

Alpha Wire Helps Olin College Build an Electric Race Car from the Wheels Up



To design and build its all-electric, formula-style race car for an international competition, the Olin Electric Motorsports team relies on EcoWire® to fabricate a wiring harness that acts as the car's central nervous system.

Meet the Olin Electric Motorsports Team

Formed only a few decades ago, Needham, MA-based Olin College of Engineering is on a mission to become a vital contributor to the advancement of engineering education across the United States and abroad.

A small school by design, it takes a different approach to training the next generation of engineers. Instead of a curriculum driven by textbooks and lectures, coursework is focused on design processes, entrepreneurial skills and collaboration enabled by work on real-world projects.

Case in point: The college's Olin Electric Motorsports team. Part of SAE International's (formerly the Society of Automotive Engineers) Formula SAE Electric division, this student-run group of 60+ builds and races all-electric, formula-style race cars at an international competition every year—with no oversight from faculty.

Finding the Right Wire to Support Electrical Connectivity

During the design phase, students are responsible for seeking out materials, services and support that will help subsidize the high costs associated with bringing their car to life.

"We look for sponsors that can provide us with what we need," explains Trinity Lee, engineering lead and electrical safety officer for the Olin Electric Motorsports team. "Quality is something we really care about when it comes to wiring in our electric race car. If anything goes wrong with the wire, for example, it can catch on fire and be very dangerous."

In previous years, harnessing had been difficult due to poor wire quality and lack of planning. This year, the team didn't want to make the same mistake.

Due to Alpha Wire's reputation for quality, the Olin Electric Motorsports team reached out to the company for support. When Alpha Wire learned about the team's quest to qualify for the Formula SAE Electric competition in 2024, it was proud to provide wire for the team's race car.

"We were really excited when Alpha Wire replied back right away and said they would give us the wire we needed," says Lee.



What It Takes to Fabricate an Electric Racecar

From design to safety, the Olin Electric Motorsports team is responsible for every component and every step associated with the race car. Each part is designed and manufactured by an Olin Electric Motorsports student, from the low-voltage electronics to the car's suspension. For example, the team designs, prints and assembles the printed circuit board (PCB). They also design and build the car's battery management system.

"It's a lot more hands-on work than what you get in a traditional classroom environment," explains Lee. "Students also get to teach and mentor one another." For example, students who join the team with no PCB design experience develop skills in leading a high-voltage subteam or designing a high-voltage battery management system.

Lee leads the electrical team, which is made up of 30 student-engineers and four subleaders who are spread out across smaller groups dedicated to high-voltage work, low-voltage work, the battery management system and integration.

The communication that occurs within the race car requires a harness made up of an assembly of 50+ wires that connect all electrical and electronic components, such as sensors, batteries and actuators. In other words, the harness acts as the car's central nervous system.

"It takes an incredible amount of wire to create what we need," explains Lee. "And we knew we needed good wire to make our build possible. For example, if our wires were sheared off, we would have to start over and crimp a whole new wire. Good connections were also a high priority. Working with quality wire for our harness not only makes sure the car is safe, but also helps us get our work done faster and more effectively and makes it simple to troubleshoot, especially during integration when we're debugging things."

Alpha Wire provided a consistent supply of EcoWire® 600V hook-up wire in the colors, types and variations the team needed to comply with the design of its harness. EcoWire provides optimum performance, light weight and a small diameter.

"We already turned on the low-voltage power for the entire car in October," describes Lee, "and everything was wired up really well. It performed as we hoped. We can press a button and verify that everything runs."

Racing to the Finish Line

Out of the hundreds of Formula SAE Electric teams throughout North America, Lee estimates that approximately 50 make it to the final competition every year. Among that group, less than half pass the final technical inspections and endurance tests required for race qualification.

In 2019, the Olin Electric Motorsports team's car placed eighth overall. In 2021, it took home first place for race car design. In 2024, the team hopes to continue this streak of success.

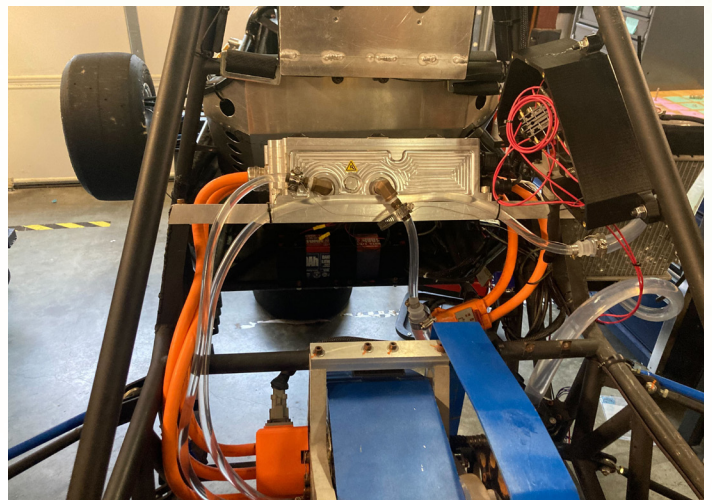
After initial designs are complete, the team spends most of its time at the Large Project Building on campus, where they can further build and test the race car before being judged and evaluated.

Before the team can begin fabricating the race car, its design and infrastructure must pass a series of technical inspections laid out by SAE International. For example, before the wheels spin, the team must detail every component of their car and submit diagrams of the PCB to ensure safety.

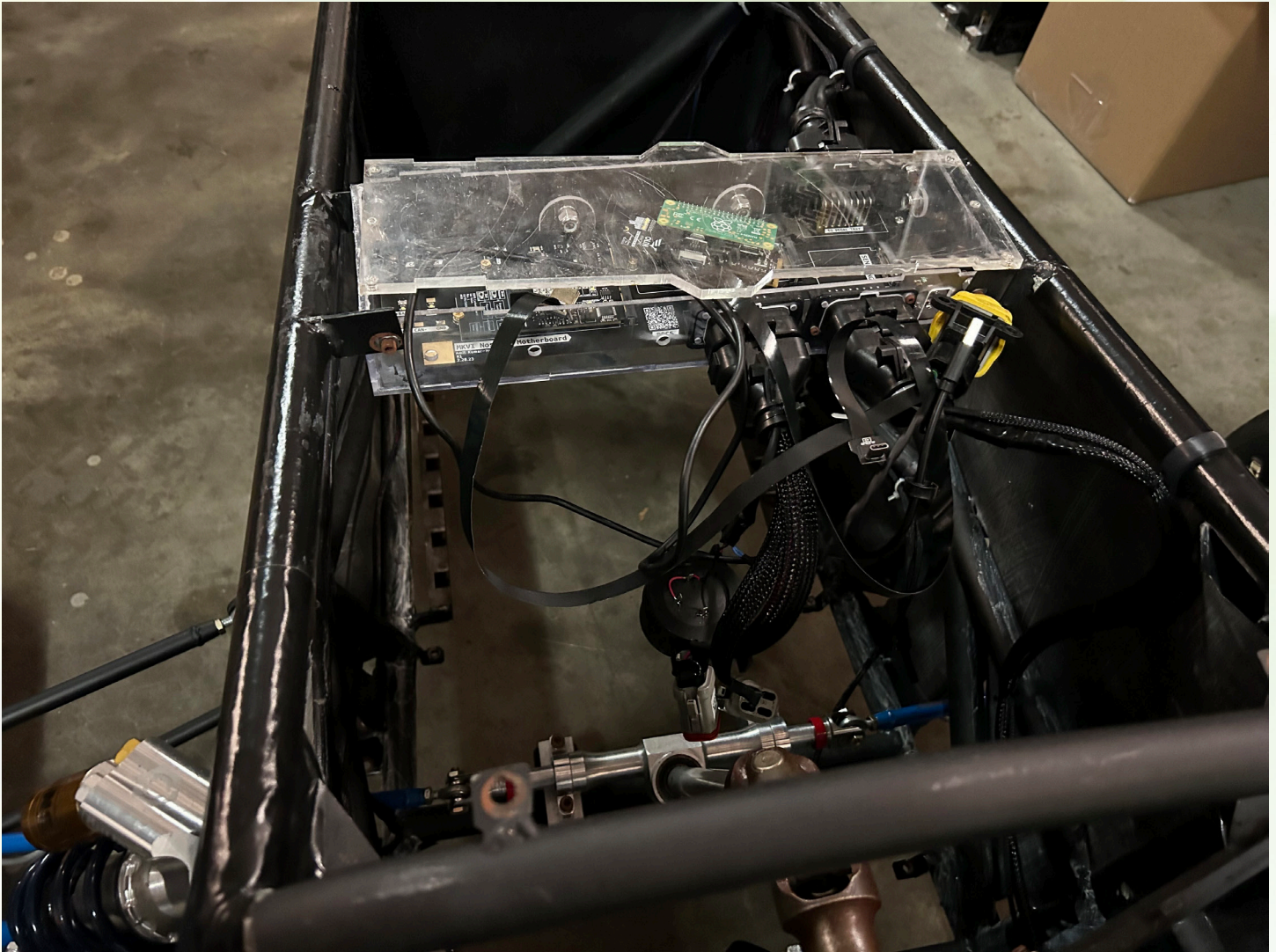
As the team moves from design to production, other inspections must be completed along the way to ensure compliance, safety and endurance.

Amid many of the challenges associated with designing, developing and fabricating an electric race car, such as supply chain issues or sponsors delaying work to fulfill higher-priority customer orders, Lee says the team is grateful that Alpha Wire always comes through.

"Because we were working with Alpha Wire, we didn't have to scramble," says Lee. "They were good on their word. They came through for us very quickly, made the process very easy and we had supplies when we needed them. Everything Alpha Wire has done for us has been great."



Pictured: Olin Engineering's harnessing featuring red 20 AWG wires from Alpha Wire.



Pictured: Olin's integrated harness connected to the car's motherboard.

In June 2024, the Olin Electric Motorsports team will take its car to the Michigan International Speedway along with 74 other teams to complete a rigorous technical inspection and compete in timed events and design evaluations that show off the team's creativity and engineering skills compared to colleges around the world.

"We've been able to make a really robust wiring harness, thanks to Alpha Wire," says Jack Greenberg, recent Olin College of Engineering graduate and former electrical subteam lead, financial manager and senior electrical engineer for Olin Electric Motorsports. "I'm optimistic that, this year, our harness will be one of the best on the racetrack! The wire you provided us will likely carry us through another harness next year, and we can't wait to continue using Alpha Wire products on our team."



Pictured: Olin Engineering's integrated harness using Alpha Wire's products.

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