Queries, comments, correspondence, and curiosities . . .

Earthquakes & BS 8110

My correspondent Denis Camilleri writing from Malta replies to the letter from Mr Tee in the Journal of 17 July 2007. He says:

The question raised by Mr Tee (Verulam – 17 07 07) could possibly be sorted out by delving into Eurocode 8: *Design provisions for earthquake resistance of structures*.

This code requests that the design ground acceleration for a return period of 475 years is to be specified for a region. This being equated to the ground motion level which is not going to be exceeded in the 50 years' design life, in 90% of cases.

A no seismic zone, which requires no seismic calculations to be undertaken, is where this specified design ground acceleration does not exceed 0.04g.

Where this specified design ground acceleration lies between 0.04g and 0.1g, this region is defined as a low seismic zone, in which case preliminary basic static seismic calculations would have to be undertaken, however no further detailing is required to that found in EC 2 and EC 3, being the concrete and steel codes respectively.

On the other hand where the specified design ground acceleration exceeds 0.1g, this is considered to be a high seismic zone region. Here dynamic seismic analysis has to be undertaken together with further structural requirements outlined in EC 8, which considers further ductility requirements at the structural joints together with enhanced detailing.

My thanks to Mr Camilleri for providing the guidance on this particular query.

IStructE Membership

Ian Dean writes from Aberdeen to explain why he will not be renewing his IStructE membership next time.

I have been a full 'silent' member of the Institution since 1980. I will be approaching retirement from my current position as a lead structural engineer in the offshore industry in a couple of years time.

I have decided not to renew my membership next year as I have realised that there is absolutely no benefit to myself whatsoever apart from the prestige of being able to put a few letters behind my name. The industry I am in has little regard for professional qualifications and my remuneration will be the same regardless of whether or not I am a member of a professional institution. The CPD situation has probably pushed me over the edge – I do not have a black dot against my name but I would have thought that at a certain age maybe some of us have developed as much as we can or need to. I will however continue to produce innovative designs and I trust that I and my younger colleagues and myself will mutually benefit from working together.

I am sorry to read that Mr Dean feels so strongly on this subject that he no longer considers it necessary to renew his membership. His colleagues, IStructE members in Scotland and elsewhere may feel this decision to be an opportunity missed in the knowledge that Mr Dean could pass on his extensive experience through a presentation at his regional branch or possibly through a paper in the Journal.

The membership survey

Royston Foot of Orpington, Kent writes to explain why he does not vote in the surveys any longer.

I am a member of one or two engineering institutions and at times receive membership surveys from them both.

However, I am in my 80th year and long retired and feel that it is only the younger, active members who should be involved in replying to these surveys.

Hence it is a conscious decision, not apathy, that leads me not to reply to them.

An understandable reason from Mr Foot though I expect that the Institution is interested in the opinions of all members whatever their age.

IT's a brave new world

Professor Bill Jenkins of Blairgowrie, Perthshire praises the recent 'Special Issue' of the Journal and looks to the future. He writes:

Congratulations on the Information Technology (IT) themed issue of *The Structural Engineer* 3 July, I found the developments described exciting and highly significant. We have been treated to outstanding progress in graphics, modelling, design, simulation, parametric design and more.

Having worked in this field for nigh on 50 years I have found that there is always more to come. What we are seeing now could hardly have been predicted 50 years ago but we have seen and continue to see, quite incredible developments in the use of computers in structural engineering.

We have witnessed remarkable increases in processing speeds, memory capacity and (particularly) graphics. We have highly developed FE analysis and design software but what we have not got is a fully integrated approach to analysis and design. The reason for this is clear: design and analysis require very different computational approaches. Design is basically an iterative process – we get there step-by-step, whereas analysis is an '*ab initio*' numerical process in which we analyse a structure already designed and if we change the design the analysis starts again from the beginning. There seems to be no way out of this so we can take the view that it doesn't really matter and we only need to analyse, at appropriate stages, to check that all is well. We need to do better than this. Time to broaden our vision.

What we (hesitatingly) call 'optimum' design, never mind for the moment what 'optimum' means, will be inescapable at some time in the future. Designs will all have to be 'optimum' in some appropriate way, so we should take it seriously. There is no question about using our current analysis software in these circumstances since the structure may need to be reanalysed many thousands of times. No need to baulk at this – future computers will be able to do it but we are not quite there yet. The point is, to put it briefly, analysis will have to be iterative just as design is iterative. The 'interruption' in the design process caused by analysis needs to be removed. What is possible is that the analytical method will be part of a network approach to design.

Some exploratory work in this direction has already been carried out[1] where the analysis is continuously updated with each design change. If we can achieve this, the designer is free to concentrate on the design process. Pie in the sky? I don't think so.

Reference:

[1]Jenkins, W. M. 'Structural design optimisation by evolution', *The Structural Engineer,* 6 July 2004

The speed with which computer technology advances means that the inclusion of an automatic iterative analysis procedure within the design process, to which Professor Jenkins refers, may indeed be near. Let us hope that the design improvements such a procedure can bring will materialise in benefits across all aspects of engineering.

Queries, comments, correspondence, and curiosities . . .

Innovative materials in design

Mark Pundsack writing from Southampton makes a plea to structural engineers.

As a structural engineer employed within building control, I have recently become aware of a worrying trend. A number of project engineers have chosen to use innovative materials and products. Nothing wrong there, in fact I fully support this move particularly where there is an environmental or safety benefit. The issue that I have, is that I have only become aware of this through the press.

My plea to all designers is before you write your most interesting technical papers, and before you make presentations at seminars about your wonderful designs, please make sure you have passed these by your building control body.

PI insurance

Melvin Hurst in Kuwait adds to his letter in the Journal of 17 April 2007. He writes:

Yes, your comment on my contribution regarding PI in Botswana (17 April) was indeed cynical, patronising even. The requirement is to ensure that those submitting building regulations applications are properly qualified, a matter of concern whether it is in a developing country such as Botswana, or in a 'developed' country such as the UK.

Precisely! The PI requirement is a condition that ideally should be universal, but particularly so in countries where the checking procedures may not be as strict as in UK and other western countries.

Road pricing

Gerald Bratchell of Kings Langley, Hertfordshire comments:

I read numerous letters in Verulam and elsewhere that 'Road pricing' is acceptable if the money is ring-fenced. Such writers should be reminded that about 100 years ago, politicians introduced a 'Road Fund', to which money from car licensing would be paid, and which was dedicated to the provision and maintenance of main roads. After WW2, politicians filched this fund and switched it into general taxation. So much for promises and ring fencing.

It was ever thus!

Innovative road roundabouts

Professor Carl Ross of the University of Portsmouth writes in with a novel solution to congestion at roundabouts.

I would like to take this opportunity of drawing your attention to a very recent invention of mine that could considerably reduce traffic congestion at road roundabouts. My proposal replaces the conventional road roundabout with a two- or multi-storey road roundabout, where the tube/tunnel roundabouts are vertically stacked on top of each other. Thus, for a two-storey roundabout the lower roundabout can be called a tunnel roundabout and the upper storey roundabout can be called a tube roundabout. The flow of traffic through the roundabout can be described as follows.

If you have a two-lane dual carriageway coming on to a roundabout then both the tunnel roundabout and the tube roundabout can each have two lanes, vertically stacked above each other, effectively converting a two-lane dual carriageway into a four-lane roundabout. Now very often at a conventional road roundabout, there is traffic congestion caused partly by the queue of traffic waiting to get on to the roundabout and partly by the traffic currently negotiating the roundabout. In the case of my tube/tunnel roundabout, as the number of their combined carriageways is four, the traffic approaching the roundabout can make their choice, as to whether they choose to negotiate the roundabout via the tube or the tunnel, depending on which is being less used at the time. This procedure should help relieve traffic congestion!

My idea can be particularly useful in the future, with certain road roundabouts, where a four-lane carriageway reduces to a one or two-lane carriageway/roundabout and where there can be considerable congestion. Such roundabouts can be described as 'pigs' during the 'rush hour'; two or multiple storey tube/tunnel road roundabouts can replace these conventional road roundabouts. My idea can also be used in conjunction with my tube/tunnel motorways, which I invented to eradicate carbon footprints, caused by road traffic[1].

[1]*Ross, C. T. F.:* Darkies can fight, *Antony Rowe Publishing Services Ltd, Eastbourne, Sussex, UK.*

The ideas of Professor Ross appear to have the benefit of reducing carbon emissions to the atmosphere providing they can be dealt with at source, though there may be some psychological knock-on effects for drivers in sustaining continuous driving in tunnels.

The Membership survey

Clive Shearer of Seattle, Washington, USA writes:

Cosmologists estimate that only 4% of the composition of the universe is made up of ordinary matter, such as the sun and everything on planet Earth. The rest? A mysterious 'dark energy' and 'dark matter' are presumed to make up the vast majority of the content of the universe. There is much conjecture, but no one really knows the composition of dark matter and dark energy.

Now what about the universe of IStructE? Only 15% of members took part in the recent survey.

Well 15% may indeed be well above the statistical average, according to the firm hired to conduct the survey, but that still leaves 85% of the member's views hidden behind a veil of mystery.

There is much conjecture, but no one really knows the composition of the bulk of the views of the membership.

While a Member of IStructE for many years, I have practised as a marketing consultant in the USA for 25 years. When I conduct a survey for my clients, I get close to 100% response. Oh, we don't contact thousands, we contact a random sample in each category. In the survey conducted by your consultant, you have obtained information from a 15% sample that is not random at all. It is a self-selected 15%, comprised of those who thought it worthwhile to respond.

In my view, I'd rather get a little feedback from 85% of members, than a lot of detail from 15% of members. The sort of simple survey I have in mind would have focused on the 'vital few' questions—the ones that can really be relied upon to drive an Action Plan. The upshot of the IStructE survey? Well done! But the fact remains that all you really know is that 15% of the membership have clearly expressed views, and the views of 85% remain a mystery. How on earth (pun intended) can you drive the bus forward when you don't really know where most of your passengers want to go? So, where do they want to go? Ah, therein lies the mystery. Perhaps this IStructE mystery will be solved before the cosmologists identify the composition of the universe's dark matter and dark energy. Perhaps not!

Despite the category 'spread' of information from Mr Shearer's marketing approach the answers provided would still be the views of a small percentage of the membership. Surely the question that needs to be asked is 'why the apathy?'

Earthquakes and BS 8110

Horng Hean Tee asks why UK design codes are silent on provision for earthquakes and says:

It was noted in *The Observer* newspaper, 29 April 2007 under the heading 'Quake forces Kent families to flee

homes: One woman is injured and roads are closed after tremor measures 4.3 on [the] Richter Scale', that earthquakes occasionally occur in the United Kingdom. For instance, in 1382 and 1580, two earthquakes shook the Dover Straits and in 1931, the Dogger Bank earthquake was felt across the UK. Since it was known already from a much earlier period that earthquakes do exist in the UK, why is there no explicit provision in BS 8110 or IStructE's *Concrete Manual* to resist, say, an earthquake that occurs once in a certain period of years?

The question is of interest and while I cannot give an authoritative answer I expect it will have something to do with risk and low incidence rate. I will be pleased to publish letters on this subject in answer to the query Mr Tee raises.

Striking a chord

Dino McKee of Prestwick, South Ayrshire writes:

I have recently been asked to attend several properties where pre-fabricated roof trusses have been altered, namely the internal chords have been either almost totally or partly removed to create a larger space, in most cases for someone in the family to 'have their own space' or the like. Without doubt it would appear to me a large proportion of the general public fails to understand the principles of roof truss design and the triangulation of forces therein. Fortunately all the cases I've attended can be rectified without too much trouble and, other than deflection of ceilings below, no greater damage has been caused. It does however seem that more and more people are willing to carry out DIY on these integral structural elements without thinking about the possible consequences. Maybe they just don't realise the dangers that could befall them should these members be more fully loaded after alteration.

The major truss suppliers usually attach a 'ticket' on each truss which gives their company details as a marketing tool, I'm sure we've all seen them – usually at ridge level. I suggest this ticket could be expanded with a warning stating: 'These roof trusses are structurally designed elements and as such should not be altered in any way without consulting a structural engineer'.

This or some similarly worded sentence would quite literally add pennies to the cost of each truss and serve as a warning to the lay person as to the potential danger involved in unauthorised alteration of these structural elements.

Perhaps some lobbying of truss manufacturers would be appropriate. At the very least it would ascertain their thoughts on the matter and give an indication as to what additional cost (if any) would be incurred in amending their tickets.

Have any other members come across this apparently growing trend?

Mr McKee draws attention to an all too common problem. His suggestion would help to prevent the resulting defects as would a stringent clause in the house insurance policy.

3D sketching

Ken Northgreaves of Chobham, Surrey makes an interesting point:

May I add a rider to the very interesting views expressed in Verulam on 3D sketching.

When the present generation of structural engineers are old, retired and a little bit wonky like me, they may look to sketching and painting as a pleasant pastime.

If they have bothered to sketch in earlier years they will find that their grasp of perspective is immaculate.

A welcome benefit derived from all those years in front of a screen.

Hand drawing and the CM exam

Mohamad Al-Dah of Cardiff is an advocate of free hand sketches and writes:

I read Alan Hannaford's letter in *The Structural Engineer,* 5 June 2007 with interest. As young engineer (aged 27), I sat my Chartered Membership exam this Easter and eagerly await my results. Having spent many months preparing for the exam, I found the issue of drawings both challenging and controversial.

Almost everyone I have spoken to who has passed the exam advised me to produce my drawings using a ruler and to scale. However, I believe that part of the aim of the CM exam is to test the candidate's communications skills graphically. I feel that I can communicate my design better and quicker using hand sketches both in plan/section and in 3D.

As the exam is all about scheme design and time management rather than the production of detailed construction information I see no point in producing a near perfect plan for, say, a typical floor when instead, I could have used the same time to produce a sketch of the plan, a few sections, and a 3D view of a tricky area. Such sketches convey my thoughts much better than a neat drawing given the long time it takes to prepare drawings to scale and with a ruler. I find that I can sketch approximately to scale using graph paper by counting the number of squares.

This brings me to the point that Mr Hannaford did not emphasise strongly enough in his letter. Should the IStructE accept sketches instead of hand-drawn drawings to scale? I am confident in my drawing skills, but I'm not sure I can do a question justice if I am to draw things as accurately as I'd like. Perhaps future CM exams could ask for a mixture of drawings and sketches?

Going back to my student years, I still remember our draughting instructor who taught me everything I know about hand-drawings. The engineering degree at Oxford University required all candidates to pass the draughting course regardless of their engineering discipline. This is something I strongly agree with, especially after starting work and being continuously shocked by the lack of drawing skills of some engineers, particularly the younger ones who swear by all things CAD.

I still proudly remember my mark for my drawings at university, I got 4.5 out of 5.

I'd be very happy if my CM exam mark was half of that mark!

Free hand sketches would need to be easily understood by the examiner if they were to be accepted. I wish Mr Al-Dah success in the CM exam.

Emails can be sent to Verulam via: verulam@istructe.org

Readers are referred to the publisher's disclaimer as set out on the Contents page.

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Queries, comments, correspondence, and curiosities . . .

Mississippi bridge collapse

John Bell of Bristol comments on a recent article about the US bridge collapse in* New Civil Engineer. *He writes:

A recent issue of NCE has an article 'I-35W collapse warnings went unheeded', in which the following extracts appeared.

Some details from structural inspections

1995. 'Hinge joint on span 2 to be repaired.'

2000. 'Hinge joint in span 2 is locked in full expansion and several beams are contracting, consequently pier 1 has tipped slightly to the north and south abutment bearings are in full contraction.'

There is little doubt that where a bridge is designed with hinge joints somewhere in the structure then the stress behaviour in the individual structural members and joints is very different from that in a bridge with no hinge joints (effect of locked hinges). And when this situation also appears to cause a supporting pier to move, then it might be construed that the stresses in the bridge could be seriously different from that envisaged when originally designed. There must be a good reason why such an alarming situation did not instigate immediate action to remedy the problem, because not to do the work might perceivably lead to inevitable failure of part of the structure.

Doing surfacing work on the bridge in an asymmetrical manner might be considered to be a possible added problem for the bridge stresses, but might also be considered not to be the main problem.

What if the supporting pier that had moved actually changed position because of a foundation problem, and this helped to overstress the bridge?

The results of the investigations will be read with interest.

The news articles on the bridge in NCE strongly suggest that the bridge was already susceptible to collapse due to the lack of structural redundancy and un-addressed fatigue problems.

Earthquakes and BS 8110

Dr Allan Mann, writing from Manchester, provides further guidance on the approach to earthquake design in UK.

There was a response from Denis Camilleri on 21 August making reference to the Eurocodes

The fundamental issue is whether we should design for low frequency, high consequence events and that is a judgment about the balance of risk and how much the nation should spend to gain protection (and that cost would include design effort).

As Mr Tee points out, there are earthquakes in the UK but ones of reasonable intensity are rare. The records we do have show very occasional structural damage and almost no risk of injury. If we provided protection nationally, we might well spend far more than the cost of patching up the odd chimney pot, so overall the risk is best covered by insurance.

I suspect the risks of damage from tornadoes (which we don't design for either) are actually much greater than those from earthquakes: witness the single street damage caused in Birmingham and London in recent years. Earthquakes cause lateral forces at a magnitude linked to building mass. Experience from all over the world shows that well-designed building can withstand low level of shaking reasonably. Hence if we adhere to the Codified rules about tying structures together, the risks of failure here are acceptably low. Where the consequences are potentially high, as in nuclear plant, seismic design is mandatory even in the UK.

Dr Mann's contribution seems to sum up the situation succinctly.

Nuclear power for energy – is it immoral?

Richard Annett writing from Birmingham asks this provocative question:

The article on the role of engineers in designing for nuclear power (7 August) led me to think whether engineers who contribute to the building of new nuclear power sites are immoral? If the answer is 'yes' should we bar these members from the IStructE?

What would be the basis for immorality associated with nuclear energy? Let us look at the definition of immorality:

'The human quality of not being in accord with standards of right or good conduct.'

Can we have a 'moral standard' with respect to future energy? Most engineers would say that if they could, they would provide sustainable solutions for their client. This would mean that they would think about the how to recycle products at the end of their useful life. Is sustainability a 'moral right and good standard of conduct'?

If this concept is accepted by the majority of engineers as being a moral standard, then anyone offering a client something that is unsustainable is by definition committing an immoral act.

The degree of immorality is important. The line between morality and immorality may be thick or thin depending upon the subject. For sustainability, I would suggest it is pretty thick. But what would the sustainable spectrum consist of?

On the moral end of the spectrum would be an energy plant that uses readily available resources, uses those resources efficiently, that does not change the environment around it and which can be totally recycled at the end.

The immoral end of the morality spectrum is an energy plant that:

1. Uses resources that are expensive, rare, difficult to process, difficult to store and are a security threat.
2. Is an extreme hazard, which if during the life of the plant there was an accident, would lead to dreadful environmental issues.
3. Is a difficult and hazardous material to operate with.
4. At the end of the useful life of the energy providing material it is a hazard for thousands of years.
5. The plant using the energy is also a bio-hazard for future generations.
6. The containment of the materials in items 4 and 5 which cannot be recycled and end up being hazardous in their own right.

How would you rank the following established energy plant alternatives – hydro-electricity, gas, coal, nuclear and renewable energy?

Should we ban any energy plant that sits at the immoral end of the spectrum just because it is there? We have a social/moral/environmental duty to decide because of the potential negative effect on the future of humanity and the planet.

So my answer has to be yes, we do ban immoral energy plants. Yes we do classify engineers that work on them as immoral. Yes we do ban them from the IStructE. No engineers, no plant. Problem solved!

What is your moral viewpoint and how do you class engineers that participate or are thinking of participating in nuclear energy? Would you class them in the same frame as paedophiles or murderers? Would you accept them as having the right to decide? Would you welcome them with open arms? You decide. It's your planet.

I thank Mr Annett for his letter. I anticipate a flurry of partisan correspondence portraying the good and bad points of both sides.

Queries, comments, correspondence, and curiosities . . .

Emergency shelter accommodation

Duncan Anderson of Redhill, Surrey, writes in to say:

I am very concerned at the remarks made by Jo da Silva in the paper on disaster shelter tents reported in *The Structural Engineer* of 17 July. Jo made some disparaging remarks in connection with tents supplied to Sri Lanka for the tsunami, and the photograph (Fig 2) shows the tent she was referring to supplied by Rotary International under our Emergency Box scheme. Jo remarks that the tents are not suitable for the Sri Lanka climate, but I know that some have been providing 'temporary' shelter in Sri Lanka up to the time of writing. The whole point of the Rotary tents is that they are available fast, they are in store, and we have them shipped out immediately a disaster and a need occurs. Hence the recipient receives shelter very quickly, and whilst it may not be ideal, clearly in such circumstances the people do not have time to hang around and await designers to arrive, design and construct the perfect shelter to suit their environment. The Rotary shelter tent is in fact available in a variety of designs to suit different climatic conditions. It is split into compartments and will accommodate up to 10 people, and the box it arrives in also contains emergency equipment to keep those people for up to a month. To date the Rotary tents have accommodated 500 000 people in emergency situations, many of whom would undoubtedly have lost their lives without this aid. What is more, it is supplied completely free of charge, only one of many international disaster aids provided by the entirely voluntary work of the 50 000 plus Rotarians throughout the UK.

The paper by Jo da Silva describes in broad terms the aims that organisations have in meeting the problems caused by natural disasters, but people suffering these hardships will, I am sure, welcome wholeheartedly the work of Duncan Anderson's Rotary International in providing emergency shelter at short notice.

Eurostar terminals

Dudley Dennington of Surbiton, Surrey, comments on the two London Terminal structures.

Whilst the Victorian 'gothic' roof of the new St Pancras terminal is structurally splendid, praise must also be given to the simplicity of the one at Waterloo due to be phased out. Where else is the bending moment diagram for an asymmetrical three pin arch displayed in its structure? I hope it is retained.

It would indeed be sad if this unique example of late C20 railway engineering disappeared.

Earthquakes, BS 8110 and Eurocodes

Edmund Booth of London E17 writes:

As your correspondent Mr Tee wrote recently, the Folkestone earthquake of last April reminded us that the UK occasionally experiences earthquakes causing structural damage; in fact, nowhere on this planet is totally immune. Denis Camilleri, in his response [Verulam 21 August 2007], is quite right in pointing to Eurocode 8's recognition that in some areas of the world, designated as 'very low seismicity', compliance with non-seismic standards gives sufficient robustness to provide adequate seismic protection, at least for 'ordinary' structures. For other somewhat more hazardous areas, designated as 'low seismicity', a check of adequate lateral resistance suffices without the full seismic design and detailing measures required by EC 8 for areas of high seismicity. EC 8 also recommends threshold levels of earthquake hazard for these zones, which Denis Camilleri quotes, but in fact these are only recommendations, and each nation adopting the Eurocodes can decide on appropriate threshold values for their country.

So where does the UK fit in? The UK National Foreword to EC 8 states clearly: 'the whole of the UK may be considered an area of *very low seismicity* [my italics] in which the provisions of EN 1998 (i.e. EC 8) need not apply'. That isn't the end of the story, though, because the National Foreword goes on to say: 'However, certain types of structure, by reason of their function, location or form, may warrant an explicit consideration of seismic actions. It is the intention in due course to publish separately background information on the circumstances in which this might apply in the UK'.

That background information will be issued as a BSI 'Published Document', which, together with the UK National Annexes to EC 8 Parts 1, 4, 5, and 6, were issued for public enquiry in September 2007. The aim is for final publication early in 2008. The BSI Published Document in turn will refer to three non-BSI documents. The first two are research reports issued under the aegis of the Institution of Civil Engineers' Research Enabling Fund, which has provided partial funding. These two reports comprise an authoritative reassessment of the seismicity of the UK by the British Geological Survey and a separate review of the circumstances in which seismic design may be needed in the UK. The two reports will be freely accessible on the ICE website. The third document, the 'Manual for the seismic design of steel and concrete buildings to Eurocode 8', will be published in 2008 by the IStructE as one of its series of manuals on the Eurocode suite; it is being written jointly by the Institution, SECED (the UK earthquake engineering society) and SECED's French counterpart, AFPS. The Manual will provide a complete procedure for the seismic design of most steel and concrete buildings in areas of both low and high seismicity, and aims to unravel some of the complexities of EC 8 while still satisfying all of its provisions.

A public meeting to discuss the draft UK National Annexes to EC 8 and associated documents took place, organised by SECED, on 10 October at Imperial College London. Further details can be found on the SECED website, www.seced.org.uk. More background information on design for earthquakes in the UK is given in a 2004 paper published in *The Structural Engineer*, and available from (www.istructe.org/technical/files/eurocode/Booth_and_Skipp_on_EC8.pdf).

My thanks to Mr Booth for the overview on the documentary guidance to designing for earthquakes and for the timely reminder that the IStructE is shortly to publish a manual on Eurocode 8.

Sir Nikolaus Pevsner

Mrs Bracha Nemeth writes in with this request:

In connection with a forthcoming book, would anyone with memories of the architectural historian Sir Nikolaus Pevsner, or his colleagues in whatever field, please write to me at 204 Victoria Road, London N22 7XQ or email me at (bnemeth@blueyonder.co.uk). I would be most grateful.

Disproportionate collapse

Dr Satish Desai of South Croydon, Surrey, is uncomfortable with Geoff Harding's letter in the Journal of 18 September 2007 and also with my remarks. He writes:

I refer to Mr Harding's contribution in Verulam, 18 September 2007. I would question Verulam's view that Mr Harding's contribution gives an

'authoritative insight on the subject'. Mr Harding's response is woolly; it misquotes what I have said and it dodges the real issue.

It is not enough just to remove the reference to BS 8103 from clause 33.4 of BS 5628: Part 1. I have not said that the A3 requirement for Class 2A buildings may be met by adopting floor anchorage details illustrated in Annex D of BS 5628: Part 1. This would be quite opposite to my basic point that clause 33.4 and Table 11 (BS 5628: Part 1) contain serious contradictions. They recommend that, for Class 2A buildings, the Requirement A3 can be met by using tie forces given in Table 12 and by adopting details in Annex D of the code. Annex D details are meant for providing horizontal lateral restraints. These details are not derived from any rules and they are not meant to cope with the forces given in Table 12 of BS 5628: Part 1.

It is contrary to the principles of structural engineering to say that a particular building construction should be provided with lower degrees of protection against any actions, including disproportionate collapse. Mr Harding claims that the Annex D details have been followed for years in the load-bearing construction and there is no evidence of failures. Nothing more should be done, therefore, that may burden the masonry industry!

On the other hand, the meeting held in March 1996 at the Institution of Civil Engineers cited reduction in robustness of smaller buildings – mainly resulting from lack of supervision, economic pressures and inadequate detailing – supported by case studies involving load-bearing structures. If the evidence obtained during the last 11 years is different, the same 'no failures' argument must apply to steel or concrete framed buildings under Class 2A. Why should these buildings be treated differently and designed for considerably higher standards of tying forces than those for the load-bearing masonry buildings?

The BSI must amend clause 33.4 and remove the anomaly in full. In view of Mr Harding's concerns for the masonry industry, I have offered a practical solution to him that may not be a perfect one from theoretical point of view. I have suggested that the tie force capacities of connections detailed in Annex D should be determined and the tie forces applicable to Class 2A buildings should be lowered accordingly, compared with those for Class 2B buildings. This will at least create a level playing field for all buildings and remove the most undesirable lack of consistency in the recommendations of BS 5628 clause 33.4 and Table 11.

I am grateful to Dr Desai for his pursuing the inconsistency he relates above. Mr Harding maintains however that the treatment of Class 1 and Class 2A buildings should be addressed separately for the reasons he mentions in his letter. The way forward from this impasse suggested by Dr Desai may be the solution.

Project management by spreadsheet

Andrew Shaw of Wakefield, West Yorkshire makes this contribution:

Having been a practising, but now recently retired, structural engineer for many years, I have seen many trends and fads come and go in more than 40 years. Occasionally I have felt obliged to voice my concerns about some of these trends, the latest being a relatively recent trend, which I can only describe as 'Project Management by Spreadsheet'.

This is the process whereby all project design and management activity is controlled (for want of a better word) within the framework of centrally administered computer software. There will be separate compartments within the program for site minutes, programming and drawings, for main contractor, for the design team, and for sub-contractors and suppliers, plus the myriad of other activities.

The concept is relatively beguiling; in theory, all members of the project team have access to the latest information and records are kept of who accesses what, or, more importantly, who does not access what and prompts are sent in the event of inactivity.

The risk I perceive, and have experienced, with this form of management is that this becomes simply a computer exercise and the key project management staff fail to exercise selectivity. The result, which occurs all too often is that a broad brush approach is used and every party to the project gets sent notifications relating to virtually every bit of the project, whether it is relevant to them or not. The result of this is, if you are a sub-contractor to a sub-contractor for instance, is 'information overload', creating unnecessary administrative costs to the parties which do not require the information. At this point, human intervention kicks in, and the notifications are simply disregarded, with the result that, sooner or later, key information will be overlooked. This indicates to me that many of those managing such sites really have little experience of managing actual projects.

This trend is particularly worrying to me in view of the ever-increasing tendency towards design and build, with less of the design being carried out by the main project design team, and more by sub-contractors, who have their margins squeezed by competition and cannot therefore allow for the management costs associated with weeding out relevant from non-relevant information.

A key consideration also in this regard is one of professional indemnity. Our insurers regularly send missives regarding risk management, but it appears to me that there is a significant risk issue here which requires addressing. The role of certain sub-contractors on a project may be simply to supply a few beams, for instance. Are they expected to wade through the entire project documentation to extract any matters which are relevant to them? This may be drawings or specifications. If they do, what happens when those drawings or specifications are amended? The sub-contractor may have had a generic notification that something has changed, but this may well be one among 30 such notifications, most of which are not relevant to the sub-contractor's work and if his work is not for a significant sum of money, he may well disregard those notifications as being irrelevant if nobody draws their attention to the specifics of the matter. Members of this Institution may well have designed those beams, but may not be party to the circulation list of the notifications, and even if they are, the sum of money they have received for designing those beams certainly does not justify such forensic interrogation. Therefore what starts off as a beguiling theoretical benefit to the project actually becomes a scenario which creates risk, especially to those at the 'bottom of the design/supply chain'.

Do other members of the Institution have similar concerns?

Mr Shaw raises an interesting point which has probably arisen in the interests of keeping every member of the team informed. In the situations described by Mr Shaw however the 'information overload' is an unnecessary adjunct to the mail on screen or on paper for many in the supply chain and is the likely result of a lack of conscientious filtering of the relevant parts by those initially disseminating the knowledge. I await the reaction from members to the invitation from Mr Shaw.

Memories of Major Maitland 'Remembrance of things past'

David Brett of Provence, France, recalls an early meeting with a well respected Secretary of the Institution:

When I was a young student of 19 years I was ready to take the final exam for membership of the Institution, but was too young – as you had to be 21 at that time in order to be allowed to sit the exam. I was in my final year at College and had done well in the College exams. With National Service looming I did not want to have a 2-year gap in my studies just before sitting the exam, when I would have been 21.

My senior lecturer – who probably knew that the Institution was short of cash – advised me to: 'Show them the colour of your money'. I duly marched up to headquarters and demanded to see Major Maitland. I explained the situation to him and produced my application form and cash – which seemed to impress him as he allowed me to take the exam, which I passed.

I remember him as a kindly man and a good listener – as I think I did most of the talking!

In our Centenary year, Verulam welcomes from members their recollections of significant or interesting events, meetings, anecdotes etc. from earlier times – and any other memories of Major Maitland that may come to mind.

Queries, comments, correspondence, and curiosities . . .

Engineering status, fees and salaries

Bill Holloway of Harrow, Middlesex applauds David Pearce for his letter in the Journal of 18 September 2007.

If like me you are fed up with reading sad letters to Verulam from self-pitying engineers bemoaning low status and remuneration levels within our profession you will have been buoyed by David Pearce's refreshingly optimistic outlook on the topic. If you are one of those disgruntled persons you would do well to remember that status is earned, not given, and, if you are not comfortable with this, the answer lies in your own hands. Well written David – and I hope you continue to enjoy your retirement as much as you evidently enjoyed your career in engineering.

I sincerely hope that we have now given this subject sufficient column space, but I am pleased to publish Mr Holloway's letter which provides a positive note to the topic.

.... and Roger Evison of Wellington, New Zealand also expresses support for Mr Pearce's letter:

As an enthusiastic reader of the Journal for nearly 60 years I am moved to add my approval to the comments you printed from David Pearce. Practising in New Zealand all this time, although now retired, my own experience confirms David's views and keenly supports his approach.

Many years ago my practice was selected by a famous London-based client to serve them in a developing programme of expansion. Our immediate interest was a major science-based manufacturing project but the client's first requirement was for an overall percentage fee to cover everything they might want, down to quite minor alterations and maintenance.

At a time when the N. Z. Standard Scale of Fees was $5^1/_2$% to a minimum 5%, I quoted $8^1/_2$% to cover everything, and our eminent client accepted. We had a great relationship over many years.

When one of our projects deserved a technical paper to the then New Zealand Institution of Engineers I was asked what fees we could recover for it and my reply received a reaction which might well apply to some of your less fortunate correspondents.

I sincerely hope this note is effective in supporting the mature position taken by David Pearce.

I look forward to many more years of *The Structural Engineer*, and of Verulam.

Messrs Pearce, Holloway and Evison bring a refreshing insight to past engineering practice. It seems that trust between client and engineer has often disappeared these days in the quest for profit.

Nuclear power for energy – is it immoral?

Richard Annett's letter in the Journal of 2 October 2007 predictably prompted some letters on the subject.
Adrian Leeds of Lakenheath, Suffolk says:

I am a Verulam virgin, (this being my first time) but would like to comment on Richard Annett's take on the moral standpoint of structural designers (2 October 2007). I agree that there is a moral decision to be made by engineers as to their participation on projects, however I think that to castigate and persecute designers who take a differing point of view could be a step too far.

I have been called cynical in the past but might it be the case that if an embargo is placed on so-called 'unsustainable / dubious' projects, then engineers who may not be so competent may be called upon to carry out the designs.

At a time when we are endeavouring to raise the standing of engineers in the minds of the general public, effectively saying there are now two classes of structural engineers, the 'good' ones belonging to the Institution, and other, possibly cheaper, ones which are still good enough to design nuclear power stations(!)

I feel this does the profession no favours.

...but in responding to Mr Annett, Dr Peter Jackson of Dalgety Bay, Fife points to the lack of morality. He writes:

While understanding Mr Annett's concern over the morality of nuclear energy, surely he has the wrong target. The problem facing us can be summarised as follows:

1) The current world population of around 6.5bn is predicted to plateau out at 9 to 10bn. Some of us currently have a high standard of living, and it would seem morally reasonable for all to aspire to at least this standard.

2) All our activities ultimately depend on one economic model, which uses energy to convert raw materials into good(s). We do this by consuming the world's inherited wealth of materials at an ever increasing rate.

3) The planet has a finite volume, therefore there are limited amounts of useful raw materials. 'The limits to growth', published half a century ago, outlined the likely future problems. It is being acknowledged that fossil fuels are coming to an end, with a somewhat longer life for coal. With luck and ingenuity we may just be able to accommodate fuel shortages, but not without major sacrifices in standards of living. But there will be no alternatives when the minerals run out.

4) In the past the prophets of doom usually were pseudo religious cranks whose prophesies had no foundation. Not any more. We now have scientists providing figures, which governments accept, predicting dire conditions within the lifetime of people currently alive.

5) And how do we resolve the problems? Basically we ignore them. We bask in a corporate culture where 'team working' is paramount, and anything less than blind positive optimism is almost a sackable offence. Ever more grandiose, and often frivolous, schemes are embarked upon, consuming ever more energy and materials. We feel we are doing our bit by recycling and using low energy light bulbs, reminiscent of the removal of wrought iron railings during the Second World War as a contribution to the war effort. Such actions are comforting but of little or no value. Therein lies the lack of morality.

... while Donald Holliday of Windamere, Cumbria gives his order of morally sustainable fuels and urges the nuclear industry to show that processing the waste with current knowledge is not an insurmountable problem.

Imagine my amazement when turning to Verulam to read: not the usual tedious mix of status moans and technical issues far above my head – but a McCarthyist attack on nuclear power!

Now retired, I have never worked in the nuclear industry, but always supported it, in spite of its well publicised faults.

Arguably there are no truly 'moral' sources of power, after all even wind farm proposals receive severe objections here in scenic Cumbria and rarely get beyond the planning stage.

In these days of climate change the moral goalposts have moved radically, so today I would single out supporters of fossil fuels as the moral pariahs.

Why are we still using gas in power stations now that it is being imported from Russia and not the North Sea?

Why have we not closed all our coal and oil plants already?

The simple answer is that we can't afford to, because renewables cannot currently be sufficient to close the gap – and more insulation and other efficiency drives will never be enough here in still frigid Cumbria!

My order of moral demerit (worst to best) would be:

- Coal
- Oil
- Gas
- Biomass (deforestation issues as

well as competition with food crops)
- Nuclear
- Hydro-electric
- Geothermal (how do I retrofit my home?)
- Wind and wave (subject to environmental impact of particular locations)
- Solar

Nuclear is not the cleanest but is much cleaner than it was in the 1950s when the main aim was weapons production – and most of our dirtiest waste stems from the same hidden agenda. We have to bite the bullet on existing waste – so let's make serious plans for the relatively minor future requirement, while still investigating new ways of processing waste so that it loses its long half-life.

We must set an example to third world countries by phasing out fossil fuels immediately, otherwise how can we expect them to follow our lead on other green issues?

And don't kick out engineers you don't like – they'll only go and join the Civils!

My correspondents to date while not proclaiming the use of nuclear fuel as the pinnacle of sustainable energy do not however dismiss it. There is also an underlying thread of support for engineers in the nuclear industry because, as a relatively clean source of energy production, it is seen as providing significantly for the needs of an expanding population. However, as Dr Jackson implies, there is a need to think beyond tinkering with the frivolous schemes and develop reliable renewable sources of energy.

Conservation accreditation

Professor Phil Banfill of Heriot-Watt University, having read Ian Hume's article in the Journal of 4 September 2007, writes in with further information about the on-line resource at his University.

While not a member of IStructE, I receive *The Structural Engineer* on behalf of the resource centre at the School of the Built Environment, Heriot-Watt University. I was very interested to read Ian Hume's news item about the CARE panel as we have been involved in the development of Practitioner Accreditation for Built Environment Conservation since 2000, as part of the Edinburgh Group. This is a pan-professional body, on which IStructE is represented, and one of its outputs is an on-line resource, which went live in March 2007.

Incorporating the internationally recognised ICOMOS Training and Education Guidelines, the website is open to all and has the primary purpose of supporting individual practitioners who wish to apply for accreditation. A variety of support tools are available for professional users so they can work their way through the support material and build up their portfolio of evidence for assessment.

In addition, the site provides useful educational material for a much broader range of users, such as students, trainers and educators, contractors and the interested public. Any member who is considering responding to Ian's message will find much helpful information on the website: (www.understandingconservation.org).

My thanks to Professor Banfill for drawing our attention to this facility.

EC 8 UK NA & PD – What is the point?

Costas Georgopoulos of Camberley, Surrey provides a personal view:

In a recent survey on 'which Eurocodes are currently taught at Universities in the UK' that was carried out by the 'teaching Eurocodes at UK Universities' study group of the Institution, EC 8 came third after EC 2 in the first place and EC 3 in the second. So there is no doubt that EC 8 and seismic design is very important in the UK and the Institution has already introduced the 'what if earthquake' question in the Chartered Membership Examination.

Nevertheless the vast majority of colleagues practising in the UK do not have to use EC 8 in their careers unless they work for the Nuclear Industry or on projects in earthquake-prone countries abroad. Are the recommendations in the draft National Annex and Published Document to EC 8 going to change that and if not, what's the point?

Having recently attended the SECED / IStructE Implementation of EC 8 event at Imperial College London and studied the ICE report *Establishing the need for seismic design in the UK*, I would like to comment on the latter since it represents the philosophy on which both the UK NA and PD to EC 8 are based.

In accordance with the UK National Foreword 'the whole of the UK may be considered an area of very low seismicity in which the provisions of EC 8 need not apply, however certain types of structure, by reason of their function, location or form, may warrant an explicit consideration of seismic actions'. Guidance on identifying these circumstances when seismic design may be required and recommendations on how to carry it out thereafter is given in the aforementioned ICE report.

To identify the circumstances, a screening process is recommended whereby seismic actions should be explicitly considered for Consequence Class 3 structures where at least two of the three factors listed below apply:
- Unfavourable seismic hazard (i.e. above 4%g PGA of 2500 years return period)
- Unfavourable soil conditions
- Unfavourable structural features

Is it really recommended to design a CC3 building such as a hospital – with unfavourable structural features such as being non regular in elevation and, on unfavourable soil conditions such as soft soils of moderate depth overlying bedrock but situated on a non seismic zone such as in London – for earthquakes? I suspect that it would take all three factors including location before an engineer decides to discuss seismic qualification with his client. And in that case if, say, the hospital is in Cardiff, the following would probably happen:
- The engineer will have to convince his / her client that it's worth investing by seismic qualifying the hospital on the basis that it would increase its structural reliability and therefore its perceived value and minimise the perceived risk to the public. Is there any guidance on how engineers can do that?
- The engineer will have to convince himself / herself and then the client that the seismic hazard to be used with the recommended return period of 2500 years (unlike 475 years in EC 8) – for valid reasons – is an acceptable risk for the UK.
- Assuming that the engineer/ client accepts the hazard, why wouldn't they do something about the unfavourable soil conditions such as deep foundations? And if this is done, why should they not make the structure regular in accordance with EC 8 and therefore stop there?
- Assuming that the engineer/ client decides to proceed with both unfavourable soil conditions and unfavourable structural features, the engineer would have to explain to the client that spectra specific to the site have to be developed because the type 2 spectra from EC8 can only be used for preliminary design in the UK. The engineer has to find the expertise and convince the client to bear the extra cost.
- The engineer has now received 'site specific' spectra and has to carry out a 2D or 3D modal response spectrum analysis and combine the results with other load cases. If the typical UK engineer is not experienced enough then the seismic experts from the nuclear industry would have to be called in.

But if the UK seismic experts are going to be doing the job at the end, do they really need any guidelines or just such an instruction as 'use EC 8'? So I wonder to whom the UK NA and PD to EC 8 is addressed?

Mr Georgopoulos makes a point but it can only be right that the UK industry has a seismic guide even if the country is low risk.

Innovative road roundabouts

Stuart Nutton obliges by sending me information on the Hemel Hempstead roundabout which was the subject of Mr Bratchell's letter in **The Structural Engineer** ***of 16 October 2007.***

Regarding 'Innovative road roundabouts' – this wikipedia page explains the Hemel Hempstead 'magic roundabout' (http://en.wikipedia.org/wiki/Magic_Roundabout_%28Hemel_Hempstead%29).

Hope this helps you visualise!

The diagram explains the system well. Thank you for that information.