DQI online service gets recognition from BIFM

CIC has celebrated one year of the DQI (Design Quality Indicators) online with a BIFM Innovation Award nomination.

Graham Watts, CIC Chief Executive said: 'We are really pleased that the BIFM has recognised what the DQI can do for the users and the managers of buildings; feedback from completed buildings at the end of the project is essential if we are to make the much better buildings we need and deserve. Ratification of the tool by the Institute whose members are responsible for running buildings recognises the role the DQI is playing in capturing all the stakeholders' views at the briefing stage.'

At the first DQI AGM, users of the toolkit reflected on the real value of the DQI, whilst newcomers gained a better understanding of what the DQI could do for them and their projects.

- 365 projects have registered with the DQI. This relates to over 400 individual assessments or workshops undertaken with the DQI.
- 2800 individuals have fed into these workshops, and all had a structured opportunity to provide their views on the building projects with which they are involved.
- More than 70% of these 2800 people are end users, facilities managers or visitors to the building. This shows that the DQI is delivering a key aim to involve as many people as possible in defining a value set for their building, and the DQI process is clearly helping this to be achieved.

Richard Simmons, CABE Chief Executive said: 'Enabling dialogue between designer and client is the true strength of the DQI – demystifying design, developing a common language and to agreeing shared project aims.'

The future of the DQI tool was discussed. Short term activities are:

- Following feedback from users improve the briefing version of the DQI toolkit to provide a better benchmark of design quality over the buildings life;
- Analysis of the data collected by the tool to develop industry benchmarks on design quality;
- Developing a register of DQI facilitators, trained professionals who can help add value at the start of the project;
- Developing a variant of the DQI toolkit specific to the needs to schools in partnerships with the Department for Education and Skills (DFES)(over 50% of projects registered with the DQI are schools);
- Developing a DQI for green spaces – the GQI tool – in partnership with CABE Space.

Sunand Prasad, one of the founding members of the DQI Management Board said: 'I hope that by 2010 use of the DQI will become a natural part of briefing and design development through all stages of a project. Additionally we will have accumulated a rich data resource about the projects which will yield valuable insights into what process improvements make for better outcomes for the design of buildings and places.'

- Case studies and other resources: (website: www.dqi.org.uk; tel: DQI team, 020 7399 7407).

Rebuilding a village in El Salvador

Some of the group working with community members on one of the houses

Eight Imperial College students, an engineer from whitbybird and a translator have rebuilt a rural village in Costa Rica, El Salvador, Central America, which was devastated by a series of earthquakes in 2001. The team worked with a local non-government organisation, Reconstruction and Development of El Salvador (REDES) to manage the construction of 17 earthquake-resistant dwellings and a retaining wall protecting the village school.

The 17 dwellings, designed by REDES, are of a lightweight construction – reinforced concrete foundations, a slender steel frame and a diaphragm wall made of plastered over bamboo rods. The roof is constructed of pre-fabricated fibro cement panels. This design attracts as little ground force as possible and will withstand sway created by earthquakes.

The 40m long retaining wall was built in sections; excavating the slope, building rebar cages, fixing L-bars to the cage and concrete for the foundation. Concrete hollow blocks placed over the cast-in L-bars created the wall which was then stiffened by concrete in-fill. The earth was then backfilled, compacted layer by layer and re-planted.

The team was based in El Salvador for 6 weeks during which the retaining wall was complete and half of the dwellings constructed. The team included engineer Robert Godbold from whitbybird and eight students from Imperial College, Martin Threakall, Sanna Supponnen, Michelle Maloney, Alexandra McCredie, Neil Turkington, KK Ho, Albert Lau and Daniel Woodier. Hannah Stevens was the translator.

The project was funded by contributions raised by Imperial College and whitbybird. REDES, funded by overseas charities, identifies and provides aid to communities in El Salvador destroyed by the Civil War (1980-92) and, more recently the earthquakes.

The group pictured in front of part of the retaining wall which they built in the village

Engineering at the heart of the 2012 London Olympics bid

Kathy Stansfield reports:

The structural engineering challenge of large sporting events such as the Olympics was explored at a round table discussion amongst experts hosted by the Engineering & Technology Board recently. ETB has placed itself squarely behind the London bid for the 2012 Olympics and sees such events as an excellent way to promote the work of engineers. 'There are few challenges as big as bringing the Olympics to London', said the ETB's Mike Gannaway.

Sustainability and legacy issues form an important part of the International Olympic Committee's brief to bidders and are central to the London bid, according to Tanya Ross (Buro Happold, one of the 2012 bid team). Like the Australian Olympics site, the 200ha east London site in the Lea Valley is a heavily industrialised, polluted area on a floodplain, and in need of a trigger which will allow regeneration.

The engineering strategy underpins the whole proposal and is a long term solution to the future of the site. The plan includes improving the hydrology by restoring the flow of the canalised rivers, and a bold idea to put the high voltage cables which cross the area into a combined utilities spine tunnel which will ease maintenance in the future. It will connect combined heat and power sites at each end. It also involves tackling huge areas of contaminated land, wherever possible by remediation on site rather than excavation and dumping the problem elsewhere.

The Olympics plan will plug into existing plans by the four local authorities, major transport plans and the south east strategy, providing sports facilities for later local use and housing which will be sold after the event. 'Engineers will make a fundamental difference to the way the valley will look', said Ms Ross. It was not just a matter of devoting time and resources to the big event in London. 'The renewal of the Lea Valley involves techniques entirely applicable to other UK and European cities' she said.

Roger Plank (Sheffield University) and Stephen Morley (Biannchi Morley) said that structural engineers could take more of a lead on designing the buildings. New types of structures have been developed such as long-span arena roofs to give clear site lines and covered stadia or retractable roofs to allow a wider range of use. Stadia roofs could be designed to reduce the visual impact in densely populated areas. It was important to maximise off-site prefabrication, minimise waste and operational energy, and to use local and recycled materials.

Model Analysis Awards 2004

The winners
First Prize
£250 and a certificate went to **Alexandros Feretzakis** of Dundee University, for his dissertation on 'Edge column – slab junction with new detailing'. The Plaque for the winning university department was collected by Dr Nutan Subedi (supervisor).

Judges' comments:
The paper describes experiments as part of the development of a new type of shear reinforcement system. It contains a good review of the problem of shear and the provision of shear reinforcement; clearly the author has taken the trouble to read around the subject. The experimental work is well described, with clear observations. However, it is debatable whether he has found a new failure mode; shear has been avoided and failure is flexural, as would be achieved with high levels of conventional shear reinforcement. The conclusions were fairly limited, being based on the small test programme, and one might question whether the plate is actually a practical approach; it would appear to be very large in relation to the column size. However, the submission is generally of a high standard and the judges were unanimous that the paper should be awarded First Prize.

Highly Commended
Two prizes were awarded in this category, each receiving £100 and a certificate:
1. **Stuart Guarniere** and **Clare Whitworth** of Warwick University for their joint project on 'Branching structures – form finding and model analysis'. Clare was unable to attend the awards presentation.

Judges' comments:
This is an interesting paper, which attempts to see how natural structural forms (tree branches in this case) can be adapted to form roof-supporting structures. The background reasons for the project are not particularly well stated but good examples of structures that adopt the approach have been included. The work was straightforward, making observations of the branching of actual trees, idealising their forms and then using a standard program to produce structural supporting systems. Though largely analytical, with models only used as an aid to envisioning the output, it was good that the authors were aware of the practical limitations of the systems they were proposing, e.g. joints, assembly problems etc. In view of the general quality of the paper, the judges agreed that it should be Highly Commended.

2. **Rory O'Malley** of Bath University, for his work on 'Size effect in FRP reinforced concrete beams'.

Judges' comments:
This was a straightforward piece of work, looking at size effects in beams with FRP reinforcement. His reasons for carrying out the project are clearly stated; the guidance in design codes is for steel, while FRP is new material and so the approaches need to be checked. He appears to have carried out a thorough review of the available literature. The experimental work specifically investigated scale effects, but he has considered other factors which might have an effect, such as not scaling the aggregate size. The experimental work would appear to have been carried out with care. The results are clearly presented and compared with the predicted failure stresses, leading to clear conclusions, though he admits that they only cover one type of FRP. In view of the general quality of the paper, the judges agreed that it should be Highly Commended.

Commended
£50 and certificate went to:
Colum Cavanagh of City University, for his project on 'Effects of tunnel induced movements on deep foundations'

Judges' comments:
This would appear to be a reasonably straightforward piece of work, looking at the settlements induced by tunnelling. The literature review mainly concentrates on centrifuge testing rather than on actual practical problems; the one collapse cited, on the CTRL, was due to the presence of an unrecorded well on the line of the tunnel and had no relevance to movements of deep foundations. The experimental work appears to have been carried out with care and there is a reasonable discussion and interpretation of the results. Overall the author has demonstrated that he has a good understanding of the subject. The judges agreed that the entry should be Commended.

The Model Analysis Award has been organised by the study group on Model Analysis as a Design Tool for many years. However it has recently been disbanded and stewardship of the competition has passed to the Institution's technical department so that it can continue to run. This is a transition year. Dr Fikry Garas was the convenor of the study group and now acts as chair of judges. Dr John Clarke was the study group secretary/treasurer and continues to assist Dr Garas in the judging.

The competition, which is in its 23rd year, is open to 3rd & 4th year undergraduates and first year postgraduates. The award aims to develop awareness in young engineers of the potential of physical testing as part of the design process and to encourage the presentation of their findings in a clear and concise manner. The award is for the best paper dealing with the use of physical models and testing techniques in structural engineering design.

Papers describe a physical modelling project, concerned with the resolution of a practical problem related to any form of construction, including marine and coastal structures. Any construction material ie: steel, concrete, masonry, timber and composites can be used.

Model Analysis prizewinners from left: Stuart Guarniere (Highly Commended), Alexandros Feretzakis (First Prize), Rory O' Malley, and Colum Cavanagh (Commended)

Left: Vice President Michael Dickson with Dr Nutan Subedi and his winning student, Alexandros
Right: the judges, Dr Fikry Garas and Dr John Clarke with Berenice Chan, IStructE

President's Corner

People, places, projects, and a President's challenge

IStructE President Mike Fordyce reports:

At the time of writing this column it is just over 2 weeks since I presented my Address on 'Structural engineering – a passport to travel – and spoke of my journey as a structural engineer involving many interesting people, places and projects.

My journey now continues – this time around the UK & Ireland – and I sometimes feel that I am somewhere between a Bill Bryson and a Billy Connolly (without the beard, language and motorbike). I have already been to several more, interesting places and in this initial part of this current journey it has taken me back to my roots and the start of my career in structural engineering – Edinburgh, Glasgow, Leeds & London, with Middlesbrough & Aberdeen thrown in for good measure. The north east of England has its own place in my make up as it is the homeland of my wife Joan. Aberdeen, of course, is a world of its own in offshore engineering (and a still very active one).

All are very different from each other and all have brought back many memories from a now distant time that also highlight the changes that have taken place over the past 30 to 40 years.

Wherever we have been, of course, it is the people that matter most and it is great to be able to meet so many enthusiastic and diverse groups of our members that make up our Branches. I was forewarned that each of our Branches would be different and they are. This is as it should be. It reflects our profession of structural engineering – the fundamentals are the same, but the details vary with the social, cultural and environmental differences from place to place and between groups of people. Put a problem in front of any group of structural engineers and the response will be as varied as the group.

This is one of the great strengths of our Institution – that while we all belong to a common profession of structural engineering we can organise our affairs locally to accommodate our differences and in a way that suits us best in our own area. There are some basic ground rules that we all must follow but we generally appear to have a good measure of elasticity with little evidence of brittle fracture in our response. (If you disagree, drop me an email: president@istructe.org.uk.)

One of the privileges of this journey around the branches is being taken to see projects, examples of structural engineering in action, and to date these have been most impressive:

- *Terminal 5 at Heathrow* – a massive project, involving major structures above and below ground and huge clear span steel tied arch roof structure.
- *Wembley Arena* – another unique project with its equally impressive steel arch structure and erection methodology.
- *The Wellhead Deck* topside structure for the new Buzzard oilfield being fabricated indoors in a huge shed in Fife.
- *The Leeds College of Music* – a design and build project with its constraints of building on a tight city centre site to a tight programme and budget.

Each of these very different projects has demonstrated the value of teamwork and the benefits to be gained from working together. In all cases the close collaboration between designer and builder is evident with the construction methodology dictating the design in many cases. The scale of the first two projects has also required collaboration between teams of structural engineers from different companies in different locations – with Australia playing a significant role I am pleased to note.

In Scotland I attended the opening of the new Civil Engineering Research Laboratories at the University of Dundee. The official opening by Nigel Griffiths MP, Under Secretary of State at the DTI, was followed by a seminar: 'Researching the future – a celebration of civil engineering', at which I gave an address on the importance of research in structural engineering. There are some interesting structural engineering research projects being carried out at Dundee and I was most impressed by the interdisciplinary research in biomechanics in which structural engineering tools are being used to study the human eye to assist the work of ophthalmologists – yet another example of working together.

One of the challenges I highlighted in my address was about how we engage the younger members of our profession. The branches that I have visited to date are doing a good job with students, and another of my pleasant duties has been to present many student awards at the various branch functions. I trust that I will find similar schemes at all branches. Of course we can always do more and one of our objectives is to ensure that all eligible students become enrolled as student members of our Institution. Perhaps there should be a competition to see which branch can get the highest student membership – on some *per capita* or proportional basis of course!

Each branch should also have a Young Members Group and if not we have to ask why not? The younger members are our future and we should involve them in our branch activities as much as possible.

Challenge No. 1: get involved with your local schools

This brings me to our involvement with schools and the introduction of the President's Challenge to Members – the PCM. My first visit was to Surrey Branch where the Chairman, Peter Minnett, described the visits he makes to his local school. After explaining to the students the basic types and concepts of bridges (arches, girders, suspension, etc) he sets them the task of constructing a bridge using simple basic materials (paper, balsa wood, paddlepop sticks, etc). The bridges are then tested for efficiency – greatest load carried for least weight of bridge. These year nine students who know nothing of structural engineering beforehand are

enthused and excited and produce some very innovative solutions. G'donya, Peter!

I am sure there must be others doing similar things in our schools. Thus the PCM No1 is to all of our Members* to emulate Peter's efforts – little or no resources are required, only a bit of time and a lot of enthusiasm. Let me know what you are doing at: (email: president@istructe.org.uk.).

(*Although my current journey is around UK & Ireland this does not mean that our members outside the UK are excused.)

People

Staff at HQ

Wintana Demoz and **Lucy Pollard** have joined the Membership Department as Qualifications Officers

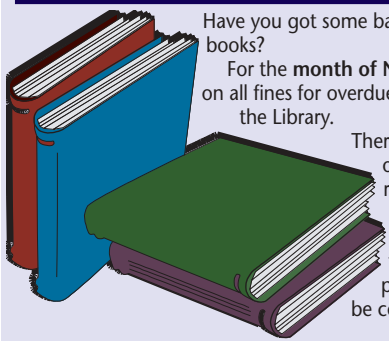
Melissa Whittle has joined IStructE as the new Registration Scheme Administrator.

Hazel Guile, Conference Officer at IStructE from 1989–2001, when she retired, has completed a post graduate part-time degree in Historic Conservation at Oxford Brookes University. She is using her Certificate and Diploma in building related historic conservation to review LA listed building planning applications and hopes to work on the practical repair side of building conservation.

Professor Tim Ibell (M) is the new Chair of Civil Engineering at Bath University.

Adam Humphrey (M) and **Ian Waddingham** (M) have been promoted to Associate Directors at the Hemsley Orrell Partnership.

LIBRARY BOOK AMNESTY: FINAL REMINDER



Have you got some badly overdue IStructE Library books?

For the **month of November** there will be an amnesty on all fines for overdue books so please return them to the Library.

There are normally no fines for overdues but borrowers are reminded that if they do not respond to their second overdue letter they will then incur a £20 fine. Books can by renewed by phone, email or in person so please be considerate towards other users.

Using energy from foundations powers buildings of the future

Kathy Stansfield reports:

The use of geothermal energy in buildings, tunnels, roads and bridges, via foundations, walls and piles, was discussed at a recent Mott MacDonald customer seminar. The technique, which has been used on 400 projects in Europe but only two in the UK, was described by Professor Dietmar Adam of the Vienna University of Technology.

He showed how concrete piles, diphragm walls and base slabs can be designed to absorb geothermal energy by inserting tubes filled with a mix of water and glycol within the reinforcement cage. The tubes are connected to heat pumps and secondary heating circuits for use in buildings, enabling temperatures to be raised to the required heating level, or used to cool buildings.

Improvements in methods have allowed the idea, which was first developed 40 years ago, to be more widely used as the efficiency has been improved, reducing costs and making payback times realistic, Prof. Adam explained.

Geothermal energy is found at constant temperatures of 10-12ºC at a depth of 10-20m. It provides a self-regenerating sustainable energy source with a long life which also helps reduce CO_2 emissions. An added advantage is the positive public image, making unpopular development more acceptable.

Prof. Adam gave examples of use of the technique to heat 40 houses from 143 energy piles in the retaining structure, and an exhibition hall and ice rink where 320 such piles provide 800kW heat, with a payback of under 4 years. Piles have been found to be more efficient than slabs.

In the UK, Keble College, Oxford, used 19 energy piles which have reduced CO_2 emissions by 80%. In a feasibility study Heathrow's T5, it was found that London clay and gravels were ideal for energy foundations and that enough power could be supplied to cover all the cooling and part of the heating requirement. An agreement to use the process for part of T5 has been reached.

New developments have sourced energy from bored tunnels using a geothermal membrane equipped with tubes connected to absorber pipes as part of the tunnel lining. In the extension of the Viennese metro system, U2, the foundations of the station building and tubes have been used as heat absorbers, and four new metro stations and tunnel tubes are to be heated and cooled using geothermal energy.

Asked if the technique could be used in retrofitting buildings and in infrastructure, Prof. Adam said there were difficulties in existing buildings, but where tunnel linings were being replaced, as in London's underground system, it could be installed.

- Further information: Alan Powderham, MottMacDonald (tel: 020 8774 2000).

Standards news

The following standards publications (advised in the Oct 2004 issue of BSI's Update Standards) can be ordered from BSI Customer Services, 389 Chiswick High Road, London W4 4AL (tel: 020 8996 9001; fax: 020 8996 7001; email: orders@bsi-global.com).

New standards

BS 5911: *Precast concrete pipes, fittings and ancillary products*
BS 5911-5:2000 *Specification for prestressed non-pressure pipes and fittings with flexible joints*
supersedes BS 5911-103:1994

BS EN publications

BS EN 12269: *Determination of the bond behaviour between reinforcing steel and autoclaved aerated concrete by the 'beam test'*
BS EN 12269-2:2003 *Long term test*
No current standard is superseded
BS EN 12369: *Wood based panels. Characteristics values for structural design*
BS EN 12369-2: 2004 *Plywood*
No current standard is superseded
BS EN 13636: 2004 *Cathodic protection of buried metallic tanks and related piping*
partially supersedes BS 7361-1:1991
BS EN 13672: 2004 *Surfaces for sports areas. determination of resistance to abrasion of non-filled synthetic turf*
No current standard is superseded
BS EN 13877: *Concrete pavements*
BS EN 13877-1: 2004 *Materials*
No current standard is superseded
BS EN 13964: 2004 *Suspended ceilings. Requirements and test methods*
No current standard is superseded
BS EN 14297: 2004 *Chimneys. Freeze-thaw resistance test method for chimney products*
No current standard is superseded
BS EN 14316: *Thermal insulation products for buildings. In-situ thermal insulation formed from expanded perlite (EP) products*
BS EN 14316-1: 2004 *Specification for bonded and loose-fill products before installation*
No current standard is superseded
BS EN 14317: *Thermal insulation products for buildings. In-situ thermal insulation formed from exfoliated vermiculite (EV) products*
BS EN 14317-1: 2004 *Specification for bonded and loose-fill products before installation*
No current standard is superseded
BS EN 14869: *Structural adhesives. Determination of shear behaviour of structural bonds*
BS EN 14869-2: 2004 *Thick adherends shear test*
No current standard is superseded

Publicly available specifications

PAS 60: *Equipment used in the controlled removal of asbestos-containing materials*
PAS 60-1: 2004 *Controlled wetting of asbestos-containing materials. Specification*
No current standard is superseded
PAS 65: 2004 *Management of public swimming pools. general management. Code of practice*
No current standard is superseded

Amendments to British Standards

BS EN 933: *Tests for geometrical properties of aggregates*
BS EN 933-6: 2001 *Assessment of surface characteristics. Flow coefficient of aggregates*
CORRIGENDUM 1 AMD 15318
BS EN 1367: *Tests for thermal and weathering properties of aggregates*
BS EN 1367-3: 2001 *Boiling test for Sonnenbrand basalt*
CORRIGENDUM 1 AMD 15332
BS EN 12620: 2002 *Aggregates for concrete*
CORRIGENDUM 1 AMD 15333
BS EN 13043: 2002 *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*
CORRIGENDUM 1 AMD 15334
BS EN 13055: *Lightweight aggregates*
BS EN 13055-1: 2002 *Lightweight aggregates for concrete, mortar and grout*
CORRIGENDUM 1 AMD 15339
BS EN 13139: 2002 *Aggregates for mortar*
CORRIGENDUM 1 AMD 15335
BS EN 13242: 2002 *Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction*
CORRIGENDUM 1 AMD 15336

British Standards proposed for withdrawal

BS 8301:1995 *Code of practice for building drainage*
Superseded by parts 1-4 of BS EN 752 and has been proposed for withdrawal

British Standards withdrawn

BS 5911: *Precast concrete pipes, fittings and ancillary products*
BS 5911-2: 1982 *Specification for inspection chambers*
Superseded by BS 5911-4:2002 and BS EN 1917:2002
BS 5911-100:1988 *Specification for unreinforced and reinforced pipes and fittings with flexible joints*
Superseded by BS 5911-1:2002 and BS EN 1916:2002
BS 5911-103:1994 *Specification for prestressed non-pressure pipes and fittings with flexible joints*
Superseded by BS 5911-5:2004
BS 5911-120:1989 *Specification for reinforced jacking pipes with flexible joints*
Superseded by BS 5911-1:2002 and BS EN 1916:2002
BS 5911-200:1994 *Specification for unreinforced and reinforced manholes and soakaways of circular cross section*
Superseded by BS 5911-3:2002 and BS EN 1917:2002

New work started

BS EN 1295: *Structural design of buried pipelines under various conditions of loading*
BS EN 1295-1: 1998/Corrigendum 1 *General requirements. Corrigendum 1 to national annex*

Draft British Standards for public comment

04/19983213 DC
BS EN 14992 *Precast concrete products. Wall elements. Products properties and performance*
Comments for the above are required by 31 October 2004
04/19983215 DC
BS EN 14990 *Precast concrete products. Road traffic noise reducing devices and barriers. Requirements and test methods*
04/19988807 DC
BS EN 14991 *Precast concrete products. Foundation elements*

CEN European standards

EN 1771:2004 Products and systems for the protection and repair of concrete structures. Test methods. Determination of injectability using the sand column test
EN 12504: *Testing concrete*
EN 12504-4: 2004 *Determination of ultrasonic pulse velocity*
EN 12617: *Products and systems for the protection and repair of concrete structures. Test methods. Shrinkage*
EN 12617-2: 2004 *Shrinkage of crack injection products based on polymer binder. Volumetric shrinkage*
EN 12618: *Products and systems for the protection and repair of concrete structures. Test methods*
EN 12618-2:2004 *Determination of the adhesion of injection products, with and without thermal cycling. Adhesion by tensile bond strength*
EN 12629: *Machines for the manufacture of construction products from concrete and calcium-silicate. Safety*
EN 12629-6: 2004 *Stationary and mobile equipment for the manufacture of precast reinforced products*
EN 13224: 2004 *Precast concrete products. Ribbed floor elements*
EN 13361: 2004 *Geosynthetic barriers. Characteristics required for use in the construction of reservoirs and dams*
EN 13877: *Concrete pavements*
EN 13877-2: 2004 *Functional requirements for concrete pavements*