even though we hadn't finished building it yet. We still had the bulk of the electrical wiring to do on the car. While the other teams were going through the 3-day scrutineering process, we were still completing our car. Then came the first of the two days of driving on the track to qualify for the road race. Our car had not moved one inch under its own power – ever. Meanwhile, several of our competitors had driven their Solar Car the entire 2,400 miles of the race route to Calgary as a test.

We were having trouble getting our motor controller to work. Eventually, the team leader from the University of Minnesota, Sam Lenius, who had done his research for his Electrical Engineering degree on the same motor controller, came over and was able to fix the problem. We would not have made the race without Sam's help.

With the race starting Sunday morning, I was awakened by a phone call from Sam at 11:30 Saturday night. Minnesota's team had burned out all of their power trackers and wondered if we might have any spares. A power tracker is a sophisticated device that adjusts the amperage to provide a constant voltage as the power from the sun varies. There were only two manufacturers of these in the world, one in Switzerland and one in Australia. We had changed brands and brought our eleven former ones with us even though we didn't really know what we would do with them. I was very happy to tell Sam that his team could use all eleven trackers. He drove right over, picked them up, and his team worked through the night to install the necessary eight of them on their car. They completed the task and were ready to enter the race by the 9 AM start. We would not have been in the race without Sam's help...

and Sam's Minnesota team would not have been in the race without Principia's help. We ended up finishing the race in second place – beaten only by the University of Michigan. Once again, no limits.

To complete the story, when Sam finished up his degree at Minnesota, he started a company, Dilithium Power Systems, making power trackers for Solar Cars. We are currently running trackers from Sam on Ra 7s.

- When Solar Car student, Sidd Bikkannavar, graduated from Principia in 2004 he went to work for the Jet Propulsion Laboratory (JPL) in Pasadena, CA. Years ago when I contacted Sidd, he was working on the Mars Rover and I got to see the vehicle up close before it was launched. Sidd has also been very active in helping with the Solar Car races in South Africa and Australia for several years now. On my latest visit to JPL he informed me that he is working on a classified project and cannot tell me what it is. His team isn't even allowed to discuss their work in the JPL lunchroom. What he could tell me, however, was that of the eight elite scientists on this project, they have one graduate from MIT, one from Stanford, and TWO from Principia College! That's pretty neat – no limits.

I recently stopped by Stanford University for the first time and visited their Solar Car team. They have an amazing Solar Car shop with multiple bays all donated by Volkswagen and their own beautiful CNC milling equipment. In describing their 2011 Solar Car to me they explained how Corning Glass helped them out by developing a special .5mm thick glass with three specific coatings specifically for encapsulating the solar cells on Stanford's car. While being blown away by all the resources at their disposal, I remembered that 'little' Principia has finished ahead of Stanford many more times than Stanford has finished ahead of Principia. Our goal is not to come in ahead of other teams, but it does make me smile (no limits).

Currently I have over 28,000 Solar Car photographs on my laptop and I am always ready to show (some of) them to anyone that is willing. For years, I have given Principia Club talks and presentations about the Solar Car. I recently got an email from a couple that had come to my Principia



Sidd Bikkannavar
2011 World Solar Challenge

Club Solar Car talk five years ago. Since that time they've wanted to support our project, and now they are happy they are finally able to contribute.

Some of our competitors spend as much as \$10-12 million on a single Solar Car. Principia College usually spends around \$180,000. Since we are not part of the College's operating budget, this is still a lot of money for us to raise for each new car (we are now designing our 9th car). We are so grateful for all the wonderful support from our generous donors. This time around, however, we need the full \$180,000 in a very short time to build our new car before next summer's race.

Also next summer (June 2014) we have invited all Solar Car alumni back to the College for a Solar Car Reunion. It should be a wonderful time and I personally am looking forward to reuniting with many (hopefully hundreds) of our Solar Car graduates. Since its inception in the early 90's, Principia has had over 300 different students on its Solar Car teams. (Some of our largest competitors have over 300 team members at any one time.)

Principia College is the only liberal arts college left in Solar Car racing. Most of our competitors get half their members from their mechanical engineering department and the other half from their electrical engineering department. We prefer students that are Christian Scientists. They know, and we know, that they have no limits.

In Principia's list of 23 Policies, I love Policy 6, which states that we will train our students to think, "clearly, vigorously, fearlessly, tolerantly, unselfishly" (i.e. no limits). Solar Car has not only been a big blessing for our school and our students, but for me as well.

Driving the Line

By Brian Ritter

My name is Brian Ritter and this will be my fourth year on the team. I am a senior computer science major, and I plan to study electrical engineering after graduating from Principia College. Throughout my time on the team I have worked on many different aspects of the car, but during my sophomore year I began focusing on helping with the electrical work.

During this past race, 2013 Formula Sun Grand Prix in Austin, I was the primary driver and head of the electrical team. During scrutineering, Brian Kamus-inga (Brin) and I worked on implementing an active cooling system for our batteries, as well as rewiring the horn and performing general maintenance and replacements on the electrical systems. Once the race started, I focused more on my responsibilities as the primary driver. Our team's mandatory driver bedtime kept me from some of my duties with electrical, and I'm very grateful that Brin and John were there to pick up the slack. I drove approximately five to six hours each of the three race days. Driving Ra 7s on a Formula 1 Grand Prix track was an amazing opportunity.

It's hard to pinpoint my favorite experience from my time on the solar car team, but what it comes down to for me is all of the times something goes wrong and I am pushed to my limit as a teammate, an individual, or a Christian Scientist. This may sound strange at first, but looking back, these are the experiences that stick with me and from which I grew the most. With so many examples, I will just choose a couple to illustrate my point.

During the most recent American Solar Challenge, I had the pleasure of driving our solar-powered car through several rainstorms. One particularly quick downpour during an already-severe storm completely blocked out my vision while I was going about 40 mph. I stopped as quickly as I could,

hoping and praying that I wouldn't run into anything up ahead. Once stopped on the side of the road and after the panic had subsided some, I knew I had to address the fear that I could feel building inside me. I was terrified of what could have gone wrong, and didn't feel ready or able to continue driving. We waited for around 30 minutes until the storm began to let up, and the entire time I was working to regain my sense of safety and protection that I felt I had lost. I can't say I appreciated this trial at the time, but it was a defining moment for me in learning to handle fear when it seems so rational in the moment.

On the electrical team we have a saying for when something goes wrong: "that would be too convenient." This phrase was spoken too many times to count during the days of scrutineering before the American Solar Challenge. Brin and I were working on the battery protection system (BPS), and it seemed that for every problem we fixed, two more would pop up, each one more confusing than the last. It took tremendous patience and hard work, not to mention several very late nights, to finally get the BPS to a point where it was ready for scrutineering. Keep in mind that once the car passes scrutineering, nothing can be changed to the systems or else the car must go back through the corresponding inspection. Failing to get the BPS working just wasn't an option, and it still inspires me to think of the strength we are given when we most need it. While we may struggle and go through trials, it is the conquering of these challenges that allows us to grow and show what we are capable of.

I have had so many opportunities to learn and grow over the past three years, and the experiences I mentioned are just the tip of the iceberg. For me, I can't help but appreciate all the times I've struggled, because in the end I have these experiences to thank for pushing me to become the person I am today.

The Sleepy Mechanic

By Garrett Fielding

Flat tire! Flat tire!" I snap awake, bolt upright, grab my tool belt, only to find the rest of the van laughing at me. As usual, I had fallen asleep while out testing the car and, as usual, that meant it was time to play jokes on Garrett. But it's all in good fun, and I am soon back asleep. I'm Garrett Fielding, a Senior Chemistry major entering my fourth year with Principia Solar Car, and the team's mechanical lead. Had this been an actual stop, the team would have leapt into action, deploying team members to various locations for safety, driver care, and the mechanical and electrical teams to fix whatever was broken. Often this is as simple as changing to a fresh set of tires, but it can also be far more complicated and time consuming. Now, back to the road...

This is what solar car is all about. While it's true that the many races in which we compete are the ultimate test of our car, the many days and weeks of testing leading up to races demonstrate whether or not we have actually accomplished what we have set out to do. It is often on the river road from Alton to Grafton that we learn what final changes need to be made before setting off to compete with the best engineering schools in the world.

Even when a car has competed in multiple races, our constant improvements and modifications provide us with the opportunity to both test new systems and train new team members on how to function as a unit. Whether driving around Crafton athletic center, cruising the River Road, or zipping around the track at the Gateway Motorsports Park, field tests are some of the most important moments in the life of a solar car and its team.



Garrett Fielding, Mechanical Head

These times also provide some of the most memorable Solar Car moments. The memories made while huddling together for warmth while the car drives around Crafton in near freezing conditions, or driving onto an official NASCAR style track for the first time, are ones that team members will always be able to look back on fondly for years. Beyond engineering challenges, problem solving, and growth in character, Solar Car provides a bond that Liberal Arts students of Principia College will treasure as their own. As recent graduate and Solar Car driver Justin Sinichko put it in his early days on the project, "I want my own stories." I look back on my years on the team and I know that I have many stories to share with teammates and friends alike. And though I hope that my time with this project is not nearing its end, I know that I have received the fullest experience from my Principia education, all because of the Solar Car project. Even now, I'm sure that someone on the team is plotting their next prank to pull on helpless sleeping Garrett.



Brian Ritter, Driver & Electrical Head

“Pit Princess”

By Kali McKee

I still remember calling my mom freshman year to tell her I had joined the Principia College Solar Car team. Three years later, I have spent every spring break, countless Tuesdays and Saturdays, most of my summer months, and four solar car races working tirelessly with the team. Blood, sweat, tears, hugs, hours, miles, and much more, solar car takes experiential learning to a new level, and I will be forever grateful for the experiences this journey has brought me. Now a senior at Principia College majoring in Business Administration and Computer Science and minoring in Dance, I have filled my college years with many different activities that have made college memorable.

While on Solar Car I have worked as pit crew, navigator, business manager, team leader, driver, and any other job that needed to get done. For the 2013 Formula Sun Grand Prix (FSGP) I played my usual role of business manager with Lisa Lewis, which included corresponding with race officials and local supporters, writing the daily Google updates, posting updates to Twitter and Facebook, and cohosting the PIR show every evening. This was also my second race as backup driver to Brian Ritter. I would have to say that my favorite part about the 2013 FSGP was being able to drive Ra 7s on a brand-new, beautifully crafted Formula 1 track. I have always loved driving in general, so every opportunity I get to drive Ra 7s is just another chance to do something I absolutely love. The Circuit of the Americas did an incredible job with their track, and driving it was an experience I will never forget.

Looking back I realize that I didn't have a specific job while working in the pits. What I found myself doing most of the time was keeping the team and pits organized, answering general questions from team members, and keeping everyone busy – that way we were always ready for any pit stop or on track fix. Team advisor Joe Ritter jokingly called me “Pit Princess,” but the closest official job title I

can think of would be pit chief. Wherever the car went, I went too unless I was needed elsewhere. I assisted with tire changes, mechanical repairs, and even the many tweaks and fix-its we performed on the electrical system. This was completely different than what I was used to because I spent most of the 2011 and 2012 FSGPs in the timing tent except when I was driving. I thoroughly enjoyed the excitement and bustle of the pits. The team kept me busy, and in the end I felt extremely content with the fact that I was able to directly contribute to the team's overall efforts.

Solar Car has taught me many valuable lessons. The first lesson the project has taught me is the value behind glorifying God and always doing my best. These two goals might be jokingly thrown around between team members, but we all know the true weight and power behind working towards those goals. The best part is that these goals do not just apply to building a solar car—who would have thought?? Over the past three years, I have learned to use these goals as my focus in classes, family, peers, dance, and life in general. Having a goal always makes a difference in the overall result.

Other than the goals, my advisors and teammates have also taught me how to be patient, forgiving, humble, loving, focused, organized, and articulate, as well as not taking everything personally... and did I mention communication? Although I will always be teased about my many “whoopsies” and moments where I overreacted or failed to communicate clearly, I love every single individual who took the time and patience to guide me through breaking bad habits and teaching an old dog new tricks. I know that I have not yet mastered the art of teamwork and communication, but I have definitely learned to love every opportunity for personal growth. These lessons could easily be the sole reason for being a member of the Principia Solar Car Team—not to mention the gorgeous car and good food.

Aerodynamic Guru

by Kenneth Stack

Hi, my name is Kenneth. I am in my senior year at Principia College, majoring in Physics, and have been with the solar car team since my freshman year. Besides physics and the solar car, I have also been involved with rugby and the chemistry club. So far I have participated in the 2012 American Solar Challenge and the 2013 Formula Sun Grand Prix. In the first race, I helped with navigating from New York to Minnesota by plotting our course on a computer program. I was also the assistant safety officer that summer when the team received our sixth safety award. At this summer's race, my tasks were centered on body repairs, tire maintenance, and mechanical assistance.

My favorite experience so far on solar car has been creating a 3D model of Ra 9. This 3D model is significant because it will outline exactly what is to be done during fabrication. I spent last spring learning the fundamentals of our computer aided design (CAD) software from a tutorial. Then I began to explore how our streamlined shape could be formed by creating surfaces from outlining curves. As my familiarity with the software has developed, so has the shape of Ra 9. We started with crude models of just the central portion of the car and now have a design that contains all aerodynamic features. This has been a fascinating opportunity for me to learn about our modeling software and about aerodynamics.

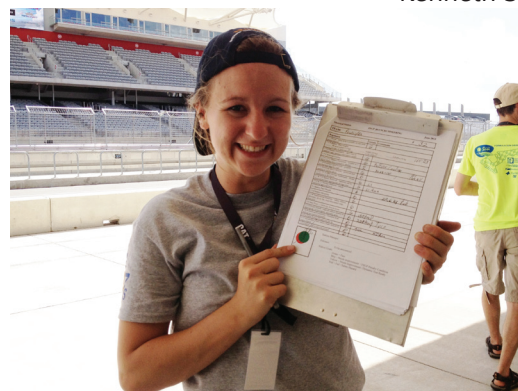
One of the great things I have found in this CAD program NX by Siemens is its ability to model airflow over the different surfaces of our car. By studying the air pressure and speed over the car, it is possible to see how different shapes affect the aerodynamic drag and/or lift generated. Aerodynamic drag is the collective force on a moving object that is created from friction of air moving over the object's surfaces. Because aerodynamic drag accounts for approximately 70% of energy consumption at highway speeds, it is a significant feature worth optimizing. At the same time, our

mechanical head Garrett Fielding and faculty advisor John Broere helped me take practicality into consideration. Being able to change our tires, driver, ballast, and motor quickly while having adequate room for these features is important for a competitive car, and is not worth sacrificing for a tiny decrease in aerodynamic drag.

My most meaningful experience on the team is not a single experience, but a collection of moments. Through solar car I have had the opportunity to practice speaking to others. I participated in many outreach events that required traveling to a school or small festival to display our solar car. These are times when I am able to share my enthusiasm for solar car with others and answer their questions. The culmination of my public speaking occurred when we took part in a large Siemens User Conference this past summer. We gave a presentation about our solar car team to over one-thousand audience members; I am proud that I did not make a fool of myself. Being a part of this solar car team has given me the unique opportunity not only to learn technical information, but how to work with a team and communicate more effectively with others.



Kenneth Stack, Body Head



Kali McKee, Pit Chief

“Tweet Tweet”

by Lisa Lewis

Hey Everyone! My name is Lisa Lewis and I am currently a junior majoring in Business Administration and minoring in Mass Communications and Spanish. In the spring of 2012, I joined the team because I thought it would be a fun class to take to get an extra credit hour. Little did I know how much Principia Solar Car would impact the next three years of college. After joining, I went on the 2012 American Solar Challenge. The race was such an amazing experience. I looked up to all the team members and learned so much more than I ever thought I would.

Currently in my fourth semester on the team, I am the team business manager. This leadership position includes writing Google updates, creating newsletters, and constantly updating our social media sites such as our website, Twitter, Facebook, and Flickr. Other tasks consist of organizing general logistics and outreach events and making sure everyone is cared for and has what they need.

This past summer in Austin was a blast. It was not only my first time in Texas but also my first time visiting and racing on a Formula 1 track. The track was beautiful. I had many different roles as a member of the 2013 Formula Sun Grand Prix race team: safety head, business manager, and outreach coordinator. Before a race begins, each team must qualify to race by passing scrutineering (technical inspections conducted by race officials). During these three days of the race, I was responsible for taking notes at meetings and inspections. In the previous race I never saw what went on during inspections, so this was an exciting experience.

Another one of my roles was safety head. As safety head, one must have past race experience and be CPR/AED certified. During races, the safety head always has a radio on hand in order to hear what is going on at the track and to communicate safety details with team members. Along with making sure everyone has food, water, and is wearing sun

screen, the safety head is one of the first people to head out to the track if there is a roadside problem. While at the track, whenever I was needed in the timing tent or was helping with outreach, I handed my radio and “safety head” title to team member Kenneth Stack.

Along with safety head I continued with business tasks such as daily updates, tweeting, and my favorite part, talking to visitors and supporters. While at the Circuit of the Americas, I would meet with all of the visitors that stopped by to see the team and car. Whether it was family from across the states, Principia alumni, or local high school groups, I welcomed them and gave them a tour of the pits. One of my favorite groups to visit us was students from a local church. The students ranged from 3rd grade to college, and it was great to see their enthusiasm about Solar Car.

The students were able to get a close up view of the car and learn the basics of Ra 7s. After answering many eager questions, we led the group around the other bays to check out other teams’ cars. They were even able to talk to the team leader from Oregon State University. The students also spent time watching teams go through dynamic scrutineering. Racing at the Circuits of the Americas was a great experience.



Lisa Lewis, Business Manager

Tire Transformers

by Matt Herman

During the tail-end week in June this year I had the opportunity to join the solar car team in Austin, Texas for Ra 7s' last hurrah race at the Circuit of the Americas in the 2013 Formula Sun Grand Prix. Currently majoring in physics at Principia College, I have a strong interest in everything that goes into making and racing solar cars. Since this was my first year on the team, I was put into training positions—namely mechanical and safety. Some of the jobs I worked on included tire seating, assisting in pit tasks, and making sure everyone was staying hydrated in the hot Texas sun.

I have a background in robotics from high school, which is what prompted my interest in the Solar Car project. I must say that the two are very different, although I am enjoying solar car as a great opportunity for experiential learning. My excitement for the race started early in the summer as the team made preparations for the week in Texas and did not stop until I arrived home with many new stories to share.

The heat wave we experienced in Austin did not faze our team as everybody worked in harmony on and off the track. One of my duties for the race was to hold the array of Ra 7s as tire changes and electrical problems were fixed. This was a crucial job that allowed mechanical and electrical teams to be able to do their jobs as quickly as possible. I was glad to be a part of the team, because everybody was as excited as I was to be there! Our team was not only cooperative with each other, but I enjoyed seeing each team work together to achieve a common goal.

What I noticed throughout the week were the harmonious interactions between teams. Sometimes teams were looking for extra parts, so they would go to other teams asking to borrow or trade. This took me a bit by surprise, because even with such close competition, the generosity was still there. One of the most awesome parts of the race was

watching the teams try to make it up the steep hill on turn one. Many students from different teams would come out of the pits to cheer on a car attempting the first turn. This was a special moment of unity and perfect demonstration of everyone's love for the project rather than the competition.

A wonderful example of gratitude for the race was the team dinner at the University of Texas Austin after the last day of racing. Everyone was served dinner and awards were presented to various teams. Before closing the ceremony, the officials opened the microphone to anyone who wanted to share gratitude towards any other teams. I was happily surprised when many people slowly made their way up to the microphone to thank other teams, officials, and specific people for all the things shared, borrowed or accomplished during the race. The amount of thankfulness from every team was incredible. This was certainly not something I expected from a competitive event and it made the whole experience feel much more spiritual!

Overall, this summer has given me a great experience to take with me as I continue to support and be a part of a wonderful solar car team.



Matt Herman, Pit & Tire Crew

Light Packer

by Peter Telschow

My name is Peter Telschow, and I am a senior studying for a Bachelor of Science in Biology. Outside of the Solar Car team, I love playing Frisbee, longboarding, and doing random shenanigans around campus. I am starting my third year on the Solar Car team, and as of right now I am the Quartermaster for the team, as well as the project manager for the construction of our new car, Ra 9. As Quartermaster, it is my job to know where almost everything is or at least have a general idea of where to look for tools and materials. On the 2012 American Solar Challenge and 2013 Formula Sun Grand Prix, I kept the pit and trailer stocked with everything we would potentially need for car repairs, as well as organizing the trailer and making sure the mechanical and electrical teams had everything they needed. In addition, I helped with tire changes, cleaning the car, checking toe after each driver or tire change, maintaining team radios, and running errands for the team.

My favorite experience from this past race was learning about how to set up the pit radio that boosted the range of radio contact while Ra 7s was on the track. I had the opportunity to go on the roof of one of the buildings, thus giving me a birds-eye view of the whole track. I worked with tools that I had never seen before and had no idea how they worked, which was an excellent learning experience. Plus I had the best seat in the house for the time I was up there.

The most significant healing I have had on Solar Car has been learning patience and trusting that God has everything under control. Being in the pit and not knowing what is going on with the car on the track can be really stressful at times, and having people demand of me what they need with the sense of urgency that they need it with can be a lot of pressure. The idea that I work with is that all things can be accomplished with and through God. I know that there is no challenge that cannot be met, because it would not have been presented if the ability to overcome it was not already present.

Overall I love Solar Car for the people we have on the team and those we meet on the races. The amount of bonding that occurs through solar car is phenomenal. We have such a fun and loving group of people and we can make almost any situation exciting and adventurous no matter the current pressures.

My most significant role in this past race was maintaining the hot and cold pits and our trailer. Every morning, I had to make sure all of our radios were fully charged and where they needed to be so that the team could properly communicate with the driver, timing tent, and pit. I also helped set up our hot pit every morning, which included a tent and all of the necessary tools and toolboxes needed for efficient pit stops.

The best part of being the Quartermaster this race was packing up to leave. We had less than an hour after the race ended to be packed up and off the grounds. During most of the afternoon leading up to the finish of the race, Adam Eckert and I had been packing up the nonessentials from the pit back into the trailer. The fun part started after the race finished, when we were pressed for time to load everything back into the trailer and have it ready for the drive back home. I had most of a pit to put away in less than an hour in 105 degree Texan heat. It was the most exhilarating feeling I have ever experienced. I loved every minute of it and I have to say, being the Quartermaster for the team is a pretty fun gig.



Peter Telschow, Quartermaster

Time Check

by Tamara Thomas

Hey there! My name is Tamara Thomas and I am currently a junior at Principia College studying Mass Communications. Last semester, Spring of 2013, was my first term as part of the Solar Car team. Upon joining the team, I really did not know anything about building or maintaining a solar car, let alone how anything worked mechanically. After being a member of the solar car team for just one semester and one race, I have learned more than I could have imagined. I am now a driver in training and was given the role of back up driver on the race this summer in Texas. Aside from being a driver in training, I am also involved on the mechanical side of things. This last semester I learned how to do things like change tires, plumb brakes, and set tire alignment, as well as other small projects on the car.

This summer I had the opportunity to be involved in all sorts of jobs. As I mentioned before, one of my roles was backup driver. This meant that if for any reason our two main drivers, Brian and Kali, could not drive, I would be available to do so. With this role, I went through all the scrutineering required to qualify as a driver, such as completing a wet brake test and slalom, which is essentially weaving the car through cones under a specific time limit. Aside from being backup driver, I also helped out with many other tasks. Some involved cleaning both the array and body of the car, performing any mechanical repairs, and assisting in pit crew procedures, as well as working for our team in the timing booth.

Working in the timing booth was a completely different experience than being in the pits during the race. In the timing booth, one representative from each team is required to be present in order to record laps, lap times, and speed, as well as relay concerns from race officials and other teams back to our team. If a team does not have one person in the timing booth while their car is out on the track, any laps that team completes are not counted. As someone who is new to the team, it was very interesting being able to spend time in the timing

booth. It was also great experience working with the other teams. This was a fun role for me because I learned a lot about how the race works and the variety of challenges other teams were dealing with.



Tamara Thomas, Driver & Team Timer

One of my favorite experiences in the timing booth was on the last race day. I was working in the booth for the last couple hours that day and many teams were neck and neck with each other. If something took one of the lead teams off the track for just a few minutes, this would likely cost them their lead position. Tensions were running high in the timing booth with frantic conversations between those in the booth and their team relaying lap times and positions. It was intense because by the end, the three top teams were only one lap apart. Working in the timing booth made me realize how cohesive Principia's solar car team really is. Some of the other teams would be frantically yelling into their radios arguing, while others just seemed unorganized and unprepared. I think this really goes to show how keeping the idea of "One Mind" at the forefront of our thought allows our team to harmoniously work through all sorts of challenges together and come out with the incredible success we have.

After experiencing my very first solar car race this summer, I am very excited to continue learning all about building, improving, and maintaining a solar car. With Ra 9 now in the works, I am especially looking forward to learning all there is about building a new car from the start.

My First Race Experience

By Adam Eckert

Hi there! My name is Adam Eckert. I'm a sophomore majoring in Biology and Natural Resources (with minors in Sustainability and Physics), and this is my second term on Principia's Solar Car Team. In my free time I like to rock climb, slack line, and play Ultimate Frisbee. On non-race days, I help with almost anything that needs to be done, from changing tires to replacing brake lines to cleaning up the garage. During race conditions, I am in charge of car body care, tire seating, array care, and am a member of the pit crew. I am also the Quartermaster-in-Training, which means keeping track of all supplies. My favorite experience so far was definitely participating in the 2013 Formula Sun Grand Prix (FSGP).

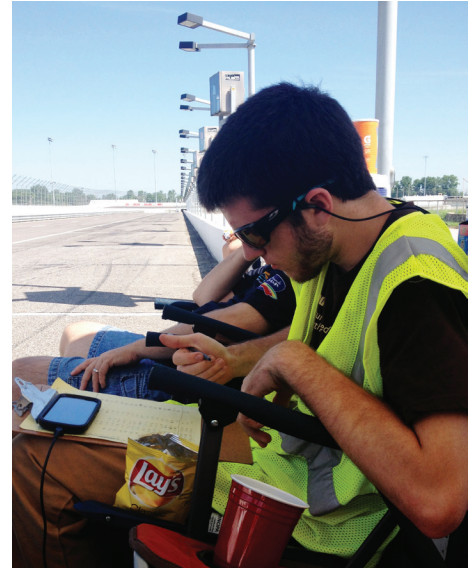
In June, the Principia Solar Car Team braved the intense heat of Austin, Texas to race in the 2013 FSGP. The race was hosted at the Circuit of the Americas, which is the only Formula One track in the United States. The garages opened to the teams on Monday, June 24, and we wanted to be the first ones there. Unfortunately, this meant leaving at four o'clock in the morning on Sunday and driving 18 hours in one stretch. Despite being trapped in a small box for many hours with the same four people, everyone arrived excited and ready to hit the track the next morning! The following two days were filled with prepping the car to race and passing scrutineering. I enjoyed walking around the venue and seeing how other teams built their cars using the same set of regulations. It was also fun seeing so many other people take part in the event.

One of the coolest things that I saw during this whole process was how the teams were cooperating with each other. People from different teams would help others by lending parts or assistance as needed. We all know how hard it is to make it to where we are, and we all want as many teams participating as possible. Once teams finished scrutineering, many would send team members around to see if anyone else needed help. The air of help-

fulness didn't abate during the race days, either. Over the three race days, it never ceased to impress me how supportive the teams were of other teams. For example, everyone would cheer

enthusiastically when a car reentered the track after spending a few hours in the pits or the first time a team's car made it over the steep hill in turn one. If someone needed to borrow a tool or part, almost any team that had one was willing to let them borrow it. A prime example of this active support is that the team that won, Oregon State University, was running a motor borrowed from another team!

Another really neat example of camaraderie between teams was the dinner and awards ceremony following the final race day. One race tradition is the trading of team shirts. A laid back process, everyone was trading shirts throughout and following the ceremony. If you wanted a shirt from a certain team, all you had to do was walk over to a group of them and say, "Hi! Do any of you have a shirt of "X" size that you'd be willing to trade?" Even race officials participate in shirt trading, and their shirts are highly prized! The final amazing thing that I experienced was the gratitude session at the end. After all the awards were given out, the microphone was opened up to teams that wanted to share their thanks for other teams. It lasted approximately 30 minutes, with a steady line of people who wanted to thank their peers for the help they had provided, whether it was in the form of encouragement, a bolt, a helping hand, or even an entire motor...



Adam Eckert, Quartermaster in Training

Regardless of how each team placed, I doubt that anyone left feeling bitter or upset.

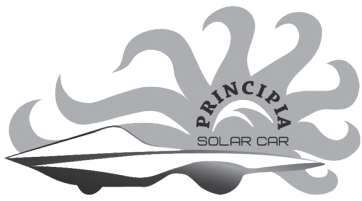
On a more personal level, I had a blast with my job as the Quartermaster-in-Training, affectionately abbreviated the QUIT. I spent most of my time assisting senior team member Peter Telschow with his Quartermaster duties. This involved keeping track of all supplies, which was everything from food and drinks to car parts and tools. This is a very important job, because in times of need, it is vital that the team has all necessary supplies readily available.

When I didn't have my Quartermaster hat on, I was helping with whatever needed to be done on the car itself. Usually this meant holding the upper body of the car while tune-ups, driver changes, and/or tire changes were happening. Despite the fact that I was holding a rather heavy part of the car on a very hot track for possibly 20 minutes or more at a time, I re-

ally enjoyed this role. One reason was that these duties directly benefit the team, and even though a good day during a solar car race is a boring day, meaning that nothing breaks, I'm not a fan of sitting around. Another big bonus is that I could see what was going on "under the hood" and was always available if anyone needed help.

I've been to a fair number of competitions in my life, from Tae Kwon Do tournaments to Percussion Ensemble competitions, but I doubt that I've ever had so much fun and been around such wonderful people, both on the Principia team and the opposing teams. The fact that all of the teams genuinely wanted everyone else to race to the best of their abilities and were willing to help them reach that goal was amazing to see. This is what I believe is the number one reason solar car is so special, and why my first race experience was so memorable.





Solar Car Team
Principia College
Elsah, IL 62028
www.principia.edu/solar
solar@prin.edu



**All uncredited photos are property of Principia Solar Car.

To receive updates on what we are doing each week, join us at:

<http://www.principia.edu/solar>

Please address contributions to:

Fundraising Chairman
Principia Solar Car Project
Elsah, IL 62028

Checks payable to: Principia Solar Car Team

All contributions to our 501(c)(3) educational organization are gratefully accepted and are tax deductible. Please include a corporate matching form if your employer has such a program.