

# Research and the practising engineer

David MacKenzie, Partner, Flint & Neill Partnership and member of the Institution's Research Panel, writes on the benefits of closer collaboration between practising engineers and the research communities

The body of knowledge that enables structural engineers to remain at the forefront of their profession has been accumulated over many centuries (Fig 1). In the past century the recording and collation of this collective knowledge has been more formalised and, perhaps the past 40 years have seen the most significant expansion of that knowledge through systematic and planned research in our universities and other industrial groups. It is this strong link with the research institutions that has enabled the structural engineer to develop new design concepts, new materials and advanced methods of analysis.

However, this link needs to be nurtured to ensure the continued development of our profession and to improve the quality of life in the communities we seek to serve. It has been recognised, through a recent government-led initiative, that the size of the construction industry, with its diverse interests and lack of central client focus makes it difficult to disseminate both research needs and research outputs. The Fairclough report (*Rethinking Construction Innovations and Research – a review of Government R&D policies and practices*, DTI Feb. 2002) identifies several means for improving the current status, but lays down the challenge to structural engineers (and others) to consider how we can make the best use of the research facilities to improve the quality of construction.

It would be hubris to suggest that we know all we need to and examples abound of the extrapolation of conventional structural forms that have ended in disaster (Fig 2).

But, there are signs that our industry has become more mature and the researcher has changed emphasis from discovering things hitherto unknown to developing their full potential. Although this is by no means universal, and there is exciting new work in the development of materials that challenge this viewpoint, there is a growing acceptance that there is a limit to the refinement that we can bring to those processes we use as

structural engineers.

The randomness of the natural world provides a source of challenge but laws of diminishing return apply in attempting to quantify it as precisely as we might like. Mathematics may be an exact science, engineering is not.

Structural engineering has been well served by the universities and colleges of higher education. They fulfil the dual needs of the profession, supplying both a source of bright young things ready to take up the challenges of the industry and the skills necessary to conduct the research. Sandwiched somewhere in between is the practising engineer.

Tasked with the development of the client's concept into physical reality, the practising engineer must draw upon the available knowledge base (Fig 3).

When presented with a task outside of that knowledge base, the practising engineer would like to look to the researcher for assistance. The difficulty faced is the conflicting time frames of both parties. The engineer faced with an immediate problem will

Fig 1.  
The leaning tower of Pisa

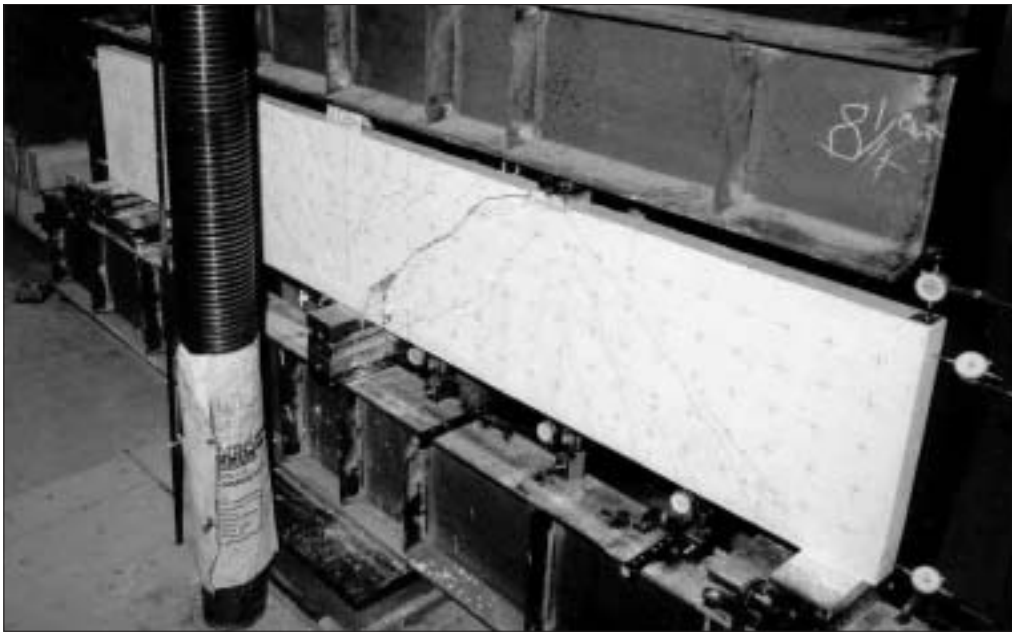


want a rapid response. The researcher will require time to set up the research, undertake testing, write up the work, have it peer reviewed and published. This impasse needs to be resolved and can only happen if we, as a profession, improve our forecasting of requirements for research. We must be able to articulate our needs to researchers and to advise on the benefit of research outcomes. It requires planning and consultation and closer liaison between industry groups.

Recent efforts within the profession have seen such liaison being actively promoted within particular disciplines.

Fig 2.  
Milford Haven collapse





Dr Campbell Middleton of Cambridge University, for example, has set up two complementary forums, the Bridge Owners' Forum and the Bridge Consultants' Forum, where the needs for research in the bridge industry can be discussed and feedback gained on the application of the research in practice.

Other groups such as the Concrete Bridge Development Group also assist in bridging the gap between research

**A continuous deep beam under test**

and practice. The bridge industry is fortunate to be more focused in this manner owing to the greater number of structures being owned by fewer clients, thus allowing better dissemination of client and industry needs.

Other disciplines are well served by groups such as the Building Research Establishment, the Construction Industry Research and Information Association, the Steel Construction Institute and the Timber Research and

Development Association which provide a focus for research and encourage participation through industrial membership.

Through the active participation in the development of research ideas, the practising engineer can bring a significant positive benefit to the profession, enabling access to the results of current research activities. The engineering industry has to compete against other technologies for research funds from organisations such as the Engineering and Physical Sciences Research Council. Significant industry involvement enhances the chances of research proposals being taken forwards and funded.

Thus it is in all of our interests to promote research ideas that will improve our understanding of our working environment and enable us to continue to deliver the service expected of us by our clients. Through strong academic institutions, alive with purposeful and interesting research, we will encourage and maintain the quality of graduates coming through into the profession.

The Institution's Research Panel seeks to encourage the active dissemination of research ideas through the profession and looks to the membership of the Institution to assist in defining the research requirements for take up by academia. se



The Institution of Structural Engineers

structural awards  
2003

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To be held at Gibson Hall, Bishopsgate, London EC2  
Wednesday 5 March 2003

**structural awards 2002 LUNCH BOOKING FORM (Wednesday 5 March 2003)**  
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The Institution will be holding the 2003 Awards Lunch at the Gibson Hall, Bishopsgate, London EC2, an outstanding venue in the heart of the City of London. Gibson Hall was formerly a banking hall where financial transactions were once painstakingly documented in precise copperplate handwriting, and it now provides a spectacular setting for one of the Institution's major functions.

The lunch is being held on Wednesday 5 March at 12.45pm, hosted by the President, Bob McKittrick. Prior to this, at 11.30am onwards, there is a reception and an opportunity to view an exhibition of the Awards structures and meet representatives of the winners, together with the Gold Medallist and other Award winners. Dress is informal. The lunch is open to non-members and their guests.

Early booking for places for lunch is advisable as numbers will be limited for what is always regarded as a very pleasant and special occasion. Tickets are available for the lunch at a cost of £58.17 (including VAT), inclusive of table wines and reception, and may be obtained using the booking slip. Booking and any enquiries should be made to Mrs Cathy Cotton at the Institution.

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