



Take Two

STORY AND PHOTOS BY GEOFF WEISENBERGER

The University of California, Berkeley wins its second National Student Steel Bridge Competition in a row.

THE LAST TIME I attended the National Student Steel Bridge Competition, back in 2009, it was in sunny Las Vegas.

This year's competition, organized by AISC and the American Society of Civil Engineers (ASCE) took place at the University of Washington in sunny Seattle. Yes, you heard me correctly. Despite the Emerald City's gray reputation (it averages more than 220 cloudy days per year though less annual rainfall

than AISC's hometown of Chicago), the weather couldn't have been more perfect for the 22nd annual competition, which challenges college engineering students with building the best bridge they can in the shortest amount of time.

And for the second year in a row—and the third time since 2008—the University of California, Berkeley team came out on top as the overall winner, buoyed by their first-place finishes in two out of the six categories (lightness and efficiency).

“There are two main reasons that led to this team's success,” said Marios Panagiotou, assistant professor of structural engineering in UC Berkeley's Civil and Environmental Engineering (CEE) department and faculty advisor for the team. “First, the continuous transfer of knowledge and experience from team members of previous years to new team members, and second, these new members were motivated by the fact that *staying* in first place is possibly even tougher than coming in first.”

The other four categories—stiffness, economy, construction speed and display—were won by New Jersey Institute of Technology, Massachusetts Institute of Technology (MIT), University of California–Davis (UCD) and Milwaukee School of Engineering, respectively. MIT and UCD rounded out the top three over-



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- ◀ The University of Washington team in action (UW was the host school for this year's competition).
- ▶ The national competition featured 49 bridge teams.

all winners in a national competition of 49 teams, which were picked from 18 regional competitions across the country; schools from Canada and Puerto Rico also made it to the national competition.

"We were happy to host the NSSBC and were very pleased with the way it all turned out," said Jeffrey W. Berman, associate professor with UW's Department of Civil and Environmental Engineering and the UW team's faculty advisor. "The weather even gave us opportunity to show off our beautiful campus. The bridges were all very well done and fierce competition made for an excellent overall event."

Campus Visit

The NSSBC turns out to be a great way to tour a college. On the Friday of the competition, AISC digital content editor Victoria Cservenyak and I made our way all the way across the UW campus to a vast parking lot near the athletic facilities, where students were going through practice runs. This is their final dress rehearsal before the construction competition the next day—a chance to go through the motions in real time, make tweaks and potentially shave seconds off their build time (the fastest team this year, UCD, put their bridge together in just over four minutes, and build times went as high as 25-plus minutes). The various teams marked the asphalt to represent the boundaries of the actual competition, which involves building a bridge over a virtual river; the builders must stay on dry land, including a cofferdam in the middle of the river. The University of Maryland team, perhaps as extra motivation, labeled their practice river as "lava."

From the practice area we made our way to the Husky Union Building, where John Parucki, head judge for the competition for nearly two decades, went over the rules with various judges, including a hands-on demonstration with an actual competition bridge. He also provided plenty of advice, especially useful to first-time judges, and stressed the importance of safety and the need to avoid "coaching" the students in any way.

"Don't talk to them, don't even give them a sad look," he urged. "You do that and they're going to wonder what's wrong with their bridge. As much as your heart bleeds for



- ▲ The winning team, the University of California, Berkeley.
- ▼ AISC director of education, Nancy Gavlin, surveying bridges at UW's Red Square during the display portion.





- ▲ Judges used the board test on each bridge to make sure there were no elements protruding from the top of the deck.
- ◀ UC Berkeley, huddling up before the competition.

these students, you cannot help them. Only talk to the captains, but do not give advice.”

A strict adherence to the rules, Parucki added, is not only fair but also helps prepare students for the trials and tribulations of real-life work—and it doesn’t take away from the fun.

Following the meeting the judges made their way to UW’s Red Square, a plaza where all of the teams set up their bridges for the display portion of the competition, and rated the bridges on their visual appeal. Some were painted while some were not, some featured intricate etchings or decoration while others went for a minimalist aesthetic. But of course, all bridges have to stay within certain parameters, which are modified slightly every year. This year’s entries all had to feature a cantilever on one end and no above-deck elements.

Next came a portion of the competition that, while not factored into the overall score, was fun to watch: the first annual team tug-of-war. Taking place in a wooded area in the middle of campus, but seemingly far from civilization, the tug-of-war, like the NSSBC as a whole, put to rest any silly stereotypes of engineering students being mild-mannered, introverted or not particularly athletic. Give them a rope and an opponent, and they put (or rather pull) just as much effort into it as they do their bridge-building. Luckily no injuries were sustained in the raucous competition aside, perhaps, from bruised egos.

(Not Much) Time to Build

The next morning, Saturday, the campus was relatively calm and quiet as I traversed it. Not so in UW’s basketball arena, Hec Edmundson Pavilion, which lies in the shadow of the recently renovated steel-supported Husky Stadium (home of UW’s football team). It was abuzz with activity as the timed construction competition was in full swing. Simply put, the fastest assembly time scores the highest, with penalty time assessed for violations such as dropping bolts or stepping in the water.

While it’s typical for a team to bring 10 or more students to the competition, most teams only used five or six at most for the timed construction. In fact, as economy is a factor, several teams (including UC Berkeley) used only three students to build their bridges: one to transport the steel members, tools, temporary pier and bolts from the materials staging area, and two to assemble the bridge. Every year, students find creative new ways to transport and hold the bolts, and this year was no different, with one team using Chick-Fil-A French fry cartons and another relying on metal trays held to the bridge structure via magnets; one team’s runner even used a dust pan to put his bolts into plastic cups—multiple solutions to the same problem, just like in real-life construction projects.

Also just like the real world, delays can occur. For example, three of the five vertical load test stations—where students apply 2,500 lb of weight to their bridges and judges measure deflec-



- ▲ The University of Texas-El Paso team practices in a campus parking lot.
- ▶ MIT, which came in second place overall, in action.
- ▼ The lateral stiffness test.



tion—went down at the same time, which created a bit of a bottleneck; they were eventually up and running again, which allayed some judges' worries that the competition would go all night and turn the awards dinner into an awards breakfast.

Besides being judged on time, economics and vertical stiffness, bridges were also assessed in terms of weight and lateral stiffness (weight and the stiffness tests factor into the efficiency category). While the vertical loading test includes a certain element of anxiety—namely that the bridge will collapse—that weight is added gradually. With the lateral test, the weight (50 lb) is added all at once. Attached to the bridge via a cable and lowered via a pulley (this is done twice, once for the back span and once for the cantilever), there's a tense moment as the team member releases the weight, hoping the bridge doesn't sway more than ½ in. (which would result in it not passing the test). The weight test is less stressful: Put the supports on four scales, have the judge take the reading, then take the bridge out of the competition area—and stop thinking about building bridges for a while (the weight test is the last one).

Later that night, back at the Husky Union Building, the awards banquet saw the students in more formal attire than their competition





▲ Blowing off steam during the team tug-of-war competition.

hard hats, t-shirts and jeans/pants. AISC president Roger Ferch, a UW alum himself, spoke of the best qualities of the competition: instilling the concept of teamwork in the competitors as well as having engineering students actually building something with their bare hands. Key-note speaker Jon Magnusson, senior principal of Seattle structural engineering firm Magnusson Klemencic Associates, spoke about innovation in structural engineering, discussing several steel-framed Seattle-area

MKA projects as examples. And then the winners were announced for each category—again, with UC Berkeley taking top honors. And no doubt contemplating a three-peat. **MSC**

Next year's competition will take place at the University of Akron. You can view/link to the full results of this year's national and regional conference competitions, as well as the competition rules, at www.aisc.org/steelbridge.