



Photographs courtesy of Gael Force Team

FIRST Robotics in Clinton, Massachusetts

by Judi Poe, Federal Reserve Bank of Boston

Communities around the country are finding that partnerships between businesses and schools can help young people develop the skills they need for the job openings companies need to fill. One New England collaboration demonstrates just how successful such partnerships can be. The vehicle for the joint effort of the Clinton, Massachusetts, school district and Clinton-based plastics company Nypro Inc. is a national robotics competition. It is called FIRST (**F**or **I**nspiration and **R**ecognition of **S**cience and **T**echnology).

The Hardest Fun Ever

Imagine this: You have to build a robot that performs specified functions, using the parts provided and no more than \$3,500 for additional parts. Complete the design, build the robot, and test it within six weeks. Impossible? Thousands of high school students in the FIRST program nationwide have been doing it every year since 1992.

The brainchild of Dean Kamen (inventor of the insulin pump and Segway personal transporters) and Woodie Flowers (MIT engineering professor), FIRST seeks to excite students about science, math, and technology, and encourage them to go to college. In 1992, 28 teams participated in the inaugural competition in Manchester, New Hampshire. By 2007, there were 37 regional competitions (including competitions in Israel, Brazil, and Canada), one national competition in Atlanta, 1,300 teams, 32,000 students, 18,000 mentors, and 5,700 other volunteers.

As the FIRST web site says, it's "the hardest fun ever." The challenge is different every year, with robots being assigned to climb a bridge, stack boxes, shoot balls through a hoop, or hang from a chin-up bar. At the competition, there are six robots on the field at once (each weighing approximately 130 pounds) and 24 humans playing a prescribed "game." Each match lasts two minutes 15 seconds. It's a real sporting event: The fast-moving robots are loud, the human players are loud, the fans are loud, the announcer is loud, the music is loud.

That's the fun part. The hard part is finding sponsors and mentors, raising funds, planning and building the robot, and arranging transportation. With newsletters to write, presentations to give, project plans to create, and strategy to plan, a strong support team is essential. Flowers calls FIRST a microcosm of a real engineering experience: "It's a problem too big, in a time too short, with a budget too small, and a team too large."¹

How Nypro Got Involved

Peter Marshall of Nypro learned about FIRST from customer Deka Research, Kamen's company. During a sales call in 1991 Kamen talked about a project to interest young people in technology. Kamen thought Nypro should start a team. Marshall spoke to Nypro owner Gordon Lankton and key technical people, who saw FIRST as an opportunity for community involvement with the added possibility that some students might one day make good employees. Nypro approached the Clinton School system, which jumped at the chance for a great learning opportunity.

Nypro engineers and teachers from Clinton High School collaborated to interest students in joining the team. Team Gael Force was formed, the motto "Molding the Future" was chosen, and a robot was built. None of the participants knew how much



their world was going to change. They won the championship and got to meet President Clinton.

Lankton says, "Once you win and are invited to the White House, how can you give up?"² Nypro was in for the long haul. Gael Force is one of only six of the original 28 teams that have competed in every championship since 1992—and one of only

three teams that have had the same high school and sponsor from the beginning.

The mentors work with young people who may never have used tools, designed parts, built anything. They help students analyze the construction project, plan their robot, fabricate parts, assemble the robot, and plan their strategy. They provide space to work in and serve as the role models.

Why do they do it? Though Lankton has been heard to say, "I love that school," Nypro is probably practicing some enlightened self-interest, too. The company is building goodwill and at the same time helping to train the workforce of the future.

The company experienced the value of goodwill in 1998, when it needed to expand its plant. Its factory is located in a National Historic Register building, which limits changes to the exterior. An athletic field owned by the town abutted the Nypro building. The company proposed purchasing the property in exchange for building a new athletic field. In addition, the company assured the town that it would continue its commitment to Gael Force. The people of Clinton voted overwhelming support of Nypro. The educational, inspirational, and job-related value of FIRST likely played a role in voters' attitudes.

Since 1992, the company has hired more than 50 students from the FIRST program for both full-time and part-time jobs. According to Rob Brand, director of human resources, hiring students is cost-effective. "If it costs \$5,000 to recruit an employee, we've saved \$250,000." The program acts as an automatic job reference for students. "What better recommendation can you get," says Brand, "than working with someone from the time they are 14 and watching them grow?" Although Nypro did not get involved with FIRST with the intent to create a recruiting pipeline, that has been another of the many positive outcomes of the program.

The Making of an Engineer

In some ways, Tim Baird is the poster child for FIRST. Entering high school, Tim was thinking about a career in architecture or marine biology. But he joined the FIRST team in fall 1998 and never looked back. He was awarded the FIRST scholarship to Worcester Polytechnic Institute, a four-year full-tuition scholarship worth more than \$120,000 at the time. In 2004 he graduated, began work on his master's degree, and started working at Nypro as a project engineer.

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A mentor for WPI/Massachusetts Academy of Math & Science FIRST team during his college years, Baird now mentors the Clinton High School/Nypro team.

"Nypro and [Lankton] give so much to the program," he says, "that we are rather spoiled in comparison to some other teams. We have the right facilities, supplies, mentors, and everything else that a successful team needs to survive. Working with the engineers was fantastic for me as a high school student. Watching what some of them did inspired me to go on and do the work that I am doing now. It was also great because through FIRST I became better friends with Rick Paulino, a Nypro engineer who worked on the team during my high school years. Whenever I had problems with homework at WPI or needed info for a project, I'd call or e-mail him, and he helped me out. I try to do the same now for my friends on the team because I know how much I appreciated it."

As teams have become more experienced, the program has become less about winning and more about building leaders. All student team members are required to do fund-raising. The outreach means students get to know

local businesspeople and learn skills such as giving presentations. The students also make presentations about their FIRST experience to the Nypro senior managers.

Additionally, students are encouraged to give back to their community. They mentor middle school students in FIRST Lego League, make presentations to other schools about FIRST robotics, and generally spread the message of FIRST.

Jorge Martinez, a Nypro mentor for 16 years, began mentoring originally for the

thrill of winning but soon got excited about the learning that went on. At that time, he says, although few women were engineers, most of his students were girls. Even today his eyes light up when he describes the delight girls felt when they realized, "I designed and built that!" Martinez's entire family has participated—either as students or as volunteers.

Talk to any student in the country who has been a member of a FIRST team and you will hear the names and industries of the many sponsoring companies. The competition process introduces students to the business world. Meanwhile, the companies know they are not only promoting education but paving the way for their own future success. The importance of creating new generations of engineers, scientists, and technologists cannot be overemphasized. Nor can the satisfaction of employees who have become mentors and watched young people bloom.

Judi Poe is a technical consultant at the Federal Reserve Bank of Boston and "the cookie lady" for Team 126 in Clinton, Massachusetts.

Endnotes

¹ See www.youtube.com/watch?v=zyavvQEDYW0 and www.usfirst.org.

² *FIRST: Chronicles of Inspiration, Competition, and Changing the World* (Los Altos, California: Palo Alto Press, 2007).

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Joel Cosme, Ryan Doherty, Coach Tim Baird, and Rachel Kulis made up the 2007 Gael Force Team.