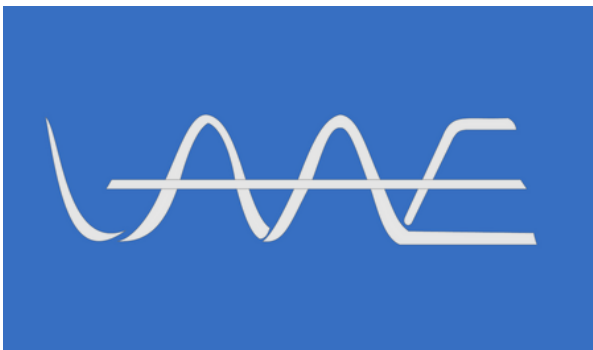


SPRING 2023

# LOS ALTOS ACADEMY OF ENGINEERING

BUILD A CLEANER, MORE FUEL EFFICIENT TOMORROW



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Editor: Hana Chloe Yoon

Authors: Alison Guan and  
Hana Chloe Yoon

# TAKING ON THE CHALLENGE

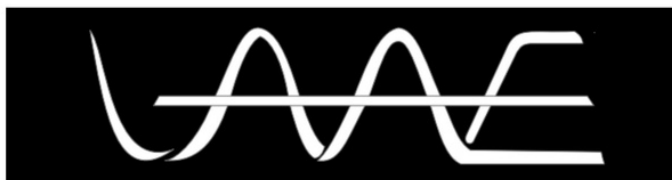
Written by Chloe Yoon

The Los Altos Academy of Engineering (LAAE) has taken on the challenge of participating in the Energy Invitational. Vital Link hosts the competition in order to provide a project-based learning environment. This competition gives engineering students the opportunity to design, build, test, and race a vehicle. Participants are required to create a design brief, video of the design process, design Powerpoint Presentation, and construct a vehicle to race. The objective is to travel ten laps using the least amount of energy in each of the four heats.

Junior Alison Guan states, "The Energy Invitational is the first major event that we are participating in after the pandemic." Therefore, the Energy Invitational is one of many students' first competition that they are partaking in.

The program, however, got a late start to the competition due to a sudden change of plans. Originally, the Academy planned to participate in the Solar Cup, but the competition was canceled as another victim of the pandemic. Therefore, the teams decided to commit to a new challenge, the Energy Invitational. Although LAAE has experienced a setback, the late start has only fueled the members' motivation to succeed.

## Los Altos Academy of Engineering Energy Invitational Design Brief



When building the vehicle, the teams must be aware of some restrictions: the total weight of the vehicle and driver must be under 330 lbs, the driver of the vehicle must have a driver's license, a cycle analyst with its stock shunt must be provided on the vehicle, a roll bar needs to be two inches above the driver's head, and a horn light setup must be supplied as a twelve volt system.

With limited experience after the pandemic, the program needed assistance on where to start. Advisors Eric Munoz, Will Cervantes, and Jon and Jaime Estrada, guided the teams through the building process of the vehicle. Eric Munoz has been an impactful figure to the program, he came to after school sessions to offer advice about problems and helped with aspects that the teams struggled with. Junior Alyna Huerta expresses, "He helped me a lot in welding by teaching me how to operate a tig welder and lending his mini welder for us to use on the trailer. As a result, I was able to weld the lock piece on the trailer because of his machine." His guidance, aid, and support was a driving force to the Academy's success in building a vehicle.

In addition, Will Cervantes helped the mechanical team by steering them in the right direction. Junior Ahmed Al-Ansari says, "He sent us weight calculations of the roll bar. Confused and pressured by time, he was there to help us and give us what we needed. We are really grateful." Furthermore, Jon and Jaime Estrada helped the electrical team with the Cycle Analyst. Junior Andrew Ore, a member of the electrical team, states, "Initially we didn't really know how to set up the Cycle Analyst and had the whole system wrong, but they looked at our car and came back with the correct schematics that helped guide us."

Before the competition, the teams had to meet several deadlines. On March 5th, the program submitted a design brief and Powerpoint Presentation of the vehicle, and presented the presentation in front of a panel of judges. A few weeks later on April 22nd, the vehicle passed the safety inspection that determined whether it would qualify for the race.



On the day of the competition, the team had a perfect start. The vehicle was able to make ten laps in both the first and second heat, however, the vehicle began to slow down, making three laps in the third heat. Unfortunately, the Academy had to pull out of the final heat due to a failure in the vehicle's system. Despite the outcome of the race, it has been an exciting experience for many members of the program being their first experience and major project. According to Senior Alejandro Mejia, he expresses, "It was pretty amazing. Although we couldn't finish, it was a cool experience to be there and see my teammate race. We had a lot of setbacks, but we were able to learn and push through. Ultimately, we did the best that we could and we were all happy to be there and see our finished product."

The program is proud of the team's effort and commitment dedicated to the Energy Invitational. With multiple obstacles in addition to the late start, the Academy has exhibited persistence and tenacity as they push through problems to find solutions. These setbacks have only motivated the members of LAEE, and the hard work of the members will only continue in the future events to come.

# SPECTRE ON TRACK

Written by Alison Guan

With the Energy Invitational competition in mind, the Los Altos Academy of Engineering decided to focus on the building process and completion of its newest car, Spectre. The vehicle is an aero-coupe model that was purchased from Blue Sky Designs. It was started in past years but left incomplete due to the shutdown during the pandemic. After deciding to commit to the Energy Invitational competition, the program decided to finalize Spectre to enter the competition.

Before committing to the race, it was possible for the program to submit two aero-coupe vehicles into the competition. After consulting with the team leaders, the Academy agreed that submitting one vehicle was the best option. This was due to the limit of time before the race day, May 6, 2023. Fortunately, this decision allowed the Academy to better focus on one car rather than rushing to submit two vehicles in a span of six months.



The chassis of Spectre consists of a hollow steel frame and a teardrop-shaped fiberglass body. The Scott DC motor is placed at the rear of the car, and powered by two ExpertPower batteries located behind the driver. The motor is mounted at the back of the vehicle on a newly machined aluminum plate. The vehicle has two Maxxis 16x1.95 inch wheels in the front and a Maxxis 20x1.95 tire for the rear wheel. Steering for the vehicle is done through hollow steel lever tubes.

Spectre has a running gear that uses a fixed gear chain and sprocket system with a gear ratio of 5:1. The system is used to increase the car's speed for the race. The body of Spectre is made from fiberglass material that covers the vehicle and seals off openings that could harm the driver.

In the process of modifying the vehicle to fit the competition's safety requirements, the team faced multiple problems that needed to be addressed. This was a huge setback for the Academy because the team had limited time to finish the vehicle before the competition date.



On April 22, 2023, LAE was required to take Spectre to the Inspection Day held by Energy Invitational. In the week prior to the competition, Spectre was still incomplete and lacked crucial components that were required. With great determination, the advisor, Mr. Richter encouraged the Academy to persevere and to not end the competition with regrets, but with pride and acceptance. Nonetheless, Spectre passed the inspection with minimal errors. This meant that Spectre was allowed to be driven and LAE would be able to attend the race day.

After returning from the inspection, the Academy began working on the issues that needed to be fixed. This included the addition of padding to the headset, limiting the steering to a 45 degree angle, tightening the brakes and loose wiring, changing to a rubber battery cover, and placing a temperature sensor for the motor. Project manager, Samantha Sandoval claimed that “the most important task was to focus on the list of changes that needed to be made. Spectre had to meet the requirements so that the inspector could clear the vehicle for the race.”



In the following weeks, the Academy worked diligently to complete the car and prepare for the race. On the race day, Spectre was able to run consistently on the first two heats, however an unknown issue caused Spectre to pull out of the race early. LAE is grateful to everyone who was involved and offered assistance in the process of the competition. The Academy is determined to return to the track next year with greater knowledge and confidence.



Ultimately, the Energy Invitational has provided Los Altos Academy of Engineering with the opportunity to apply the skills and knowledge learned through the program. Electrical member Elias Cuevas states, “The competition has taught us to keep track of deadlines and to take responsibility over our tasks. Communication between the teams also improved, we work much more efficiently now.” The competition has granted each team to showcase their specialties and bring them together to create a final product of a vehicle. By working together, the teams overcame issues and factors through critical and objective thinking. In conclusion, the Energy Invitational provides experience that impactfully contributes to the careers and futures of the students. LAE is proud of its achievements and will return next school year with fresh innovative minds.

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