



# NUTS & BOLTS



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**SPECIAL POINTS OF INTEREST:**

- **Steel Bridge:**  
The New Generation
- **Concrete Canoe** is aiming high with multi-faceted advancements
- **Seismic Outreach** is better than ever!
- **Wise words from Faculty Advisor Professor Michael Todd**

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## Presidential Address

It is my distinct honor to serve as the President of the Society of Civil and Structural Engineers for the 2008-2009 year. This is my fourth year of involvement in SCSE, and I must say that year after year, the growth of this organization is astounding. Within this issue of Nuts and Bolts, you will find examples of how we are finding more ways to fulfill our mission to supplement the engineering education of our members and improve our community.

Competition is perhaps the backbone of SCSE, and with the ASCE regional conference in Hawaii this year, there has been significant pressure put on our steel bridge and concrete canoe teams, as well as our conference organizers. So far, we have risen to the challenge. The concrete canoe has just been poured on what was the most ambitious timeline ever attempted by our chapter, due to the necessity of shipping the canoe to Hawaii. Our steel bridge team is also making great strides, and is on track to meeting a similarly demanding schedule. Finally, there are over 50 students signed up and ready to participate in Hawaii, a great achievement considering the logistical challenges we face. Our Seismic Design team, after taking first place in last year's national competition hosted by EERI, looks to repeat their success this year.

The 3<sup>rd</sup> Annual Seismic Outreach program has already been held this year, as

the 500 sixth graders from the nearby Del Mar Union School District participated in the highly successful project in the fall. In an effort to expand our outreach efforts and further reach out to our community, we are in the planning stages for a second event which we hope to hold this spring.

Much of our success in any activity depends on having an active membership. We have sought to develop that by organizing more events and more effectively publicizing them. Our website is newly redesigned and consistently updated. There have been more social events than ever, including a ping-pong tournament, faculty mixer, finals week breakfast, and several games of fugitive. In addition to hosting guest speakers from industry at our general body meetings three times a quarter, we have already scheduled six tours so far this year to give our members a closer look at engineering practice. There is also a mentor-mentee program and an EIT study group to help underclassmen take advantage of the experience of the upperclassmen. With the additions of the new freshman and sophomore representative positions, focused solely on encouraging participation from those classes, the leadership of SCSE should be secure for the foreseeable future.

SCSE had success this year unimaginable not so long ago. Participation is at record levels for all of our activities and we look forward to sustaining our growth as we continue our mission to promote the development of our members. I invite you to join us in this exciting time for SCSE.



Left: SCSE President: Colin Haynes



Above: 2008 Pacific Southwest Regional Conference Team

**-Colin Haynes-President of SCSE**

# Steel Bridge... Steel Strong



**Top: 2007-2008's successful Steel Bridge Team lead by Jeremiah Niez**

**Right: Student welder at work**



**"Never before has the steel bridge team had so many members be involved with the fabrication of the bridge"**

This year UC San Diego SCSE steel bridge team has exceeded its expectations under the guidance of Captain Jimmy Chung and Co-captains Armando Romo, Jeremiah Niez, and Mick Wasco. The steel bridge team has a record number of members working on the overall project ranging from 30 to 40 undergraduate students. Jimmy and his Co-

captains have developed a system that allows students working on the bridge to be more involved with all aspects of the project, while preparing them with leadership skills that will allow them to lead the steel bridge team in years to come.

"Illest II" is the name of this year steel bridge. The creation of the Illest II has been a long process. It began fall quarter and it is scheduled to be completed mid February.

The design process was based on choosing between several top-ranked SAP models created by different sub-teams. The ranking was based on deflection, weight and economics. In addition, tensile testing was done to gain knowledge of the properties of the selected material. The design was further developed using Solidworks, where students were able to use their creativity and engineering intuition to create steel members and functional connections for the overall design of the bridge.

A major highlight for this year's team has been the fabrication process. Never before has the steel bridge team had so many members be involved with the fabrication of the bridge. Students have been trained to take on different sections of the fabrication process—every member of the team is either primarily a miller, lather, welder or steel cutter/driller. In the end, the entire bridge is going to be completely manufactured by the students of the steel bridge



**Left: New generation students mastering manufacturing techniques**

team. In the process, the team is gaining experience about what designing and fabricating will be like in the real world. It also allows students to learn from their mistakes and later be able to easily design and fabricate something that still holds its structural integrity.

Overall, steel bridge provides engineering students with a great experience that helps to develop skills learned in the classroom by applying concepts to a real project. It not only offers students an academically enriching experience but also works on building teamwork and communication skills among students.

**-Geovani Mendez**  
Member of Steel Bridge

**Right: Hooke, "Master of the seven seas," was SCSE's 2007-2008 concrete canoe**



# Concrete Canoe: Making Waves

One of the most challenging student design competitions is known as

the National Concrete Canoe Competition, put on each year by ASCE. The competition is to design, construct, and race a canoe made of special lightweight concrete against other schools in the Pacific Southwest Regional Conference. The

project involves acquiring a theme, developing a design paper and oral presentation, and producing a final product which is light enough and strong enough to take on the rigors of the competition.

This year, SCSE's team is directed by a dedi-



**Left: This years new technique: a female mold**

cated group of 9 people: 8 Team Leaders and 1 Project Manager. The concrete canoe team pushed the envelope with several advancements in its design. A new construction method employed a female mold for the first time, and 2 molds were created this year. Also, the team designed two distinct concrete mixes. One concrete mix is a white, high strength, aesthetic outer layer. The second mix has

a low density and medium strength, designed for the middle layer of the canoe. Additionally, the team produced white concrete for the first time, enhancing the color and texture of the canoe and allowing for the aesthetics team to stain an eloquent design based on the theme. This year's boat, named "The Dow Jones" is expected to have its ups and downs, but the team has learned that the key to success is dedication, persistence, and teamwork.

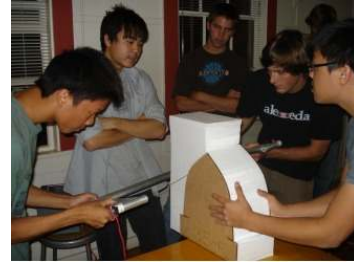
Pour Day was scheduled on the 17<sup>th</sup> of January, several weeks earlier than ever before. Race Day, the day upon which the paddlers will be se-

lected, is fast approaching. Once the canoe cures, the aesthetics team will begin the finishing touches and the canoe will be ready for Conference. The advances made by the canoe team this year should make "The Dow Jones" very competitive this year, and the entire team is looking forward to competing this April.

**-Mark Galvan**  
Concrete Canoe Project Manager



**Left: The concrete mix design team's development of a light weight, high strength concrete**



**Top: Construction team trying to perfect the cutting techniques**



**Left: There is nothing better than friendly wiffleball game at the end of a hard day's work**

This fall, SCSE invited the sixth graders of the Del Mar School District to participate in the 3<sup>rd</sup> annual Seismic Outreach project. Nearly 500 students participated in a competition that involved K'NEX™ toys and student creativity. The purpose of the project is to introduce structural engineering to young students as well as show them what life is like on a college campus.

The project began with volunteers from UCSD undergraduates visiting six schools in the Del Mar School District prepared with a presentation on earthquake phenomena, structural engineering, and the K'NEX competition logistics. This year, the presentation took place October 6<sup>th</sup>-16<sup>th</sup>. The students then worked in groups of four during the following five

## Seismic Outreach: Shaking it up

weeks to create a skyscraper that would hypothetically be built in downtown San Diego. Each group also had to create structural drawings, an architectural rendering of their building, and calculate the Performance Index.

Several weeks later, the students brought the documents and buildings to UCSD, where their buildings were earthquake tested on a mini shake table. Furthermore, they were interviewed and quizzed on their knowledge as well as taken on a campus tour. However, the event most exciting (according to the students) was the wiffleball games that both volunteers and sixth graders participated.

In just its third year, the project has been a tremendous success, teaching the fundamentals of earthquake engineering to 2,000 students so far. Over 50 UCSD undergraduate students (mostly structural engineering

majors) volunteered to help out in the project as presenters, tour guides, judges, and interviewers. Many teachers, who in previous years participated in the project, say it is the most exciting event the sixth graders encounter. Due to the success of the program, the Outreach Director Jim McKechnie, Outreach Assistant Director Eliza Alcantara and SCSE President Colin Haynes are hoping to expand the program to other schools in other districts around San Diego. Certainly, all of the SCSE volunteers are excited to continue the Seismic Outreach project and continue to give back to our community.

*"teaching the fundamentals of earthquake engineering to 2,000 students so far"*

**Jim McKechnie**- Outreach Coordinator



**Top: At the end of the day rewards are given to the best design skyscraper**

# Structural Engineering: Get Involved in the ‘Renaissance’ Engineering Field!



**Professor Michael Todd**

Welcome to another year in Structural Engineering and SCSE! As we shake off the relative calm of the holidays and dive back in to the winter quarter, we are immediately confronted (and some might say overwhelmed, but I think in general we’d rather be busy than bored!) with the many impending events that SCSE so actively participates in, such as “SE Day” and the various competitions that comprise Regional Conference. It is this time of year when it becomes so clear to me how participation and the incredible “pride of ownership” that SE students take in our pre-professional organization really make it among the most—if not *the* most—active and personally-relevant student organizations at UCSD.

For those that may not yet see this energy and importance, now is the time to get involved. Everybody—from first-year students to transfer students to seasoned seniors—benefits from involvement in SCSE. Whether it’s mentoring, professional social networking, team-building, enrichment learning, or competing, SCSE has a place for absolutely everyone. I can honestly say that were it not for a similar organization at my university when I was an undergraduate (way back in the late ‘80s Dark Ages!), I would not have had the opportunities or experiences I have had today. In fact, even my first job after graduate school (at the US Naval Research Laboratory) was almost completely obtained by the kinds of professional networking opportunities that organizations like SCSE provide.

Just what is this great career that SCSE is such an excellent gateway for? I think it is completely appropriate to muse briefly on what structural engineering is and its important role in our society. Certainly one need not look any further than the 2007 tragic collapse of the I-35 bridge in Minneapolis, MN, as a dramatic example of the importance of structural engineering. What we as

structural engineers do directly affects the life safety and economic welfare of society: when many of the kinds of structures we design, analyze, and build for safe lifetime performance fail, people can die. Not only that, but severe economic consequences can result: the loss of a primary component in the transportation network of Minneapolis has affected a number of industries, as commuters won’t get to work and commerce won’t be completed efficiently for a long time (loss of productivity, loss of revenue, transportation cost increases, etc.).

And this importance extends well beyond bridges. Certainly one part of structural engineering is the design of such things as the civil infrastructure (bridges, buildings, dams, and so forth), but structural engineers inevitably have their hand in just about everything that we come into contact with on a daily basis. A structural engineer was involved in building the very laptop computer with which I am typing these words right now, both in designing the casing to be shock-proof as well as working with mechanical engineers to make the microchip arrays inside withstand the various thermal and mechanical stresses they experience. Structural engineers contributed to designing and analyzing the cars in which we drove to school (and the roads upon which we drove), the chairs on which we sit in class, the pens with which we use to take notes, and aircraft in which we fly for holidays. Structural engineers enable technology development to augment performance for many of these and myriad other structures, too. Clearly “structures” are everywhere, at whatever length scale we can imagine! How many other kinds of engineers can claim such pervasive influence on society? Structural engineers may very well be today’s “Renaissance Engineers.” Quite simply put, structural engineering *matters*. And SCSE is a great enabler for our structural engineering careers, regardless of how we choose to use it. All of us should be proud that we have chosen such an important role in the world, even as we accept the awesome responsibility that comes with that choice.

**-Michael Todd**  
UCSD Associate Professor and SCSE advisor

## WHO ARE WE?

**President:**  
Colin Haynes

**Vice Presidents**  
*-Programming:*  
Jennie Lee

*-Finance:*  
Christina Thung

*-Conference Internal:*  
Jessica Green

*-Conference External:*  
Brittany Rumley

**Executive Assistant**  
Jose Aceituno

**Publicist**  
Henry Chan

**Fundraising Coordinator**  
Lonnie Chang

**Outreach Director**  
Jim McKechnie

**Assistant Outreach Director**  
Eliza Alcantara

**Social Events Chair**  
Scott Ouellette

**TESC Rep**  
Michael Germeraad

**Sophomore Rep**  
Sabina Piras

**Freshman Rep**  
Marvin Monterrosa