

I D E a S

INQUIRY, DISCOVERY IN ENGINEERING AND SCIENCE

COLLEGE OF ENGINEERING AND SCIENCE

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From the Dean

Issues related to the declining state of America's infrastructure appear to be more complex and challenging every day, and they're a major concern to those of us in engineering and science education. The American Society of Civil Engineers' most recent report card rates the nation's infrastructure GPA as a "D." Most experts agree that the Rx for the country's infrastructure is investment, and I'm excited to report that — here at Clemson — we recognize the need and are actively involved in producing the young civil engineers who will be addressing the issues.

For the first time, *IDEaS* is dedicated to a single department — the recently named Glenn Department of Civil Engineering. Gerald Glenn is a 1964 Clemson alumnus who is very familiar with America's infrastructure needs. He spent more than four decades leading engineering projects around the globe, and he has now turned his attention to a new, even more demanding task: building the next generation of engineers for the greater challenges that lie ahead. In

this issue, we'll share what makes the department special, and what our partnership with Gerald means for the future.

Even before the Glenn gift, the civil engineering department had made "sustainable and resilient infrastructure" a future research and educational focus. Last year, a three-year National Science Foundation award allowed us to establish

a new degree program to support 14 master's students who are studying and conducting research on sustainability issues such as aging roads and bridges, water supplies and power grids.

Through the years, we've been committed to providing real-world experiences where students can test their knowledge and skills. Beyond practicums, co-ops and internships, Clemson also offers a unique program called Creative Inquiry (CI), which encourages undergraduate research. On page 6, you can learn more about CI and how one of these teams was recognized with the S.C. Commission on Higher Education's Service-Learning Award.



Among the features, you'll also find stories about how dedicated faculty have been striving to improve leadership and instruction within the department. One story is about a mentoring program that brings young and more established faculty together to inspire collaborative research and teaching. Another story features the efforts of Clemson Alumni Distinguished Professor Emeritus Jack McCormac to write textbooks that ease the difficulty students may experience with understanding complex engineering principles.

We hope you enjoy the features in this issue of *IDEaS*, and we welcome your comments.

Sincerely,

R. Larry Dooley, Acting Dean*
College of Engineering and Science
Clemson University

*Dean Esin Gulari is on medical leave, so acting dean, R. Larry Dooley, is writing the "From the Dean" letter for this issue.

Continuing to Build on the Future

By Tom Hallman

Gerald Glenn committed the lion's share of his life to building things.

As an executive with international engineering firms like Chicago Bridge & Iron Company B.V. and Fluor Corp., Glenn devoted his career to creating and developing new manufacturing, energy and environmental infrastructure.

With a track record of more than four decades in leading engineering projects around the globe, he has now turned his attention to a new, even more demanding task: building the next generation of engineers for the greater challenges that lie ahead.

"Whatever the future may hold, it's certain the coming decades will require unparalleled talent and expertise in engineering and construction across the spectrum – from energy and transportation to housing and manufacturing," Glenn said in announcing a \$5 million gift to Clemson's civil engineering department. "We're honored to be able to participate in the development of the next generation of engineers."

The unrestricted gift from Gerald and Candice W. Glenn is one of the largest gifts from an alumnus in Clemson's Will to Lead capital campaign to raise \$600 million to support students and faculty with scholarships, professorships, facilities, technology and enhanced opportunities for learning and research. The gift also provides for the first named department in the campaign: the Glenn Department of Civil Engineering.

"We're proud to have the Glenn name associated with Clemson," says University President James F. Barker. "Not only professionally, but also personally, Gerald and Candi are exceptional role models for our civil engineering students."

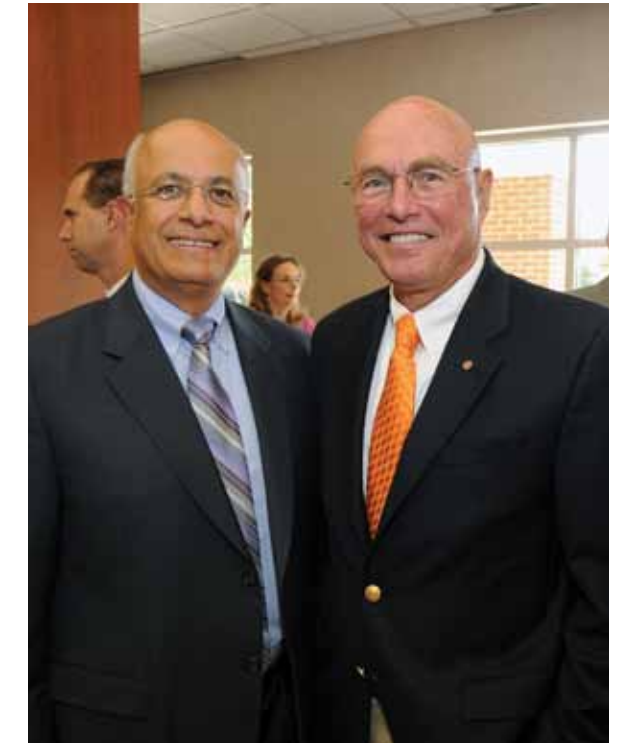
The department from which Glenn graduated not only bears his name, but also bears his mark. "The gift will create scholarships and fellowships, support collaborative learning workspaces and seminars, attract and retain top

faculty, and develop a program that will help civil engineering students gain a global perspective," says Nadim Aziz, chairman of the department.

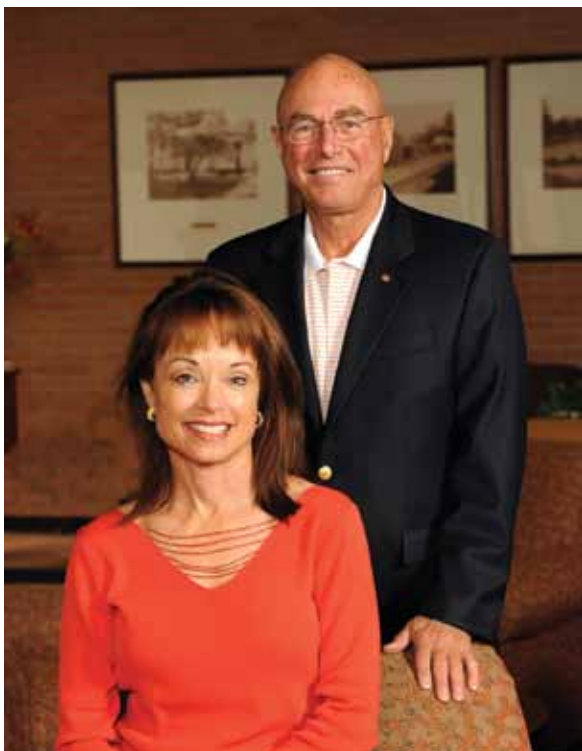
"This will help us mold the future leaders of civil engineering," Aziz says. "As we face more pressing problems with our infrastructure, our graduates will need the broad education that will make them the problem solvers of the future. This gift will help us create the environment necessary for students, faculty, government and industry partners to come together to discuss ideas for solutions to our failing infrastructure."

Even before the Glenn gift, the department had made "sustainable and resilient infrastructure" a research and educational focus for its future. A \$700,000 NSF grant last year allowed for 14 master's students over the next three years to enter a new program involving interdisciplinary course work and internships with external partners, helping them focus on broader issues involving the nation's infrastructure problems – from aging roads and bridges to water supplies and power grids.

A 1964 Clemson alumnus, Glenn is no stranger to America's infrastructure needs. He served as chairman, president and CEO of the Chicago Bridge & Iron Company B.V. – a multinational engineering, procurement and construction company that posted more than \$3.6 billion in revenue in 2010. Previously, he was a director of Fluor Corp. and a group president of Fluor Daniel Inc., its primary subsidiary. He has served as director of the Gas Technology



Nadim Aziz and
Gerald Glenn



Gerald and
Candi Glenn

Institute and a member of the Mid-America Committee, the 25-Year Club of the Petroleum Industry plus a number of other professional organizations.

From the vantage point of his own career, Glenn sees the wisdom – and the necessity – of Clemson’s approach. The Glenns and the civil engineering department share a common goal: to prepare a generation of engineers who could shepherd the nation’s infrastructure throughout its life – from the planning stages through

design, construction, operation, maintenance and rehabilitation.

“It’s critical that Clemson builds on its strengths in engineering and science to meet the needs of our economy and our nation. Our experience in sustainable and resilient infrastructure is a key,” Glenn says.

“Clemson is in a unique position to prepare our engineering students for a role of leading a cooperative setting with construction, manufacturing, materials, environment and management in the coming decades,” he says. “We’re proud to contribute to Clemson’s continuing support of civil engineering, advancing it to reach its rightful leadership position.”

For the Glenns, the gift is another step in lifelong philanthropic contributions.

“Gerald and Candi are a credit to the communities they serve, including Clemson,” Barker says. “Their professional achievements are outstanding, but their gifts of time and resources to so many important causes show their vision for the future and commitment to helping others.”

The Glenns have been active contributors to the College of Engineering and Science Leadership Circle and other projects, including

The Glenns and the civil engineering department share a common goal: to prepare a generation of engineers who could shepherd the nation’s infrastructure throughout its life — from the planning stages through design, construction, operation, maintenance and rehabilitation.

the Fluor Daniel Engineering Innovation Center. In the coming year, Gerald will serve on the President’s Advisory Board at Clemson. He also serves as vice chairman of The John Cooper School and is a board member for both the Montgomery County Women’s Center and St. Luke’s Hospital.

Candice is an attorney and a graduate of the University of California-Irvine and Southwestern Law School. She served as chairman of the board and was instrumental in rebuilding the Cynthia Woods Mitchell Pavilion, a 16,000-seat outdoor amphitheater north of Houston, after it was severely damaged by Hurricane Ike in 2008. She was recently recognized as a “Hometown Hero” in *The Woodlands*.

The Glenns have chaired the Heart Ball fundraiser in both Chicago and The Woodlands, and Gerald chaired the metropolitan Chicago board of directors of the American Heart Association.

The Glenns live in The Woodlands, Texas, and they have two sons. Mike is an engineering student at Clemson, and Charlie is a sophomore at The John Cooper School. Gerald’s daughter, Gina, is director of operations for *Homes & Land* magazine.

“As a father, I often think about what the future may hold for my children and for their children. What will our world be like in 20 or 30 years?” Glenn says. “Engineering will remain a vital field in that future, and a critical task for engineering and construction companies will be to ensure that we have sufficient human resources – especially engineers and skilled craftsmen – to design and build the facilities that will be required.” *

By Charreau Bell

Putting It to The Test



Clemson's goal of creating engineers and scientists ready to engage in real-world challenges has led to an educational experience peppered with learning opportunities that are, indeed, unique. In fact, beyond the usual internships and co-op experiences, civil engineering students frequently take advantage of chances to see how what they've learned in the classroom affects the rest of the world.

Immersed in a departmental culture of faculty achievement based on cross-disciplinary partnerships and mentoring, civil engineering students are extending this tradition of excellence through competition, service and academic achievement. Student organizations provide opportunities for polishing professional development.

The American Society of Civil Engineers (ASCE) Steel Bridge Team competes annually in a unique arena. "Winning this competition means designing and fabricating bridge components that are as light as possible but can also sustain a 2,500-pound load," says Scott Schiff, faculty adviser. He continues, "For some teams, that means hiring someone else

to fabricate their bridges, but our students build it themselves." Among other criteria, the bridges are judged on their appearance, ability to bear loads, the speed at which they can be constructed and cost effectiveness. Clemson's Steel Bridge Team holds a national championship title, and out of 15 consecutive appearances at the National Student Steel Bridge Competition, they have achieved eight top-20 finishes. The annual competitions are held on campuses around the country, and in 2012, the National Steel Bridge Competition will be hosted at Clemson University.

The Clemson University Concrete Canoe team is also of championship caliber, having brought home a national title three times from the ASCE competition. The team has made appearances at the national level for 17 of the last 18 years, and over the last seven years, the team has won the regional championship six times. Team adviser and assistant professor of civil engineering Brad Putman says, "This competition provides firsthand experience in handling challenges that are encountered in real-world civil engineering projects." He continues, "Overcoming them requires technical skill, teamwork and creativity."



Left to right: Clemson's chapter of Engineers for Developing Countries visited Haiti; the concrete canoe team competes regionally and nationally; graduate student Jennifer Johnson won an NSF Graduate Research Fellowship to pursue her Ph.D.; students go on service projects as part of Clemson's chapter of the Institute of Transportation Engineers.

Students must design, construct and race a concrete canoe, which requires research and consultation with experts, fabrication in the civil engineering department facilities, and testing and training with the concrete canoe on Hartwell Lake. There is also a critical presentation component that can mean the difference in being a first-place team or a team that "also-ran."

The civil engineering department also houses a number of organizations with specialized topics within the framework of the discipline, including transportation and structural engineering. The student chapter of the Institute of Transportation Engineers participates in a number of transportation engineering projects and has several regional and national accolades, including five Best Student Chapter awards and five consecutive Southern District Traffic Bowl Championship titles. "This competition tests students on their knowledge of transportation engineering and planning; it's been a great testament for the quality of the program at Clemson," observes chapter faculty adviser and associate professor of civil engineering Wayne Sarasua. The competition requires students to correctly answer transportation engineering questions in a "Jeopardy"-like setting. The prize is the championship title and a \$3,000 scholarship.

Clemson's civil engineering students' competitive spirit is as strong as their commitment to service activities.

Clemson Engineers for Developing Countries (CEDC)

was dedicated to developing a plan for a water treatment and distribution facility for rural parts of Haiti even before the earthquake in 2009. "We had ideas for a new community fountain and created a master plan to present to decision-makers for the new water pump design," says Jeff Plumblee, a civil engineering graduate student and CEDC president. The group is actively engaged in design, logistics, training and fundraising for the project. Faculty adviser and civil engineering professor Lance Bell states, "It's a significant challenge to help the residents get something as essential as water. Their situation is urgent, so we work decisively and effectively to meet those needs." For the merit of their project as well as planning and implementing the design, the group won one of the highest state awards by the S.C. Commission on Higher Education — the Service Learning Project of the Year Award.

The Structural Engineers Association of Clemson University (SEA-CU), a division of ASCE, was founded in 2008 by a group of students and professors dedicated to structural engineering. Membership in this group carries a community service component. Michael Grayson, SEA-CU president and NSF Graduate Research Fellow, states, "The main purpose of SEA is to stimulate interest in the discipline of structural engineering. The greatest benefit comes through exposure to real-world experience through presentations from prominent and experienced professionals working in the field."

In addition to hosting these technical seminars, members also spend time introducing K-12 students to the basics of structural dynamics. SEA challenges them to construct buildings with pasta and gumdrops to determine how they fare in an "earthquake," simulated on Clemson's shake table. In addition, the group works with Habitat for Humanity to provide the roof trusses on Clemson's annual Habitat house, constructed on Bowman Field during the week of homecoming.

Civil engineering students are also distinguished for their academic achievements. Three of the eight 2011 NSF Graduate Research Fellowship recipients at Clemson University are students in civil engineering. Jennifer Johnson received one of those fellowships, and she's now pursuing her Ph.D. in civil engineering at her alma mater. She was recently named one of five laureates of Tau Beta Pi, the world's largest engineering society, and, for her dedication to increasing the number of professional women in academia, she won the Thea McCrary Student Award for Outstanding Service by the Clemson University President's Commission on the Status of Women. She is also the inaugural recipient of the college-wide Hambricht Leadership award.

In total, the department has five NSF Graduate Research Fellows, three U.S. Department of Transportation Eisenhower Fellows and six privately funded graduate fellowships.

"Our purpose is to mold the future leaders of civil engineering," says department head Nadim Aziz. "The level of excellence demonstrated by these students individually and in team competitions sets the standard for achievement nationally. Our students are determined to be on the cutting edge of the profession, and their experience in the Glenn Department of Civil Engineering helps temper the steel of their knowledge and ability." *

Building Bridges

In May, the field of dreams will hold visions of steel as Clemson University hosts the 2012 ASCE/AISC National Student Steel Bridge Competition. The conference will be held May 24 – 26 and is the second national civil engineering competition that Clemson has hosted. The event includes a number of technical presentations and workshops, business meetings, competitions, social gatherings and an awards banquet.

Sponsored by the American Society of Civil Engineers (ASCE) and the American Institute of Steel Construction (AISC), the competition tests students on their knowledge of structural engineering by requiring them to design, fabricate and construct a steel bridge.

The steel bridge competition originated in 1987 from the college relations division of AISC as a local competition to determine which student bridge design — made from balsa wood at that time — was the best. Since then, the competition has evolved, and the bridges are fabricated from structural steel by students at their home college institution or under strict student direction by a commercial fabricator.

"This event challenges students to face real-world structural design issues," explains Scott Schiff, Clemson civil engineering professor and event coordinator. "A winning design must meet a host of spatial, strength, fabrication, construction and cost criteria."

Bridges are judged based on *lightness* — the weight of the bridge, *stiffness* — the bridge's ability to resist sagging under a heavy load, *structural efficiency* — a dollar amount corresponding to the lightness and deflection qualities of the bridge, *construction speed* — the total time required for builders to erect the bridge during the competition, *construction economy* — a dollar amount reflecting the construction speed and additional materials required, and *display* — the aesthetic qualities and identifying features of the bridge. The overall winners have the lowest scores in construction economy and structural efficiency.

To compete at the national level, teams must place in the top positions of their regional competitions. The rules of the competition are varied each year, and success in the competition requires effective teamwork and time management to meet the required criteria.





Bridging the Gap

Albert Einstein observed, “Problems cannot be solved by the same level of thinking that created them.” Which leads to the question – how does one go about changing his or her level of thinking? One way to conquer seemingly insurmountable problems is through collaboration across disciplines and areas of expertise.

Nadim Aziz, chair of the newly named Glenn Department of Civil Engineering, is building a successful department through his philosophy of collaboration and cooperation. Historically, Clemson’s civil engineering department was grouped into six traditional areas of civil engineering: applied fluid mechanics, construction engineering and management, construction materials, geotechnical engineering, structural engineering and transportation engineering.

Aziz realized that there would be distinct advantages in de-emphasizing compartmentalization and emphasizing collaboration. “At the time, there were very few faculty members crossing disciplinary boundaries,” he observes. “I challenged them to discover ways to align the department with national priorities by forming interdisciplinary teams.”

Using a mentoring strategy that pairs young faculty with productive, established professors is one step in creating a “collaborative culture.”

One tool Aziz used to establish this “collaborative culture” was a mentoring strategy that pairs young faculty with productive, established professors. This approach was an extension of his own mentoring philosophy.

“As the chair of the department, I believe it’s my responsibility to do all I can to provide guidance and counsel to junior faculty,” states Aziz.

The actual guidance provided by senior faculty varies from one member to another and can focus on both teaching and research. Aziz has provided direction on teacher effectiveness, research proposals, journal publications, professional society leadership and time management.

Partnerships between Aziz and his young faculty attract highly competitive national research funding, and he recognizes that encouraging mentoring across the department leads to broader opportunities for success.

Two of these pairings have been particularly productive. Sez Atamturktur, a young female faculty member, was teamed with Hsein Juang, who has an international reputation in geotechnical engineering. Juang is a prodigious scholar, having published more than 120 technical articles in professional journals.

“Just after I became a mentee of professor Juang, I asked him for his curriculum vitae,” explains Atamturktur. “When I made a hard copy, I thought there was something wrong with the printer, it ran so many pages! His record of scholarship truly is amazing, but what I find inspiring is his grace and approachability.” Juang’s example of access and affability is one she admires and tries to emulate.

Juang’s work in geotechnical engineering meshes well with Atamturktur’s focus on structural engineering.

“My association with Sez is more than a mentoring relationship,” observes Juang. “We’re colleagues, and in fact, we’ve jointly submitted a number of funding proposals. We both bring a different perspective to our proposals, and by incorporating both views, our joint submission is stronger than what we might have been able to accomplish as individuals.”

Juang and Atamturktur have co-advised an M.S. student and a Ph.D. student – both of whom graduated last winter. They have also co-authored several journal papers with their students.

A second mentoring partnership brought together associate professor Mashrur (Ronnie) Chowdhury and junior faculty member Leidy Klotz. Chowdhury has received more than \$3 million in sponsored research

Left page: Ronnie Chowdhury and Leidy Klotz

By Ron Grant

A tradition of success

Founded in 1852, the American Society of Civil Engineers (ASCE) represents more than 140,000 members of the civil engineering profession worldwide and is America's oldest national engineering society. The status of Fellow is attained by professional accomplishments. Fellows are practitioners, educators, mentors — and most of all — leaders. They have distinguished careers that have contributed significantly to the civil engineering profession.

This prestigious distinction is held by less than 5 percent of ASCE members, while 18 percent of Clemson's civil engineering faculty members hold the honor.

Lansford C. Bell, Ph.D., P.E. Professor of Civil Engineering

Areas of Interest:

Construction management
Materials management
Information technology
Contracting strategies
Construction manpower and cost forecasting
Leadership skills in construction project management

Education:

B.S., Civil Engineering, University of Maryland
M.S., Civil Engineering, University of Maryland
Ph.D., Civil Engineering, Vanderbilt University

Membership:

Fellow, ASCE

Professional Registration:

P.E. in S.C. and Ala.

Abdul A. Khan, Ph.D., P.E. Associate Professor of Civil Engineering

Areas of Interest:

Computational hydrodynamics
Environmental fluid mechanics
Sediment transport
Hydraulics and hydrology

Education:

B.S., Civil Engineering, University of Engineering and Technology
M.S., Civil Engineering, University of Alberta
Ph.D., Civil Engineering, University of Alberta

Membership:

Fellow, ASCE
Member, International Association of Hydro-Environmental Research

Professional Registration:

P.E. in S.C.

Professional Activities:

Editor, *Journal of Experimental and Applied Mechanics*
Member, ASCE Computational Hydraulics Committee

Charng Hsein Juang, Ph.D., P.E. Professor of Civil Engineering

Areas of Interest:

Uncertainty modeling and reliability design in geotechnical engineering
Liquefaction
Braced excavations
Risk assessment and management

Education:

B.S., Civil Engineering, National Cheng Kung University
M.S., Civil Engineering, National Cheng Kung University
Ph.D., Civil Engineering, Purdue University

Membership:

Fellow, ASCE

Professional Registration:

P.E. in S.C.

Professional Activities:

Associate Editor, *Journal of Geotechnical and Geoenvironmental Engineering*

Member of Editorial Boards, *Engineering Geology, Georisk and GeoEngineering*
Chairman, ASCE Geo Institute Technical Committee on Risk Assessment and Management

Mashrur (Ronnie) Chowdhury, Ph.D., P.E. Associate Professor of Civil Engineering Eugene Douglas Mays Professor of Transportation

Areas of Interest:

Intelligent transportation systems
Surface transportation safety and security infrastructure
Traffic engineering
Multiobjective decision making
Fault-tree analysis

Education:

B.S., Civil Engineering, Bangladesh Institute of Technology, 1988
M.S., Transportation, Morgan State University, 1991
Ph.D., Civil Engineering, University of Virginia, 1995

Membership:

Fellow, ASCE

Professional Registration:

P.E. in Ohio

Professional Activities:

Associate Editor, *IEEE Transactions on Intelligent Transportation Systems*
Editorial Advisory Board Member, *Journal of ITS*
Editorial Advisory Board Member, *Journal of Transportation Security*

funding from the NSF, the Departments of Transportation in Ohio and South Carolina, and the U.S. Department of Transportation Centers. Chowdhury is an associate editor of the *IEEE Transaction on Intelligent Transportation Systems (ITS)* and the *Journal of ITS*.

Klotz is a recent recipient of an NSF CAREER grant. The CAREER program supports junior faculty who exemplify the role of teacher-scholars through outstanding research, excellent education and their integration within the context of the mission of their organizations. In his study, Klotz plans to investigate designers' decision-making practices for net-zero energy buildings — a topic that addresses a major national push toward a sustainable energy future.

"I was so proud of Leidy when he won his NSF CAREER award," says Chowdhury. "I had the opportunity to offer a few recommendations on the proposal, so I felt very much a part of the process. When he won, I jokingly told him that now I could list an NSF CAREER award on my resume."

"Ronnie has helped make my transition to a faculty position an enjoyable one," says Klotz. "Of course, he covered the professional bases — offering advice and guidance on my teaching and research, but beyond that, I am particularly grateful for his recommendations about maintaining a work/life balance. This is an area that can cause problems for new faculty members. Ronnie is an excellent example of being an incredibly productive faculty member and an even better father and husband."

In the fall of 2009, Aziz undertook a very special mentoring project. He brought together a team of junior and senior faculty members to compete for a very prestigious NSF funding program.

Solid teamwork resulted in the proposal being funded. The grant provides resources to develop a science master's program (SMP) in sustainable and resilient infrastructure. The SMP team includes 10 faculty members: six from civil engineering and single representatives from architecture, physics, environmental engineering and earth sciences, and management. To date, 14 fellowships have been awarded to M.S. students, each including a \$15,000 stipend and \$10,500 for educational expenses.



Hsein Juang and
Sez Atamturktur

"This program gives us the opportunity to prepare a generation of engineers who will examine the nation's infrastructure throughout its life," says Ron Andrus, professor of civil engineering and principal investigator on the project.

Obviously, it is difficult to measure the impact of this NSF project on the future of the department; however, the fact that students and faculty are engaged on a topic of national importance is a significant achievement for the Glenn Department of Civil Engineering. This project and an internal refocus on the common theme of sustainable and resilient infrastructure have resulted in several faculty members from different disciplines working with several Ph.D. students to address fundamental research in the field. This has also led to the development of new undergraduate and graduate courses.

"I'm very proud of what my colleagues have accomplished," offers Aziz. "And I'm honored to be a part of this dynamic department." *

Book Smart

By Heidi Coryell Williams

Much has transpired in the world of engineering since Clemson Alumni Distinguished Professor Emeritus Jack McCormac penned his first textbook 50 years ago.

From the equipment engineers use to the way equations are computed, staying relevant has meant staying current. But of all the technologies, certifications and applications that have required updating through more than two dozen editions of textbooks authored by McCormac, one thing has stayed the same: the difficulty young students experience with understanding complex engineering principles. “Sometimes it’s a challenge for authors to determine where civil engineering students are going to have difficulty,” McCormac explains from his office on the third floor of Lowry Hall.

“When I started, I didn’t know much,” McCormac admits. “I struggled when I learned these things, and I figured other students had the same trouble understanding. I thought about that a lot when I was writing my textbooks.”

Five decades and seven textbooks later, McCormac is one of the most notable engineers in the world – not because of an ingenious invention or some awe-inspiring building design. His claim to fame is having found a unique way to help students learn the basics.

The rest, as they say, will go down in civil engineering history. When the *Engineering News-Record* named its top 125 engineers or architects in the world, McCormac’s name was listed alongside such notables as Frank Lloyd Wright, Thomas Edison, Gustave Eiffel and Henry J. Kaiser – and he was one of only two educators still living to receive the honor.

The *News-Record*, widely recognized as the definitive source of news for the construction industry worldwide, noted in its write-up about McCormac that he penned a textbook for each of the classes he taught – structural analysis, structural steel design, design of reinforced concrete and surveying. Those books, in turn, have educated and influenced untold numbers of students and civil engineers.

Now an Alumni Distinguished Professor Emeritus of Clemson University’s Glenn Department of Civil Engineering, McCormac – retired since 1989 – still spends his weekday mornings at a metal desk in a modest office he shares with another professor emeritus. Reflecting on a lifetime of work, he demurs to any suggestion that his contributions to the industry have been exceptional.

“The nicest thing anyone ever said to me about my books is that they went back and referred to them,” he says. “Former students are always nice about the books.”

Modest Beginnings

When McCormac graduated from high school at age 15 and left his hometown of Columbia to enroll at The Citadel, he never imagined that the remainder of his life would be spent almost entirely in a classroom, much less creating the texts that would usher tens of thousands of budding civil engineers through their instructive course

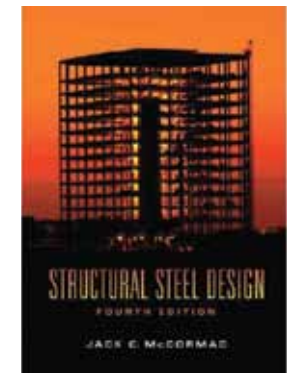
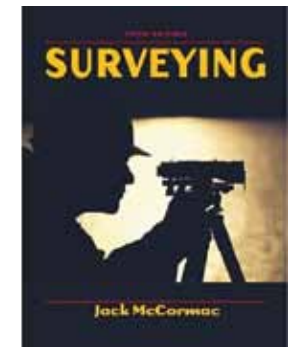
work. His first writing gig was in college, occasionally being asked to provide “filler” content for an alumni publication. He wasn’t even supposed to be writing – his official title was circulation manager, which meant he was supposed to sell the magazine, not contribute to it. “I would find historical tidbits, interesting things to write about,” McCormac recalls.

So when he started writing textbooks in 1957, during the first of two teaching stints at Clemson, he found himself returning to familiar territory. “I found ways to put interesting statements in there, historical things that would appeal to students,” he says. “Like, Napoleon got his first promotion in the military because he could read a topographical map.”

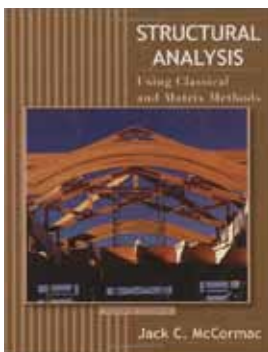
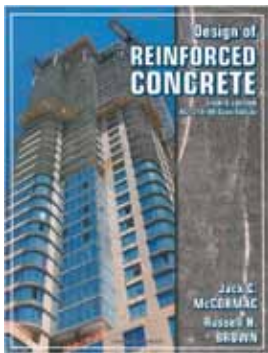
In a textbook about structural steel design, he offers memorable anecdotes about problems with temperature change and constructing lengthy bridges. For example, a famous bridge in Edinburgh, Scotland – being built in the dead of winter – was wrapped in naphtha-soaked cloth and set on fire so the steel would expand, enabling workers to line up the bolt holes. Conversely, workers on the St. Louis Bridge had to pack steel beams in ice when summer heat caused the members to expand, creating misalignment.

Students in his Clemson classes always got a “sneak peek” at the texts before they were published. Everything, from anecdotes to information and equations, was copied and handed out in his classes so he could test his writing on the people who would ultimately benefit from it. “The best textbooks are those that are used in class before they’re published,” McCormac says.

Since he proclaims himself to be an expert on exactly nothing (save staying out of his wife’s way during her lengthy antique hunts), he found himself gathering information for his textbooks in unlikely ways, as well. Asked to pen a guide on surveying early in his career, he quickly realized he had little more than a textbook understanding of the skill himself. So, he went to work for an area surveyor, using a now-antiquated brass transit



McCormac’s textbooks have educated untold numbers of students and civil engineers.



to gather measurements and collect evidence. “I had to describe how people actually went about surveying,” he explains. “Actually doing the work seemed to be the most expedient way to do it.”

The only times he was not in the classroom, as either a student or a teacher, were when he was drafted to serve in World War II, followed a few years later by a four-year stint at the E.I. DuPont Co. in Aiken. He was one of many engineers involved in the construction of the Savannah River Site.

McCormac is listed as one of the *Engineering News-Record's* top 125 engineers or architects of the world.

“I enjoyed working in the field,” McCormac recalls of his time at the nuclear facility. “But I always felt like I wasn’t working hard enough. Here, I always felt like I had something to do – maybe because I was always writing books.”

Colleague and Clemson professor Ben Sill says that the mere fact that McCormac has been able to write so many textbooks that are so successful is the best indicator of his reputation nationally and abroad. “I’m the co-author of a single text and just can’t imagine the effort required over many years to produce the number of books Jack did,” he explains.

But what many might view as extraordinary effort is, in McCormac’s view, a healthy diversion. Spend a little time talking to him, and one realizes he seldom sits still. Retired for more than two decades, McCormac is a spry 84 years old, and it seems that a common theme in his life has been simply staying busy.

Honors and Avocations

Among the more notable awards McCormac has received throughout his career include the AT&T Award for Engineering Teaching in the U.S. (1987), an Honorary Doctor of Letters degree from Clemson

University (1995), induction into the Thomas Green Clemson Academy of Engineers and Scientists (2000), the Letellier Cup for an outstanding lifetime contribution to the profession of civil engineering (2001), as well as a variety of technical and professional merit and achievement awards for contributions to construction, engineering and education.

After five decades in the textbook and teaching business, he shifted into the world of fiction writing in 2009. “It’s a lot easier to tell lies,” he chuckles. His series of fiction books, published by Ithaca Press, is titled “The Sketching Detective.” The main character, Jack MacKay, bears just a little resemblance to the author himself. MacKay is a professor of civil engineering who’s witty, collects wood shaft golf clubs and bumbles through life and various unsolved murder cases – negotiating mishap after mishap – all while trying to use the sketching skills acquired in engineering mechanics to figure out “whodunit.”

Though he has never undertaken police work as a distraction from the day-to-day, McCormac does collect wood shaft golf clubs, along with mystery books (think Hardy Boys), a habit he picked up while accompanying his wife on lengthy antiquing missions through the years.

When he’s not penning his latest work of fiction (he’s now on his fifth book in the series), he’s playing 36 holes of golf a week, taking part in tennis matches, swimming laps at the local rec center, or fishing and hiking a piece of land he owns in the nearby mountains. On the seventh day, he rests. Which means he attends early church services and walks between five to 10 miles.

As busy as McCormac still manages to stay, he’s started phasing out his work on the textbooks he spent so many years writing and revising. He’s selected five professors to take over the revision work, which they will need to continue in earnest for the books to stay current. Four of the five co-authors are from Clemson. The fifth is at The Citadel.

For over half a century, McCormac’s contributions to engineering education have forever changed the world and the way it’s held together. His words will continue to enlighten and educate for years to come. *

Civil Engineering

Nadim M. Aziz, Ph.D.

Department Chair
864-656-3002
aziz@clemson.edu
clemson.edu/ce

Fast Facts

Tenured/tenure-track faculty: 21

Enrollment:	Undergraduate	490
	Master's	75
	Doctoral	50

Degrees awarded:	Undergraduate	157
	Master's	48
	Doctoral	9

Research expenditures: \$3,327,643

Research thrusts: sustainable and resilient infrastructure

Faculty Highlights

Geotechnical Risk Assessment and Management, edited by **C. Hsein Juang**, Kok Kwang Phoon, Anand J. Puppala, Russell A. Green and Gordon A. Fenton, contains 127 peer-reviewed papers that address uncertainties in the geological environment. It covers new and continuing work on geohazard mitigation, uncertainty modeling, and risk assessment and management. Published for the proceedings of GeoRisk 2011: Geotechnical Risk Assessment and Management held last summer, the Geo-Institute-sponsored collection offers researchers and practitioners in all fields of geotechnical engineering essential information on identifying and managing risks.

Structural Steel Design by professor emeritus **Jack McCormac** and professor **Steve Csernak** was published last summer. The authors' major objective in preparing this new edition was to update the text to conform to both the *American Institute of Steel Construction (AISC) 2010 Specification for Structural Steel Buildings* and the 14th edition of the *AISC Steel Construction Manual* published in 2011. Also, changes were incorporated from the *ASCE 7-10 Minimum Design Loads for Buildings and Other Structures* published in 2010. McCormac continues to publish textbooks in structural engineering in addition to writing mystery novels (four so far). Csernak is the Glenn Department of Civil Engineering undergraduate program coordinator and teaches structural engineering courses and the capstone design course.

Rainfall: State of the Science by assistant professor of civil engineering at Clemson University **Firat Testik** and professor Mekonnen Gebremichael from the University of Connecticut addresses the critical component of the water and energy cycles – rainfall. The authors present the science of rainfall by focusing on rainfall microphysics, measurement and estimation, and statistical analysis. The book is published by the American Geophysical Union. Testik teaches and conducts research in the area of fluid mechanics.

Associate professor **Abdul A. Khan** has been elected Fellow of the ASCE. The society grants the Fellow status to fewer than 4 percent of its 125,000 members. Khan's specialty is modeling river flow and associated phenomena, including sediment transport and flows with shocks such as dam failure.

Assistant professor **Leidy Klotz** received an NSF CAREER grant to study the irrationalities of designers to support their decisions for net-zero energy buildings. The outcome will affect how energy-related decisions are made at the planning and design stages. The project will bridge engineering and behavioral sciences to advance understanding of how irrationalities influence design decisions. The project's research and education components support the civil engineering department's focus on sustainable and resilient infrastructure. Klotz is an expert on sustainability and has received research funding from the U.S. Department of Energy and the NSF. He teaches courses on sustainable construction, energy and infrastructure systems.

Student Achievements

Ph.D. student **Lee Tupper** gave a presentation on "Clemson's Integrated Intelligent Transportation Platform" at the 18th Intelligent Transportation System (ITS) World Congress. The presentation described a collaborative proposal developed by a team of 12 Clemson graduate students from five departments: civil engineering, electrical and computer engineering, automotive engineering, the business school and the School of Computing. The proposal from Clemson's team won the People's Choice Award in the U.S. DOT Connected Vehicle Challenge, which sought innovative transportation-related uses for dedicated short-range communications. The winners of the challenge presented their proposals in a featured session at the conference. Nine students from the civil engineering department attended the ITS World Congress to accept the award on the team's behalf and also presented five papers.



Lee Tupper



Above: A student prepares Clemson's entry in the ASCE/AISC National Steel Bridge Competition. This year, Clemson will host the event.

On the cover: Clemson's planetarium celebrates its second half-century by opening its newly renovated, state-of-the-art facilities.