



INSTITUTION OF ENGINEERS PNG

NEWSLETTER

MARCH 2016



FROM THE CEO'S DESK

My Dear Members of the Institution, stakeholders and friends, welcome to the March issue of the IEPNG Newsletter.

I am pleased to announce that work is on track for the Annual General Meeting, which is scheduled for April 22, 2016. The team at IEPNG is working tirelessly behind the scenes, with support from the Board and others, to ensure that the AGM takes place as planned. I take this opportunity to once again remind all financial members and others, both in Port Moresby and other centres, to do all you can to attend the half-day meeting, because, as some of you may have already been aware, important issues will be on the agenda. These issues will have some effect on you as engineers and technicians at your workplace, and the engineering profession in general. The IEPNG has published a newspaper supplement two weeks ago, highlighting the Competency-Based Assessment format, which will be

handed out at the AGM - another important reason for financial members to make an effort to attend the meeting. The CBA was delayed a bit but IEPNG staff and the Board have been working hard, and it is now ready to be rolled out.

Also published in that same newspaper supplement was a list of IEPNG financial members and PERB-registered engineers and technicians. If you have missed out on reading that list to find out if your name was on that list or not, contact us at IEPNG so that we can try to furnish you that list. If you have not registered or are yet to renew your registration, please do so as soon as possible to avoid the obvious repercussions.

The Board has been promoting talk of ethics in the business of engineering, and I wish to echo that as we approach the AGM. In whatever capacity you work, in whatever organisation, you must ensure to practice ethical engineering practices so that infrastructure, which our own people will be using, must be safe and secure for our citizens to use.

Our next newsletter will be circulated after the AGM, so until then, pleasant reading, and see you all at the AGM.

IEPNG ROLLS OUT NEW ASSESSMENT FORMAT

The Institution of Engineers PNG has begun rolling out a new system to assess professional engineers and technicians before registering them to work in the country.

The new assessment format, which comes in a package, is called Competency-Based Assessment (CBA). It departs from the traditional formats of assessing engineers and other professionals, which is often done through their CVs and qualifications. In the new assessment format, before an engineer or technician is registered with the IEPNG, assessors will take them through a set of criteria to establish the applicants' strengths against no less than 12 sets of competencies.

They will only be registered with the IEPNG if they pass this new, rigorous assessment format. But the assessment does not end there. If the engineers and technicians pass the first assessment, they can register, but there would be periodical assessments, using the same sets of competencies, to ensure that they remain competent in their line of work both within and outside of the country. In a nutshell, the CBA involves producing evidence to make a judgement (decision) about whether the person is competent or not compared to a particular standard. It is criterion-referenced, evidence-based and is a participatory process.

A criterion-referenced assessment involves a person being assessed against an industry standard, or a set of criteria to establish competency; for example; a driving test. Evidence-based assessment is a process that matches evidence of competency against a standard. A participatory process involves the person and the assessor talking about and deciding what and how evidence will be collected to judge competency against the standard.

IEPNG Chief Executive Officer Mr Benedict Mick says the new CBA package will be handed out at the IEPNG's Annual General Meeting in April 22 in Port Moresby. Financial members of the Institution who attended the AGM will be given copies but those that are in other centres of the country will get theirs thereafter to familiarise themselves with it.

NEW ASSESSMENT FORMAT

ELEMENT ONE – KNOWLEDGE		
PE	Comprehend and apply knowledge of the accepted principles underpinning widely applied good practice in professional engineering (Washington Accord degree level)	Provide annotations to your evidence portfolio (document and page number)
ET	Comprehend and apply knowledge underpinning good practice as an engineering technician (Dublin Accord degree level)	
ETn	Comprehend and apply detailed knowledge underpinning good practice as an engineering technician (Dublin Accord qualification level)	
PERFORMANCE INDICATORS FOR PROFESSIONAL ENGINEER		
Has a Washington Accord degree or recognised equivalent qualification or has demonstrated equivalent knowledge and is able to:		
- Identify, comprehend and apply appropriate engineering knowledge - Work from first principles to make reliable predictions of outcomes - Seek advice, where necessary, to supplement own knowledge and experience - Read literature, comprehend, evaluate and apply new knowledge and experience		
ELEMENT THREE – ANALYSE PROBLEMS		
PE	Define, investigate and analyse complex engineering problems in accordance with good practice for professional engineering	Provide annotations to your evidence portfolio (document and page number)
ET	Identify, clarify and analyse broadly-defined engineering problems in accordance with good engineering practice	
ETn	Identify, state and analyse well-defined engineering problems in accordance with good practice for engineering	
PERFORMANCE INDICATORS FOR PROFESSIONAL ENGINEER		
- Identifies and defines the scope of the problem - Investigates and analyses relevant information using quantitative and qualitative techniques - Tests analysis for correctness of results - Conducts any necessary research and reaches substantiated conclusions		

Samples of the competencies that would be used to assess engineers and technicians in the new Competency-Based Assessment system.

WHAT IS COMPETENCY-BASED ASSESSMENT?

Competency based assessment is: **Criterion-referenced; Evidence-based; and Participatory.**

Competency-based assessment is producing evidence to make a judgement [decision] about whether the person is competent compared to a particular standard.

Criterion-referenced assessment - Means the person is assessed against an industry standard, or a set of criteria to establish competency; for example; a driving test.

Evidence based assessment - is a process that matches evidence of competency against a standard.

Participatory process - involves the person and the assessor talking about and deciding what and how evidence will be collected to judge competency against the standard.

You are probably familiar with assessments like tests and exams that measure performance on percentages of accuracy or comparison to the performance of others.

We all remember the 'pass' and 'fail' system of assessment. This is known as norm-referenced assessment.

Norm-referenced assessment methods may have:

- Student results compared against each other
- Statistical comparisons used to grade achievement
- Training assessed by mean/average performance
- Training courses and programs as the basis of assessment
- Sectors of the training used in final examination
- Marking scales used for passing criteria
- Many questions or topics may be ignored.

Norm-referenced assessment is not useful or effective in determining a person's competence to consistently perform a certain task or job activity to an agreed industry standard.

A person can pass a norm-referenced assessment and answer questions with 50 per cent correct responses. What happens if one of the questions that is answered incorrectly is about an important part of the job?

In the norm-reference assessment it would not matter — the person "passed" even though they did not show they have an important piece of knowledge to do the job!

Competency-based assessment measures the performance of the participant against an agreed set of industry defined standards, rather than against other participants or based on a pass/fail method.

Competency-Based Quality Marks or Membership Category

The term "quality mark" refers to any title, membership class or registration that is only achieved through demonstration of a specified level of competence by competence assessment. Current competence means that competence has been demonstrated within the last three years.

IEPNG currently operates one register of current competence

(Professional Engineer) and has five competence-based membership classes (Fellow, Member, Graduate Member, Companion & Technician).

They all require an assessment of competence.

Membership is a "lifetime" brand — once the required competence has been demonstrated, no further re-assessments are required to retain the quality mark. Registration on any current competence register requires on-going assessments of current competence to retain registration.

Any engineering professional can apply for any quality mark, however, the appropriate quality mark will be determined by the level of complexity of engineering work being performed competently:

- Professional engineers perform "Complex engineering";
- Engineering technologists perform "broadly-defined engineering";
- Engineering technicians perform "well-defined engineering".

Assessment for entry to these registers is done in conjunction with assessment for Professional Engineers Registration Board (PERB) registration.

Types of Assessment

There are two types of assessment:

a) Assessment for Admission (AFA) to one or more of the competence based registers or IEPNG membership classes. These involve a knowledge assessment unless you hold the appropriate exemplar qualification where evidence is presented by way of work samples. If evidence is weak, the panel may require a face-to-face Interview/discussion with the applicant.

b) Continued Registration Assessment (CRA) — used to retain/renew registration again on a current-competence register. These involve a knowledge assessment unless you hold the appropriate exemplar qualification where evidence is presented by way of work samples. If evidence is weak, the panel may require a face-to-face interview/discussion with the candidate.

CRA's are required at intervals not exceeding four years. That means a Professional engineer MUST undertake the Competence Assessment every four years to remain on the Register.

Public Naming of Candidates Being Assessed

Changes made to the IEPNG/PERB Rules and IEPNG/PERB Regulations covering competence assessment means that from 2017 any person presenting for competence assessment will have his or her name posted on the IEPNG website for no more than 21 days. During this period any person may make a statement to IEPNG about the candidate's competence.

Any such statement received will be forwarded to the candidate with an invitation to the candidate to make a response.

WORK ON TRACK FOR ANNUAL GENERAL MEETING

Work is on track for the Institution of Engineers PNG Annual General Meeting, scheduled April 22 in Port Moresby, which will coincide with the election of new members of the IEPNG Board.

IEPNG staff have been hard at work since the start of the year, calling for nominations, which opened on January 25 and closed on February 12.

The actual voting for new Board members, which started on February 29, will end on April 8 before the Annual General Meeting dinner on April 22, where the new Board members will be announced.

IEPNG Chief Executive Officer Mr Benedict Mick has appealed to

all financial members to take part in the election process diligently as the results of that process will determine how they move forward as an institution and as a profession.

KEY DATES AND EVENTS:

- | | |
|-------------|----------------------------------|
| January 25 | - Nominations Opened |
| February 12 | - Nominations Closed |
| February 29 | - Voting Started |
| April 8 | - Voting Ends |
| April 22 | - Board Members Announcement/AGM |

RESEARCHERS WORK TO SOLVE INFRASTRUCTURE CHALLENGES THROUGH NEW RESEARCH CENTRE

New Mexico State University in the United States is one of four universities in a new National Science Foundation Engineering Research Centre to develop advances in geotechnical engineering that will provide solutions to some of the world's biggest infrastructure developments and environmental challenges...

NMSU's College of Engineering joins a consortium of university, industry and government partners, led by Arizona State University. The \$18.5 million NSF award establishes the Center for Bio-mediated and Bio-inspired Geotechnics (CBBG) to expand the emerging field of biogeotechnical engineering.

Paola Bandini, NMSU civil engineering associate professor, CBBG co-principal investigator and leader of the center's work at NMSU, was honored at NMSU's Scholarly Excellence Rally, Oct. 30. She is directing the center's work on infrastructure construction, one of four research thrusts of the program.

Engineers and scientists at NMSU, ASU, Georgia Tech and the University of California, Davis are collaborating to develop methods to use or mimic biological processes for engineering the ground in ways that reduce construction costs while mitigating natural hazards and environmental degradation.

"The Center for Bio-mediated and Bio-inspired Geotechnics will learn from nature," Bandini said. "We will learn from biological processes. Nature has had 3.8 billion years of evolution to develop and perfect, very elegant, efficient solutions to problems.

"We're going to learn from those biological processes to improve the methods and find solutions for infrastructure-related construction, maintenance and operations; to reduce the carbon footprint of our construction methods; to reduce the ecological and environmental impact of industries like mining and construction; and to make better and more sustainable use of the non-renewable resources we have," she said.

The center's four research thrusts include hazard mitigation, environmental protection and restoration, infrastructure construction and resource development.

The second main objective of the center is to inspire a diverse group of engineers and scientists to provide the associate workforce necessary for

this new field of biogeotechnical engineering.

"In addition to the university partnership, we have education, outreach and diversity partners including community colleges, school districts and science museums that will work with us to deliver the educational materials that we will develop through the center," Bandini said. "The CBBG also includes a strong partnership program with private industry and government agencies like state departments of transportation, cities and counties that are owners and managers of the civil infrastructure." The center has more than 12 companies and state government agencies confirmed as industrial partners to support the research initiatives along with 15 universities from across the globe.

A multidisciplinary team of nine NMSU researchers specialized in civil engineering, geotechnical and environmental engineering, computer science, geological sciences and biology will participate in various CBBG projects.

In the first year, NMSU research projects will include bio-inspired soil reinforcement, a study of the mechanisms of root growth and mechanical reinforcement in unsaturated soil; bio-enhanced removal of contaminants in groundwater; revegetation of degraded top soils, stripped lands or salinized and eroded soils; and development of self-motile probe for multi-sensor deployment for subsurface investigations.

In addition, NMSU's Arrowhead Center will help implement technology transfer and pursue patents for technologies created at NMSU.

This story is reprinted from materials provided by New Mexico State University (NMSU). The original item was written by Tiffany Acosta. Note: Materials may be edited for content and length. Source: Sciencedaily



NMSU civil engineering professor Paola Bandini, right, works in her laboratory with graduate students Hend Hussien Al-Shatnawi, left, and Rachelle Mason. Credit: Darren Phillips

ANNUAL GENERAL MEETING DINNER

BOOK NOW!

Featuring:

SAM KOIM, Anti-Corruption Advocate

LAWRENCE STEPHENS, TIPNG Chairman

Theme: Enhancing Ethics In Engineering - Paving The Course For Infrastructure Development

► **Date: April 22, 2016** ► **Venue: Dynasty Restaurant, Vision City, Port Moresby**

► **Cost: Per Head - K350 / Table for 10 - K3,500**

Concrete innovation makes Seattle skyscraper stable

A University of Wisconsin-Madison engineer's solution for streamlining the construction of skyscrapers is having a skyscraper moment in one of the most seismically-active regions of the United States...

All coupling beams in the 1.5 million-square-foot Lincoln Square Expansion -- which includes luxury condos, a hotel, dining, retail and office space in two 450-foot towers in the heart of Seattle suburb Bellevue, Washington -- are made of fiber-reinforced concrete using a unique design co-developed by Gustavo Parra-Montesinos, professor of civil and environmental engineering at UW-Madison.

These concrete coupling beams span doorways and windows, helping walls with such openings in them to function as a single structural unit, while bolstering the building as a whole against earthquakes.

Traditionally, coupling beams are reinforced with a labyrinth of rebar, adding a great deal of time, cost and complexity to the construction process.

"Placement of the rebar in these link beams can sometimes control the construction schedule," says Cary Kopczynski, whose Seattle-based firm is the structural engineering company for the project. "Most of the west coast of the U.S., of course, is a highly seismic area, so when you're building concrete structures, they require a lot of intricate rebar to carry the seismic loads."

As an alternative to excessive amounts of rebar, Parra-Montesinos' solution incorporates steel fibers into the concrete mix, and he and University of Michigan collaborator James K. Wight engineered that approach to create beams that equal or exceed the performance of cumbersome rebar designs, yet simplify and speed up the construction process.

The first real-world implementation of the coupling beam solution occurred a few years back. Kopczynski incorporated the fiber-reinforced coupling beams into a portion of The Martin, a 255-foot, 23-story apartment building completed in Seattle in 2013.

Kopczynski credits The Martin's owner and developer for taking a chance on a technology grounded in research, simulation and laboratory-scale testing, but not yet implemented in the field. "They were very interested in being innovative and embracing new technologies," he says.

"That project was viewed as being a huge success because it reduced the level of uncertainty that existed prior to actually using it."

This time around, the teams behind the Lincoln Square Expansion embraced the coupling beam technology because of the overwhelmingly positive feedback they received from crews who worked with it on The Martin project, says Kopczynski.

"The reason we're using the new coupling beams is that they're faster, less expensive, and reduce the potential for field mistakes," he says.

"With traditional coupling beams, it's very common to have placing mistakes in the field because of all of the intricacy. Now, not only can we build the building faster and more simply, but we can reduce the potential for field errors."

Because the new technology is not yet included in the American Concrete Institute's building code -- which sets the agenda for the concrete

construction industry and its regulators -- both buildings have had to pass muster with outside peer reviewers engaged by local officials.

Parra-Montesinos hopes it will be included in the next edition of the code, which is due out in 2019.

"I think we've come up with a very robust design," he says. "We just need to be able to specify the minimum performance requirement for the fiber-reinforced concrete based on standard material tests." Currently, with funding from the Charles Pankow Foundation and other industry partners, Parra-Montesinos and his students are studying other types of steel fibers incorporated into the concrete in various quantities.

"Ultimately, we expect to establish a link between material behavior and seismic performance of the coupling beam so that users are not required to use the same fiber and in the same amounts as we used in our past research," Parra-Montesinos says. "This is a required step to develop design provisions for the building code." His research emphasizes large-scale physical testing, an approach that is helping the construction world catch up to the promise of fiber-reinforced concrete. Kopczynski recognizes that potential, and he looks forward to seeing the new coupling beams become more widely adopted in skyscraper construction. However, he says, a greater payoff will occur when innovative structural engineers like Parra-Montesinos develop ways to incorporate fiber-reinforced concrete into other key building components. "Then, we could potentially start reducing the reinforcement-bar requirements throughout the entire core of the building, and that would have an impact in a very positive way on the way we build concrete buildings," Kopczynski says.



Fiber-reinforced concrete developed in part by UW-Madison engineers protects The Lincoln Square Expansion -- a 450-foot condo, hotel and office building rising in Bellevue, Washington -- against frequent earthquake activity. Credit: Courtesy Cary Kopczynski & Company

This story is reprinted from materials provided by University of Wisconsin-Madison. The original item was written by Renee Meiller. Note: Materials may be edited for content and length. Source: Sciencedaily

EDITOR'S NOTE: IEPNG Members or Stakeholders who wish to contribute to this newsletter are welcome to do so and can get in touch with the IEPNG Editorial team on telephone number 325 8765 or 325 8763, through fax number 325 8718 or email JethroWamm@iepng.org.pg