The Department of Structural Engineering (SE) at the University of California, San Diego is known world-wide for quality teaching programs and its leadership in innovative experimental research. Programs cover earthquake engineering, blast loading and mitigation strategies, health monitoring and condition assessment, as well as composite materials and light-weight structural systems, hydrodynamics and fluid-structure interaction, reliability and risk engineering, renewal engineering, and civil structural design.

In the next academic year, new faculty members are joining us to continue the department’s vision of providing our students with a state-of-the-art education based on cutting-edge research trends. By equipping our graduates with sought-after skills and experience, they stand poised to thrive in the competitive and increasingly international work force.

The Department of Structural Engineering graduated seventy-one students this past June. Currently, there are 433 undergraduates and ninety-one graduate students enrolled in our program. For the names of our recent Ph.D. and M.S. students in 2005-2006, please see page 2.
Greetings, and welcome to the first issue of Structural Engineering News, which we plan to publish twice annually. It is my pleasure to greet our students, alumni, and supporters.

Summer finds us with commencement ceremonies completed, a peaceful campus, and a time to catch up. Inside this issue you will read about the department’s impressive research (including the remarkable results from a 7-story building seismic test and the Blast Simulator testing), recent student and faculty accomplishments, news from our alumni, and the new building for Structural and Materials Engineering.

We also celebrate the 20th Anniversary of the Charles Lee Powell Laboratories with the continuation of our cutting-edge technology, innovative research, and the growing student interest in both our undergraduate and graduate degree programs.

I hope you enjoy reading the accomplishments and news within these pages, and I welcome your comments and suggestions.

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M.S. and Ph.D. Degrees (2005-2006) (Continued from cover story)

Rebecca Atadero, Ph.D., “Development of Load and Resistance Factor Design for FRP Strengthening of Reinforced Concrete Structures,” Professor Vistasp Karbhari, advisor.

Lijuan Cheng, Ph.D., “Development of a Steel-Free-Concrete Slab-on-Girder Modular Bridge System,” Professor Vistasp Karbhari, advisor.

Jason Delaney, M.S., “The Assessment of Aspects Related to Defect Critically in CFRP Strengthened Concrete Flexural Members,” Professor Vistasp Karbhari, advisor.


Michael Gebman, Ph.D. “Axial Force Transfer Mechanisms with Cast-in-Steel-Shell Files,” Professor Scott Ashford, advisor.

Kumar Ghosh, Ph.D. “Assessment of FRP Composite Strengthened Reinforced Concrete Bridge Structures at the Component and Systems Level Through Progressive Damage and Non-Destructive Evaluation (NDE),” Professor Vistasp Karbhari.

Hong Guan, Ph.D. “Vibration Based Structural Health Monitoring of Highway Bridges,” Professor Vistasp Karbhari, advisor.

John Harris, Ph.D., “A Direct Displacement-Based Design of Low-Rise Seismic Steel Moment Frames,” Professor Chia-Ming Uang, advisor.

Christopher Krier, M.S., “Testing of Full-Scale Precast Prestressed Pile to Deck Connections,” Professor José Restrepo, advisor.

Liangcai He, Ph.D., “Parallel Finite Element Modeling of Earthquake Ground Response and Liquefaction,” Professor Ahmed Elgamal, advisor.

Chung-Sheng Lee, Ph.D., “Analysis of DFRP-Jacketed RC Columns Subject to Combined Axial and Lateral (Blast-Type Loads),” Professor Gilbert Hegemier, advisor.


Travis Sanders, MS., “Full-Scale Load Testing of San-Jacks,” Professor Scott Ashford, advisor.


Yuyi Zhang, Ph.D., “Probabilistic Structural Seismic Assessment Methodology and Application to a Bridge-Foundation-Ground System,” Professor Joel Conte, advisor.
Remarkable Results from 7-Story Building Seismic Test

In 2005, a 7-story testing structure was built atop the world’s only outdoor shake table, located at the Englekirk Structural Engineering Center (the largest U.S. facility of its kind, located just eight miles from the UCSD campus). The 275-ton, 65-foot-tall building was constructed by Highrise Concrete Systems, Inc. of Dallas, Texas, and was used in many tests before being dismantled recently to allow for new experiments at the Englekirk Center. In each test, the building was subjected to ground motions that mimicked historic California earthquakes. Researchers hoped to discover how new mid-rise concrete apartments, condominiums and hotels can be built to withstand powerful earthquakes with less steel reinforcement than what is currently required by state building codes.

“What we found is fairly simple; if we use an intelligent design strategy that reduces the demands required by the current California building standards and use about half the reinforcing steel that’s required, mid-rise buildings will survive powerful earthquakes with only minor damage,” stated SE professor, José Restrepo and co-principal investigator of the project. In an interview featured on the CBS Evening News in January, 2006, Jacobs School of Engineering Dean Frieder Seible commented, “In earthquakes, stronger is not always better...this particular test we’re doing here shows that current building code provisions are not necessarily safe.”

“The structural engineering community wants to develop regional design procedures that allow for the development of more suitable buildings in Southern California,” added Robert Englekirk, co-principal investigator, SE adjunct professor, and namesake for the Englekirk Center.

Full-scale testing of such large buildings had previously not been possible because of weight, height, and technical limitations. UCSD’s shake table can actually support a building roughly 10 times heavier than the one currently being tested. Maintenance of the shake table is funded by the George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES), http://nees.ucsd.edu.

4th World Conference on Structural Control and Monitoring Held at UCSD

The U.S. Panel on Structural Control Research in collaboration with the International Association of Structural Control and Monitoring (IASCM) and several scientific organizations in the United States, Asia, and Europe, recently held its Fourth World Conference on Structural Control and Monitoring (4WCSCM) in the Price Center Ballrooms on the UCSD campus in July. This international event involved over 320 participants, with many from Europe and Asia. The 4WCSCM was organized jointly by UCSD and USC under the auspices of IASCM. Dr. Gianmario Benzoni, Structural Engineering Researcher (pictured, left), was the UCSD conference coordinator.

The conference objective was to bring together engineers, scientists, architects, builders, and others interested in the general field of active or hybrid vibration control and structural health monitoring of buildings and civil infrastructure systems. The conference focused on topics related to building structures, including adaptive structures, intelligent/smart materials and systems, sensor networks, health monitoring and damage detection, actuators, vibration isolation, and hybrid vibration control of civil infrastructure components under the action of earthquakes, wind, and man-made loads. The next world conference of IASCM will be held in 2010 in Tokyo, Japan.
Innovative Blast Simulation Testing Continues at the Englekirk Structural Engineering Center

SE’s Explosive Loading Laboratory Test Program, funded by the Technical Support Working Group (TSWG) at the Englekirk Structural Engineering Center, is the first program in the world to develop a hydraulic based blast simulator to simulate full scale, live explosive events up to 3000 psi-msec without the use of explosive materials and without a fireball. Energy deposition, which takes place in time intervals of 2 to 4 ms, is accomplished via an array of ultra-fast, computer controlled hydraulic actuators with a combined hydraulic/high pressure nitrogen energy source. The blast simulator has been validated through the comparison with live explosive field test data. Computational blast physics models and codes are being improved and validated using blast simulator and field test data.

In an interview, SE professor and principal investigator, Gil Hegemier, commented, “With this [equipment], we can actually run tests very consistently that provide high-quality data [and] allows us to really understand the phenomenology and what’s happening with the specimens.”

Current testing includes the generation of high fidelity data on the response and failure processes associated with critical infrastructure components subject to explosive loads, the evolution of effective blast hardening/protective methodologies for existing and new structures, and standardizing test protocols for product validation. The simulator is performing fully repeatable blast load simulations on structural elements such as columns, beams, girders, and walls; on nonstructural elements such as windows, masonry walls, and curtain walls; and on bridge components such as decks, piers, and towers.

Los Alamos National Laboratory-UCSD’s Graduate Training Program Taught via “Distance Learning”

In 2003, Jacobs School of Engineering and the Los Alamos National Laboratory (LANL) in New Mexico developed the country’s first graduate training and research program in Structural Health Monitoring, Damage Prognosis and Validated Simulations. With courses taught so far by SE Professors Michael Todd, Francesco Lanza di Scalea, John Kosmatka, Gil Hegemier, Enrique Luco, William Hodgkiss (Scripps Institute of Oceanography), and by Drs. Charles Farrar (LANL, also SE Adjunct Faculty) and François Hemez (LANL), this program is delivered using “distance learning” in real-time and two-way communications. Professors and students are able to teach and learn directly without any discernable delay, simulating a “live” classroom environment.

To date, nineteen courses have been broadcast via “distance learning” while even more students have been taught in traditional settings at UCSD. In spring 2006, David Mascarenas became the first to graduate from the program with a Masters of Science degree.

In addition to the specialized multi-disciplinary curricula, several fellowships are associated with eight specific research projects, including UAV Damage Prognosis and Reliability, Structural Joint Integrity Monitoring and Assessment, and Remote Joint Inspection.

Above: (Top) Professor Charles Farrar teaching via distance learning to students (below) at LANL.
Student Chapter in Top 10 at National Competition

The 2006 American Society of Civil Engineers (ASCE) National Student Steel Bridge Competition was held in May in Salt Lake City, Utah. UCSD’s Steel Bridge team was comprised of nineteen undergraduate students, captained by SE student, Roy San Diego, advised by professor Chia-Ming Uang, competing against forty-three student chapters.

The competition involved designing, fabricating, and constructing a 22 foot-long bridge that met strict design and safety criteria and could quickly be assembled during the competition. The UCSD team has been participating in the steel bridge competition for just four years, and is one of the only teams to take a fresh approach by redesigning their bridge each year. “[Our Structural Engineering] faculty are famous for bridge design, and I think we benefited from our training in structural analysis and advanced computer tools.” says Oliver Asis, a volunteer for the steel bridge design team and conference coordinator for the UCSD team. The unique twist and snap-in-place connections that the students created were critical, allowing them to assemble their entire truss bridge in 6 minutes and 38 seconds during the competition. Their entry placed top 10 in all six categories, won 7th place overall, and was the highest ranked bridge for the western region.

UCSD Students in International Unmanned Aircraft Competition

In their first year of competition, UCSD students placed fifth out of eighteen universities at the for Unmanned Vehicle Systems International (AUVSI) 4th Annual Association Unmanned Aircraft Competition, at the Pax River Naval Base in Maryland. The UCSD team was composed of undergraduate students from several departments within UCSD’s Irwin and Joan Jacobs School of Engineering, including Structural, Mechanical & Aeronautical, and Electrical & Computer Engineering. John Kosmatka, SE professor and advisor of the American Institute of Aeronautics and Astronautics Chapter (AIAA) commented, “This is by far the best performance of a first-year team. The [UCSD team] was one of the few teams to get bonus points for being able to reprogram the autopilot during flight. They have big plans [for next year] to improve the cameras and target recognition software.” David Klein, SE student and AUVSI project manager, wishes it known that the team is looking for more sponsors and mentors for next year’s competition. Contact SE professor John Kosmatka at jkosmatka@ucsd.edu for more information.

COSMOS 2006

The California State Summer School for Mathematics and Science (COSMOS), held in July at UCSD, consists of lectures, computer exercises, hands-on laboratory experiments, videos, final projects, and field trips. COSMOS exposes talented and motivated high-school students to mathematics and science to encourage them to continue their education in science and engineering. Benson Shing, SE professor, Andreas Stavridis, graduate research assistant, and Bridget Smith, seismologist at the Scripps Institute of Oceanography, ran the four-week course, “Earthquakes in Action,” with seventeen COSMOS participants.
Faculty Honors

Our Academic Senate announced the selection of SE professor Joel Conte for UCSD’s most prestigious teaching honor, the Distinguished Teaching Award, for 2006. Additionally, Professor Conte recently received the Senior Fulbright Research Scholarship for 2006-2007. SE Professors José Restrepo and Frieder Seible were both named recipients of the American Concrete Institute’s “Chester Paul Siess Award for Excellence in Structural Research.” Additionally, Professor Restrepo was selected as engineering keynote speaker for the First European Conference on Earthquake Engineering and Seismology, being held in September, 2006 in Geneva, Switzerland. SE professor Michael Todd was recently named the “Structural Health Monitoring Person of the Year” by the editors of Structural Health Monitoring: An International Journal. Professor Todd is co-Director of the UCSD-Los Alamos Engineering Institute, and has initiated a new multi-disciplinary graduate degree program (see story on page 4). The research and work of SE Professor Vistasp Karbhari, Kumar Ghosh (former SE graduate student of Professor Karbhari), and others, entitled “Monitoring the Disbond of Externally Bonded CFRP Composite Strips for Rehabilitation of Bridges,” was selected as “Best Paper” for The European Workshop on Structural Health Monitoring held recently in Granada, Spain.

Student Awards

Philip Yu, 2005-2006 Student Chapter President of the Society of Civil and Structural Engineers (SCSE), was recognized for his “Outstanding Student Leadership” with a certificate and a check for $1,000, to be used for academic purposes. The check was a joint gift from Dean Frieder Seible and the Department of Structural Engineering. Pictured above is Professor Chia-Ming Uang (chapter advisor), with Philip Yu, and Professor Ahmed Elgamal (department chair).

Faculty Promotions

Our congratulations to Dr. Scott Ashford on his promotion from Associate Professor to Professor, and to Dr. Michael Todd who was promoted from Assistant Professor to Associate Professor.

Staff Additions

Lisa Bodecker comes to Structural Engineering, with 20 years at UCSD, from the Department of Electrical and Computing Engineering (ECE), as SE’s Academic Personnel Specialist and the Chair’s Assistant.

The Englekirk Structural Engineering Center has had many new additions recently. We welcome Andrea High as Administrative Assistant II in Site Operations and Dan Radulescu as NEES Site Operations Manager to the SE department.

Giving Back . . .

Interested in supporting the Department of Structural Engineering with a tax-deductible gift? UCSD has a new on-line giving website—

www-er.ucsd.edu/givetoucs/step2.asp

Be sure to select “Jacobs School” and then “Structural Engineering” to correctly route your gift.

Thank you...to Amy Liu, Class of 1995 (AMES) and to Chao-Chin Fan, Class of 2000, for their recent gifts to SE’s Academic Enrichment fund.
2005  Lijuan "Dawn" Cheng  
PH.D. STRUCTURAL ENGINEERING  
Cheng is currently an assistant professor in the area of structural engineering and structural mechanics in the Dept. of Civil and Environmental Engineering at UC Davis (“Go Ags!”).

2005  Ezequiel Montanez  
B.S. STRUCTURAL ENGINEERING  
Montanez is a Jr. Structural Engineer with the Metropolitan Water District of Southern California, working with the Pipeline & Facilities group assisting with substructure reviews. At press time, Montanez and his wife were expecting the birth of their second child in July, 2006.

2005  Luke Lee  
PH.D. STRUCTURAL ENGINEERING  
Lee is assistant professor of civil engineering at Louisiana Tech University in Ruston, Louisiana. Luke and his wife, Theresa, had a daughter, Elinor, in February, 2006.

2005  Andrea Martinez  
B.S. STRUCTURAL ENGINEERING  
Martinez is employed by DeBerry Engineering. She writes, “I have a job that I love…I work designing residential buildings.”

2004  Ryan Harrell  
B.S. STRUCTURAL ENGINEERING  
Harrell is the Regional Manager for the Southern CA office of Fibrwrap Construction, a turnkey company for concrete restorations/strengthening and seismic rehabilitation. “I now oversee all projects in Southern California, Nevada, and Arizona, from the initial development, design, contracting, construction and conclusion.”

2004  Eric Kelley, P.E.  
B.S., M.S. STRUCTURAL ENGINEERING  
“Since leaving UCSD, I’ve worked as a bridge design engineer in California, Oregon and Washington. Currently, our team is beginning the design of a new bascule [moveable] bridge, in the Seattle/Tacoma area.” Kelley is employed at Parsons Brinckerhoff, Inc.

2003  Christopher Stearns, P.E.  
M.S. STRUCTURAL ENGINEERING  
Stearns designs high-rise buildings for MKA of Seattle, Washington, and continues to make frequent visits to San Diego.

2002  Joshua T. Hewes, P.E.  
B.S., M.S., PH.D. STRUCTURAL ENGINEERING  
“I worked as a bridge engineer in California for David Evans and Associates for a few years before coming to Northern Arizona University [in August, 2005]. I’m an assistant professor in the Civil & Environmental Engineering Department, and teach the Structures courses.”

2002  Cole C. McDaniel  
B.S., M.S., PH.D. STRUCTURAL ENGINEERING  
McDaniel recently became an Assistant Professor in the Architectural Engineering Department at CalPoly San Luis Obispo, after spending three years as an Assistant Professor at Washington State University.

2001  María D. Martinez-Rodrigo  
M.S. STRUCTURAL ENGINEERING  
Martinez-Rodrigo is back in Spain, where she serves as an associate professor in the Mechanical Engineering and Construction Department of Universitat Jaume I. She is finishing her Ph.D. thesis which deals with the reduction of resonant vibrations in high speed railway bridges by means of passive energy dissipation devices.

2000  Jorge A. Rivera  
B.S., M.S. STRUCTURAL ENGINEERING  
Rivera has been employed at Nabih Yousses & Associates in Los Angeles as a Structural Designer for six years. Rivera is currently on a “rat-race break…going on a second year at the Rose School in Pavia, Italy for a Ph.D. in Earthquake Engineering.”

1995  Jason Ingham  
PH.D. STRUCTURAL ENGINEERING  
“I completed my Ph.D. under Nigel Priestley. I am now an associate professor in Structural Engineering at the University of Auckland in New Zealand.”

What’s New With You? SE alumni, we want to hear from you! Please send us updates on your professional activities and personal achievements. Your information may be included in an upcoming newsletter. Submit your information online, including address changes, at jacobsschool.ucsd.edu/alumni/update_form.html

New Building for Structural Engineering

Office and laboratory space is currently being designed and planned for a new UCSD “Structural and Materials Engineering” building, pictured below with a proposed future wing. The 110,000 sq. ft. facility will be shared between Structural Engineering (50,000 sq. ft.), Materials Engineering (40,000 sq. ft.), with studio and exhibition space for the Department of Visual Arts (20,000 sq. ft.). Construction is expected to commence in March, 2008 and be completed in November, 2010. The building site is planned for the existing location for the Office of Graduate Studies and Research.
1986–2006: Charles Lee Powell Laboratories

Grand Opening Ceremonies of the Charles Lee Powell Laboratories (CLPL), 1986: (Above; left to right) Gil Hegemier (founding & current CLPL Director), Lea Rudee (founding Dean of Jacobs School of Engineering and Professor Emeritus), Charles W. Rees, Jr. (then President of the Board of Directors, CLP Foundation), Frieder Seible (founding Department Chair, CLPL Designer, and current Dean of Jacobs School of Engineering), Ralph Richey (Daly Corporation), and Richard Atkinson (then UCSD Chancellor). In the twenty years since its inception, CLPL have grown to include thirteen distinct and specialized testing facilities, including the new Englekirk Structural Engineering Center, which opened in 2005.