

More than a Race



Working under the unrelenting Texas sun in the middle of summer is probably not what most high school students would describe as fun. But for the members of the Coppell Solar Racing Team, this is one of the most anticipated times of the year. Coppell is one of around 15 high school teams that build and race a solar car in the Solar Car Challenge, held each July. The competition, which began in 1993 as the Winston Solar Challenge, is designed to encourage students in science, engineering, technology, and alternative energy, as well as to help them develop business skills. Depending on their level of experience, teams register in the Classic, Open, or Advanced Division.

The Coppell Solar Car Racing Team was founded in 2008 by a group of high school students who were interested in doing an engineering project. With the encouragement of their teacher, Mr. Michael Yakubovsky (affectionately referred to as Yak, and who still advises the team today), they decided to enter the Solar Car Challenge. Each year, the competition alternates between a closed-track event at the Texas Motor Speedway and a cross-country event to a major city—with the exception of 2014, when the challenge featured a hybrid race combining the two. But having participated in the challenge for the past two years, I know that it is much more than a race.

An Intensive Endeavor

Preparation begins in July with a workshop where new teams and their teachers receive information on best practices, fundraising, and technical matters. Many high school groups are deterred when they learn about the intense nature of this extracurricular activity: Not only is participating in the challenge expensive—requiring money for parts, marketing materials, uniforms, entrance fees, and travel—but it is also intensive in terms of skill, labor, and time.

THE SOLAR CAR

In addition to meeting after school for two hours twice a week, our team works every other Saturday from 9:00 to 4:00. Because our budget to participate in the competition is around \$30,000 each year, we rely heavily on corporate sponsorships and donations from our community, which means that we also have to attend community events and company pitches. And that's only the official meetings. As our team's Marketing Lead, I stay after school most days to mentor younger team members and meet with our adviser to plan events and make sure we're staying on schedule for our car.

Strategy for Success

Since it is very expensive to build a new car from scratch, each year we modify our team's existing car with the ultimate goal of increasing efficiency. To minimize aerodynamic drag, we need to consider the overall shape of our car. To maximize energy gain, we must determine the best place and method to mount the solar cells. We also have to determine the ideal speed in order to maximize battery power, and the best window of time for sun collection if, for example, partly cloudy skies are predicted.

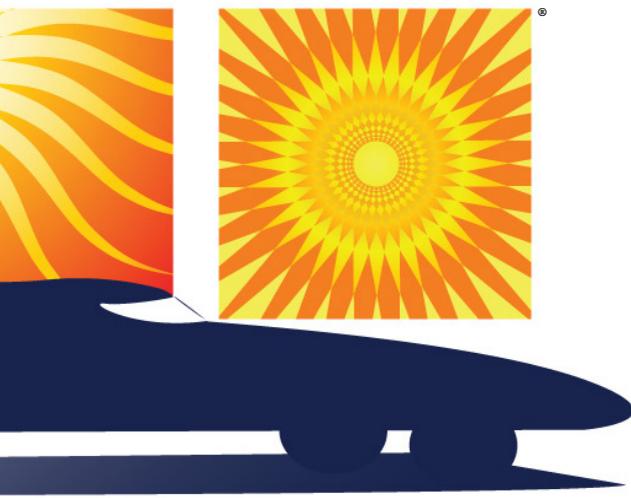
In addition to these considerations, we must satisfy a long list of requirements before we can actually race, including the use of specific materials and construction methods. Many a team has been eliminated prior to the race during a qualifying process known as "scrutineering," which requires teams to demonstrate that their car complies with all the rules.

Slow and Steady

It is also vital that we understand the limitations of our car. During the race, we have to carefully monitor aperture and voltage, two main indicators of how much power is being drawn from the battery pack.



Andrea Clark, second from left, and members of the Coppell Solar Racing Team



CHALLENGE

by Andrea Clark



The 2014 Solar Car Challenge

Some teams choose to burn through their battery array and race very quickly, but—like the proverbial tortoise and hare—they risk losing in the long run. Our team strives to achieve a net-zero energy transfer: We drive as fast as we can, but we make sure that the car is gaining charge at the same time it is using it.

Driving a solar car on an open road presents its own challenges. For one thing, we're going much slower than other cars, which can provoke road rage. More commonly, though, drivers will stop and stare in confusion, perhaps not understanding what they're seeing. Rubbernecking drivers have actually driven us onto the shoulder of the highway trying to get a look! Fortunately, the challenge provides very specific protocols to address these and other safety issues.

A Bump in the Road

In an ideal year, we would have 15–20 team members, including a Systems Integrator (also called the Team Lead) and Mechanical, Electrical, Marketing, and Strategy and Logistics Leads, as well as mechanical and electrical assistants. Last year, however, we had only seven members in total, which made it very challenging to balance all of the responsibilities. We also struggled to acquire major sponsorships, which impaired our ability to buy parts and fund travel. However, we were determined to succeed and to demonstrate our skill as engineers. In the end, we drove our car over 200 miles, from the Texas Motor Speedway in Fort Worth to Waco and finally to Austin—all out on the open road. And despite our limitations, we placed ninth in the nation out of 18 teams.

This year, with over 25 team members, we are looking forward to racing in the 2015 Solar Car Challenge with our faithful car, Aurora 15. Our goal is to run 600 miles at an average speed of 25 miles per hour. To achieve this, we plan to decrease our car's weight by changing our frame's material from 16-gauge carbon steel to a stronger, lighter steel alloy. We also plan to replace our solar panels with lighter, more efficient ones, and we've designed a simpler, lighter-weight suspension system that uses less material.

Participating in the Solar Car Challenge is an awesome way to experience what it's like to think like an engineer. I've always been interested in business and economics, and participating in the challenge has helped me see the connection between marketing and engineering. Making pitches to companies for sponsorships, creating and following budgets, and soliciting donations from the community have helped me hone my business skills. As I enter college next fall, I know that the skills I've developed as a member of the team will serve me well. ■



Andrea Clark is a senior at Coppell High School in Texas, where she is secretary of the STEM Academy, president of the Society of Women Engineers Club, and a member of the soccer, dance, and speech and debate teams. She plans to pursue a double major in mechanical engineering and business at Southern Methodist University.

Learn more about the Solar Car Challenge at www.solarcarchallenge.org/challenge.