

Auto Programs

All of our auto programs involve extensive student and teacher interviews to focus on how students feel the projects are going, what value they perceive the cars will bring, and things they would want to do differently if given the chance. Our projects are designed to enhance student (and teacher) growth and development.

Northshore and the Electric Dragster

- Students in the Northshore School District pitched the idea for special car build
- Students decided to build a type of electric drag racer that has not been attempted by high school students before to our knowledge, an AC motor, fully electric, drag racer.
- Automotive community members from around Seattle came together to share expertise and get the car rolling
- After some build challenges, the dragster hit the track in May 2016, with teacher Pat McCue behind the wheel, setting a record time of a 9.5 second ¼ mile at 152 mph.

Meadowdale: Hot Rod Combustion and Electric Technology

- Taking what we learned about what makes for a valuable and educational auto-tech project experience, we approached Meadowdale about working with their auto program.
- Advanced third-year students suggested and agreed upon a project that would maximize hands-on time and be completable within a year's time: working on kit-car Model T's from the ground-up, initially with V8 engines and then doing an electric conversion.
- Six kit cars were obtained, and the students split up to work on them in small teams.
- Although slightly less technically challenging than the electric dragster, the added hands-on time, team ownership over each kit, and obtainable goal (before graduation) led to a very valuable experience and sense of fulfillment for all students involved

Setting the Stage: Northshore and Electric Dragster

As big automotive fans, we at foundry10 were trying to figure out a way to augment traditional automotive tech learning. This journey started in summer of 2014 after visiting a couple of pro auto races. We began brainstorming what types of experiences might be valuable to bring to high school students. Through conversations with each other and with Don Kitsch from [ProFormance Racing](#) and [Team Seattle Racing](#), we formulated an idea: we wanted students to have the chance to do an auto build of their choice, from the ground-up. Project-based learning to the extreme!

We visited local high school auto programs to meet teachers and hear about their programs, and when we visited Bothell High School's magnet auto program in the Northshore school district, we knew we had good fit philosophically and technically. Our contact there was Pat McCue, the automotive technology instructor, and we told him we were interested in partnering

on a build project of his students' choice. Pat had his students pitch different ideas for special build projects in the fall of 2014 to each other and ultimately to us. The ideas ranged from a drift car, a gas-powered drag car, an electric dragster, and a baja-style truck. Ultimately, in a close vote, the electric dragster won out.

Students began researching both AC and DC powered motors. In late fall, a select group of students came and presented two alternate builds of an electric dragster to a panel of automotive enthusiasts, experts and engineers we had pulled together. The DC electric dragster is something that had been done before and was likely to go relatively smoothly. The AC electric dragster was much more of a wild card in terms of power, design and challenges. The students and Pat were most excited by the thought of building something no one else had built before and ultimately, our panel also felt like that would be the more interesting, although challenging route. AC dragster it was! The process of the first foundry10 high school auto build project was on its way.

Foundry10 granted the school district the money to buy the race car body and all the parts for the electric motors and batteries. The original goal was to have the build complete by spring of 2015 so the car could race in the high school drags that year. Due to delays and complications, the car didn't end up racing till the following spring, which posed an interesting challenge as some of the initial students who were excited about the project had already graduated and a new crop of students were introduced to the car. Since the students voted on the car, losing the group that initially voted as they graduated made the transition for the new students a little strange but once they began to really work on the vehicle some of that initial enthusiasm was re-established.

The build turned out to be really challenging, but at the same time, it gave the students a chance to connect with other community members. Local electric car racing experts came in to work with the students and teacher, there were special field trips to meet with motor and battery makers, and even local paint shops took an interest in the project and had those students interested in paint come in to do work. In addition, students who were interested in doing the vinyl wrap on the car worked with experts in wrapping to get their designs on the vehicle.

The biggest question we all had by early spring of 2016 was whether or not the car would make it down the track! There was really no place to try it out, so Pacific Raceways was going to be the testing ground. At the high school drags in May 2016, the car did make it down the track and it was fast! Even without cranking it up to full power, the dragster easily hit 11.5 seconds at a ¼ mile with a primarily student pit-crew (some experts helped with the battery charging). The school was able to take the car to a special event in Canada a few weeks later, with another student crew, and it hit 152 mph with a 9.5 second quarter mile.

Northshore's auto program will be able to share the car with other schools interested in electric technology and will be taking the car and students to special events over the next few years. It was a great opportunity for students to learn about wiring, electricity, racing and the challenges of building a race car from scratch.

Meadowdale: Hot Rod Combustion and Electric Technology

We hope to learn something new from each project we do with schools. What we learned from working with Northshore on the electric dragster was applied to our second automotive project with Meadowdale High School.

Bryan Robbins, the instructor at Meadowdale, was introduced to us by Pat from Northshore. We came out and chatted with Bryan about his program and learned that one of his goals was to enhance the curriculum for his most advanced third-year auto-tech students. After further discussion, it was decided that we should involve the students again and talk with them to have them pitch us an idea. However, this time we encouraged the students to think creatively about their exposure to new tech and asked that they think about ways to maximize their individual hands-on potential. One thing we learned is that maximizing student hands-on contact with the vehicle is crucial. The buy-in from students is obviously higher if they feel like they are actually responsible for a key aspect of the vehicle, so increasing the likelihood that students would have lots of hands-on time was an important component to emphasize.

A couple of weeks later, a team from foundry10 came out to meet with the students and we were treated to a fantastic presentation, complete with violin music! The students were really interested in building kit car Model T hot rods and doing a V8 engine build from the ground up with a conversion to an electric motor. The first part of the year was spent focused on rebuilding the V8 engines; the second half of the year was dedicated to figuring out the electric motor. We were impressed by the research Bryan and his students had done and were excited to get another project moving.

Since the electric dragster vote had been such a close tie, we had these students do anonymous, brief surveys to make sure the majority of the advanced students were interested in the proposed project, to highlight the specific interest areas they had and find out what they were interested in spending their time on. Getting student buy-in on the project is an essential component, especially if they are building from the ground up.

One aspect of the project that was really appealing to students at Meadowdale was the opportunity to compete a bit with each other. They didn't ask for just one Model T kit, they wanted to order a couple. Due to the prices of the kits and some deals they were able to work out with the manufacturers for the project, they were able to obtain six kits with funding from foundry10. That meant that the students would have a great deal more hands-on time with each car. And, since they were all building the same cars, not only was there a bit of pressure to stay on top of the project, but there was some friendly competition regarding the builds of their V8's as well as the electric conversion.

An element that worked particularly well with this project was the exposure for students to building a V8, which in itself is not a guarantee in a high school automotive class. The work with electric batteries and motors, which are not readily available in classrooms, was also a valuable

experience with advanced technology for the students. The electric motors in this program were a bit less technically challenging than the electric dragster, but the two programs offered really interesting looks into either performance motors or everyday conversions.

Working on the hot rod Model T's really gave students a chance to push their knowledge in all aspects of automotive: suspension, brakes, electronics, engines of all kinds, body and transmission. Working in small teams, collaboratively, gave students the chance to hone their teamwork skills and work on goal-setting and communication. The advanced projects at the third year level really allow for students to apply a wide variety of skills in a project that gives them a strong sense of ownership and ability. Students at Meadowdale will be able to utilize the hot rod kits for years to come in the advanced program!