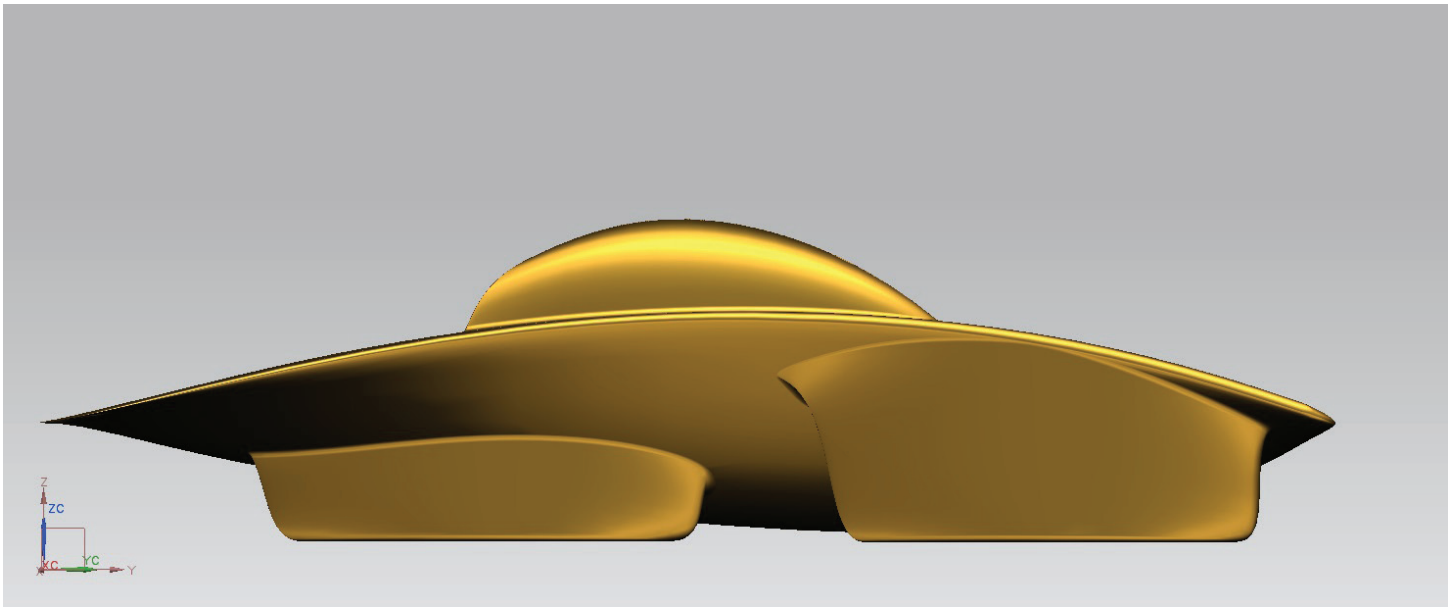
THE
SOLAR FLARE

December 2013



Another Semester Completed!

By Kali McKee

This semester was a busy one! With a class of over 20 students, everyone was kept busy with learning new skills that can only be learned through designing and building a solar car from the ground up. The impending deadline of the 2014 American Solar Challenge has not fazed students, as they continue to work through the semester and into their winter break. Meanwhile, many of the students had a blast attending the various solar car outreach events throughout the semester and meeting more of our amazing supporters from across the states!

Our newsletters are one of many opportunities for our team to share our passion for solar car. Written by many of our newest team members, this newsletter is filled with in-depth articles about several technical aspects of a solar car, solar car race, and race regulations. Once again, thank you for all of your support. This project would not be possible without you!

Solar Car Thanksgiving

By Steve Shedd

We all want to thank David Cornell for starting the Solar Car project back in the early '90s. I would also like to thank Joe Ritter and John Broere for all their help and the hundreds of students over the years.

But in this article, I want to thank the generous, loving folks that helped us along every route of our cross-country races, and in particular two special people. (I hope I didn't miss anyone in my list below. If I did, I apologize.)

'95 – USA – Indianapolis, IN to Golden, CO
Arno List
Bud Hardman
Linda Cornell

'99 – USA – Washington, DC to Epcot Center, FL
Bud Hardman

'02 – China – Shanghai to Beijing
Cindy Shedd

'03 – USA – Chicago, IL to Claremont, CA
Neil & Vanessa Franking
Ken & Kathy Pratt

'97 – USA – Indianapolis, IN to Colorado Springs, CO
Nancy & Ken Shivers
Arno List
Bud Hardman
Linda Cornell

'01 – USA – Chicago, IL to Claremont, CA
Ken & Kathy Pratt
Bud Hardman

'03 – Australia – Darwin to Adelaide
Ken & Kathy Pratt
Cindy Shedd

'04 – Greece
Ken & Kathy Pratt
Alison Reid (C '03)

'04 – (route drive) USA – Austin, TX to Calgary, Alberta

John Broere (had already graduated from Principia in '02 but had not started teaching for Prin yet)

'05 – USA – Austin, TX to Calgary, Alberta

John Broere (had already graduated from Principia in '02 but had not started teaching for Prin yet)

Neil & Vanessa Franking
Steve Warren
Ken Pratt
Mal Neal

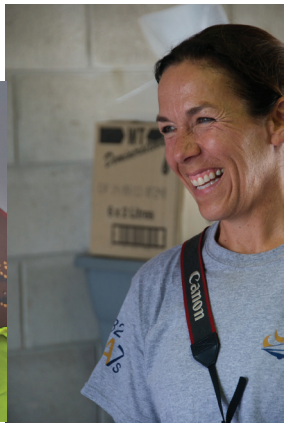
'06 – Taiwan
Ken & Kathy Pratt
Alison Reid (C '03)

'08 – USA – Plano, TX to Calgary, Alberta
Bob & Debbie Brownell
Denise Reeves
Ken Pratt

'09 – Australia – Darwin to Adelaide
Bob & Debbie Brownell
Ken Pratt
Karen Davis (C '07)
Sten Palmer (C '08)
Matthew Piatt (C '06)

'11 – Australia – Darwin to Adelaide
Julie Sanderude
Ken & Kathy Pratt
Justin Sinichko (C '10)
Brian Kamusinga (C '11)
Sten Palmer (C '08)

'12 – USA – Rochester, NY to St. Paul, MN
Ken Pratt
Brian Kamusinga (C '11)
David Crabill (C '09)



Of the 52 names (24 unique friends) listed above, you might have noticed that Ken Pratt's name shows up **10 times** – that is travelling with the team on 10 complete cross-country races! (I have only done 13 cross-country races.) In second place is Ken's wife, Kathy Pratt, helping us on six cross-country races. What a giant THANK YOU the Pratts deserve for their tremendous help over many years! A big heart-felt THANK YOU to everyone that has helped our team – we never could have done it without you.

Thanksgiving (continued)

Now for two other very special people:

On the 2001 race nearing the end of a race day, the sky was black and there were forecasts of possible hail (not good for the delicate solar cells). We were on the old Route 66 in Budville, New Mexico, a very small town not even having a gas station. There was one small church and a person in its parking lot. We stopped and asked if we could stop for the night and use their parking lot and were told, "No." At the opposite end of town (about four buildings later) was the Dixie Bar. The owner of the bar, Lawrence Peterson, was there and we asked him if we could use his establishment as our finish-line for the day. He replied, "Sure," and proceeded to ask if we had a place to stay. He offered to let us stay at his house nearby. We had 18 people and this dear stranger (who had never heard of Principia) was willing to put up all 18 of us in his home! We ended up not needing to do this because Joe had gone ahead and found the Sky City Casino four or five miles down the road on I-40 and had gotten rooms.

The next morning, we had to bring the car back to the Dixie Bar in order to start exactly where we had finished the night before. As the students were checking over the car, they found a broken part and realized that we would need some equipment to make another one – equipment that we didn't have with us. Although we knew the size of the town (not even a gas station), we asked Lawrence anyway if there might be any place around with a drill press. He replied, "Sure, I have one in my shop in back of the bar – come on in." Talk about needs being met.

In 2003, the route went past the Dixie Bar again, but this time it was not at the end of a race day, so we were unable to stop. Members of Lawrence's family had made a large sign cheering us on including the words, "Principia College – Go Baby Go." Recently, as John and I drove the Solar Car (in the trailer) back to campus from California, we stopped at the Dixie Bar in New Mexico. The bar is now closed due to a flood seven years ago that put three feet of standing water in the building and ruined everything inside. So we drove to Lawrence's home a mile away in Cubero.

I had called Lawrence a few days earlier and told him we would like to stop by on our way home. He and his wife, Lucy, were there and were happy to see our eighth solar car, Ra 7s (quite different from Ra 4, the car we were driving in 2001). Lawrence and Lucy have been married for 60 years and have six children. At least five of them and their spouses and some grandchildren came by to visit with us and see the car. It was one daughter's birthday and Lucy was baking a cake. John and I stayed for cake and a nice visit with the family. We gave them some info cards, DVDs, and small gifts as tokens of our appreciation for their loving hospitality 12 years ago – what a great family.

My final Solar Car thank you goes out to Brenda Koopman. In 2005, we happened to be coming in to the small town of Ivanhoe, Minnesota as our race day was ending. There was a Sinclair gas station there that happened to be run by Brenda (again, never heard of Principia College). We asked if we could stop there for the night and she said, "Yes." She said we could pitch our tents on the edge of her corn field and make ourselves at home. The gas station had two service bays that she didn't use anymore, as they no longer provided service – just sells gas and runs a small restaurant. She opened up the service bays for us for the whole night (and the bathrooms as well). It was such a blessing as five students stayed up all night completely taking the car apart, making repairs, and reassembling it before the morning start. What a help to have a roof, lights, and power at our disposal. It turned out we needed a welder as well and didn't have

one with us. Brenda's son drove around asking local farmers in the area and returned with a borrowed welder that we could use – what a blessing.

We had so much work to do on the car, we couldn't all eat at once in Brenda's restaurant – so she kept it open late for us while we ate in shifts. When dinner was done, Brenda's waitresses asked for all our dirty clothes. They took them to their homes, washed them, dried them, folded them, and returned them to us in the morning. (I can't type this article without tears filling my eyes.) This is why the term NEIGHBOR was invented and it doesn't have to be next door.

I haven't had the chance to go back to see Brenda yet, but I did find her phone number and called her since then. I sent her some small tokens of Principia's appreciation and I plan on visiting her when I can get close to Ivanhoe.

Many people ask, "How does little Principia do so well?" You can see the answer is people like Brenda, Lawrence, Kathy, Ken, and our many other volunteers, supporters, and donors. During this Thanksgiving season, our Solar Car project has so many people to be thankful for – THANKS from the bottom of my heart!

American Solar Challenge

by Jake Elmore

The American Solar Challenge (ASC), previously known as Sunrayce and The North American Solar Challenge (NASC), is a multi-day, 1200 – 1800 mile cross-country road race across North America. The race used to cross into regions in Canada, however, in 2010 the race officials decided to limit it to only the U.S. The first ASC was organized and sponsored in 1990 by General Motors (GM). GM's reason for designing the race was to encourage automotive engineering and solar energy among college students. Since 1990, the race has been held a total of eleven different times all throughout the U.S. and two entering the southern regions of Canada. Most recently, ASC has been dominated by the University of Michigan, who has won seven out of the eleven races, including the past four. However, competitors continue to step up their game, causing the races to get closer and closer every year. To help maintain a level of integrity among entries into ASC, the officials decided to add a qualifier race for teams to compete in.

The Formula Sun Grand Prix (FSGP) was started in 2000, and frequently serves as a qualifier race for ASC. On the years that ASC is not held, FSGP is used to test the teams' cars' abilities. FSGP is an annual track race that is held on grand prix or road style closed courses. This unique style of solar car racing is open to teams from around the world and truly tests the limits of the vehicles in handling curves, braking, and acceleration.

Principia Solar Car's involvement in the two races has steadily increased over the past decade. In 2001, Ra 4 blew away the competition and took 1st place at FSGP in Michigan. This qualified Ra 4 for ASC, where the team took home a 7th place finish and the Sportsmanship Award. That year, the team finished ahead of large engineering schools such as MIT and Stanford. Ra 4 also placed 4th in the 2002 Formula Sun Grand Prix in Kansas. The team's next solar car, Ra 5, was just as competitive as Ra 4, as the team raced to a 4th place finish in the 2003 ASC and earned the Teamwork Award. Ra 6 maintained the growing legacy of the Principia Solar Car Team when she finished 7th in the 2005 NASC.

The team's success has continued to build and Ra 7 did not disappoint on the results. At the 2008 NASC, Ra 7 came in 2nd place, right on the heels of the University of Michigan. In addition to winning the Safety Award, Principia was honored with a Technical Excellence Award for having the most efficient solar array in the competition. After Ra 7's excellent racing career, the team set to work on designing Ra 7s. Ra 7s placed 3rd in the 2012 ASC and 4th in the most recent 2013 FSGP. We are currently in the process of designing Ra 9, which we hope to have finished by this summer so we can participate in the 2014 ASC in July.

World Solar Challenge

By Christof Kenworthy

One of the most prestigious races a solar car team can participate in is the World Solar Challenge, which goes through the Australian Outback. This is a race nearly 3000 kilometers (1864 miles) from Darwin to Adelaide. The race was created to "showcase the development of advanced automotive technology and promote alternatives to conventional vehicle engines," according to the World Solar Challenge website, and it continues to attract many qualified teams around the world.

In this race teams are expected to push themselves and express their full capabilities as they take on this journey. One of the many requirements of the race is to be self-sufficient and travel the greatest distance possible until 5 p.m. each day. Once this time is reached the team must stop wherever they are and make camp. One of the most interesting aspects of the race is that there is very little in the way of civilization and accommodations. Teams are expected to be able to care for themselves on the go. Some of the few times civilization is seen are the minimum of 7 checkpoints throughout the race, where teams can perform only the most basic and necessary maintenances. These include checking and maintaining tire pressure as well as cleaning debris from the car. Officials can also stop teams throughout the race to make sure the teams are following the regulations.

Over the past decade Principia Solar Car has placed in the top ten twice in the World Solar Challenge. The first time Principia Solar Car participated in the World Solar Challenge was with Ra 5 in 2003 and took 6th place. The team participated once again in 2009 with Ra 7, placing 7th. We will be ready for the Solar Car Challenge in October 2015.

ASC Driver Requirements

by Sean Tong and Damon Wilgus

For all the feats of engineering and teamwork that go into building a solar car, it would be hard-pressed to actually run without a crucial piece: the driver. However, drivers aren't just a part of the car, they are people – living people, so naturally race officials want to make sure the drivers are safe. The American Solar Car Challenge is no exception.

In section 7.4 of the 2014 American Solar Challenge regulations, it is stipulated that drivers' helmets must meet or exceed the ISO, Snell 95, or DOT motorcycle regulations. The rules and regulations also cover everything from drivers' shoes and allotted driving time to minimum amount of water required on-board for the driver. For example, the driver must wear closed-toe shoes, which are designed to protect the driver's feet from debris in the case of an accident, and a minimum of one litre (34 fl. oz.) must be accessible to the driver in the cockpit. The amount of time spent driving is also an issue, as too much time spent in the solar car under harsh conditions can seriously impact the focus and effectiveness of a driver, no matter how much water they may be drinking. Six hours is the maximum time allowed, although extended breaks spent outside the car (such as in the case of a breakdown) do not contribute.

However, before the team can even think about applying the rules to the race, they must make sure that their driver is qualified to drive the car. Section 3.10 covers driver requirements, noting that there must be a minimum of two drivers on hand at all time to help ease driving fatigue, but also no more than four. Regulations also require drivers to be at least 18 years of age and have a current driver's license. Since total weight impacts the amount of energy the car has to expend to move, thus affecting the speed and range, the ASC officials have mandated that all drivers must weigh 80 kg (176 lbs). Any difference is put into a provided clothe bag with carefully labelled ballast to bring the total up to 80 kg, although the team do not receive credit for any drivers over 80 kg.

As a part of the scrutineering process for FSGP and ASC, dynamic testing is required for each team. The inspectors select different drivers to perform various tests, including the figure-8 test, the brake test, and the slalom test. For the figure-8 test, drivers must be able to complete a figure-8 course in less than nine seconds per side. During the test, the solar car cannot knock over any of the cones or show any signs of structural instability. For the brake test, solar cars must decelerate at a specified rate and not veer to the left or right excessively or show any signs of instability. For the slalom test, drivers have to weave in-and-out of cones spaced out evenly over 126 meters. This test has to be completed in 11.5 seconds or less. Lastly, every team's drivers have to drive a specified number of laps before they can qualify for ASC. If the drivers pass all of the tests and meet all of the specifications, the team and its drivers are clear to compete in the American Solar Challenge.

And the Safety Award Goes to...

By Austin Moyle and Sean Neal

Only one-half of a page out of the forty-five pages of regulations for the American Solar Challenge and World Solar Challenge is devoted entirely to safety, and the requirements in this area are fairly straightforward. So how does the Principia Solar Car Team maintain such a high safety standard that it has won the safety award nationally five times (in '97, '99, '05, '08, and '12)? Faculty advisor Joe Ritter shares the simple answer: "We are designing, building, and driving solar cars on public roads at highway conditions with highway traffic, and so safety is a huge concern. Our team has a culture of safety."

This culture began as early as 1995 in the team's workshop safety expectations and standards when Melanie Shedd (C '99), alumnus and current Chemistry teacher at the Principia Upper School, was a freshman. Shedd recollects that the first time the award was ever given was in 1997, when there were almost no safety regulations. The team earned national recognition because two members of the team directed bumper-to-bumper traffic around tens of solar cars waiting to be allowed onto a race track for qualification. Although Shedd, in her humility, credits the new stop signs the team had invested in that year, Ritter credits Shedd, one of the two students directing traffic, because of her fast action and consciousness for safety.

During her time on the team, Shedd served as the team's safety head, a responsibility assigned to one team member during a race. The safety head serves to keep the team safe at all times. Ritter shares that for the American Solar Challenge, "the United States inherently plans for more safety," whereas for the World Solar Challenge, "the roll cage design isn't as severe," and "the first time [Ritter] ever saw a car flip was in Australia. You don't drive the same way here. The culture of the U.S. is more safety-conscious than [in Australia]." This is why our team's safety heads are so valuable.

In Australia during the 2011 World Solar Challenge, Ritter and veteran members have highlighted an event when our team prevented a huge lithium battery fire twice when a local fire department was going to put water and then water-based foam on the flames. Team member Brian Kamusinga (C '12) sprinted to the car with Lith-X and proceeded to advise the fire department on how to properly put out a battery fire. This accurately demonstrates our team's mentality of staying aware of our own safety, as well as those around us. In 2009, we placed 7th in the World Solar Challenge and won the safety award for that year, led by our safety head, Mark Evans. We have competed in the World Solar Challenge three times and have held the standard for safety on each occasion.

All members are expected to be safety-conscious at all times. Principia Solar Car is "creating a culture where we trust each other," shares Ritter. "We're the team that has safety vests on all the time. If you're at the track, you have a safety vest on, if you're racing—from sun-up to sun-down—you have a safety vest on, even after sundown. It's just kind of who we are."

The Fundamentals of (RA)erodynamics

by Gage Edgar and Jackson Walker

Hi! This is Gage Edgar and Jackson Walker, and we are freshmen on the Principia Solar Car team. We have been learning a lot about the solar car and are looking forward to learning more about the fundamentals of aerodynamics and how it applies to the overall Principia Solar Car experience. Due to the change in regulations, Ra 9 has had some major modifications to its body shape. These modifications have affected the aerodynamics in many ways.

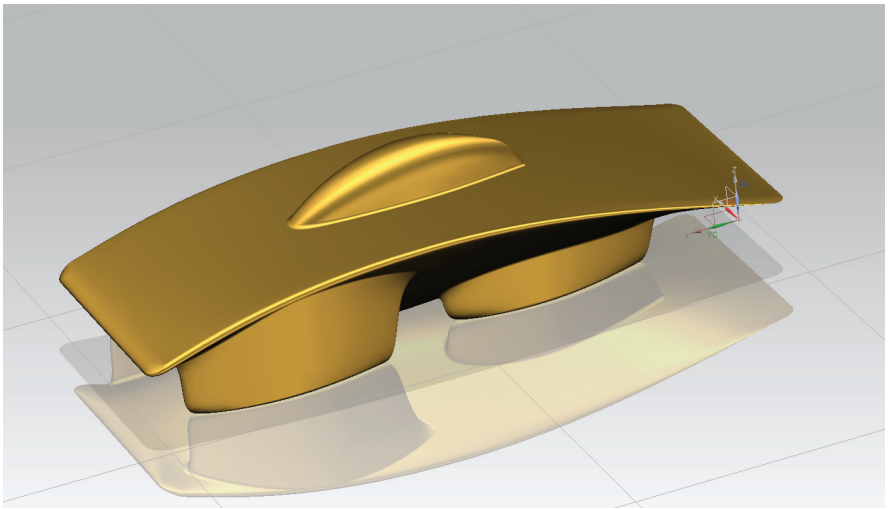
One major change in the regulations is the fact that the driver's feet must be the lowest point in the car, and that they must be sitting up at an angle no less than 63 degrees from the horizontal. This has caused the increase of the height of the canopy. Unfortunately the increased height has increased the separation drag on the top of the car. Separation drag is caused by the inability or resistance in ability for air to "meet up again later" after moving around surfaces.

The increased height in the body has also required a deeper slope in the underbelly of Ra 9. A potential problem this could create, if not dealt with properly, is an induced drag or lift. When air flows around the top and bottom of a moving object at different speeds, there is a pressure difference. If the air is pushing the car downwards, the rolling resistance is increased. This is similar to something pushing down on an object when it is on a scale. The result is that the scale will read heavier! With an increase in rolling resistance, the car requires more force and energy to move forward.

However, upward lift can also be detrimental to the overall design, because it causes the car to be less stable. Senior team member and Aerodynamics Head Kenneth Stack has incorporated a curved design on the top of the car in order to compensate for the deeper curve on the bottom.

The last major addition to the regulations is the requirement for four tires. With the addition of a fourth tire, Ra 9 will include a fourth fairing, instead of the three found in past iterations. This addition will certainly create an increase in overall drag. Luckily, this will not hurt the team's overall performance because every team must meet this new regulation. As long as the fairings and wheel placement are designed properly, the fourth wheel will not be detrimental to the overall aerodynamics.

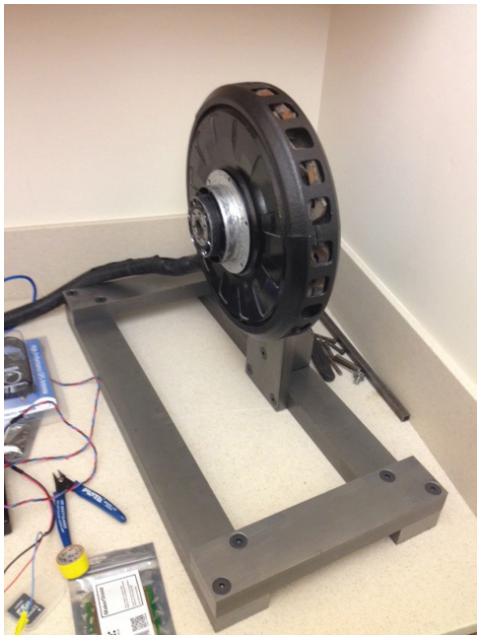
In short, with the new regulations, high efficiency in aerodynamics is more difficult to incorporate into the car design. Although having said this, careful precision and design of Ra 9 has resulted in a total aerodynamic drag that is impressively close to the drag on Ra 7s.



Motors and Motor Controllers: Past, Present & Future

By Ariana Dale

A lot of Principia Solar Car's time, energy, and resources are put into the motor and the motor controller, and there's little question as to why. These pieces of equipment are important and not exactly the cheapest part of the car. While designing the new solar car, Ra9, there has been a lot of thought as to which motor and motor controller we should invest in. As technology continues to develop rapidly, it is important for the team to stay on top of our game if we want to continue to be strong competitors in upcoming races. Here are some of the ideas the team has been considering as we design the new solar car.



In the past, Principia Solar Car has always used the NuGen motor. This motor has a plate of magnets and a plate of coils that run parallel to each other. The team purchased its most recent motor in 2009. One of the pros to having a NuGen motor is being able to adjust the air gap between the magnets and coils to account for different voltages.

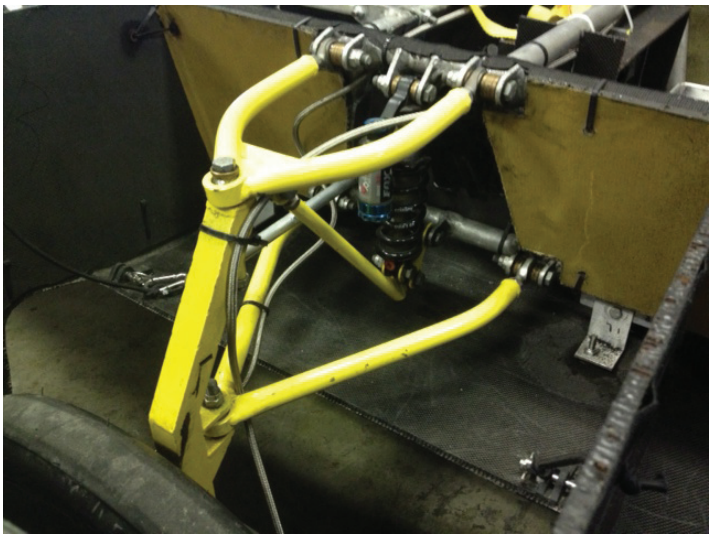
It's really important to take proper care of the motor and to make sure not to "throw a magnet," which is when a magnet comes loose while the motor is running and gets tossed around inside the running motor, essentially ripping it apart and doing incredible amounts of damage. A driver must be attentive to the condition and feel of the motor to make sure this doesn't happen. In the early 2000's, Principia Solar Car was participating in a race in Kansas and the team ended up throwing a magnet. Luckily the damage wasn't too bad, and the team sent the motor back for repairs.

NuGen is not the only motor producer, so the team has been looking into different options. Mitsuba is a company based in Japan that has the philosophy of "creating technology in harmony with society and the environment." The biggest difference between the Mitsuba motor and the NuGen motor is that the magnets and coils lie in concentric circles as opposed to parallel to each other. The disadvantage of this is that it leaves less room to alter the distance between the coils and the magnets based on the voltage supplied to the motor. The way Mitsuba remedies this detail is by having teams provide the voltage of their car and Mitsuba custom designs the motor with the proper air gap.

The other important piece is the motor controller. This is a device that sends a sine wave current to the motor coils to alternate the direction of current in order to increase power efficiency: the cleaner the sine waves, the more efficient the motor. This is largely what determines the cost of a motor controller. The more expensive motor controllers are typically ones that produce the cleanest wave. The team currently plans to use a Tritium motor controller, which works with many different motors. Other than finding a balance between cost and technology, it is also important to keep race regulations in mind when planning the set up and configuration within the car.

Ra 9 Suspension

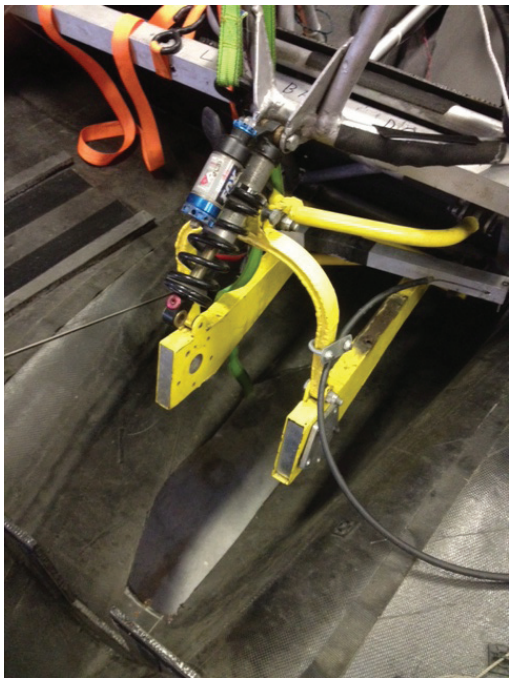
by Gabe Korinek



The suspension on a car is one of the most important mechanical systems, as it connects the wheels to the car. The suspension supports all the weight of the car, absorbs energy from bumps in the road, and determines the handling abilities. With the designing process of Ra 9, we are taking our suspension from previous cars and altering it to meet the specifications of our new, four-wheeled solar car. The front suspension will be the same unequal length, double A-arm suspension found in Ra 7s with a few inches added to compensate for Ra 9's taller ride height. The rear suspension will be modeled after the monolever, single swingarm used on Ra 6, only this time there will be two.

This suspension setup is quite common among solar cars. The unequal length, double A-arm suspension in the front provides great handling in a compact design – the same reason it's so popular in almost all other forms of auto racing. The rear monolever, single swingarm suspension is simple, effective, and strong enough to be able to mount our drive motor. Similar suspension setups can be found on BMW and other high performance motorcycles. This design differs from the rear suspension found on Ra 7s in that there is only one swingarm connecting each rear wheel to the chassis instead of two. This leaves one side of the tire exposed, which allows for easier and faster tire changes. Therefore, with two tires in back and faster tire changes, we'll have the advantage and higher efficiency of running lighter, air filled tires instead of heavy, foam filled tires.

Although there are many advantages to this new suspension design, the monolever, single swing-arm has its disadvantages. The disadvantage to this design is that there is now a torque twisting the swing arm. The solution is found in extra reinforcement and cross braces built into the swing arm. The suspension for Ra 9 has been taken from previous designs that have proved to provide good handling and reliability on countless miles of road. Of course, the only true test of any solar car system is the races themselves, but no need to wait in suspense – this is an effective setup.



The Emergency Shut-Off System

By Ricardo Barrionuevo

In the World Solar Challenge and the American Solar Challenge, certain safety mechanisms are required in order to participate in the competitions. One safety mechanism in particular must serve to cut off all electrical current from the vehicle in the event of an emergency. Visibility of this emergency shut-off button is absolutely necessary, as the mechanism must be located outside of the vehicle with clear instructions to enable the user to operate it quickly and easily. The two competitions differ in their location requirements of the devices. Since ASC does not have strict regulation requirements for this switch, Principia Solar Car closely follows the specifications found in WSC regulations.

WSC specifically requires that the cut off device is located within 50mm of the lower edge of the windscreen, on the left side of the vehicle. This external switch must be placed within a yellow disc, have a minimum diameter of 180mm, and a minimum side length of 150 mm. International markings must also be visible, including a red lightning bolt within a white-edged blue equilateral triangle and clearly displayed. Additionally, there must be clear instructions on how to operate the device using letters with a minimum height of 10mm (e.g. PULL, PUSH, or PRESS). Instructions must also be supported by diagrams (i.e. an arrow pointing in the correct direction of actuation).

Solar Car Outreach Programs

by Haley Chichester and Lisa Lewis

Outreach is an important part of Principia Solar Car. Without outreach, the Principia Solar Car team would not be able to compete in races. Although some funding comes from Principia College—which we are very grateful for—the majority of our funding comes from Principia Alumni and Solar Car supporters. There are a number of ways the team connects with supporters, including visiting schools and attending numerous outreach events throughout the year.

Just this past semester, the Principia Solar Car team had Ra 7s on display at the Grafton Art Fair, a TEDx talk in St. Louis, the Great Homes and Great Gardens Fair by the St. Louis Botanical Gardens, and the California Solar Decathlon Expo. The Grafton Art Fair is just a hop and a skip down River Road. The team has attended this annual event for the past four years. The event is a local favorite and attendees love the opportunity to check out our latest car and chat with team members. It is also a great way for the team to reach out to the local community. At the Great Homes and Great Gardens Fair, Ra 7s was put on display next to a Tesla and other electric vehicles. It was a beautiful day, and the team had fun connecting with environmentalists from the St. Louis area.

Along with the University of Missouri Science and Technology Solar Car team, Principia Solar Car had the honor of attending the TEDx talk in St. Louis. Ra 7s was put on display next to other engineering projects and exhibits. There was a large turnout for the event and even some members of the Principia School community stopped by to see the car. The Solar Decathlon Expo was another great opportunity to not only connect with individuals from the Principia School community, but also Christian Scientists and Principia alumni from Southern California region.

On Earth Day during this upcoming spring semester, the team will be hosting chapel at the Principia Upper School. The team also brings the car out specifically to share with the college campus at least three times a year—at the beginning of the year during freshman orientation, at the end of the year during graduation, and for the Alumni during Summer Session. Summer Session is a great opportunity for alumni and other Christian Science adults to return to Principia College to take courses offered by faculty. The Principia Solar Car Team loves connecting with all alumni and supporters, so please follow us via Twitter, Facebook, Newsletter, and on our website.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PRINCIPIA
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BOSCH
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CISCO
EDISON

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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

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