



**WIND
ENGINEERING
SOCIETY**

Newsletter

❖ Chairman's Column

Free drink

Hopefully that has got your attention! Firstly, I must add my few words about the Scruton Lecture to those that appear elsewhere in this Newsletter. We are very fortunate in WES to have two such distinguished members – both of them Fellows of the Royal Academy of Engineering – and doubly fortunate that they have agreed to share their experience and wisdom in the 8th Scruton Lecture. The subject of dynamics will be very interesting to many engineers from a variety of backgrounds. I urge you to attend on the 5th November and to bring along friends, colleagues and clients. I am certain they will not be disappointed and there is that free drink I mentioned at the start!!

Committee Activity

I will turn now to a progress report on some of the things I have set out to achieve in my two years as Chairman. I can start with plans to share responsibilities around the committee members. I have already agreed roles with several and aim to complete this very shortly. I have also recently attended a meeting of the Associated Society

Chairmen at Great George Street. This was a useful get together and I came away strongly reassured that the Institution really does value the contribution of societies like ours. A working group has been set up to look at the services provided to societies and to look for economies – which is a more positive way of doing what often turns out to be an imposed increase in our fees paid to the ICE. It was heartening to see this more considered approach and I have volunteered to sit on the working group to ensure that the needs of small societies are properly aired.

Becoming a CEng

It has long been an aim of WES that we should be able to offer a route to chartered membership of ICE but it has been difficult to find a way to accommodate the specialist nature of our work. With this in mind I recently met with a very helpful member of the Institution's Membership Department.

As a result, I am greatly encouraged by the Institution's attitude and have found that the rules are now framed in a way much more conducive to including the wide range of disciplines that make up civil and structural engineering.

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I personally intend to pursue this and will be aiming to submit my application next year. I am also appealing here for any other members who are interested to get in touch so that we might share the pain and help each other. For older (like me), more experienced (possibly less like me) engineers, an immediate application may be appropriate. For younger engineers, I would like to establish a group that we, along with the Institution, might guide towards gaining the correct experience and training to apply in a short while.

Please e-mail me at pfreathy@anemos.co.uk

❖ Snippets

❖ A Wind Solution Finds its Feet

There are 82 wind power projects in the UK today, consisting of 1,030 turbines which together generate 588 MW (megawatts). That's enough to power 386,000 homes. There are plans to build many more, since the government is relying heavily on wind power to help meet its renewables targets.

In July this year the Department of Trade and Industry announced plans to build new offshore wind farms capable of generating up to 6 GW (gigawatts), enough to power 15 per cent of UK homes by 2010. Wind farm developers have been invited to tender to build in three locations: the Thames Estuary, Greater Wash and the North-west. These new sites are in addition to offshore wind farms already under construction at North Hoyle, near Rhyl, Scroby Sands near Great Yarmouth and 15 others in the planning stage. Between them these will generate around 1.5 G.W.

With thanks to Prospect, this is a short abstract of an article that appeared in their journal 'Profile' Issue 7 October 2003, profile@prospect.org.uk

❖ Saving our aviation heritage

The success of BBC television's Restoration programme has brought to light another candidate, which although not one of the

programme's finalists has been described as the 'cradle of aviation' in the UK.

Today the Royal Aircraft Establishment at Farnborough might look like a collection of brick huts with a corrugated iron clock tower and civil service style buildings. But the first jet engine, the bouncing bomb, the Spitfire, Harrier jump jet and Concorde were all developed there – as well as carbon fibre. (*ed. And also significant work relating to wind engineering*)

Since the Ministry of Defence sold the site in 1998, much of it has been demolished. However, thanks to the ten-year campaign of the Farnborough Air Sciences Trust (FAST) and Save Britain's Heritage, the historic core of the site has been saved.

They have achieved Grade 1 listing for the two main wind tunnels and for the oldest wind tunnel on the site built in 1916. FAST is now keen to move on to the second phase of their plan – restoration.

Campaigners want to preserve the remaining buildings dotted between the wind tunnels to retain the sense and consistent feel of the place. They plan to work with the existing owners of the site to turn them into an "educational and heritage resource to inspire and instruct future generations".

Thousands of Prospect members worked at Farnborough over many decades, at the very heart of the challenging and innovative work under-taken there.

Terry-Anne Boxshall, secretary of the QinetiQ branch, said: "The site at Farnborough has much of the history of the Royal Aircraft Establishment in its old buildings, especially for those of us in Prospect who worked there.

"We congratulate the campaign to save our science and engineering heritage for future generations".

For further information contact: John Selby, 01489 572795 or www.fasta.co.uk and www.savebritainsheritage.org

With thanks to Prospect, this article appeared in their journal 'Profile' Issue 7 October 2003, profile@prospect.org.uk



8th Biennial Scruton Lecture November 5th 2003 at ICE

The Wind Engineering Society is pleased to announce the 8th Biennial Scruton Lecture to be held at the Institution of Civil Engineers on 5th November 2003.

Drinks and nibbles will be served from 5:00pm

Structures, Dynamics and Wind - a 10 Year Review **Lecture to be given jointly by Brian Smith and Tom Wyatt**

Synopsis

The past ten years has seen increasing recognition of the importance of wind engineering in the design of structures together with the availability of new tools for the engineer to use. The theoretical and modelling advances, however, have made the determination of a robust route to design increasingly complex. Bridges of record breaking spans or unusual configuration, lighter and more esoteric structures of many kinds, the use of novel materials, and structures shaped more by architectural considerations than by optimal resistance to the wind on the one hand, with the introduction of more detailed Code requirements on the other, have characterised the past decade for the wind engineer. The outcome has been not only advance, but also some surprises and even some disappointments and retrofits.

The speakers will review both advances and surprises, covering a wide range of wind-sensitive structures. Drawing especially on their extensive personal experience, they will offer their own views on current techniques and a few unresolved questions.

Tom Wyatt

Tom Wyatt is one of the country's outstanding civil engineers and he entered the profession at a time when the majority of practitioners thought wind forces could be adequately dealt with by applying a static loading. He helped to pioneer the study of dynamic loading and soon discovered a kindred spirit in Kit Scruton. Long span bridges provided the application area where Scruton's aeronautical aeroelastic background and Tom's understanding of dynamic structural response of buildings could come together and flourish. Tom's ability for clear and careful thinking was soon applied to a much broader range of wind engineering problems including the prediction of the response of structures due to unsteady loading induced by atmospheric turbulence. Discussions with Tom are always rewarding and usually leave us realising that how the structure behaves is just as important as understanding what the wind is doing.

Brian Smith

Brian Smith is a Consultant to the Flint & Neill Partnership having been a Partner from 1977 to 1997. Brian has been responsible for the design and assessment of a wide range of wind sensitive structures ranging from major bridges to tall tower and masts, from footbridges to chimneys. He has been extensively involved in British, European and International Codes and Standards; currently he is Chairman of the BSI Committee on Masts and Towers and a member of the BSI Working Group on Wind Loading. He is Convenor of the project teams for the Eurocodes on Masts and Towers and on Steel Chimneys and was a special advisor to the Highways Agency for the aerodynamic stability of bridges, being a co-author (with Tom Wyatt) of the British Design Rules (BD49). He was Chairman of the Wind Engineering Society from 1999 to 2001. With thoughts of retirement, Brian is quite artistic and paints.

There will be a dinner following the Scruton Lecture and any member who would like to join this (at their own expense) please contact Eunice.Waddell@ice.org.uk.



❖ More news from the USA Bill aims to reduce wind hazards

Legislation recently reintroduced in Congress would direct the federal government to adopt a coordinated program in developing new approaches for reducing damage caused by windstorms. Although an earlier version of the bill languished in the previous Congress, the current version appears to be attracting greater interest.

Introduced on May 7 by Representative Dennis Moore (D-Kansas), the Hurricane, Tornado, and Related Hazards Research Act (H.R. 2020) would establish a Natural Wind-storm Hazard Reduction Program to develop and implement a coordinated process for carrying out research and developing and transferring technologies designed to reduce the hazards associated with windstorms. Managed by representatives of relevant federal agencies, the program would be overseen by the White House's Office of Science and Technology Policy.

The bill's stated objective is to achieve within 10 years of its passage "major measurable reductions in losses that would otherwise have occurred to life and property from windstorms and related hazards."

Each year in the United States tornadoes cause an average of 80 deaths, more than 1,500 injuries, and \$850 million in damage, and hurricanes annually cause an estimated \$5 billion in damage, according to the Wind Hazard Reduction Coalition, a group of businesses, universities, associations, and professional societies – including ASCE – dedicated to reducing the loss of life and damage to property resulting from windstorms.

The legislation would promote efforts to carry out research in order to develop and demonstrate improved "disaster-resistant systems", construction materials, exterior components for buildings, structural design, and design and construction techniques. Such efforts would rely on physical testing, post-disaster assessments, and computer simulations. Information about the performance of building systems and materials during windstorms would be collected and

inventoried. For such critical facilities as schools, public utilities, and "other structures that are especially needed in time of disaster", the bill calls for the development of "cost-effective and affordable planning, design, construction, rehabilitation, and retrofit methods and procedures".

Research results, cost-effective construction techniques, and other items developed as part of the program would be disseminated to the public. Information and technology released by the program would be provided "in a form that [would be] of use to the design professions, the construction industry, and other interested parties".

With thanks to the Civil Engineer, July 2003, this is an extract of an article under the heading Policy Briefing.

❖ Wind factor forces redesign of Hong Kong bridge

RISK OF cable vibrations caused by wind induced sway have forced engineers to redesign the huge 293m high towers for Hong Kong's 1.01km central span cable stayed Stonecutters Bridge.

Composite construction will now be used for the upper 120m sections instead of an all steel solution to increase stiffness.

News of the change has emerged as five groups of international contractors prepare to submit bids to build the bridge incorporating what will be the world's longest cable stay span.

Halcrow/Flint & Neill won the original competition for the bridge, with a design which featured distinctive all steel upper sections.

But this was a preliminary design and had not been wind tunnel tested before detail design work was handed over to Arup's Hong Kong office.

After a programme of wind tunnel tests, Arup has finally opted for a stiffer stainless steel/concrete composite shell for the upper tower sections.

Arup's solution was developed in conjunction with its principal sub-consultant COWI of Denmark.

A stainless steel outer shell will be doweled into an inner insitu concrete skin typically 800mm



thick. High performance duplex stainless steel 20mm thick was specified for the outer skin. The Arup design team has a brief to retain much as possible of the visual aspects of the original competition-winning concept (*NCE* 3 May 2001). This meant switching to an all-concrete pylon was undesirable.

“Duplex stainless steel combine durability and strength,” said stainless steel fabricator Ancon Building Products special projects manager Paul Fisher.

“But they are difficult to weld consistently, because steel temperatures have to be very closely controlled or durability is compromised”. Recent full scale trials in Ancon’s Sheffield factory proved the feasibility of the Arup concept. (*NCE* 29 May).

With thanks to the New Civil Engineer, October 2003.

❖ Second bearing replaced on troubled Glasgow tower

Ed. You may recall one of our evening meetings when we were informed about the Glasgow tower which rotates to face the wind. Teething troubles usually make good publicity, I, for one, want to see it.

A SECOND key bearing on the controversial £8.5M Glasgow Science Centre tower has had to be replaced, main contractor Carillion confirmed this week.

In addition to the massive plain spherical bearing installed last week (*NEWS* last week), it has emerged that Carillion also replaced the radial roller bearing immediately above the thrust bearing. The plain spherical bearing replaced the failed roller thrust bearing that originally supported the 450t structure’s weight. The second radial bearing, surrounding the lower end of the tower’s root cone, is designed to resist lateral wind loads.

Visitors have been barred from the tower’s observation platform since it was discovered that the 105m high structure had sunk 15mm into its basement pit.

The subsidence jammed the mechanism that ensured the platform could rotate so it always faced into the wind. It also allowed rainwater to percolate through the water proof membrane at

ground level. “We discovered the radial bearing had sustained some damage during the original subsidence,” a Carillion spokeswoman told *NCE*. “As a precautionary measure a new bearing of the same type was installed while the tower was jacked up last week”.

Carillion was due to begin the first rotation trials this week.

With thanks to the New Civil Engineer, October 2003

❖ The International Association of Wind Engineering

The International Association for Wind Engineering was set up several decades ago as a fairly informal organisation. It’s basic role was to organise the four-yearly international conferences, and its “membership”, in so far as this could be defined, was a rather ad hoc group of national delegates who met at the International Conference, to hear reports on activities around the world and to decide on future conference venues. The officers of the Association were its Chairman – usually the organiser of the next International Conference, and three regional co-ordinators – one for Europe and Africa, one for the Americas and one for the Asia – Pacific region. At the International Conference in Copenhagen in 1999, this rather informal body decided that the discipline of wind engineering had matured sufficiently to warrant a more formal organisation, and a small group was tasked to work on the preparation of a more formal constitution and structure. This constitution was presented at the recent Lubbock conference and unanimously accepted. It sets out the following aim for the reformed IAWE.

The aim of the association is to promote international co-operation amongst scientists, engineers and other professionals for the advancement of knowledge in the broad field of wind engineering.

The Association will accomplish its aim by

- *organising international and regional meetings;*
- *accomplishing the liaison with national and international*



organisations working in wind engineering and similar fields;

- *promoting and facilitating the interchange of knowledge, ideas, results of research and technological collaboration; and*
- *encouraging the constitution of new member organisations.*

Members of the association will be national or regional wind engineering societies, who will appoint a number of delegates (between 1 and 4 depending on the number of members in each society) to the General Assembly of the IAWWE. This assembly will meet at the International Conference every four years, again to hear reports of international activities and to decide on the future conference programme, as well as to discuss long term initiatives in the field of wind engineering. The day-to-day work of the Association will be carried out by an Executive Committee, which will consist of

- The President of the Association, elected by the General Assembly for a four-year term.
- The immediate past President
- The Chairman of the next International Conference.
- Three Regional Co-ordinators, elected at the regional conferences which are held every four years, two years after the International Conferences, for a four-year term, who will be the primary organisers of IAWWE activities within each region.
- Three Regional Representatives, elected by the General Assembly for a four-year term.
- Co-opted members – for example the editor of JWEIA

This seems on the surface to be straightforward enough, but as with any organisation of this kind, things are never simple. At the Lubbock conference the

national delegates formed themselves into the first General Assembly of the Association, and Giovanni Solari from Genoa, the Regional Co-ordinator for the European and African region was elected as the first President. The three Regional Representatives were also elected – and I was elected as the Representative for the European and African Region. However a problem arose because Giovanni had to relinquish the post of European / African Regional Co-ordinator on being made President. This caused major confusion, not least over the position to which I was elected. Many of the European delegates thought they had elected me as Regional Co-ordinator rather than as Regional Representative, and I wasn't certain myself! A well-hidden clause in the new Constitution (which was not actually noticed until well after the meeting had closed) indicates that in the event of the Regional Co-ordinator not being able to fulfil his duties, the Chairman of the next Regional Conference should take over his duties until a new Co-ordinator can be elected at the next Regional Conference. This officially makes Jiri Napstek of Prague the acting Regional Co-ordinator.

Jiri learnt of this with some horror however, as he feels he has more than enough to do with the organisation of the next Regional Conference in Prague for 2005, and with other personal commitments. There was the possibility of holding a by-election for the post, but as the IAWWE formally has no members at present (as there is no mechanism at present in place for national associations to apply for membership) this would have been problematic. After the exchange of a great many emails and letters it was therefore decided that whilst Jiri should remain nominally the Regional Co-ordinator, I, as Regional Representative, should take on most of the Co-ordinators duties. The primary duty of course is to ensure that national wind engineering societies join the IAWWE and to help in the



formation of national / regional societies where they do not at present exist, so that a proper election for Regional Representative can take place in Prague.

All in all, I can only conclude that involvement with the organisation of international bodies makes the application of BS6399 appear trivial – and certainly presents a whole new set of challenges. I will keep WES membership informed of any future progress or initiatives

Chris Baker

❖ Launch of 'Eurocode Expert'

A new vehicle for communicating developments and guidance on the Eurocodes has been established by the Institution of Civil Engineers, Thomas Telford and various other construction industry bodies with full backing of the Governments through the Office of the Deputy Prime Minister (ODPM).

Known as 'Eurocode Expert', the campaign includes a new website at www.eurocodes.co.uk, which includes details of all codes and their progress together with listings of all recent Eurocode-related publications and forthcoming institutional events.

'Eurocode Expert' has also established a Eurocodes Users' Group which will provide:

- a periodic newsletter 'Eurocode News'
- e-mail help for basic queries on the Eurocode programme, implementation and available support.
- presentations to organisations on the Eurocode implementation.
- e-mail updates on the Eurocode programme.
- discount on Eurocode publications.

Details may be obtained from the website:

www.eurocodes.co.uk.

Brian Smith, Flint and Neill Partnership.

❖ Some recent papers by WES members

Towards quantitative visualisation of transient surface flow on building models using infrared thermography

Nicholas J. Cook, Patrick Chan, Dereck Wu,
Martin A. Holder
Abstract

This paper describes a feasibility study on improving the spatial and the temporal resolution of the visual technique proposed in 1996 by Yamada, Uematsu and Sasaki and applying it to the flow over the surfaces of model buildings. A cube with 100 mm sides was constructed of aluminium sheet, mounted on a ground plane and immersed in smooth uniform flow at around 10 m/s. The internal temperature of the cube was maintained at 50°C by constantly circulating hot water through it. The surface of the cube was coated with a uniform layer of a number of insulating materials, in turn, and the temperature of the outer insulated surface was monitored using an infrared camera. A 1.5-mm-thick neoprene sheet gave a range of surface temperature around 10°C and a time constant of about 3 s. A 0.23-mm-thick PVC sheet gave a range of around 4°C and a time constant of about 1 s. Self-adhesive PVC "Gaffer tape" of around 0.1 mm thickness gave a range of around 2°C and a time constant of about 0.2s. In this last case, unsteady fluctuations of the surface flow were clearly visible. The patterns observed were very similar to patterns of surface flow and surface pressure in published literature.

Extreme wind speeds in mixed climates revisited

Nicholas J. Cook, R.I. Harris, Richard Whiting
Abstract



The methodology for the analysis of extreme wind speeds in mixed climates originally proposed in 1978 by Gomes and Vickery is updated to take advantage of recent improvements in methodology and available data records. The revised methodology is demonstrated for two sites in Australia: Onslow and Brisbane. This work shows that the observed curvature in the upper tail is due to incomplete convergence to the Fisher-Tippett Type 1 asymptote and is not an indicator of Type 3 behaviour as sometimes supposed. It is also shown that moving from a reference epoch of 1 year to an epoch of 50 years frees the method from most of the rate dependent assumptions, and simplifies the problem to a single, dominant wind mechanism.

Ed. Thanks for the copies of these papers Nick, I also thought your exploits as a sailor taking part in the Construction Industry Regatta deserved more publicity. With thanks to Anemos.



❖ University day 10th Sept 2003.

Congratulations to all the presenters at the WES University Day, they made it an informative and interesting day that attracted a good sized audience. The work presented was varied and showed wind engineering to be active and well supported in Universities and Research Organisations.

The prize for the best presentation went to **Paul Stangroom** of Nottingham University for 'CFD Modelling of the Askervein hill'. Well done Paul. All the other presentation showed interesting projects with good understanding of the processes involved. I found the paper by Ryan Reynolds, Southampton University, on 'The structure of urban-type rough-wall boundary layers' of particular interest to me.
Ed.

❖ Windstorm damage to buildings and structures in the UK during 2002.

Executive Summary

(of a report prepared by BRE for the Office of the Deputy Prime Minister.)

This report gives the result of an analysis of damage to buildings and structures in the United Kingdom and Northern Ireland caused by gales in 2002. The analysis was carried out using press cuttings as the major source of data. This survey has been on-going since 1962 and this report is the latest in a series of annual wind damage reports. 2002 was a relatively windy year with 122 Wind damage events reported. There were 5 Gales, 16 Minor Gales, 92 isolated damage incidents and 9 tornadoes. A total of 1095 newspaper cuttings were received from which the total number of buildings damaged by wind action during 2002 has been estimated to be about 367,500. The estimated repair cost (excluding consequential and secondary losses) was estimated to be £116m. By far the largest proportion of the reported wind damage, 48.6%, was to roof coverings of all kinds and 59% of this roof damage was to tiled or slated roofs. During the year under review a total of 32 people were killed and 63 injured, 17 seriously, in wind related incidents, of these 7 deaths or serious injuries were caused by the direct action of wind on or around buildings. Of the minor injuries suffered, 17 were caused by direct building damage. The remaining minor injuries suffered had a variety of causes, including road and rail vehicles hitting fallen trees and people being blown over.



*Thanks to Paul Blackmore, BRE and ODPM for permission to include this summary. Also for granting permission to place the **full report on the WES web site.***

❖ About WES

Executive Committee

The current committee is as follows. Contact details can be obtained either from the WES website or from Eunice Waddell at the ICE.

| | |
|-------------------------|--------------|
| Chairman | Paul Freathy |
| Vice Chairman | Roger Hoxey |
| Hon. Sec/Treasurer | John Wills |
| Chairman, Research Ctte | Brian Lee |
| Chairman, Strategy Ctte | Paul Freathy |

| | |
|---------|---------------|
| Members | Chris Baker |
| | Dick Barnard |
| | Gordon Breeze |
| | Brian Smith |
| | Mark Sterling |
| | Vacancy |

| | |
|------------------|---------------|
| Co-opted members | Andrew Allsop |
| | Ian Castro |

| | |
|--|-----------|
| Structures & Building Board representative | Tom Wyatt |
|--|-----------|

ICE Support

Our contact at the Institution for all administrative support is Eunice Waddell. She can be contacted at

Tel: 020-7665-2238

Fax: 020-7799-2238

e-mail: Eunice.Waddell@ice.org.uk

WES website www.ukwes.org

❖ Forthcoming WES Meetings

5th November 2003, 6 p.m., 8th Scruton Lecture at ICE. Tom Wyatt and Brian Smith will be presenting the Scruton Lecture jointly. (details above)

3rd February 2004, High Intensity Winds. We are planning a meeting to discuss 'high intensity winds'. These range from tornadoes to

hurricanes as well as the more complicated downburst or microburst.

12th May 2004, AGM and evening meeting discussing case studies, at ICE.

15th – 17th September 2004, 6th UK Conference on Wind Engineering, Conference to be held at Cranfield University. Details to follow, first announcement and call for papers December 2003.

❖ Other Forthcoming Conferences

URBAN WIND ENGINEERING &
BUILDINGS AERODYNAMICS
International Conference Organized by
COST ACTION C14
Impact of Wind and Storm on City Life Built
Environment
5-7th May 2004

PROVISIONAL PROGRAMME

The program consists of four sessions:

- Assessment of urban wind problems and synthesis of results,
- CFD techniques
- Large scale facilities and full scale measurements,
- Analytical and numerical techniques

Ample time will be left for free discussion. Invited lectures by well-known specialists will complete the technical programme. The Conference will not have parallel sessions, enabling the participants to follow all presentations.

❖ Corporate member news

Vehicle buffeting of a traffic signal mast

Silsoe Research Institute and Flint & Neill Partnership are undertaking a study for the Highways Agency on vehicle buffeting of a large cantilever traffic signal mast (a traffic signal on a 6 m high, 5.5 m outreach arm). The goal is, as with the previous projects on



lighting columns, to formulate appropriate design rules to safeguard against fatigue induced this time by passing vehicles rather than by the wind.

A test structure has been erected at the Millbrook Proving Ground (formerly the Vauxhall test facility) in Millbrook, near Bedford, half way along the 'mile straight' test road. The mast has been instrumented with accelerometers, pressure sensors and an ultrasonic anemometer. Pressure pipes on the ground measure the speed and location of the test vehicle which is a large articulated lorry



some 4 m high and 15 m long. The vehicle will be driven at different speeds and at different positions beneath the structure. The pressure wave, wake flow, and structural response will be monitored to provide the understanding and data needed to formulate fatigue design rules.

❖ Contact Point

Contributions and responses to:



Roger Hoxey@ukwes.org



Roger Hoxey

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Wrest Park, Silsoe, Bedford,
MK45 4HS



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Please help to fill this space by contributing news clippings, people news, details of key projects or facilities that might interest others or notices of new books and meetings. **In the next newsletter we would like to include services offered by our corporate members.**