

Reclaiming past glory

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There it is, in the middle of Page 250 in the 1996 *Guinness Book of World Records*:

Fastest human-powered submarine: The fastest speed attained by a human-powered propeller submarine is 5.94 knots, by FAU-Boat, designed and built by the Florida Atlantic University Ocean Engineering Department, Boca Raton, FL, on March 8, 1994.

Doesn't sound like much, 5.94 knots (6.84 mph), but to this year's FAU sub team it's not just a number, it's a reputation.

Once, in the early 1990s, the FA U-boat was the sub to beat. Then budget cuts nearly forced the sub racing program into extinction. This year, the 15-year-old FA U-boat is back, and the team is ready to regain its world record status at the International Submarine Races this week in Maryland.

It will not be easy. Twenty-three teams of one- and two-person human-powered submarines will compete for world titles in best use of composite materials, team effort, innovation and speed. The biennial race is open to universities, colleges, corporations, research centers, high schools and privately sponsored teams.

"We're not going in there thinking we're not going to win," said Joe Birch, co-captain of the team.

If nothing else, they will be a well-cheered team. A contingent of alumni of FAU's ocean engineering department works at the Navy's Surface Warfare Center in Carderock, Md., site of the race and home to one of the world's largest indoor tanks.

The subs run a 100-meter course against the clock. To make the race more interesting this year, there will also be a three-dimensional slalom course race - like with downhill ski racing - with two teams racing at a time.

The big competition comes from the current world record holder, the OMER 5 built by students at the University of Quebec's École de Technologie Supérieure. In 2005, they set a new world speed record: 7.061 knots. The Canadian team has big-name sponsors like Dupont, big money, big dreams and a new sub that, according to the team's slick Web site, "should reach 8.5 knots." Then there are teams from the venerable MIT and Virginia Tech.

The FAU students know they are the underdogs. Their 15-year-old sub has a new paint job and has been tweaked a bit. They had hoped for a new propeller, one they designed by teaching themselves about blade element theory - a class they won't take until their senior year - but studying for midterms got in the way.

"This project is not a class requirement. They're not really doing this for credits," said Dr. Edgar An, professor of ocean engineering at FAU who gave the team a crash course on building propellers. "That shows how dedicated they are."

The FA U-boat is about 14 feet long and weighs about 75 pounds. It is fully human-powered - no springs, no flywheels. Team members Matt Young and Ken Kelly act as crew.

Once submerged, Young and Kelly sandwich themselves in the sub, one on top of the other in what they call "the Superman position."

Support divers - Laura Fenton, Mike Elias, Gerry Kaufman, Skyler Bryan and Chris Aschliman - attach the hatch, stabilize and position the sub. Because the sub is not sealed, Young and Kelly breathe from air tanks attached to the inside of the sub. One pedals as if on a horizontal unicycle, the other steers by twisting a pipe attached to fins.

They communicate with a sort of silent Morse code, a squeeze of the pilot's right shoulder by the peddler means "everything is OK." A squeeze of the left shoulder means "stop." A shake of both shoulders mean "emergency - pop the hatch!"

"I really think we're a well-oiled team," Birch said.

FAU created the nation's first ocean engineering program in 1964, a year after the loss of the nuclear-powered USS Thresher off the coast of Massachusetts. The sub and its crew were lost after a test dive and found in 8,400 feet of water, far below the sub's crush depth. The Navy became concerned about underwater equipment designed by engineers with no marine experience.

FAU's program has drawn students from around the globe, including China, Greece, Japan and Norway. In 1989, the school joined with the Perry Foundation and held the first International Submarine Race in the waters off Riviera Beach.

"It was a total disaster," 83-year-old Ray "Doc" McAllister, professor emeritus at FAU, said as he watched students in their 20s effortlessly hop from a dock in Boca Raton to the deck of the boat with scuba tanks: "I used to be able to do that." But his mind and memory are still sharp.

McAllister holds court on the stern of the 47-foot Seahorse, captained by his friend Daryl Wilmoth, who freely donates his boat, time and fuel to the team. Wilmoth's former shrimp boat can easily hoist the sub: "Trying to launch it manually would be impossible," Wilmoth said.

McAllister loves a good sub race yarn: There was the race off La Jolla, Calif., where the team watched a great white shark attack a seal just outside the race course. Then a baby gray whale decided to take a run on the course. The vaunted MIT team once installed a new sprocket in its pedaling mechanism without testing it. Four teeth snapped off.

"One sub actually went backwards," McAllister said.

Whatever calamity, the students learned, often unexpectedly, the practical value of testing their knowledge in the real world and learning from others' mistakes. The faculty learned the marketing value of making engineering fun.

"It was the best recruiting tool the department ever had," McAllister said. "We bitched like hell when they decided not to do it." A year after setting the world record, the school cut the budget for the sub race and ended FAU's sponsorship of the race. The department participated only sporadically, the last time two years ago when the team placed third for speed and first for team effort.

Charles Callaway, the pilot of the record-setting sub in 1994, still has a copy of the *Guinness Book of World Records* with his name on it and a plaque on his office wall: "I'm not sure how much pull it has, but it's an interesting conversation piece."

Callaway still frequently talks to his teammates. An alumni fund-raising drive along with corporate sponsorship has helped.

Still, they will sleep four to a hotel room and eat subs - as in sandwiches - donated by 620 Subs in Boca Raton.

If they win, they know it will be because of hard work and practice - not a fancy new fabricated sub.

"They have the money," Birch said. "We have the ocean."

And the tank at Weeki Wachee Springs, where they first tested the sub during spring break. And yes, the mermaids were in the tank, too.