

Missouri University of Science and Technology

Concrete Canoe Design Team



**CONCRETE CANOE
DESIGN TEAM**

Team Profile 2023—2024



PAST PARTNERS



TEAM BACKGROUND

HISTORY

The Concrete Canoe Design Team was founded in 1974, making it the oldest design team at Missouri S&T. The team is looking forward to celebrating it's 50th anniversary next year by hosting the 2024 regional competition on the Missouri S&T campus.

MISSION

The mission of the Concrete Canoe Team at Missouri University of Science and Technology is to provide students with the opportunity to design, construct and complete a canoe made of concrete. This unconventional challenge motivates the team to come up with creative solutions to a seemingly impossible task - making a boat of concrete float. This organization allows the members to gain invaluable experience with every step of the design process from conceptual design to a finished product. Through the spirit of intercollegiate competition, this project hopes to foster leadership, teamwork and project management skills.

VISION

Establish Missouri University of Science & Technology as one of the top contenders of the ASCE Concrete Canoe Competition and provide our team members with experiential learning.

PURPOSE

- Promote technological advancement
- Expand on team members' knowledge of classroom concepts
- Familiarize team members with product development, marketing, and project management insight
- Provide skills that will prepare members for leadership roles in the industry

GOALS

- Qualify for the nationals competition and place in the top five of all categories at regional competitions
- Build connections with industry leaders and professors
- Provide members with the technical knowledge and interpersonal skills necessary for success post-graduation
- Increase member participation and recruitment through greater presence at department and campus events

PREVIOUS RESULTS

*2020 competitions were cancelled as a result of the COVID-19 Pandemic. No results were released for 2021.

- **2022**—1st Final Product Prototype
- **2020**—1st Final Product Prototype, Spirit of the Competition Award
- **2018**—2nd Women's Sprints, 3rd Overall Races
- **2017**—1st Men's & Women's Sprints, 1st Overall Races, 2nd Technical Presentation, 2nd Co-Ed Sprints, 2nd Women's Endurance
- **2015**—1st Men's & Women's Sprints, 3rd Final Product Prototype
- **2012**—3rd Technical Presentation
- **2010**—Spirit of the Competition Award
- **2005**—3rd Overall
- **2004**—3rd Overall
- **2003**—2nd Overall Regional, 2nd Project Proposal, 3rd Final Product Prototype, 2nd Co-Ed Sprints, 2nd Faculty Race, 3rd Men's & Women's Races
- **1985**—3rd Overall Regional
- **1984**—3rd Overall Regional



OUR COMPETITION

The Concrete Canoe Competition is an annual competition held by the American Society of Civil Engineers (ASCE). It provides students the opportunity to gain hands-on experience in concrete mix design, mold & hull design, and project management. The competition consists of both regional and national finals. Competing schools are assigned to regions where they compete against other area schools. To qualify for national finals, a school must place first overall in their regional competition.

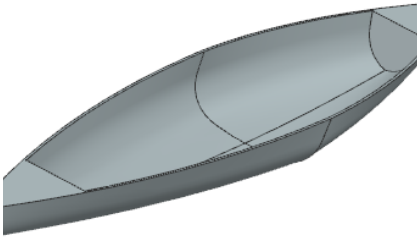
Scoring consists of four technical categories: project proposal, technical presentation, final product prototype, and overall (combination of previously listed categories plus performance in races). Races include men's, women's, and co-ed sprints; men's & women's slalom; men's & women's endurance; and faculty races. In the event of inclement weather, awards are based solely on the technical categories.

The Concrete Canoe Competition is set up as if teams are a business promoting their canoe as a prototype. The rules document is sent as a Request for Proposals (RFP). This RFP gives specifications on the physical shape of the canoe as well as for the mix design. The hull length must be at most 22 feet with the floatation in the bulkheads shorter than three feet. Industry standards for material testing, ASTMs, must be complied with when designing and testing mixes. All processes are outlined in a project proposal and presented at competition.

Our 2024 regional competition will be hosted by Missouri University of Science & Technology in Rolla, Missouri, and the 2024 national finals will be hosted by Brigham Young University.



DESIGN PROCESS



We begin the fall semester by deciding what the general shape of our canoe will be, whether it be symmetrical like a typical canoe, or asymmetrical, as we have done the past few years. The Hull Subteam then begins working on designing the canoe using a 3D modeling software called Siemens NX.

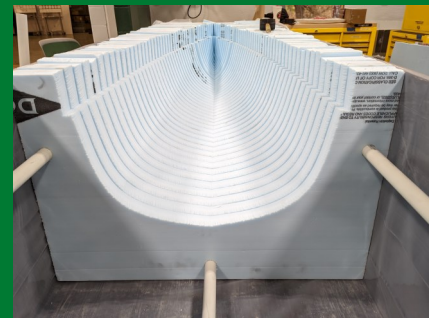
The Mix Subteam starts early in the semester. They begin with a base mix using the materials from the previous year. Gradually throughout the semester, the Mix Lead changes different factors within the mix design to further optimize the density, strength, and workability of the concrete. We mix up to four different concrete mixes each week, and make cylinders with that concrete. We use a Tinius Olsen machine to test the compressive strength of these cylinders at both 7 days and 28 days from mixing. By the end of the fall semester, we will have created a mix that is light, strong, and yet still workable enough to mold a canoe out of.



CONSTRUCTION

In the latter half of the fall semester, the Hull Subteam spends their time constructing the mold for the canoe. They convert the 3D model into roughly 130 slices that can be projected onto foam and then cut out with a water jet. This method of cutting saves countless hours of cutting by hand. After the slices are cut out, they are compressed together with PVC pipes inside to help them stay in line. The foam is sanded, covered in drywall putty, sanded again, and then lined with silver HVAC tape to provide a smooth surface to place concrete on.

The first weekend after returning from winter break, the team meets for placement day. This is an entire day of mixing and placing concrete. The team begins by placing $\frac{1}{4}$ " of concrete on the mold. We add a layer of fiberglass mesh as reinforcement, which you can think of as rebar in normal concrete structures. Another $\frac{1}{4}$ " of concrete is placed on top of the mesh. We cut out sections of foam to act as flotation in the bulkheads, place those in, and cover them with more concrete. We let the canoe cure for 28 days filled with water. Once demolded, we use a patch coat of concrete to fill in any cracks or imperfections. After that, we use a thin, more runny, concrete mix to act as our decorative coat. Once all decorations are added, we coat the canoe in a clear sealant, and miraculously, we have a concrete canoe ready for competition.



TEAM OFFICERS

2023-2024



CAPTAIN

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PR CHAIR

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SPONSORSHIPS

We greatly appreciate your interest in sponsoring our team. Your support will allow us to continue to compete in regional and national events. We use donations towards travel expenses, mix and hull materials, member recruitment, and more.

Benefits	Green Level (\$250-\$499)	Silver Level (\$500-\$749)	Gold Level (\$750-\$1499)	Platinum Level (>\$1500)
Thank you gift	✓	✓	✓	✓
Logo and name on our competition shirts		✓	✓	✓
Social media post acknowledging your company's generosity			✓	✓
Personal invite to a team general body meeting to talk about company				✓

OUTREACH PROGRAMS

MEMBER INVOLVEMENT

Mini Canoe Program

The Mini Canoe Program is our team's method of training new members on our processes in a fun and stress-free way. "Canoewbies" are assigned groups led by an experienced team member. The groups then decide on a theme, name, and shape of their mini canoes, after which they can start the construction process. Teams learn to cut and tape molds, place concrete, and place decorative coats through this program. After all teams have completed their canoes, they present their projects to a panel of judges.



Campus & Community Programs

Our team loves to interact with the public, whether that be the campus population or the Rolla community. The team regularly has booths at socials & networking events held by the Student Design & Experiential Learning Center and the Civil, Architectural, and Environmental Engineering department. Additionally, the team recruits new members at club fairs, semester orientations, and prospective student tours & events. The team also presents at outreach events such as alumni banquets and Miner Mingle.



MISSOURI S&T CONCRETE CANOE DESIGN TEAM

If you would like to get involved with the team, please contact canoe@mst.edu.

Get Connected!

Instagram: [@sandtcanoeteam](https://www.instagram.com/sandtcanoeteam)

Facebook: Missouri S&T Concrete Canoe Design Team

Website: concretecanoe.mst.edu.