

FIRST Team 1477 Texas Torque is comprised of high school students from south Montgomery County, including three public high schools from the Conroe Independent School District. Several students are from local home schools or drive from distant high schools to be part of the team; we have always had an open membership policy. The team is headquartered in The Woodlands, Texas and works out of a laboratory classroom at College Park HS built for robotics.

Students who join Texas Torque are exposed to a wide variety of experiences and opportunities. Working on the team, they have access to mentors from several fields, including mechanical engineering, programming, and electronics, all willing to teach, answer questions, and be supportive. These mentors also benefit by becoming better teachers, networking with other businesses, and training students for positions in their field. Students also get internships and jobs after joining Texas Torque from our sponsoring companies, either through one of the mentors or because of the skills they acquire from being on the team. At a minimum, the experience allows students to explore several fields of study in a hands on, real world way. In many cases students then choose to take higher level science and math classes in high school, such as calculus, physics, and computer science.

Texas Torque strongly encourages younger students to pursue careers in engineering, science, and math. The team set a goal this past year of creating and mentoring FIRST LEGO League (FLL) teams in more schools. This year alone, we formed five FLL teams and guided them through the season, while we continued providing support to teams formed in previous years. Altogether, five of the teams moved on to the Houston Tournament Area Championship. The team also hosted one of the largest FLL qualifiers for the last three years. Team members actively engage with FLL students by refereeing, judging, and supplying volunteers while running the overall event.

To ensure the sustainability of the team, Texas Torque formed a partnership this summer with the Montgomery County 4-H organization. Texas State 4-H has a goal of providing more opportunities for students to participate in robotics. They helped us establish Texas Torque 4-H Robotics as a federally tax-exempt club. Sponsors are encouraged to donate directly to Texas Torque 4-H Robotics, making these funds readily available to support team activities. Donations placed in the school account must follow Conroe ISD purchasing guidelines, which have required us to

purchase items at higher prices from bid vendors. The team has become much stronger financially over the past four years. In 2008, the team budget was \$10,000. We have raised over \$25,000 for the 2012 season, including a \$10,000 donation from founding sponsor Halliburton. When Alan Coats presented the check, he commented “we really believe in this program because it trains our future engineers, the kind of people we want to hire, with the skills we require.”

Texas Torque jumps at every chance to make others aware of FIRST Robotics and our program. We regularly participate in our local 4th of July parade, delighting old and young alike as we drive through town operating our robot on a trailer. We also met with United States Representative Kevin Brady, our school district superintendent Dr. Don Stockton, chair of the Texas State Board of Education Barbara Cargill, and Montgomery County Sheriff Tommy Gage. Dr. Stockton even took a turn driving our Logo Motion robot. His intense concentration is prominently featured in a photo on our website.

While there will always be room to grow, there are many ways in which Texas Torque demonstrates FIRST values. The team strives to be very welcoming, allowing anyone interested and willing to join our team, regardless of their experience or knowledge. The team created Texas TORCH, the Texas Torque Online Robot Crisis Hotline. Teams can call us anytime on Skype when we are in our lab to ask questions or to get help. Our faculty mentor signed up to help other teams through the FIRST Virtual Technical Advisor System; our lead student on the programming team shared our code with other teams when they had trouble establishing serial communication with their cRio. When we arrive at a competition, a small group of students gets our robot ready while everyone else scatters to assist other teams. We regularly find ourselves making bumpers, fixing a mechanical or electrical issue on a robot, looking for bugs in code, or just lending tools. We pride ourselves on being helpful, almost to a fault. It has been a running joke amongst us that we ended up losing to a team we helped at the Lone Star Regional in 2010. It happened again at the Alamo Regional in 2011. Suffice it to say, Texas Torque is always willing to help teams in trouble.

Before we travel to a competition, we drive our practice robot in the cafeteria during lunch. Our real practices are held in the evenings, but these lunch “practices” expose the entire student body to the FIRST program. Even teachers comment to

team members about how impressed they are with what we are doing. At our demonstrations to elementary schools, summer camps, and our sponsors, we teach kids and adults about FIRST Robotics. One benefit is that we find new mentors and sponsors. We also inspire students to either join our team or start their own, be it another FIRST or FLL team. Several team members often share how they first became hooked on FIRST Robotics when they participated in one of our demonstrations or saw us at a competition.

We like to say there is no off-season for Texas Torque. The team continues to compete throughout the entire year. In the summer of 2011, we attended the Indianapolis Robotics Invitational and Texas Robot Roundup. In October, the team travelled to Madera, CA for the Madtown Throwdown. Students work year-round to further improve the robot and their skills. Before the start of this season, the team hosted CAD sessions to train its members to use SolidWorks. We hold weekly Skype meetings where the team discusses build progress, project timelines, future goals, and more. This is one way the team keeps everyone up to date. Frequent emails to team members, parents, mentors, sponsors, and alumni report on progress, upcoming events or the hours the lab will be open.

On February 4th, 2012, Texas Torque partook in the first ever robotics exhibition at Sci://Tech, a science exposition. A large hall was set aside at the Lone Star Convention Center where the public could learn about our program and robotics activities in the area. Several teachers asked about starting FLL teams at their own schools. Team members taught kids about Sarge, our 2011 competition robot, while others demonstrated its abilities and allowed participants to drive and operate the robot. In another display, team members explained to children the different components of a robot. We were actively working on assemblies for this year's robot, with kids learning how to put heat shrink over exposed wires on our drive motors. We have the same mindset in our workshop: students learn best by doing the work on the robot with mentors providing guidance.

Texas Torque is dedicated to helping surrounding FIRST teams. At the beginning of this season we invited rookie and second year teams to our workshop to build a simple robot using the materials from their kit of parts. In the past, we have given parts to teams at competitions or prototypes of our robot as an example of the method we chose for that challenge. This helped them learn and become more

successful in the future. We also collaborate with other teams across the nation, from 2415 and 2791 on the east coast; 1323, 604, and 973 on the west; and 2587 and 1429 in the Houston area. We share ideas, materials, testing results, and more to improve through Coopertition.

It is exciting to be involved with Texas Torque. Those who join get caught up in the experience quickly, with an almost overwhelming number of students showing up during the robot build. Members are also quick to volunteer for the numerous activities we have outside the build season. Sometimes our best advertising is simply word of mouth as we spark interest in our peers just from our nonstop talking about robotics. Students who join must enjoy their time spent at robotics, as they give up countless evenings and weekends. There was a time when we weren't sure we would have a team from year to year; now it's hard to imagine a year without Texas Torque.

In today's world, quick and reliable communication is critical. The Texas Torque website contains key information about the team: its achievements, history, calendar of activities, how to join, and sponsors. A recent addition requested by a sponsor was a button for donating to the team using PayPal. After several years experimenting with different web authoring tools, we now use Word Press. This has simplified the updating process so information is much more current. One feature key to the members is a link to our Texas Torque wiki. This serves as a repository of information for the team, with items such as a database of specs on parts, programming tips, how to use tools in the lab, scouting reports, suppliers for parts, team rules, and much more. It is also used to keep updated copies of documents, such as this essay. There are over 100 pages with more added as we continue to grow.

It is the goal of the team to have a positive impact on everyone we come in contact with, from the young child when we make a presentation at their elementary science night, to the team members that learn how to solve real problems as they explore a future in engineering, to the mentors who dedicate their time and talent, to our community leaders who gain an appreciation for a school program that is so important to the future of our students and our country.