e-Newsletter

ASCE
AMERICAN SOCIETY OF CIVIL ENGINEERS
INDIA SECTION

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Updates on ICSCI-2014

Dear Esteemed Members,

Greetings!

As you all know, India Section of ASCE is organizing an International Conference on Sustainable Civil Infrastructure (ICSCI 2014) on 17-18, October 2014. The organizing committee is pleased to announce that the conference will be held in conjunction with Build 4 India, an essential blue print for building industry at Hitex Exhibition Center, Hyderabad. The expo will be organized from 17-19 October. The authors and delegates will get an opportunity to participate in the Expo during the conference. A variety of GREEN concepts will be discussed in the conference and will be demonstrated at the Build 4 India Expo simultaneously.

Now the list of keynote speakers are available on the conference website. We are happy to announce that 25 key experts from abroad and India are going to present on the theme topics and about 200 high quality technical papers will be presented by good mix of delegates from academia, practitioners and industry. Registration is now open and interested members are requested to register early. A number of sponsorship opportunities are also available for organizations and companiesworking in the area of sustainability to display their work and products.The Expo will be an IDEAL platform for the display. For more details, please visit http://icsci2014.asceindia.org/ and http://www.build4india.co.in/

We look forward to seeing you in Hyderabad.

Best regards

Prof. G L Sivakumar Babu & Dr. SireeshSaride

IN THIS ISSUE

News from Regions

Northern Region News

Glimpse of PEC International Student Group

Events at VYOM (PEC's annual technical festival)

(21st March 23rd March 2014)
ASCE PEC ISG organized certain events under the banner of VYOM which are as follows:

1. A talk with Mr. Nek Chand (Creator of Rock Garden) (21st March 2014)

Mr. Nek Chand was invited by ASCE PEC ISG to PEC's annual technical festival to encourage and aware students about solid waste management. Mr. Nek Chand shared his experiences about his journey of building a world recognised rock garden, made from waste materials inspiring hundreds in the auditorium. His dedication and perseverance was the talk of the day. The event was held at PEC's auditorium and was attended by all college senior members and interested students.

2.Cement your Bonds (22nd March 2014)

This event was a competition relating to the knowledge and understanding of building construction methodologies. The participants were given a task to prepare a brick masonry bond (ex. English bond, Flemish bond etc.) in minimum time with dimensions specified. The participants were given bricks and were initially short listed by a quiz.

3. A lecture by Mr. Yashjeet Gupta (COO, Synergy) (23rd March 2014)

A lecture on 'Modern Construction techniques for building a 10 storey building in 48 hours' was given by Mr. Yashjeet Gupta, COO of Synergy (A billion dollar company) . He explained the key concepts required for this type of construction and its benefits. The event was held in Committee room of PEC University of Technology.

Auto CAD Workshop (23rd April 25th April)

A 3 day 6 hour AUTOCAD workshop was given by NIFT, Chandigarh (A software training centre) at Computer centre of PEC University of Technology. This was a workshop organised by ASCE PEC ISG in collaboration with ISTE PEC Chapter so that students get a good insight and practical experience on working on drafting software like AUTOCAD. This workshop was intended to help every engineering student in their professional careers. The students turned out in good numbers and were given a completion certificate at the end of the workshop.

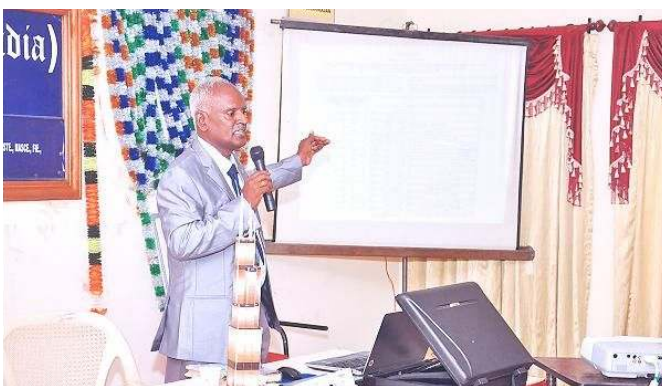
Southern Region News

Lecture on 'Tall Building structures' by Prof. P. Rajayogan at Institution of Engineers (India), Madurai Local Chapter on 19thJuly, 2014

Abstract:Tall Building definition in structural engineer's point of view Why tall buildings? Steel vs Concrete and need for Composite materials progress in the ability to build tall Need for collaborative planning compromise between conflicting demands.

Tall building behaviour function of various structural elements primary types of vertical load resisting elements such as columns and (shear) walls Although the vertical loads in column increase approximately linearly with the height but the bending moments on the building caused by the lateral loads/forces due to wind or earthquake increases with at-least the square of the height.

Necessity to provide lateral stiffness the parameter that affects an estimation of the lateral stiffness of a tall building is the drift index, defined as the ratio of the maximum deflection at the top of the building to the total height. The inter-storey drift index, gives a measure of possible localized excessive deformation.



Prof. P. Rajayogan delivering the lecture

Need to check the stability, Strength (Limit State Design) and Stiffness (Limit State of Serviceability), additional deflection due to creep, shrinkage and temperature. Second order P- Δ effect - Soil-Structure in-traction - Designing against fire.

Anniversary celebrations of ASCE International NITK Students' Group

ASCE-NITK students group has completed one year of successful activities for which there was a celebration of anniversary on 29th July 2014 at the Main seminar hall of NITK.

The esteemed chief guests for the function were Professor NeerajBuch, Professor and Chairman of the Civil and Environmental engineering at Michigan State University, Professor VenkateshKodur, Professor and Head of SAFE-D center at Michigan State University, and Professor G R Reddy, Professor at Bhabha Atomic research center, Mumbai.

Also we had the gracious presence of many professors of our Civil Engineering department who appreciated and encouraged the efforts of the group. The function was presided by the Head of Civil Engineering Department, Professor KattaVenkataramana. The faculty advisor of the students group Dr. Suresha SN was also a part of the program.

The program began with a welcome speech and introduction about the chief guests after which Nikhil Sinha presented the report of the activities conducted in the year 2013-2014. He explained about the ideology behind the formation of the group and the various activities like seminars, workshops, fest, site visits that we had in the last academic year.

Later came the most successful event of the function which was the release of annual report of ASCE NITK students group by the chief guests. The annual report was named "Aakhya" which consisted of the details of the activities conducted by the group.

Certificates were issued to the winners of the "Construzione" fest and the executive and founder members of the ASCE NITK students group for the year 2013- 2014.

Professor NeerajBuch and Professor VenkateshKodur were very impressed by the activities of the group and they appreciated the work. They also guided the group regarding how it could be a role model to other colleges in India to establish ASCE Chapters.

The program was a grand success with the participation of more than 70 students. The program ended by the announcements of the office bearers for the academic year 2014-2015.

Release of the annual report "AAKHYA" (Dr. Suresha SN, Prof. KattaVenkataramana, Prof. VenkateshKodur, Prof. NeerajBuch, Prof. GR Reddy left to right)

Expert Lecture on "Uttarakhand Flood- 2013" by Dr. Chandan Ghosh, Professor and Head in Geo Hazards division in National Institute of Disaster Management, Ministry of Home Affairs, Government of India.

Date of event: 30thJuly, 2014

Summary of the event: Natural and manmade disasters have been a point of discussion from a very long time. Dr Chandan Ghosh from NIDM addressed the professors, students and research scholars of NITK on a solemn evening and discussed various methods to mitigate the disaster. He started his lecture by showing the scanned 3-D image of Lakshmana Jhula which was taken by LiDAR (Light detection and ranging instrument). This special instrument is focussing radar which can provide accuracy to third decimal place. There were many photos which depicted the devastated situation of Uttarakhand such as unprotected zig-zag roads, steep eroded slopes, etc. Facts about Uttarakhand disaster: about 580 dead, 5447 people missing.

Dr. Chandan Ghosh mentioned about the ineffective and dangerous roads built in hilly areas along the borders. Either the steep slopes are left unattended, or there is a retaining wall built to prevent any landslide. He asserted that retaining walls are costly and unnecessary if we opt for cheap and effective solutions such as growing vetiver grass. Vetiver grass is special grass whose roots can grow down to 3-4 metres. He stated that many of the nations have extensively employed vetiver as a method for slope stabilization. He said that due to categorization of professionals, engineers in India never think of employing vetiver grass to provide slope stability. Moreover he opined that the heavy retaining walls are designed incorrectly; the weeping holes of the retaining walls are blocked and the drainage is provided in a faulty manner.

Dr. Chandan Ghosh citied many upcoming methodologies such as growing vertiver grass and slope stitching in order to stabilize the slopes. Throughout his lecture he held his concern about the attitude of people who look for their own profit at the cost of others' lives. He motivated us to be responsible engineers and increase our horizon beyond engineering.

Dr. Chandan Ghosh addressing the gathering

Lecture on'Future of Engineering Education: Focus on Research to Practical Applications and Innovations' by Prof. TG Sitharam at Indian Institute of Technology Hyderabad on August 8th, 2014

ASCE India Section, Southern Region Hyderabad chapter in association with the Department of Civil Engineering,Indian Institute of technology Hyderabad organized a lecture on Future of Engineering Education: Focus on Research to Practical Applications and Innovations by Prof. TG Sitharam, Department of Civil Engineering, Indian Institute of Science, Bangalore on August 8, 2014. Following is the executive summary of the talk.

Executive Summary:During the last two decades engineering education in India has undergone exponential growth having more than 0.85 million students (Sthapak, 2011). This sudden growth has posed the problem of maintaining quality of technical manpower. This paper presents the requirements of future engineering graduate and in particular the focus on research to practical applications and innovations. This paper covers the first degree of engineering to doctoral level of engineering with emphasis on premier research cum-teaching institutions, which are aspiring to do applied research, new knowledge and technology, innovation, and mentoring new technology icons. Applied research is a form of systematic inquiry involving the practical application of science using the accumulated academic knowledge, methods and techniques for solving practical problems. The creative application of scientific principles to design or develop products or processes is the role of engineers/scientists. Innovation can be viewed as the application of better solutions that meet new requirements, inarticulated needs or existing market needs (Wong, 2013).

In the traditional approach to higher education, the professor dispenses wisdom in the classroom and the students passively absorb it. In future, teachers are going to be only facilitators. If the objective is to facilitate or to help the students develop or improve their problem-solving or thinking skills or to stimulate their interest in a subject and motivate them to take a deeper approach to studying it, instruction that involves students actively has consistently been found more effective than straight lecturing. Meeting these challenges will require an accelerated commitment to engineering research and education. Research universities and their engineering schools will have to do many things simultaneously such as, advance the frontiers of fundamental science and technology; advance interdisciplinary work and learning; develop a new, broad approach to engineering systems; focus on technologies that address the most important problems facing the world; and recognize the global nature of all things technological. Sponsor "Design Challenge" competitions for scientists, engineers, students, etc., to research, design and develop solutions, equipment and technologies for better delivery for e.g., to control pollution, to improve movement of vehicular traffic, methods to handle natural and manmade disasters, to design more cost-effective medical equipments and medicines, etc. The topics like energy, environment, solid waste, food, manufacturing, product development, mass transportation, logistics, and communications are the key areas. This addresses some of the most sustainable challenges to the future of the world. Sustainable development must be on our agenda for preparing future engineers (Vest, 2005).

Our country is bestowed with a unique knowledge wealth of qualified professionals and its gets riches every year. In global scenario, current knowledge world seeks and rewards ideas, irrespective of where they originate and reside. Sooner, the world will depend on qualities of India's human resources. India's research and innovation program is taking the right general approach but it is too complex, and universities should play a greater role alongside the national research organizations. The world had become more diverse and interconnected, with rapid development in information and communication technologies and Nanotechnologies and the rapid development is concentrating in Asian countries like Korea, China and others speeding up global growth (UNESCO, 2014). Techno-centric innovation and entrepreneurship are on every business and government's agenda as they are seen as drivers of sustainable business value and economic growth. Investment in Research and Development has created employment potential, enhanced productivity levels and improved the living standards. Thus, in the 21st century, innovation is a key differentiator between winners and loosers in the marketplace. With globalization, businesses have to continually innovate to not only compete, but also to survive. "Innovate or perish" is the new mantra.

Unlike popular perception, innovations are rarely an outcome of chance or coincidence; and they are invariably the result of systematic ideation, strategic vision and concerted execution. So, it is imperative that underpinning drivers and determinants of innovation and entrepreneurship are well understood. Implications of regulatory policies concerning ideation, Innovation, development of Intellectual property rights and its protection, new venture creation and investment, etc. are crucial. A holistic approach to innovation is a must to achieve sustainable economic development of the country.

Central to innovation is a curiosity-fuelled and creativity-driven idea. The realization of that idea may be a vision like e.g., 'Man on Moon' project of ISRO or knowledge-driven systems (e.g., Tablet PC Akash for all students). For innovation in business, looking at our knowledge in new ways is often more vital. It has to be borne in mind that an innovation ecosystem has a community of "innovation-producers" and "innovation-enablers" functioning within or along with "innovation facilitators" set in an innovation framework of policy drivers.

India no doubt has witnessed a wave of economic growth over the last two decades. Much of this is due the demographic dividend of a young India. A vast pool of skilled, qualified, low-cost professionals has been a key driver of growth in the hi-tech sector. But to sustain growth in the long haul, it is imperative that India re-architects itself as an innovative society and a knowledge-driven economy. Hence, it is strategically critical for government to become more innovator and entrepreneur friendly. Further, Govt of India should set an example for creating a group of new Innova-

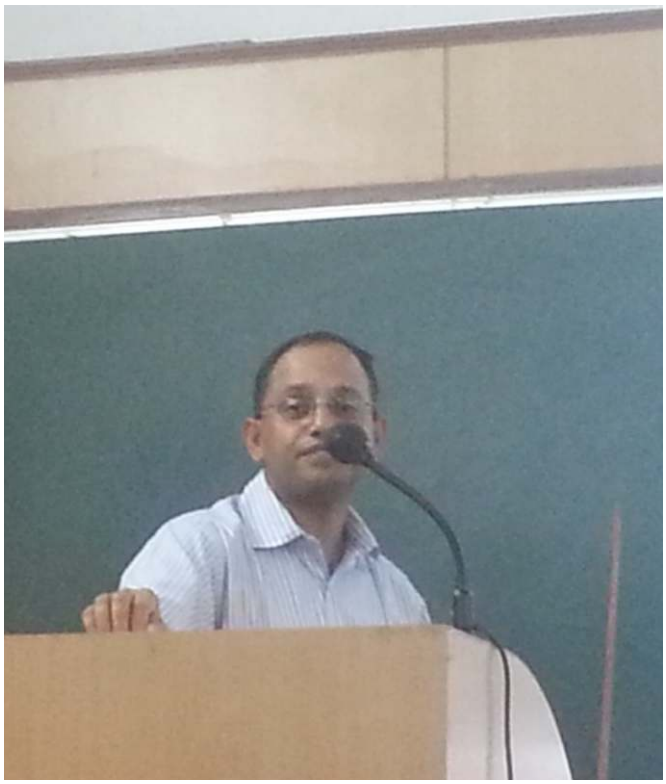
tors. Only the right policies of government can foster a culture of "sustainable, globally-competitive innovation". A position of 64 out of 141 countries ranked in the "Global Innovation Index - 2012" report of INSEAD and World Intellectual Property Organization is a poor testament to India's innovativeness. There are many isolated instances of "jugaad" - a quick-fix innovation through adhoc processes. However the fact is that systematic innovation processes for nurturing new innovators is missing. Thus, there is a need for RashtriaAavishkarAbyan (National Innovation Council) taking research and development in the country to making "made in India" products for global consumption using state of the art technologies and appropriate processes as a top down approach and inculcating innovation aspects in all the schools and colleges through RashtriaAavishkarkendras (national Innovation centre) in all district headquarters as a bottom's up approach. At a mid-level, engineering educators must tap into student's passion, curiosity, engagement, and dreams.

We have moved from slide rules to calculators to PCs to wireless laptops and palmtops. Looking ahead to 2020, setting such goals is not easy in a short span of 5 to 6 years. However, if you look 25 years back, there was no World Wide Web, cell phones and wireless communication. Years ago, Gerard O'Neil of Princeton made a study of predictions of the future and found that "we always underestimate the rate of technological change and overestimate the rate of social change" (O'Neil, 1981). This is an important lesson for engineering educators. We are ready for the speed of technological change. We educate and train the men and women who drive technological change, but we sometimes forget that they must work in a developing social, economic, and political context.

The Internet, World Wide Web, and computers can do many things for engineering schools. They can send information outside their institutes and also can bring the external world to the campus. This has eliminated the role of physical library buildings. Further, computers can be used for simulations of different lab experiments through simulators. By sending information out, one can teach or provide teaching materials to teachers and learners to outside world. By bringing the world in, we can enrich learning and discovery for the students in the campus. Information technology can access, display, store, and manipulate large amounts of information: text, images, video, and sound (O'Neil, 1981). This would be large data which is transported on the wireless networks across campuses and thus It can create learning communities across time and distance. This also provides design tools and sophisticated simulations. As this information is not knowledge, and thus one needs to strengthen the research in engineering to create that knowledge which transforms into products through innovation.

It is necessary to develop new ways of delivering the knowledge (through pedagogogical approaches) and try to attract and interest students in nano-scale science, bid data analyses, large complex systems, development of products, sustainable development, and realities in business. It is also necessary that we should expose the students to humanities, arts, and social sciences. These interdisciplinary socially relevant topics are essential to educate the engineers of 2020 and to train technically competent, socially committed young engineers.

Lectures by Dr. Swaminathan Krishnan, President, QuakeRiskinc & Visiting Associate, Structural Engineering and Geophysics, Caltech, USA at Indian Institute of Science, Bangalore, August 27-28, 2014



ASCE India Section, Southern Region Karnataka chapter in association with the Department of Civil Engineering, Indian Institute of Science Bangalore organized a series ofDr. Swaminathan Krishnan, President, QuakeRiskinc & Visiting Associate, Structural Engineering and Geophysics, Caltech, USA on August 27-28,2014 at Department of Civil Engineering Indian Institute of Science, Bangalore. The following are the abstracts of the talk.

Lecture 1: Mechanics of Tall Building Collapse under Earthquake Excitation

Abstract: In this talk, Dr. Krishnan talked about the curious case of tall building collapses in Mexico city during the magnitude 8.0 earthquake in 1985. The earthquake was centered 250 miles due west of Mexico city, yet the ground motion was strong enough to collapse several tall buildings in the 8-20 story range. He raised several questions: (i) how do tall buildings collapse when subjected to earthquake shaking? (ii) does damage localize within portions of these buildings (over their height)? (iii) if so, does damage location depend upon the primary ground motion features of frequency content, amplitude content, and duration? (iv) under what conditions does a locally damaged region precipitate global

collapse of the structure? (v) are there characteristic or preferred collapse mechanisms for each building? (vi) given a structure, can we predict its mechanisms of collapse? He addressed these questions systematically through theory (shear-beam theory, energy balance analysis of stick-mass models), observation (sloshing of water in a swimming pool during the 2010 Mexicali earthquake), simple experimentation (a spring-mass toy model), and computation (3-D nonlinear dynamic analysis of a couple of index buildings) for the special class of tall steel moment-frame buildings. He demonstrated that: (i) only long-period ground shaking can impart large enough energy to collapse long-period structures such as tall buildings; (ii) damage localizes in these structures within a few stories and results in the formation of a quasi-shear band, a trapezoidal shear-like distortion localized in a few stories of the building. A quasi-shear band is comprised of yielding of all columns in an upper story, yielding of all columns in a lower story, and yielding in all the joints or beams or columns in all the intermediate stories; (iii) the longer the period of excitation, lower is the location of the quasi-shear band; (iv) in non-uniform buildings (with strength increase as we go from top to bottom of the building), yielding is not able to penetrate the lowermost stories, especially because of column strength. In these structures, long-period ground motion causes quasi-shear bands to form, not at the lowermost stories, but a few stories higher; (v) under earthquake shaking, the block of stories above the quasi-shear band performs plastic work on it. When the band is fully plasticized, it is no longer able to carry the dead weight of the structure above, initiating progressive collapse in the structure; (vi) Greater the number of stories above the band (lower the band), greater is the driving inertial force plastically working the band. However, the lower the band, the greater is the plastic moment capacity of the band, i.e., more work is needed to fully plasticize it. Therefore, there exists an optimally located quasi-shear band (determinable using simple plastic analysis and virtual work principles) that is the easiest to drive to collapse. All the computational models driven to collapse by long-period motion exhibit the formation of either this optimal quasi-shear band or an immediately neighboring band. Dr. Krishnan concluded by stating that tall steel moment frame buildings can collapse only under long-period ground motion, and only in the manner of a few preferred collapse mechanisms that can be predicted using simple structural mechanics principles.

Lecture 2: Quantitative Risk Assessment Using Rupture-to-Rafters Simulations

Abstract: In the second talk Dr. Krishnan described the conditions under which long-period ground shaking occurs. Through regional computational models of the earth, he demonstrated how energy gets trapped within deep sedimentary basins (with soft sediments), and their sluggish inertial response leads to long-period and long-duration shaking. The large patches of slip seen on the fault during a large earthquake rupture further exacerbate this by releasing a lot of long-period energy. Whereas high-frequency waves tend to attenuate within short distances due to scattering, etc., long-period waves can travel long distances without losing much energy. When these waves encounter a soft (deep) sedimentary basin, they get amplified many times over causing large amplitude, long period ground shaking with long durations. It is this that seems to have selectively caused collapse of tall buildings in the 8-20 story range in Mexico city during an 8 magnitude earthquake centered 250 miles away. Mexico city is located on a dried lake bed surrounded by stiff mountains. The earthquake waves seem to have traveled fairly quickly through the stiff mountains, but when they entered the basin and encountered the soft sediments, they had to slow down because the material was sluggish in its response. Energy coming in quickly, but not leaving quickly enough, meant that the vibration of the ground had to grow in amplitude. The sluggish nature of the basin response meant that the ground shaking was long-period in nature. The slowing down of the waves meant that the shaking would last a long time. Modern day risk models use global attenuation relations that may not reflect the effect of regional geology such as Mexico city's. This may result in severely under-estimation of expected losses in large earthquakes. Dr. Krishnan described how one can conduct rupture-to-rafters simulations, consisting of the unzipping of a fault in the form of an earthquake, propagation of the radiated seismic energy through the earth's crust and mantle to the sites of engineered structures, and the nonlinear response of structures, to quantitatively assess risk. He presented a case study that estimated the probability of collapse of two buildings, hypothetically located at 636 locations in southern California, over the next 30 years from earthquakes on the San Andreas fault. The methodology comprised of: (i) generating several earthquake source models in the magnitude range of 6 to 8; (ii) rupturing five different locations of the southern San Andreas fault (starting from Parkfield in central California and terminating in Bombay Beach in southern California) using these earthquake sources; (iii) computing the 3-component ground motion waveforms at 636 sites in southern California for each scenario event using the spectral element method; (iv) computing the nonlinear three-dimensional response of the two buildings hypothetically located at each site under each scenario and determining the probability of collapse given an event; (v) estimating the probability of occurrence of each scenario event over the next 30 years using the Uniform California Earthquake Rupture Forecast (by binning the probabilities of all probable events on the southern San Andreas fault and assigning them to one of the five rupture locations for which response has been computed); and (vi) using total probability theorem to determine the probability of collapse of the buildings over the next 30 years from earthquakes on the San Andreas fault.

Dr. Krishnan is visiting IIT Madras from Caltech on a Fulbright grant to develop earth and structural models to be able to conduct rupture-to-rafters simulations in the Indo-Gangetic basin with a special focus on great Himalayan earthquakes. He is especially interested in working with Indian colleagues to bring together heterogeneous data from various sources (seismic, geodetic, gravity, magnetic, oil-well, bore-hole, etc.) to be able to develop a detailed seismic wavespeed model of the Indo-Gangetic plain, with density and elasticity variations; the starting point for such simulations. He can be reached by email at krishnan@caltech.edu.

Professional Engineering Certification for Civil and Structural Engineers In India

Dr. Swaminathan Krishnan

It is increasingly clear that the unregulated design of construction projects in India constitutes a hazard to the public. Lack of a strong regulatory framework in three areas plague the building (construction) sector in India: (i) design, (ii) construction, and (iii) maintenance. Just in the last year alone, no less than seven building collapses, one in Chennai, five in Mumbai, one in Baroda, directly attributable to poor design, poor construction, and/or poor maintenance, have resulted in a total of 234 deaths and tremendous hardship to go with great monetary losses. In this white paper, we present a framework to regulate the practice of civil engineering in India to assure quality and safety in design. It should be noted that other solutions to address construction and maintenance issues must be pursued in parallel to ensure a safe built environment.

1. What is Professional Engineer (PE) certification?

Professional Engineer (PE) certification is a license awarded to an engineer that gives him/her the authority to independently design buildings and other structures, and take legal responsibility for his/her designs by way of a seal or stamp on the relevant design documents (drawings, specifications, reports, and calculations). The certification would represent the profession's highest standard of competence, a symbol of achievement, and an assurance of quality, while ensuring a key point of accountability. It would serve to enhance the importance, reputation, and standing of civil/structural engineers in society and help attract the brightest young minds to this nationally critical profession.

2. Why is it needed?

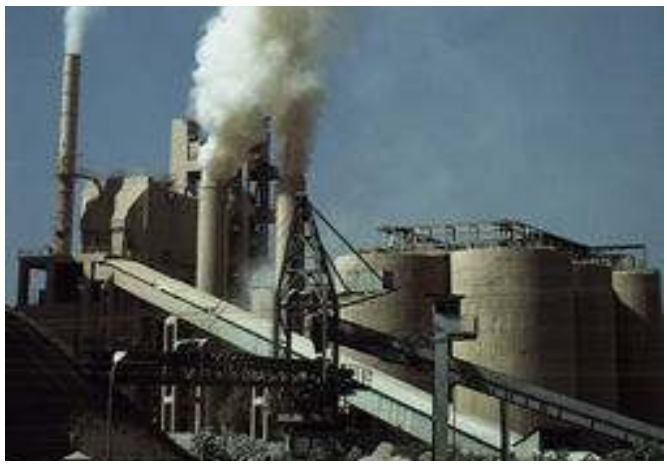
The 11-story building collapse in Chennai (61 deaths) is but one instance that could have been prevented had it been designed by a competent engineer. With the great disparity in the quality of education imparted at various colleges and universities in the nation and the increasing complexity of our buildings and other structures, a civil engineering degree (be it bachelors, masters, or PhD) is no longer a guarantor of engineering competence or know-how. Engineering competence goes beyond the conceptual understanding of the mechanics of buildings and other structures gained through an engineering degree. It can be attained only through training and experience gained under the guidance of a competent engineer. The Professional Engineer certification process is structured to forcefully create a master-apprentice ecosystem that roughly follows the guru-sishya parampara of our ancestors. We seem to care more for our money than for the safety of the buildings we live in as indicated by the fact that our accountants are required to go through a two-year apprenticeship, whereas our engineers are not. It is time to significantly alter this state of affairs.

3. How will a PE license be awarded?

To become licensed, engineers must complete a four-year college degree, work under a Professional Engineer for at least four years, and pass two intensive competency exams, the first testing the candidate's fundamental knowledge in engineering (called the engineer-in-training exam which can be taken after a Bachelor's degree in Civil Engineering), and the second testing the candidate on the practical design of civil and structural systems (called the PE exam which is to be taken after completing 4 years of apprenticeship as an Engineer-in-Training). Then, to retain their licenses, PEs must continually maintain and improve their skills throughout their careers by earning a minimum number of continuing education credits each year.

Tech Briefs

Want to cut greenhouse emissions from cement? Here is the formula



A new study suggests a way in which those emissions could be reduced by more than half -- and the result would be a stronger, more durable material.

These findings come from the most detailed molecular analysis of the complex structure of concrete, a mixture of sand, gravel, water, and cement. Cement is prepared by cooking calcium-rich material, usually limestone, with silica-rich material most often clay -- at temperatures of 1,500 degrees Celsius, yielding a hard mass called "clinker." The clinker is then ground up into a powder. It is the decarbonation of limestone, and the heating of cement, that are responsible for most of the material's greenhouse-gas output.

The new analysis suggests that reducing the ratio of calcium to silicate would not only help cut those emissions, but would actually produce better, stronger concrete. These findings are described in the journal Nature Communications by MIT senior research scientist Roland Pellenq; professors Krystyn Van Vliet, Franz-Josef Ulm, Sidney Yip, and Markus Buehler; and eight co-authors at MIT and at CNRS in Marseille, France.

In conventional cements, Pellenq explains, the calcium-to-silica ratio ranges anywhere from about 1.2 to 2.2, with 1.7 accepted as the standard

As the ratio varies, he says, the molecular structure of the hardened material progresses from a tightly ordered crystalline structure to a disordered glassy structure. They found the ratio of 1.5 parts calcium for every one part silica to be "a magical ratio," Pellenq says, because at that point the material can achieve "two times the resistance of normal cement, in mechanical resistance to fracture, with some molecular-scale design."

Apart from bringing down the green-house emission by 60% and in addition to the overall improvement in mechanical strength, Pellenq says, because the material would be more glassy and less crystalline, there would be "no residual stresses in the material, so it would be more fracture-resistant."

The work is the culmination of five years of research by a collaborative team from MIT and CNRS, where Pellenq is research director. The two institutions have a joint laboratory at MIT called the Multi-Scale Materials Science for Energy and Environment, run by Pellenq and Ulm, who is director of MIT's Concrete Sustainability Hub, and hosted by the MIT Energy Initiative.

Earthquake resistant material help prevent damage to high performance servers

In buildings such as data centers, power plants and hospitals, it could be catastrophic to have highly-sensitive equipment swinging, rocking, falling and generally bashing into things due to earthquakes.

The experiments were conducted this month at the University at Buffalo's Network for Earthquake Engineering Simulation (NEES), a shared network of laboratories based at Purdue University.

Marin-Artieda and her team used different devices for supporting 40 computer servers donated by Yahoo Labs. The researchers attached the servers to a frame in multiple configurations on seismically isolated platforms. They then subjected the frame to a variety of three-directional ground motions with the servers in partial operation to monitor how they react to an earthquake simulation.

Preliminary work confirmed, among other things, that globally and locally installed seismic isolation and damping systems, which can significantly reduce damage to computer systems and other electronic equipment.

Base isolation is a technique that sets objects atop an energy-absorbing base; damping employs energy-absorbing devices within the object to be protected from an earthquake's damaging effects.

Marin-Artieda plans to expand the research by developing a framework for analysis, design and implementation of the protective measures.

The research is funded by the National Science Foundation. In addition to Yahoo Labs, industry partners include Seismic Foundation Control Inc., The VMC Group, Minus K Technology Inc., Base Isolation of Alaska, and Roush Industries Inc. All provided in-kind materials for the experiments.

Solar energy that doesn't block the view

Researchers at the Michigan State University has developed a new type of solar concentrator that when placed over a window creates solar energy while allowing people to actually see through the window. It is called a transparent luminescent solar concentrator and can be used on buildings, cell phones and any other device that has a clear surface.

According to Richard Lunt of MSU's College of Engineering, the key word is "transparent."

Research in the production of energy from solar cells placed around luminescent plastic-like materials is not new. These past efforts, however, have yielded poor results -- the energy production was inefficient and the materials were highly colored. "No one wants to sit behind colored glass," said Lunt, an assistant professor of chemical engineering and materials science. "It makes for a very colourful environment, like working in a disco. We take an approach where we actually make the luminescent active layer itself transparent."

The solar harvesting system uses small organic molecules developed by Lunt and his team to absorb specific no visible wave lengths of sunlight. "We can tune these materials to pick up just the ultraviolet and the near infrared wavelengths that then 'glow' at another wavelength in the infrared," he said.

The "glowing" infrared light is guided to the edge of the plastic where it is converted to electricity by thin strips of photovoltaic solar cells.

"Because the materials do not absorb or emit light in the visible spectrum, they look exceptionally transparent to the human eye," Lunt said.

One of the benefits of this new development is its flexibility. While the technology is at an early stage, it has the potential to be scaled to commercial or industrial applications with an affordable cost.

"It opens a lot of area to deploy solar energy in a non-intrusive way," Lunt said. "It can be used on tall buildings with lots of windows or any kind of mobile device that demands high aesthetic quality like a phone or e-reader. Ultimately we want to make solar harvesting surfaces that you do not even know are there."

Lunt said more work is needed in order to improve its energy-producing efficiency. Currently it is able to produce a solar conversion efficiency close to 1 percent, but noted they aim to reach efficiencies beyond 5 percent when fully optimized. The best colored LSC has an efficiency of around 7 percent.

Source: The research was featured on the cover of a recent issue of the journal Advanced Optical Materials.

Russian billionaire businessman and hobbyist architect unveils plan to construct an hospital and spa that closely resembles a ship

Monaco-based Russian billionaire and hobbyist architect Vasily Klyukin has unveiled his plan to develop an upmarket hospital and spa that is designed to look like a ship. Klyukin hopes that the White Sails Hospital and Spa will become "the world's first hospital that no one is afraid to visit."

Comprising four towers which look like sails, sat aboard a ship-like base, the White Sails Hospital and Spa's resemblance to a ship goes further than skin deep, as the medical staff would also be required to dress up as sailors. If all goes well, the hospital will be located within Tunisia's Economic City development, a large and ambitious project slated to redevelop Enfidha, in the country's northeast.

"I will fly into Space next year," says Klyukin, referring to his plan to take voyage aboard a Virgin Galactic flight. "My health condition has to be checked every six months. That is why I know this feeling very well every time I'm approaching the white building of the clinic, I don't feel any joy. But I would like to show you the hospital, where there is no room for fear."

Klyukin asserts that the project is going ahead, and that at least one investor is involved. However, we've no word concerning its interior, or even a rough timeline for construction, for example basic details one might hope to see even at this early stage. Therefore, we'd recommend taking the news with a dose of sea salt until more information emerges.

Courtesy: www.vasilyklyukin.com

Events

International Conference on Sustainable Civil Infrastructure (ICSCI 2014)
October 17-18, 2014, Hyderabad, India. organized by India section of ASCE in association with the Department of Civil Engineering, IIT Hyderabad at Katriya Hotel and Towers, Hyderabad.
http://icsci2014.asceindia.org/

Build4India 2014
Event date 17 - 19 Oct 2014
Organizer HITEX and Kenes Exhibitions
Event Profile Build4India 2014 in its 4th edition aims to bring leading players in sector together to showcase their contribution in Infrastructure Development.

1. Constromat - A wide range of construction material, machinery and technology for infrastructure.
2. Builtmat - World-class building materials alongside green technologies and products.
3. Facimat - End-to-end facility management solutions and products.
   Please visit the website www.build4india.co.in/ for more details.

DFI 39th Annual Conference on Deep Foundations
Tuesday, October 21, 2014 - Friday, October 24, 2014
Marriott Marquis 404-521-0000
265 Peachtree Center Ave NE Atlanta, Georgia, USA

Earth-Retaining Structures: Selection, Design, Construction, and Inspection - Now in an LRFD Design Platform
October 16 - 17, 2014, MD - Baltimore

Pumping Systems Design for Civil Engineers
October 16 - 17, 2014, IL - Chicago

Deep Foundations: Design, Construction, and Quality Control
October 23 - 24, 2014, AZ - Phoenix

Structural Renovation of Buildings-Newly Updated for 2012 IBCand IEBC
October 30 - 31, 2014, CA - Oakland

Wind Loads for Buildings and Other Structures
October 30 - 31, 2014, ME - Portland

HEC-RAS Computer Workshop
November 5 - 7, 2014, SC - Charleston

Design of Concrete Pavements
November 6 - 7, 2014, OH - Cincinnati Metro Area

Seismic Analysis of Structures and Equipment
November 6 - 7, 2014, MO - Saint Louis

CM-at-Risk: Contracting for Owners, Consulting Engineers, and Contractors
November 6 - 7, 2014, OR - Portland

Fire Protection and Detection Systems for Civil Engineers: Analysis, Design, Inspection, Testing, and Maintenance
November 6 - 7, 2014, DC - Washington

Load Rating of Highway Bridges
November 6 - 7, 2014, PA - Philadelphia

Structural-Condition Assessment of Existing Structures
November 6 - 7, 2014, WA - Seattle

Dam Breach Analysis Using HEC-RAS
November 12 - 14, 2014, AZ - Phoenix

Design of Foundations for Dynamic Loads
November 12 - 14, 2014, TX - Austin

Aluminum Structural Design with The 2015 Aluminum Design Manual
November 13 - 14, 2014, MD - Baltimore

International conference on 'Modeling Tools for Sustainable Water Resources Management'
28-29 December, 2014
organized by the Department of Civil Engineering, IIT Hyderabad. The conference is preceded by a 2-Day workshop that provides hands on experience on modeling tools like SWAT and MODFLOW. For details, visit: http://civil.iith.ac.in/mtswrm/