Paddling Their Own Canoe

Civil engineering students harbor national championship hopes with a sleek, speedy vessel made of concrete.

ABOVE: At the 2003 regional concrete canoe competition in Manhattan, Kansas, Ryan Hague, left, and Kyle LaPointe dig in as *Sooner or Later* takes off in the men's sprint, one of five required races with the women's sprint, men's and women's slalom/endurance, and a four-person coed sprint. OPPOSITE: Smile and say "Philly cheese steak." The OU concrete canoe team gathers with professors and supporters at the national competition in Philadelphia.

BY SEAMUS FREYNE

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OU HAS WON NATIONAL CHAMPIONSHIPS IN A VARIETY OF SPORTS—MOST RECENTLY FOOTBALL, GYMNASTICS AND SOFTBALL—BUT MAY SOON ADD A NATIONAL CHAMPIONSHIP IN AN ENTIRELY DIFFERENT EVENT. In June 2003, a team of OU civil engineering students placed fifth in the National Concrete Canoe Competition in Philadelphia, Pennsylvania, and now, in 2004, OU must be considered one of the favorites.

The American Society of Civil Engineers (ASCE) first organized the National Concrete Canoe Competition in 1988, and it continues to grow in prominence. The annual contest regularly draws the attention of local and national media, and articles have appeared in magazines as diverse as the *Smithsonian* and *Sports Illustrated Women*. Master Builders Inc., one of the major sponsors, awards scholarship prizes to the top three teams.

Each year, nearly all of the 259 ASCE student chapters at universities across the nation design, build and bring their concrete canoes to race at 20 regional competitions. The regional winners, as well as a few second-place teams and international guests, are invited to the national championships. In April 2003, OU upset rival Oklahoma State University in Manhattan, Kansas, to qualify for the nationals as a regional champion. This was OU's first regional victory.

OU's 2003 canoe, named *Sooner or Later*, was the product of more than 1,000 hours of labor in design and construction. Like all the entries at the National Concrete Canoe Competition, *Sooner or Later* resembles a sleek Olympic racing vessel. "Most people probably expect a concrete canoe to look like a bathtub," observes team member Kyle LaPointe.

The National Concrete Canoe Competition was conceived with the objectives of bringing together the best and brightest civil engineering students and increasing awareness of the versatility of concrete.

"The competition provides our undergraduate students with a valuable opportunity to acquire the practical experience and the communication and leadership skills that will be important to their careers," says Professor Robert Knox, director of OU's School of Civil Engineering and Environmental Science.

Kerry Maroney, president of the ASCE student chapter at OU and a member of the team, believes the competition "challenges students to think creatively, outside the box." Amanda Luksetich, also a team member, enjoys the chance "to network with students and faculty from all over the country."

Scoring at the competition is based on three academic events, which account for 70 percent of the total score, and the races, which account for the remaining 30 percent, though changes to the scoring have been made from year to year. The academic events include a paper, presentation and the canoe itself. In the paper, teams must concisely describe their canoe design, concrete mixture design, construction method, project management philosophy and schedule. In the presentation, each team is allowed five minutes to address the basic design and innovative features of their canoe, followed by a question and answer

LEFT: All canoes must float, even when submerged in water. Here Kyle LaPointe, left, and Ryan Hague, both standing in the tank, assist a judge, in foreground, during the flotation test in Philadelphia.

BELOW: The City of Brotherly Love welcomes the Sooner canoeists as *Sooner or Later* is unloaded by team members Danny Baldwin, left, and Joey Dunaway, Adjunct Professor Seamus Freyne, and team members Marilyn Stokes and Kyle LaPointe.

period. The canoe itself is judged on the basis of its aesthetics and durability.

The climax of the competition is the five races, which include men's slalom/endurance, women's slalom/endurance, men's sprint, women's sprint and a coed sprint. All races require two paddlers except the coed sprint, which requires four paddlers. A panel of professional civil engineers acts as judges and race officials during the three-day competition.

The 2003 national title was won by the University of Wisconsin, Madison. Canada's Universite Laval and the University of California, Berkeley finished second and third respectively. South Carolina's Clemson University, whose teams had won three of the last four national titles, finished fourth, just ahead of OU. In the individual events, OU earned third in the paper, eighth in the presentation, third in the canoe judging and a collective ninth in the races.

There was some question about whether the races would be canceled in Philadelphia after the original race venue on the Schuykill River was declared too dangerous due to fast currents and high water, the result of torrential rains. However, an alternate site was found at a lake at Franklin D. Roosevelt Park. The rain and unseasonably cold weather were not too much of a concern to the OU team. "We had new team jackets to keep us warm," says team member Marilyn Stokes.

In all, 15 students endured the lengthy travel and heavy rainfall to represent OU in Philadelphia. Professor Keith Strevett and adjunct professors Chris Ramseyer and Seamus Freyne accompanied the team along with several of the students' families. Strevett is the faculty representative to the ASCE student chapter at OU.

Between events, the team found time to visit some of the historical sites around Philadelphia, places made famous by Ben Franklin, George Washington and the *Rocky* movies.

A new canoe must be built every year, of course, and changes to the rules force teams to modify their designs from previous years. Rule changes in 2003 required teams to use specific quantities of constituent materials in their concrete mixtures and also greatly restricted the use of paint on the canoe surface. In effect, the rule changes made the canoes heavier than in previous years. The average weight of the canoes in Philadelphia was about 160 pounds (73 kg), up from 120 pounds (54 kg) in recent years. At 200 pounds (91 kg), *Sooner or Later* was "ideally too heavy," admits Beth Brueggen, captain of the team in 2003, "but she cuts through the water nicely and leaves little wake."

The design of *Sooner or Later* was aimed at achieving the best combination of speed and maneuverability. The OU canoe was built 21.5 feet (6.6 m) in length and 2.5 feet (0.76 m) in maximum width and with a hull thickness less than 1 inch (25 mm). A relatively extreme tumblehome, or hull curvature, and a covered bow provided structural stability.

In addition to the basic concrete constituents of cement, aggregates and water, the concrete used to build the canoe contained fly ash, Styrofoam beads, latex and a chemical admixture designed to enhance workability and strength. With a density of only 53 lb/ft3 (850 kg/m3), or about 37 percent of the density of conventional concrete, the concrete was itself buoyant in water, which has a density of 62.4 lb/ft3 (1,000 kg/m3). The

Constructing OU's concrete canoe starts with the mold, here taking shape at the hands of Beth Brueggen, left, and Joseph Thottunkal.

The OU team launches *Sooner or Later* to begin the races at the 2003 national competition in Philadelphia, Pennsylvania.

hull shape and concrete strength allowed for minimal internal reinforcement, a single layer of fiberglass mesh in the hull and a Kevlar cord wrapped around the gunwales.

A chief innovative feature of *Sooner or Later* was the use of a special fly ash, which was ground to enhance its performance in concrete. "Fly ash is residue from burning coal," explains Brueggen, "and it is useful in concrete as a supplementary cementitious material." A second innovation was the use of a construction method in which concrete was sprayed in thin, uniform layers onto the canoe mold.

The team used admixtures to color *Sooner or Later* a proud shade of crimson (outside) and cream (inside), without paint. As finishing touches, the OU logo was artistically embedded into the hull and a flag attached to the stern. Two steel "paddlemen" were built to support the canoe out of the water.

The unique concrete designed by students someday could have a tremendous impact beyond the world of canoes. One thought is that it could replace wood as the main material in home construction, likely improving energy efficiency, durability and resistance to such calamities as tornadoes, earthquakes and fires.

Throughout the year, the team uses weekly newsletters to keep everyone up to date on the progress. The ASCE student chapter also maintains a Web site at *www.ou.edu/asce*. To increase awareness, *Sooner or Later*, at the end of its competitive life, was placed on display in Carson Engineering Center. "She's a beauty," admires team member Ryan Hague.

Any team with championship aspirations needs fan and booster support, and the concrete canoe crew found theirs in a generous, encouraging group of family and friends, alumni, faculty and staff, and the professional community. Private companies contribute much of the concrete supplies, and in addition, the team annually receives approximately $20,000 in contributions to help defray expenses.

OU now has advanced to the nationals in three consecutive years, placing eighth in 2002 in Madison, Wisconsin, with a canoe named *Jaws*, and 14th in 2001 in San Diego, California, with *Bringing the Heat*. "Each year we have improved, and we have established a solid tradition here at OU," says the enthusiastic Jan Reed, who is one of several team members who recently concluded their illustrious OU careers.

With this momentum, the team is optimistic about continuing its success in 2004, when the regionals will be in Lincoln, Nebraska, and the nationals in Washington, D.C. "We have outstanding new recruits," says team captain Brent Chancellor, "and we are busy exploring new ideas and practicing our paddling technique."

Everyone seems to have an eye on other interests as well. Among recent team members, there has been one marriage, and a second is imminent. "I guess paddling a canoe is romantic," says Halee Clour, who will wed Joey Dunaway this summer. Not surprisingly, it has been suggested that the next canoe should be called *The Love Boat*.

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