THE ROLE OF EERI SEISMIC DESIGN COMPETITION IN IMPARTING TECHNICAL COMPETENCE AND PROFESSIONAL EXPOSURE IN THE UNDERGRADUATE CIVIL ENGINEERING CURRICULUM

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Earthquake engineering at the undergraduate level: outcomes and goals

At the undergraduate level, the study of earthquake engineering may be limited to the knowledge and understanding of the earthquake mechanism and the territory's seismicity, seismic response of buildings, underlying criteria for earthquake resistant design and new systems for seismic protection of buildings.

The EERI Seismic Design Competition (SDC) provides an opportunity for undergraduate students to gain and accumulate knowledge and skills pertinent to

the evaluation of seismic response of structures *with simple configurations and structural systems* such as moment resistant frames and shear walls at the least.

The competition deals with undergraduate teams designing and constructing a multi storey balsa wood building frame structure (scale 1/72),

- which will be tested on a shake table during the event;
- SDC also requires the teams to offer response predictions in terms of roof accelerations and drifts together with anticipated failure modes.

The SDC Project gives to students the opportunity to acquire the outcomes for Earthquake Engineering at high level of cognitive achievement asked by the international standards of accreditations for the "First cycle" graduates conforming EUR-ACE* respectively bachelor's degree conforming the BOK** .

The outcomes acquired are: Experiment, Design, Project management, Communications, Globalization, Leadership and Teamwork.

* European Accreditation of Engineering Programs (EUR-ACE) (2008), EUR-ACE Framework standards for the accreditation of engineering programs, http://www.enaee.eu/the-eur-ace-system/eur-ace-framework-standards/

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THE EERI SEISMIC DESIGN COMPETITION (SDC)

- The Objectives
- The Competition History
- The Structure

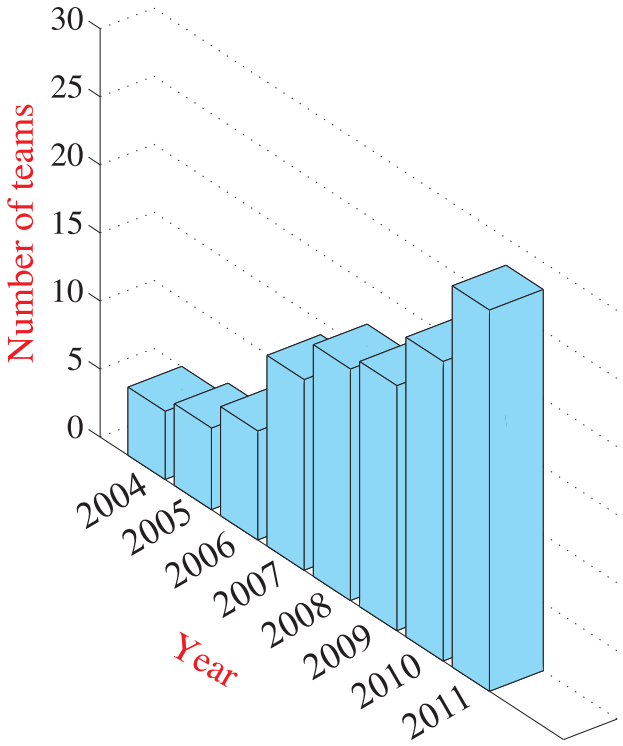
The objectives :

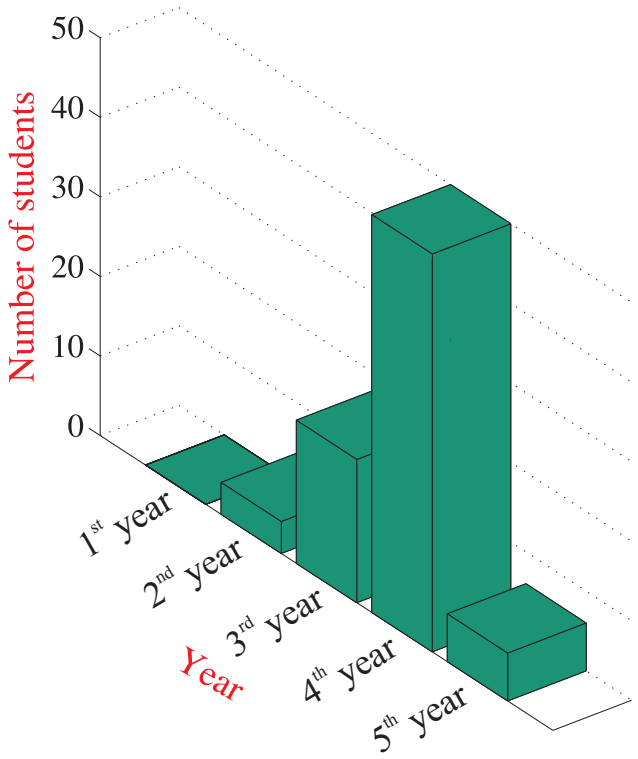
To promote the study of earthquake engineering amongst undergraduate civil engineering students,

To provide an opportunity to work on a hands-on project by designing and constructing a cost-effective building frame structure to resist earthquake excitations,

To build the awareness of the versatile activities at Earthquake Engineering Research Institute (EERI) among the civil engineering students and faculty as well as the general public and to encourage national and international participation in these activities.

The competition history





Demography of the participants in the SDC

The Structure

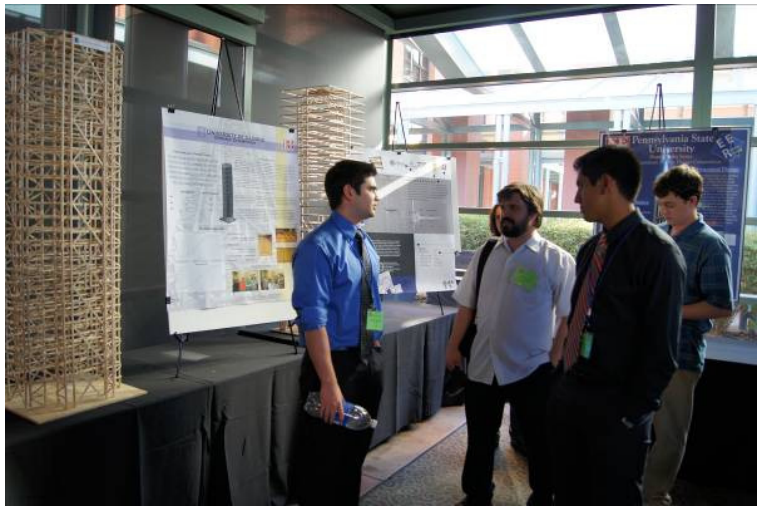
-the short presentations about various aspects of their design, analysis predictions and unique aspects of their as-built structure including innovativeness;

-poster presentations highlighting the significant contributions and important aspects of the structures constructed including details about the flow of forces, anticipated performance;

-estimates cost and revenue generated in terms of rentable space;

-the testing of the structures to typically 2 or 3 ground motions, modified to push the structure to significant non-linear limits.


Creating the Design


Pennsylvania State University

The rank is based on their total score in the competition which is based on different components:

- oral and poster presentation,
- architectural design,
- seismic performance of the structure on the shake table,
- construction cost, and the annual revenue of the building .

SDC's role in promoting technical competence and professional exposure

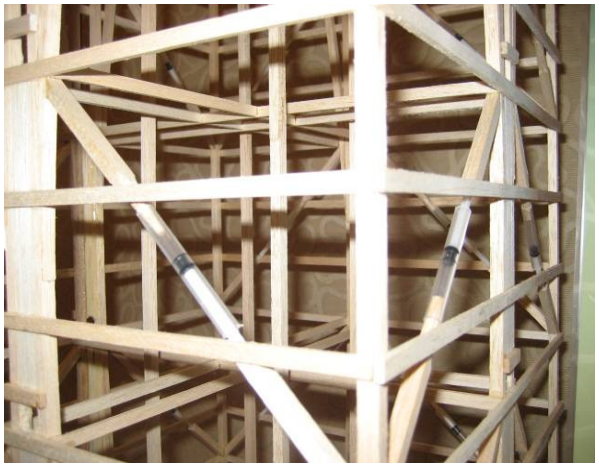
The competition encourages the students to think about structural actions in terms of flow of forces and performance of the entire structure at the global and local member levels.

The foremost of all the objectives in terms of technical competence is the exposure to the concept of structural dynamics and earthquake engineering which routinely tends to be a part of the graduate curriculum.

SDC takes a leap by introducing participating students with the idea of ground motions, and response spectrum.

Finally, though not the least preferred, a lot of emphasis is placed on coming up with designs that are architecturally pleasing.

SDC takes yet another step by encouraging the teams to come up with innovative damping systems.



a.

b.

c.

a) A syringe viscous damper - Oregon State University, SDC 2009, Salt Lake City, Utah;

b) Metallic friction damper, Technical University of Cluj-Napoca, Romania, SDC 2011, San Diego, California;

c) Friction damper, University of California Davis, SDC 2010, San Francisco, California.

CONCLUSIONS

The ultimate goal of an engineering program is to impart broad education and knowledge of contemporary issues necessary to understand the impact of civil engineering solutions in a global, societal, and environmental context.

With tremendous boom in infrastructure around the world, it is extremely important that the current undergraduates who will shape the world in the future have the right mix of technical background and professional backing to design with minimal risk.

Events such as the EERI Seismic Design Competition (SDC) provide the right platform by imparting these objectives at the right juncture (moment) in the civil engineering undergraduate program by integrating a wide array of disciplines.