Ferguson Structural Engineering Lab Newsletter

THE UNIVERSITY OF TEXAS AT AUSTIN - STRUCTURAL ENGINEERING

Volume 2, Issue 1

February 2, 2010

STEER 2010 - March 4-6

AUSTIN, TX For those of you who might not know or have not been paying attention, STEER 2010 is the highlight event for the spring semester. STEER, which stands for STructural Engineering Education Reunion, is a conference featuring speakers who are UT structures alumni and have proceeded to work on interesting structural engineering projects. The conference will be held March 4-5 at the Commons Conference Center at Pickle Research Campus with an optional golf outing on March 6. In addition to the great session topics, the conference provides a relaxed atmosphere to meet and network with past graduates. Registration is now open on the FSEL website and costs $35 for current UT graduate students (register online at the FSEL website until February 19).

New Faces at FSEL

A few students have started working at FSEL recently. If you haven't met or had a chance to get to know them yet, here is a little introduction. I'm sure they would still appreciate it if you bought them lunch* some Thursday.

Kerry Kreitman

I'm originally from Houston, went to WashU (in St Louis, MO) for undergrad and have now returned to Texas solely because of the wonderful summer weather. I like sports (I'm a big Astros and Rockets fan); returning home at night to two adorable kittens; and days when Nancy gives me rides home.

Jin-Young Kim

I am a Korean who loves 1) my wife, 2) LEGOs, 3) Xbox 360, 4) PlayStation 3, and 5) Wii.

I wish I could show you guys my "playground"/ house full of those things. However, due to the reality of life, I'm working on my research (don't worry Dr. Wood), taking classes, doing homework, and doing household chores.

Now, since its getting warm, it is time to shave my hair.

David "The Juice" Garber

I was born and raised in Central Pennsylvania in the heart of Amish Country. I completed my undergrad at Johns Hopkins University where I also played on the varsity baseball team. I started here in Austin in the fall of 2009 with both classes and work at FSEL. Outside of school I enjoy any kind of sports and board games.

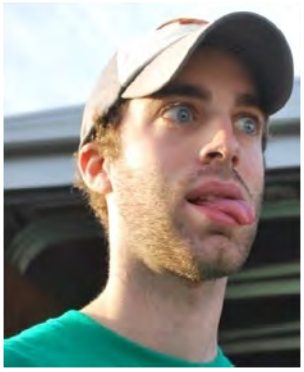
They nicknamed me the Juice because I am always worth the squeeze.

Inside this issue:

More New Faces at FSEL....

Matthew Homer

I am from the home of the Alamo, San Antonio, TX. I received a BS in Architectural Engineering from the University of Texas at Austin. I enjoy tex-mex food, reading, politics, and the outdoors.



Greg "Radicool" McCool

Born and raised in Minnesota, I spent my childhood cultivating an awesome "Fargo" accent, only to spend a year as an exchange student in Germany after high school and completely erase it. I saluted my Irish heritage by graduating from the University of Notre Dame last year. Going to college there was awesome, with the exception of football in recent years. Outside of structural engineering, I enjoy frisbee golf, bowling, weightlifting, "Smokey and the Bandit," and experiencing life in the great state of Texas.

Chris Williams

I grew up in the small town of West Frankfort in southern Illinois and completed my undergraduate studies at Southern Illinois University Carbondale where I did some research in structural health monitoring. After graduating in May of last year, I came down to UT. My interests include music, rocking out on the drums, and activities with my church.

Zach Webb

I grew up in West Texas (the sparsely populated region that makes up the western half of the state, not to be confused with the town north of Waco) but I have called Austin home for the past six plus years. After a brief stint in the workforce following my undergraduate education at UT, I joined the structures program this past August. When I am not at ECJ or FSEL, you can find me running my dog on Town Lake, at my favorite disc golf course, or at one of the many watering holes in Austin.

James "Undergrad" Kleineck

Hometown: Mesquite, TX

Number of years working at lab: 2.5

Random fact: Despite the fact that James has spent about a year on his current project, and more total time working around the lab than most of the 2nd year grad students, he still retains the nick-name "undergrad."

Eisuke "True Cowboy" Nakamura

I am from Japan. I received bachelors and masters degrees from Nagoya University, Japan. After doing research on the maintenance of concrete structures at the research institute of the government of Japan for 5 years, I came to Austin with my beautiful wife, Shiho and two powerful kids, Eito, 4 and Hana, 2. Outside of school, I enjoy being a daddy (plus a husband!!!). The fall of 2009 was my first semester at UT.

Giddy-Up!

Luca Magenes

Born and raised in Pavia, Italy, a small medieval brick town surrounded by rice fields and mosquitoes, I studied engineering because it seems that I like dealing with problems… my 9000 miles away relationship is an example. I have great passion for music, which was part of my college living, soccer (Forza Inter!), and finally good food and wine (weird for an Italian).

Neil Satrom

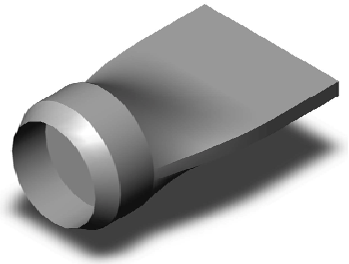
I grew up in Tulsa, OK and went to Kansas State University, where I got a bachelors degree in Architectural Engineering. That is where I met my wife, Crystal, who is a 3rd grade teacher. Kevin Quinn convinced me that UT had a pretty good engineering school and so I came down here in the fall of 2009. Someone had to make sure there was a little K-State purple left in the lab.

Tubular Cross Frames - Anthony Battistini & Weihua Wang

Cross frames are critical members for the stability of straight and curved steel bridges. Conventional cross frames are often fabricated from steel angles; however these members have relatively poor buckling behavior. Due to low buckling strength, cross frames with angle diagonals are often designed as tension-only systems, therefore increasing the necessary steel. The angles are also connected through one leg resulting in eccentric connections, causing bending of the members and reducing the fatigue performance.

Improved behavior may result if tubular members are utilized for the cross frames. The increased buckling strength of tubes results in effective members in both tension and compression, and a single diagonal cross frame can provide effective bracing. Moreover, reductions in the handling requirements during fabrication may result as the use of four steel angles usually necessitates multiple flips of the cross frame to facilitate welding.

Although there are structural advantages of utilizing tubular members, a suitable connection must be developed. We are currently designing and analyzing various geometries for use as a steel casting, which would seal the end of the tube and connect easily to the beams.



"I spent a lot of time converting this to a .jpg so I hope you appreciate it." - Anthony

Bent Plates - Craig Quadrato, Ryan Hall, Loren Campos, & Sean Donahue

The purpose of this research is to design a connection for end cross frames of skewed steel bridges to improve their efficiency in resisting girder elastic buckling and end twist. This research consists of small scale connection testing, fatigue testing, large scale buckling tests, and parametric studies using the 3-D finite element modeling program ANSYS 11.

The small scale and fatigue testing have been completed and the large scale portion of the research is now in full swing. In January the first series of twin girder buckling tests for 56´ long W30x90 sections were completed. The result was a validation of the finite element modeling of the girders that will be used in the parametric study. Currently, the first set of girders using the proposed half pipe connection is being tested to validate their finite element model. Also, cross frame fabrication continues for the upcoming large scale 3-girder tests with both a half pipe cross frame connection and bent plate cross frame connection.

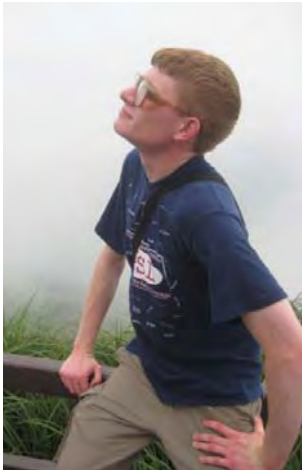
How many Grad students does it take to fabricate a bent plate? Well, that depends...

Cracked Panels - Stephen Foster & James Foreman

For almost a year, we have been monitoring the long-term prestress losses in two panels from San Antonio. Those are the two panels with the orange box on the northwest side of the lab. Shrinkage is a major component of prestress loss, and aggregate stiffness is a major factor controlling shrinkage. Soon, we will be getting four new panels made with stiffer aggregate to compare the difference in prestress loss.

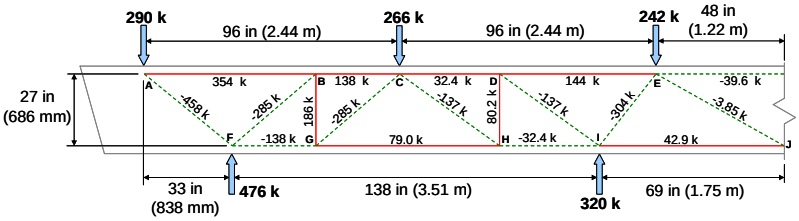
Just recently, we started a new testing program to investigate the amount of deck reinforcement required to control shrinkage cracking in the CIP portion of bridge decks. Stephen has cast several small composite bridge deck specimens, each with a different amount of reinforcement. He will be testing them in tension to compare cracking.

Wax on, wax off little grasshopper.



Strut-and-Tie Model Design Examples for Bridges - Chris Williams

This project is a continuation of TxDOT project 0-5253 "Strength and Serviceability Design of R/C Members in D-Regions" which developed new strut-and-tie provisions for the AASHTO LRFD Bridge Design Specifications that are more accurate and simpler than the current design codes. These new STM provisions are being used to develop a set of design examples to assist TxDOT engineers in their implementation and help to create uniform design procedures for various bridge components that require the use of strut-and-tie modeling. The final result will be a document that includes design examples of these bridge components presented in a clear and concise manner. The design example that is currently underway is a five column bent cap of a skewed bridge supporting four lanes of traffic.



Recipe of the month:
Texas Concrete Beam Salad
Mix previously sliced box (or trapezoidal) girders, toss some cylinder crumbs and sprinkle steel shavings to taste. Rich in calcium, iron and Vitamin C.

Shear Behavior of Box Beams - Alejandro Avendano & Eisuke Nakamura

This spring we hope to fabricate and test prestressed concrete box beams. The beams will be 5 feet wide, 40 inches deep and about 30 feet long with a total weight of about 15 tons. This will be quite challenging considering we have never before fabricated box beams within FSEL. Typical prestressing plants use crews of 15 or 20 people and even rehearse in a "dry run" before they fabricate new beams. As usual, we will need several students with overnight concrete babysitting experience. After fabricated, the beams will be tested in shear while we try to optimize/simplify different end region reinforcement details. Finally, in case you are wondering, we do not have to slice these beams like the previous ones.

Epoxy + Styrofoam = Smelly Mess!

ASR/DEF Damaged Trap Beams - Tz-Wei Wang & Nancy Larson

This project is wrapping up with the last beam tested in November. Based on the results, ASR/DEF expansion does not appear to have a significant effect on the shear capacity of prestressed trapezoidal box girders.

Not to be outdone by Alejandro, we started on our own beam cutting adventure. In order to determine the extent of damage due to ASR/DEF expansion and crack depth, Eulalio Fernández organized the injection of dyed epoxy into a beam. Slices made at various locations revealed cracks propagating past the confining reinforcement and into the web.

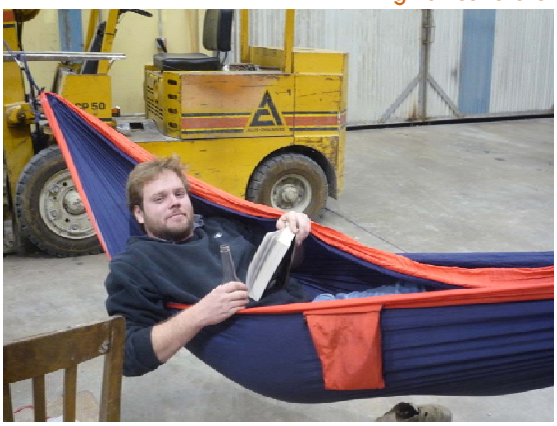
Finally we will be extracting cores for a petrography analysis and uncovering stirrups for an elastic rebound tests to determine the severity of concrete expansion.

U-Beam Shear Project - Catherine Hovell & Andy Moore

During the fall semester, the U-Beam Team built and tested a modified design for the Texas U-Beam, thickening the web walls and adding supplementary reinforcing steel. A second improved design was also fabricated out-of-house, and will be tested in the next few weeks. Our goal is to fully understand how the concrete, steel, and relative geometric properties (bottom flange width as compared to web width, for instance) influence the behavior of the U-Beam under shear loading. Of additional concern is the effect of the slanted web walls during capacity calculations and during application of a vertical shear force.

This spring, three more beams will be fabricated by a local precaster and tested at FSEL. These beams will incorporate the best of the improvements tested this fall, and will also consider the effects of skewed ends on the beam performance.

"What's more fun than watching paint dry?? Waiting for concrete to cure..."



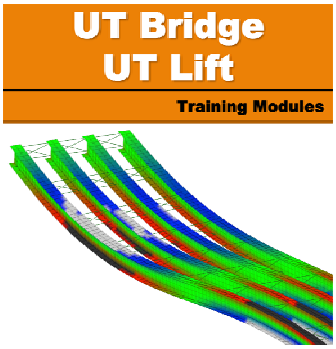
CFRP Anchorage in Shear Strengthening Applications - Yungon Kim & Neil Satrom

Since the I-35 bridge collapsed in Minneapolis, there has been a renewed concern for strengthening aging bridges in the United States. The goal of this project is to increase the usefulness of Carbon Fiber Reinforcement Polymer (CFRP) fabric in shear applications by using anchors made of the same CFRP material. In previous CFRP applications, the CFRP de-bonded from the concrete beam before ultimate strains were reached in the fibers. Our goal is to anchor the CFRP to the concrete beam using an anchor made of CFRP in order to get the ultimate capacity out of the CFRP material.

So far we have tested six 24" deep specimens and are in the process of testing four 48" deep specimens. After this we will be testing the effectiveness of CFRP anchors in fatigue and long term loading situations using more 24" deep beams. Our current tests have shown the effectiveness of CFRP anchors by increasing the capacity of CFRP strips in shear application by 30%-40% to those without anchors.

UT Bridge - Jason Stith & Brian Pretruzzi

The project goals include field instrumentation, parametric studies, and program development. Currently, the field instrumentation has been successfully completed as well as the parametric studies to understand the behavior of curved girders during erection and partially constructed stages before and after bracing is present. Additionally, two programs have been completed: UT Lift, a macro-enabled Excel spreadsheet for the lifting of curved girders and UT Bridge, a 3-D finite element analysis program to analyze bridge erection sequencing and concrete deck placement. Currently, the team is in the implementation phase for UT Bridge, which involves training TxDOT engineers on how to use the software and gain feedback on how to improve the interface and features.



It seems Jason writes less than he talks...

We know we're hot!

Positive Pressure Ventilation Research - Mustafa Abbasi, Kevin Carollo, David Gramlich, & Craig Weinschenk

Firefighters use positive pressure ventilation (PPV) to remove hot combustion products from a fire room using strategic ventilation and a large fan. Our fire research focuses on characterizing the room environment under PPV, studying its efficiency and fallbacks. Our testing parameters include vent location, and a failure in the gypsum walls to represent potential void space for uncombusted fuel. Recently, prior tests have been repeated for stronger statistics for temperature correlations. With these stronger statistics, our next goal is to model residual heat in walls from back-to-back fire testing using CFAST and FDS.

For questions, please contact ut.firegroup@gmail.com

Unfortunately, Miguel is not building a labyrinth for unruly undergrads.

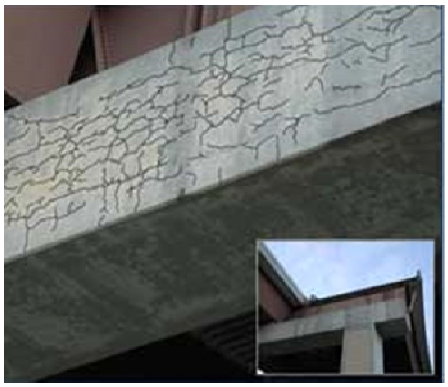
AAC Research - Miguel Forero

As part of the autoclaved aerated concrete (AAC) research, experimental work is being done to refine the current MSJC Code value for interface shear strength between grout and AAC units, and to verify that the current provisions for lap splices in grouted cores surrounded by AAC are safe. Specimens for the interface shear strength were grouted last semester and will be tested soon. Construction of the specimens for the splice tests is underway; and testing of these specimens is scheduled for later this semester. About the walls that you see on the lab floor, I have been asked if I am building a castle or a maze, or if I am playing with large LEGOs. Not to disappoint anyone, but these walls are actually the specimens for the splice tests.

Fun fact – if you google image search "asr damage concrete", Dean's picture with his beams comes up on the first or second page.

NDT Evaluation of ASR/DEF Damaged Bridge Bent Caps - Eric Giannini, Kerry Kreitman, & Zach Webb

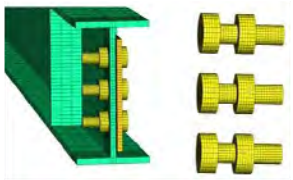
Expansions due to ASR (alkali-silica reaction) and DEF (delayed ettringite formation) in reinforced concrete bridge elements are an ongoing concern for TxDOT. The goal of this project is to investigate several non-destructive testing techniques for the evaluation of in-service TxDOT bridges showing signs of ASR/DEF deterioration. The plan is to build three large-scale bent caps along with several smaller specimens, including exposure blocks (to add to the graveyard at 18B), bridge decks, columns, and slabs on grade. NDT methods used will include UPV, impact-echo, and surface wave techniques, among others.



Beam End Connections in Fire - Guanyu Hu

In fire, large axial forces are generated in steel beams. These forces are initially compressive and with increasing temperature become tensile as catenary action develops. In the cooling stage of a fire, thermal contraction of the beam occurs and large tensile forces are generated in the connections. These forces are not usually considered in the beam end framing design process and thus can lead to connection failure.

This research project is developing experimental data, analytical models, and design models for the performance of beam end framing connections at elevated temperature. The work includes thermal-structural analysis of steel building frames to characterize the force and deformation demands at beam end connections, extensive high temperature experiments on connection subassemblies, and detailed finite element analysis of connections. Currently, the high temperature tests are ongoing.



New Prestress Loss Provisions - Dean Deschenes & Dave Dunkman

This project examines prestress losses in pretensioned concrete beams. Over time, 25 to 35% of the initial prestress "disappears" due to elastic shortening, creep, shrinkage and other effects. The traditional prestress loss provisions, unchanged in the AASHTO Bridge Design Specifications since the 1970s, have generally been shown conservative. In 2005, new prestress loss provisions were adopted, offering more accurate, though less conservative, predictions. In some cases, use of the new provisions could lead to the elimination of 15% of a beam's prestressing strands, raising concerns of flexural cracking under service loading.

Sixteen I-beams were cast over the summer, and have been shipped to two conditioning sites: Austin and Lubbock. The different weather conditions at the two sites (relative humidity and temperature) have produced minimal differences in losses measured using embedded instrumentation. In the coming months, eight more beams will be cast and sent to the two sites.

Beams conditioning just south of faculty offices, resting on pedestals constructed with a unique diaper finish.

High Mast - James Kleineck & Stephen Pool

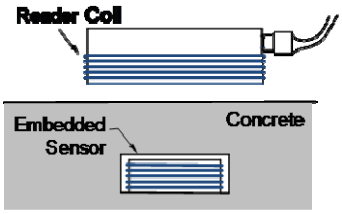
After discovering that small initial cracks can develop at the weld between the base plate and pole wall due to the galvanizing process, we have started to investigate various possible causes for this cracking.

Preliminary testing has revealed that the most likely cause is a sharp thermal gradient resulting in high stresses at the weld toe.

Currently, we are instrumenting high mast illumination poles with thermocouples prior to galvanizing to verify a finite element model being constructed in Abaqus to model these thermal stresses.

"Now, where did I put those marshmallows…"

Wireless Corrosion Sensor G2.01 - Ali Abu Yosef

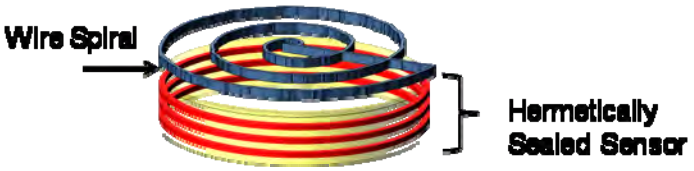


"I bet that Ms. Mona (my kindergarten teacher) would be very proud when she sees the perfectly round steel washers that I made using paper scissors."

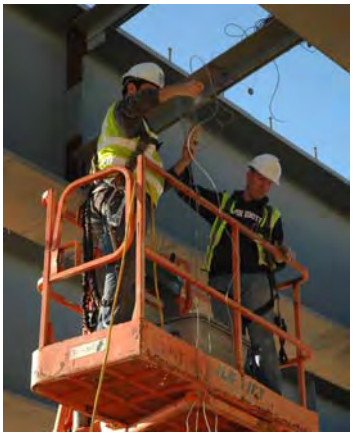
A passive wireless sensor platform has been developed by researchers from FSEL and the ECE department to monitor corrosion in reinforced concrete members. The sensor is designed to be embedded in concrete during construction and interrogated periodically over the service life of the structure.

The sensor's circuit is built simply using a 5-loop copper coil that is connected to a capacitor. In the original design, a steel wire was connected to the circuit acting as a switch, which upon corroding alters the sensors behavior.

A new design is being investigated where the corroding element (wire spiral or steel washer) is not connected to the circuit and interacts with the sensor by shielding the magnetic fields. Initial tests conducted in air show that the new sensor can detect different levels of corrosion within concrete. The next step is to place the sensors in concrete beams and monitor long-term behavior.



Wireless Fatigue Monitoring - Jeremiah Fasl & Vasilis Samaras

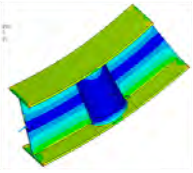


"Good thing about wires? If you drop one end, you can pull items back up with the other end."

After testing the two types of first-generation wireless equipment at three different bridge sites around Austin this past semester, we found that the ZigBee (WSN) devices worked better than the Wi-Fi devices in the steel bridges. The testing also revealed some improvements that can be made in the second generation, including better antennas, additional memory, and increased processing power. NI is currently developing a strain node based on the ZigBee devices, which we hope to test over the coming months. We tested a real-time rainflow algorithm (counts cycle size and number of cycles) last semester that we created in LabVIEW that will be used over the course of the research. The results from the rainflow analysis can be used to estimate the remaining fatigue life of a bridge. Moreover, we performed environmental chamber tests to evaluate the protection level of the WSN enclosures from humidity and condensation. On the energy-harvesting side of the project, we collected wind data from a bridge in Houston.

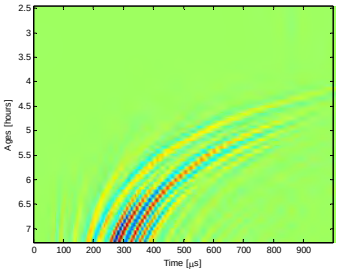
Fatigue of Half-Pipe Stiffeners - Andrew Wahr

As a subset of the bent plate project, I am investigating the fatigue life of a half-pipe stiffener in comparison with the current solution of a plate stiffener connected to a bent plate. Large scale testing was performed in the lab on four-25 foot specimens, each containing all applicable connection types in order to determine at what stress range and cycle count those connections would fail at. After more than ten million cycles of testing, the pipe stiffener appears to be performing as well as or better than the current solution. This research has now moved into the virtual world through ANSYS modeling to determine the impact of various parameters on the stress concentrations developed by the half-pipe connection.



NDT Testing - Seong-Hoon Kee

Since starting my Ph.D research at the FSEL, I have mainly focused on developing a new NDT method to evaluate the depth of surface-breaking cracks in concrete structures using elastic wave propagation. To successfully apply the method to in-situ structures, I have struggled with investigating several topics which have not been clearly organized by previous researchers: (*i*) determination of reliable transmission function of surface waves across surface-breaking cracks, (*ii*) effect of sensor locations on near-scattering field of surface waves; and (*iii*) improvement of test efficiency by using air-coupled sensors. Although I obtained reasonable results from theoretical studies and laboratory tests, more studies are needed to apply the method in the field. One big issue is developing cost-effective sensors for long-term monitoring of civil structures. Currently, I have tried to find cheap sensors for generating and measuring elastic stress waves through cementitious materials. In this sense, the bender elements were first introduced to investigate the early age properties of cement pastes. Fortunately, the signals from the preliminary tests using bender elements have been encouraging. I am expecting the experiences from developing new sensors may be helpful to develop a lower price with equivalent or higher performance transducers compared to commercial sensors.



Corrosion Resistance of New PT Systems - Greg McCool

Post-tensioned structural elements generally provide better serviceability and are more efficient than those with only mild steel reinforcement. However, their reliance on a small number of steel tendons for strength makes post-tensioned structures extremely sensitive to corrosion. Even a slight reduction in tendon steel area due to chloride ingress or the presence of oxygen can render a structure unsafe for use.

TxDOT Project 0-4562 seeks to investigate the effectiveness of various combinations of commercially available strand, duct, and anchorage systems in protecting prestressing tendons from corrosion. Twenty compact beam specimens incorporating these variables were cast in 2004-2005 and subjected to severe corrosion conditions via an alternating wet-dry salt water bath. In March, ten of these specimens will be autopsied and examined for signs of corrosion, and each different system will be rated for corrosion resistance. The ultimate goal of the project is to deliver design recommendations which TxDOT can adopt for future construction.

"Hopefully the tendons aren't rusted this bad."

Field Instrumentation of High Mast Poles - Luca Magenes

In parallel with the fatigue testing and the heat transfer models, the high masts lighting poles research is progressing with the instrumentation of poles in the field. Three poles will be instrumented with strain gauges at the base of the shaft, and an anemometer will be placed at 20 ft above the ground. The data will be collected for more than a month so that we have a better idea of what could be both the steel strain and the wind speed during the service life of the masts. Hopefully the measurement will lead to a number of cycles smaller than the design specified, allowing a better assessment of the poles.

Is that an anemometer or Luca doing a high wire act?

I think you missed a tie in the front of the beam.

Shear Cracking of IT Bent Caps - Lalo Fernandez & Dave Garber

There are several cases of Inverted Tee (IT) bent caps in Texas experiencing unexpected web cracking at early ages. The affected IT bent caps are located in the cities of Austin, Houston, El Paso, and Waco. Some of these cracks are 0.03" wide, which is significant according to the findings of TxDOT project 0-5253 (predecessor of the current project 0-6416).

Most of the current U.S. design codes recommend Strut-and-tie modeling for designing IT bent caps; however, designers have expressed concerns with the ambiguity of the current provisions and the lack of specifications regarding durability and serviceability.

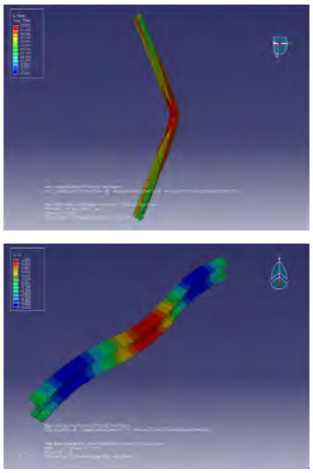
The primary technical objectives of this study are to determine the causes of cracking and to develop new design criteria to prevent or minimize such cracking under service loading.

To accomplish the objectives of the current project, the proposed work includes: field inspections of the affected bent caps, assembly of an evaluation database from previously published studies, and experimental evaluation of at least 9 beams with 2 tests per specimen.

"And in the last year of my PhD, I plan to build a skyscraper."
- Rangsan

Bracing Truss Systems - Rangsan Wongjeeraphat

The purpose of this project is to develop the bracing requirements for truss systems. The project includes the laboratory work and parametric study by using a finite element program. The laboratory work concluded in the fall of 2009 and included buckling tests of twin trusses with and without lateral bracing and with and without torsional bracing. The test setup and loading apparatus were specifically designed for the buckling tests which included gravity load simulators. Currently, the finite element model is being developed by using ANSYS. Since the truss is a complex structure, accurately modeling all of the details would be time consuming and might not be possible to do. Thus, a simplified model is being developed instead. Therefore, the lab data is important in validating the model. After the model is validated, parametric studies will be completed to develop bracing requirements.



"All in all, welcome to the creepy world!"

Creep Buckling Due to Fire - Mohammed Ali Morovat

An important aspect of predicting response of steel buildings to fire exposure is the ability to understand and compute the strength of columns at elevated temperatures. Buckling strength of columns at elevated temperatures is more complex than that at ambient temperature and is not adequately understood or quantified. One of the critical factors affecting column strength at elevated temperatures is the influence of material creep on column performance.

The overall goal of this research project is to obtain a better understanding of creep buckling of structural steel columns, and to develop data and models of creep and creep buckling to enable better analysis and design of steel structures for severe fire exposure. The research will include an extensive experimental program on elevated temperature creep testing of structural steel and creep buckling tests on structural steel columns. The experiments will be accompanied by the development of analytical and computational models for material creep and creep buckling.

Flexure-Shear Critical Columns - Matt LeBorgne

I have been continuing work on the self-calibrating shear failure model for non-seismically detailed reinforced concrete and its implementation analytically in OpenSees. The model is capable of detecting shear failure in columns and simulating inelastic shear deformations and strength loss to the residual shear capacity. Shear failure is identified when the rotations across the plastic hinge of the column reach a critical value defined by an experimentally calibrated rotation based limit curve. Upon shear failure initiation, a zero-length shear spring connected in series with the column elements changes its constitutive properties to include pinching, strength degradation, and stiffness degradation. Shear spring constitutive properties are related to column material and geometric properties through least squares regressions. Preliminary comparisons show the model fits well with experimental data and the results were presented at the ATC/SEI conference in December. My ongoing work will include finalizing the regressions, testing four columns during the summer using photometric techniques to determine strut locations, and developing a better shear failure model.

I have started working on an additional project that is part of NEES E-Defense, which will test two, four-story, reinforced concrete buildings. One building will be constructed using conventional methods and a second building will be constructed using high-performance materials. The project is a collaboration between researchers in Japan and the United States. We are conducting a 3D nonlinear dynamic fiber section-based analysis of the conventional building in the direction of the moment frame and working with additional researches at UCLA for the analysis in the direction of the shear walls. The buildings will be tested on the world's largest shake table in Japan under bi-directional seismic loading.

Response of Damaged PT Tendons - Chris McKinstry

The purpose of the research is to monitor the tension force and dynamic (frequency) response as damage accumulates in external PT tendons. The goal is to formulate a model that will estimate the level of tension force in a tendon using measured natural frequencies. In the Fall 2009 issue of the newsletter, two specimens were ongoing accelerated corrosion tests. The testing of those two specimens has completed, as well as two additional tendons. Currently, the ability to test the external tendons in the US 183 bridge in Austin is being finalized with the Texas Department of Transportation. The testing should take place in the next couple of weeks, and will provide valuable comparative field data.

BUILDING24 COMMITTEE

*Committee Vision: Increase **productivity** at Ferguson Laboratory through improved **communication** and **collaboration** of students, staff, and faculty*

JNT Golf Tournament - May 19

BASTROP, TX Another exciting event coming during the spring semester is the annual structural engineering department golf tournament. The 17th Annual J. Neils Thompson Golf Tournament will be held at the Pine Forest Golf Course (Bastrop) on the Wednesday immediately following finals, May 19; so do not head home for summer break too early. It honors J. Neils Thompson, who was the lead developer of UT's civil engineering research program as well as a scratch golfer.

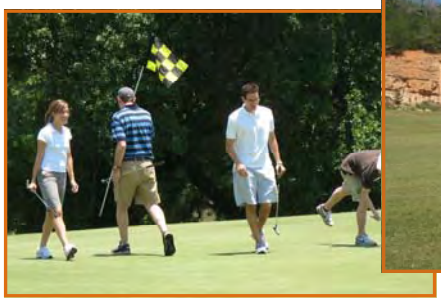
The format and rules of this tournament create a fun atmosphere for all skill levels format (more than 25% of the participants have never played golf before). A total of 88 students, professors, staff, and industry representatives have participated in each of the past two tournaments. The tournament is a "shotgun start, four-person best ball scramble." With such a scramble, all four players hit from the same spot and use the best shot of the group for their next shot (i.e. three players pick up their ball and shoot from the "best ball"). With such a format, it allows anyone to make a difference.

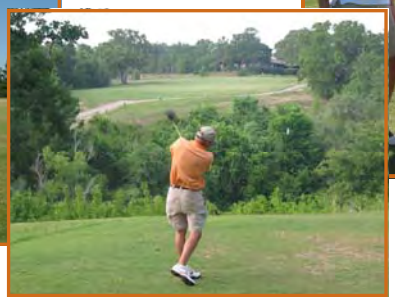
Well, if you are still fuzzy on the rules, they will be clarified closer to the tournament; but just know that the tournament is a lot of fun. Not only do you get to spend time with your fellow classmates, the tournament offers an opportunity to network with professionals who sponsor the outing to help reduce the cost for students. All skill levels are encouraged to participate and we make sure to add some "special rules" to make the round of 18 enjoyable for everyone. More details will follow during the semester.

Special points of interest:

- Lab Clean-up: March 2, 8:30am
- *STEER 2010: March 4-5, Commons Conference Center; March 6, golf outing (contact Jeremiah)
- Recruitment Weekend: March 26-27
- Annual Picnic and Softball Game: May TBD
- JNT Golf Tournament: May 19, Pine Forest Golf Course, 12pm Start

* beer provided





Information about the Newsletter

The goal of this publication is to keep those working at FSEL aware of the status of ongoing projects around them. In addition to projects, we may also highlight special events, people, or news of interest. The newsletters will come out once a semester, three times a year.

In this first issue of 2010, twenty-six research projects at FSEL are summarized. Hopefully you will learn something new about each project so as to initiate more discussions with your fellow researchers.

Feedback
Jeremiah Fasl
E-mail: jdfasl@mail.utexas.edu