Research Focus

Issue No. 45 MAY 2001

PROMOTING THE APPLICATION OF RESEARCH IN BUILDING AND CIVIL ENGINEERING

IN THIS ISSUE

CIMclad: computer-integrated manufacture of cladding systems

The CIMclad project, intended to lead to the computer-integrated design and manufacture of cladding systems, is a joint undertaking between Centre for Window and Cladding Technology Member Loughborough University, the University of Leeds, and a group of industrial partners, including CWCT.

The project's initial focus is on rainscreen cladding. Split into five parts, it has the following objectives:

- to establish the potential for process improvements through the standardisation of procedures and more-effective use of information technologies;
- to state formally a performance specification for layered cladding walls;
- to develop a product model to support the major aspects within the specification, design, manufacture and construction of layered cladding walls;
- to implement and test these concepts via fast-track implementation and industrial deployment of standard object-oriented CAD technology, configured to support the product model and incorporate proprietary knowledge from the industrial collaborators;
- to propose a map for the cladding sector as a whole to realise computer-integrated design and manufacturing.

Rainscreen overcladding (Photo courtesy of Allscott Contracts)

The CIMclad report *Potential for Process Improvement* reviews current practice, and concludes that efficiency of current business processes would be improved through standardisation of the interface between concept and detailed design.

Information and Communication Technology (ICT) Usage: Current and Future establishes the boundaries for subsequent development work on the rainscreen product model, including generic representations of how the cladding sector operates. A key outcome is a process model of how the industry currently operates, from developing a cladding system through design of a particular installation to fabrication and installation.

Review of Specifications for Rainscreen Cladding reviews existing rainscreen specifications with respect to materials, performance requirements, and testing requirements and methods, and summarises specification clauses. These three reports will shortly be available on the project web site: http://www.cae.civil.leeds.ac.uk/current/cimclad.

For further information please contact Professor Chimay J. Anumba, Centre for Innovative Construction Engineering at Loughborough University (01509 222615; fax: 01509 223982; E-mail: c.j.anumba@lboro.ac.uk).

Help wanted

Can you help provide input to a new research project? Staff from HR Wallingford Ltd. have just started work on a new study on the hydraulic design of exposed jetties. Part-funded by the DETR, the study is aimed at providing guidance on the design and construction of jetties in areas where there is significant wave action. If you have case study information in this field that you are able to offer, the project team would be very pleased to hear from you.

For further information or discussion please contact Ian Cruickshank at HR Wallingford (01491 822489; fax: 01491 832233; E-mail: icc@hrwallingford.co.uk).

ABOUT RESEARCH FOCUS

Aims

The principal aim of *Research Focus* is to promote the application of research in building and civil engineering.

Supported by many organisations in the British construction industry, its brief articles on current research are written for practising engineers, architects, surveyors and their clients with the objective of disseminating research news as widely as possible. Its sponsors wish to promote the benefits of research, improve contacts between industry and researchers, encourage investment by industry in research and the use of research in practice, and facilitate collaboration between all the parties involved.

Formally, *Research Focus* is an unrestricted newsletter containing invited factual records or case studies of building or civil engineering research projects. Articles may be reproduced, provided the source is acknowledged.

Enquiries and Comments

If you wish to know more about a specific project, you should contact the person named at the end of the relevant article. Look on the back page for addresses, telephone and fax numbers of the sponsoring research organisations and professional institutions. General information about their activities may be obtained from them directly.

We welcome your ideas on ways to improve *Research Focus* and so help it to achieve its goals. If you have a suggestion, or an article about an interesting piece of R&D, please send it to the Editor, Roger Venables, at the address below.

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Overall editorial policy is set by the Editorial Advisory Board which comprises:

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DISTRIBUTION

If you receive *Research Focus* by direct mail (i.e. not with NCE) and the address it is sent to is incorrect, if you would like additional copies for circulation within your organisation, or if you would like to be added to the direct mail list, please contact Ms Lesley Wilson at the Institution of Civil Engineers, 1 Great George Street, London SW1P 3AA
(020 7655 2242; fax 020 7799 1325;
E-mail: lesley.wilson@ice.org.uk).

Research Focus is also downloadable from the ICE website (www.ice.org.uk) and readable using Acrobat software.

COASTAL ENGINEERING & ENVIRONMENT

Building sustainable coastlines

We are all familiar with the idea of 'green boxes' for recycling household waste, but what about larger-scale recycling during construction projects? Staff from HR Wallingford Ltd. have just completed a Guidance Manual that helps engineers to identify the environmental impact of using different materials and methods of transport in coastal and river schemes.

'Engineers are used to considering engineering, economic and environmental criteria, but they have now started to look at the wider implications of material selection,' explains Jonathan Simm of HR. 'Sustainability is the watchword'.

Neal Masters, Project Manager of the study (funded by the DETR and the Environment Agency) explains, 'The Manual looks at some of the national and international initiatives on sustainability and sets out important design issues'. These include a consideration of how requirements for material might be reduced on schemes and whether recycled and/or re-cyclable materials can be incorporated, for example hardwoods.

This shows the range of materials used in construction works at Felpham (Courtesy of Arun District Council)

This approach was used with success at Greenwich, where 130-year-old timber was reclaimed from a jetty in Regents Canal Dock and recycled as facing for flood defences around the Millennium Dome.

The Guidance Manual looks at the ecological costs of transport and emphasises the environmental advantages of using local materials. 'As part of the Manual we have also included a CD ROM spreadsheet for estimating the environmental impact of materials used in river and coastal construction projects,' explains Masters. This features an ecopoint scoring system and was produced in conjunction with BRE.

Sustainable use of new & recycled materials in coastal & fluvial construction – A guidance manual, (ISBN 0727729500) is available from the Thomas Telford Bookshop, 1 Great George Street, London SW1P 3AA (0207 665 2464; fax: 0207 6652245).

For further project information please contact Neal Masters at HR Wallingford (01491 822495; fax: 01491 825539; E-mail: ndm@hrwallingford.co.uk).

TRANSPORT & SAFETY

21st century crash investigations

TRL has been commissioned by the DETR and the Highways Agency to visit the scene of accidents whilst the vehicles are still in situ, to develop a greater understanding about accident and casualty causation and to allow the development of ever more effective highway engineering and vehicle safety countermeasures.

The multidisciplinary accident investigation teams will comprise experts in vehicle safety, highway safety, bio-mechanics (human tolerance to injury) and human behaviour, giving the study the best possible opportunity to gain information on how the accident occurred and what the consequences were.

The 'On-the-Spot' project lasts for over 3 years and is piloting state-of-the-art equipment such as a 3D laser scanner, which builds a complete 3D virtual environment within minutes of arrival on site.

3D laser scanner in use at a crash site

For further information please contact Paul Forman (01344 770890; fax: 01344 770894; E-mail: pforman@trl.co.uk).

STRUCTURES & INFORMATION TECHNOL0GY

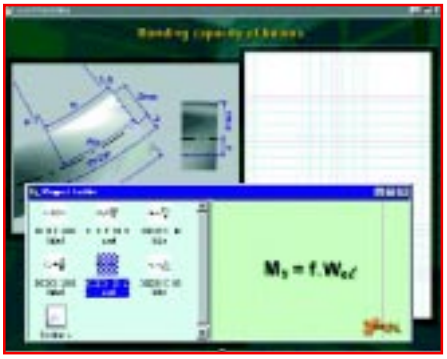
SteelCAL – a learning revolution

SteelCAL is a new internet-based, and research-derived, training tool for students and structural steel designers, with much educational potential.

SteelCAL has a modular approach, permitting tutors to select modules from a 'menu' encompassing element design, joint design and conceptual design.

Adanced pieces of software use interactive multi-media to deliver learning material in a computer-assisted learning environment. The modular material contains embedded assessment and the user's actions are monitored. Users can experience:

- exploring a virtual structures-testing laboratory, design office and fabrication shop;
- editable modular learning material;
- 3D exploration spaces in which users can dis-assemble and re-assemble 3D joints, beams and whole structures;
- an internet-based media library;
- communication tools for video conferencing and co-operative work spaces;
- the complete authoring suite, including a scripting language and compiler.



An assessment on simple bending theory

The first phase of the project is complete. It was funded by the European Commission and has received high praise for being 'a high quality product firmly located in industry and training needs'. The Commission has recently used SteelCAL in training days and Conferences as an exemplar of what the Information Society Technologies Programme can deliver.

The SCI has developed its existing Information Communication Technology skills considerably by undertaking the technical work for this project and is now utilising them in other web-based research projects.

For further information please contact John Moran, Senior Manager ICT, The Steel Construction Institute (01344 623345; fax: 01344 622944; E-mail: j.moran@steel-sci.com).

CONSTRUCTION FUTURES & INNOVATION

Opportunities for high-flying research engineers

There are opportunities for graduate and experienced engineers to work with 25 leading construction sector organisations and the Centre for Innovative Construction Engineering (CICE) on innovative research projects leading to the prestigious Doctor of Engineering (EngD) degree.

The Doctor of Engineering (EngD) is a 4-year postgraduate award intended for the UK's leading research engineers who aspire to key managerial positions in industry. A radical alternative to the traditional PhD, it is felt to be better suited to industry needs, and provides a more vocationally-oriented doctorate. Very flexible and able to accommodate participants at all levels up to board level, the main aim of the programme is to develop engineers capable of demonstrating innovation in the application of knowledge to construction.

Projects offered for the October 2001 intake are in four key areas:

- **Advanced Information and Communications Technologies**;
- **Innovative Construction Business Processes** (including knowledge management, innovative procurement and management, and concurrent engineering);
- **Innovative Construction Technologies** (including analysis and design of facilities, novel construction techniques and materials); and
- **Sustainable Construction**.

For further information on this opportunity please contact Miss Fiona Wellby, CI CE, Loughborough University (01509 228549; fax: 01509 223982 E-mail: f.wellby@lboro.ac.uk) or visit the Centre's website : www.lboro.ac.uk/cice.

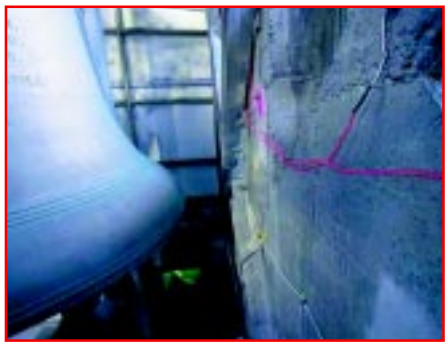
October 2000 Research Engineers

MATERIALS & STRUCTURES

Concrete corrosion guides

Publication of wide-ranging guidance on the challenges faced by those designing, building, maintaining and/or repairing reinforced concrete structures will shortly mark the completion of a major study of corrosion in concrete, sponsored by the DTI under its 'Degradation of materials in aggressive environments' programme.

Corrosion of reinforcing steel in structures such as motorway bridges, buildings and marine installations is costing the UK an estimated £550m a year. Many of these structures continue to need extensive maintenance or replacement. The project team, led by Trend 2000 Ltd and including BRE, has established a data set of more than 160 UK structures on which it has based a series of guides, which cover six key issues.



Corrosion monitoring of a concrete bell tower

- **Corrosion rate measurement** – to help engineers judge long-term durability of new and existing structures.
- **Life prediction models** – for predicting the time to corrosion initiation and critical section loss.
- **new European Standards** – the only currently available guidance.
- **Maintenance, repair and monitoring** – including the issues of health and safety, and risk analysis.
- **Protection strategies for new structures** – including service life and whole life costing strategies.
- **NDT survey techniques** – guidance based on extensive field experience.

In addition to the guides, a summary of selected data from the project's extensive data set and a CD of more than 300 references on reinforcement corrosion have been produced.

For further information please contact David M Richardson at BRE (01923 664291; fax: 01923 664786; E-mail: richardsondm@bre.co.uk).

Ventilation guide to aid air quality in urban buildings

New BRE design guidelines on ventilation will help to ensure good air quality in urban buildings. Besides the advantages for occupant health, buildings with good indoor air quality may have commercial advantages for developers, as the demand for such buildings increases. By making central urban locations more acceptable, the pressures to build new developments on greenfield sites will be reduced.

Since we spend typically 90% of our time indoors, it is essential to ensure that indoor air is as free from pollution as possible. Existing ventilation requirements for buildings usually assume that the external air supply is 'fresh'. However, air supply to a building may be contaminated by a variety of pollutants, particularly in urban areas where pollutant concentrations frequently exceed UK air quality guidelines.

The new Guidance, which was produced with funding from DETR, will allow designers to respond to the challenge of providing good indoor air quality in buildings located in polluted urban environments. It will also help to optimise the design of buildings to minimise their effect on external air quality and hence meet the requirements of the UK Air Quality Strategy and contribute to the development of sustainable urban areas. This will, in turn, assist with planning applications, which may otherwise be refused for new developments that are likely to increase local pollution loads.

Wind tunnel studies of the dispersion of pollutants from a point source around tall buildings

The Guidance sets out procedures for assessing the overall external air pollution burden on a building development. It then gives strategies for minimising pollutant ingress, and gives advice on optimum urban layout, building shape and building size to help improve the local air quality.

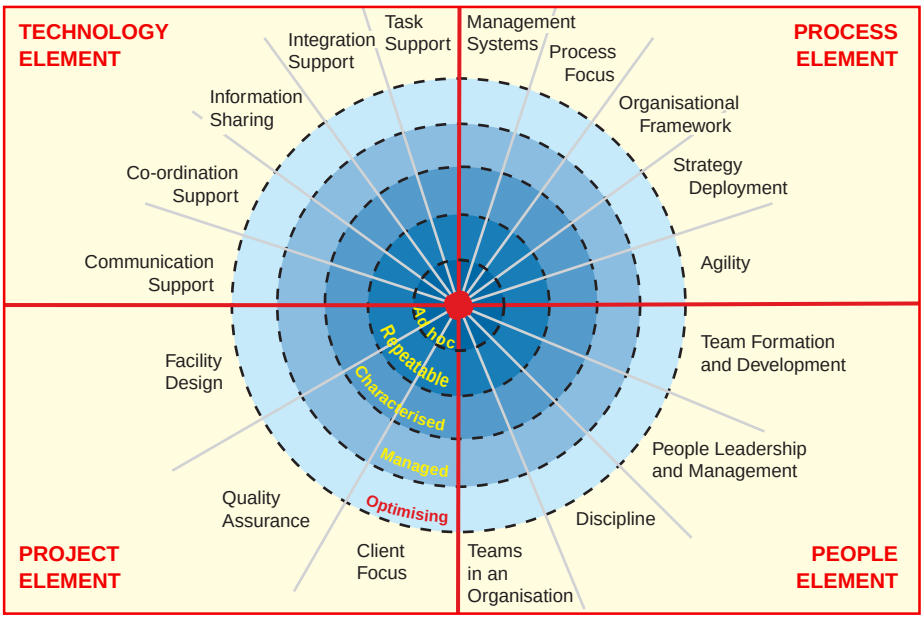
The Guidance is intended for use by architects, building services engineers, and facilities managers, and by Local Authority Environmental Health Officers, Building Control Officers and Planning Officers.

For further information please contact Dr Vina Kukadia, BRE's Centre for Safety, Health and Environment (01923 664000; fax: 01923 664010; E-mail: kukadiav@bre.co.uk).

DETR Environment Transport Regions

How ready is your organisation for collaborative working?

The need for greater co-ordination and integration within construction industry has led to the adoption of various concepts from other industries. One of these, which offers major scope for significant improvements, is Concurrent Engineering (CE). CE attempts to optimise the design and construction processes of a project to achieve improved quality and cost, and reduced lead times, by the integration of design and construction activities, and by encouraging concurrent and collaborative working.



Essentials of the BEACON Model

For an effective implementation of collaborative and concurrent engineering within an organisation, it is important to undertake a 'readiness assessment' of the organisation prior to the introduction of CE. A readiness assessment tool – the BEACON Model – has been developed for investigating the extent to which construction organisations are ready to adopt collaborative and concurrent engineering.

The BEACON Model assesses organisations on four elements: process, people, project, and technology – see figure. These elements are sub-divided into critical factors with five maturity levels. A distinctive and novel feature of the model is that it introduces two new dimensions considered vital in a CE environment: the people and project elements.

The BEACON Model has already been used to assess the readiness of different sectors of the construction supply chain including clients, consultants, contractors, sub-contractors, and material suppliers & manufacturers. The results are available from the research team.

Readiness assessment of construction organisations, using the model, will enable the development of guidelines for the effective and more appropriate implementation of collaborative and concurrent engineering in the construction industry. The BEACON Model, which has been encapsulated into prototype software, is also a useful tool for self-assessment by organisations simply interested in improving their business processes in the four key areas covered by the model.

For further information please contact Professor Chimay J. Anumba, Centre for Innovative Construction Engineering, Loughborough University (01509 222615; fax: 01509 223982; E-mail: c.j.anumba@lboro.ac.uk).

CICE

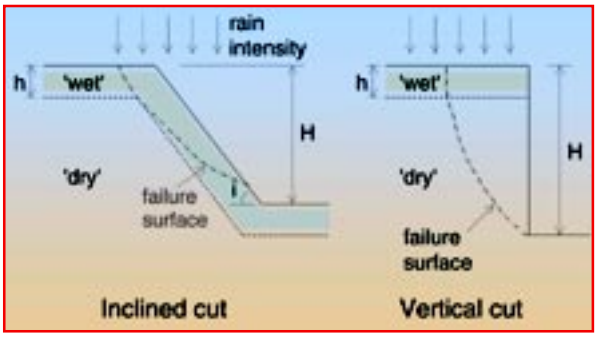
Better design for highway slopes in tropical soils

Tropical residual soils are formed in place by the profound weathering of parent rock and, generally, they exhibit good strength characteristics because of good inter-particle bonding and matric suction in the unsaturated zone. However, heavy downpours penetrate into the exposed soil in slope cuttings, especially on newly constructed slopes, reducing its shear strength and often resulting in major landslides and sometimes to loss of life.

A recent DFID-funded research project has developed a methodology for optimising slope designs through these soils, in terms of safety (minimising the likelihood of failure) and economics (minimising construction and maintenance costs). The research suggests that safer and more economical slopes can be achieved by constructing at, or close to, the vertical in some residual soils.

The proposed methodology utilises already available software together with fundamental knowledge of how residual soils behave. The methodology of analysis is as follows.

- Calculate the wetting band (the deteriorated zone due to water infiltration) using standard geotechnical data.
- Run slope analyses using appropriate soil properties for the wet and dry zone and convert the resulting factors of safety into failure probabilities.
- Calculate failure probabilities for highway cuts.
- Calculate distribution of failure probability with age of highway cut.
- Carry out whole life cost analysis based on failure probability and on construction and maintenance costs using a suitable discount rate.



Predicted slope failures for inclined and vertical cuts

Geotechnical data for Malaysian, Kenyan and Zimbabwean soils have been used to validate the methodology, with promising results. The new design approach could produce optimal highway cuts in residual soils, resulting in reduced whole life costs.

For further information please contact Dr C Holt, University of Birmingham, School of Civil Engineering, Edgbaston, Birmingham B15 2TT. DFID Projects Reference: R7114: 'Optimisation of Cuts in Residual Soils' (0121 4145142; fax: 0121 4143674; E-mail: c.c.holt@bham.ac.uk).

DFID Department for International Development

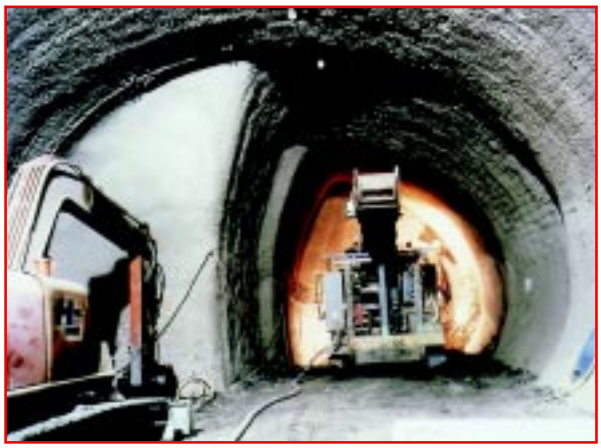
Top-down settlement and bottom-up ground movements

London Underground's Jubilee Line Extension (JLE) has demonstrated the value of acquiring good field data, leading to knowledge that will be of benefit to future urban tunnelling schemes. A huge amount of field data from the JLE was gathered by the LUL-supported LINK CMR research project *Subsidence damage to buildings: prediction, protection and repair.* It was evident that there was much more that could be learnt, and that there remained the opportunity to do so. Joint EPSRC research projects at the University of Cambridge and Imperial College are now examining the mechanisms of tunnelling-induced ground movements, their effects on buildings, and their mitigation.

While the two research teams have the same overall objectives, they have been tackling them from opposite directions. The Cambridge 'bottom-up' approach starts with the tunnelling operations and works outwards and upwards on the basis of the measurements of sub-surface ground movements. The Imperial College research concentrates on reliable measurements on the buildings down to the surface and into the foundations.

The continuing opportunity is that it has been possible, with the support of LUL, to make new measurements of ground and building movements into the longer term, this monitoring now being in its sixth year. As well as over 20 buildings, the monitoring includes instances of the use of compensation grouting, and two instrumented greenfield sites, one in London Clay and the other in the beds of the Lambeth Group. The analysis of the subsurface instrument readings is being combined with information on the tunnelling operations, including machine records.

Important to the joint research project will be the discussion of its early results at the conference *Response of buildings to excavation-induced ground movements*, to be held at Imperial College on 17 and 18 July 2001. These discussions will have a context of case studies from projects around the world and the results of other researchers. The conference, which concentrates on case histories based on good field data, is being organised by CIRIA as part of its continuing support for this research subject.



The JLE cross-over below Elizabeth House, near Waterloo station.

For details of the conference please contact CIRIA (020 7222 8891; fax: 020 7222 1708; E-mail: rfocus@ciria.org.uk; Website : www.ciria.org.uk).

For further information on the research, please contact Professor J B Burland, Department of Civil and Environmental Engineering, Imperial College, (020 7589 5111; fax: 020 7594 6053; E-mail: j.burland@ic.ac.uk) and Professor R J Mair, Engineering Department, University of Cambridge, (01223 332631; fax: 01223 339713; E-mail: rjm50@eng.cam.ac.uk).

CIRIA

Developing a UK domestic window energy rating system

Windows and doors currently 'use' more energy than any other building component. The cost of heat lost through a window over the lifetime of its use in a building is greater than the purchase cost. Energy and money can be saved, and greenhouse gases reduced, by choosing energy efficient windows.

Window energy rating is a method for assessing the total energy performance of a complete window. Conventional approaches simply assess how much energy a window loses but not how much energy a window can gain.

The total energy flow in a window consists of three major components – the solar heat gain in the form of radiation, the non-solar heat losses and gains from conduction, convection and radiation of all of the components of the window (not simply the glass), and the airflow through the window both designed (ventilation) and unintentional (infiltration).

Window energy rating takes all these energy flows into account and considers the whole of the window (both glass and frame) in assessing how much heat is lost or gained.

A DETR and industry-funded Partners in Innovation project to develop a rating system was started in Autumn 1998. Led by the British Woodworking Federation (BWF) with Partners from Leeds Metropolitan University, University College London, Centre for Window Cladding Technology, Fenestration Associates and Energy Advisory Associates, the project was not only aimed at researching and developing algorithms but also at ensuring that the research would be successfully used.

The British Fenestration Rating Council (BFRC) was therefore created at the outset to act as the vehicle for marketing the eventual Domestic Window Energy Rating (DWER) system. This embryo body was also used to involve all the other relevant trade associations and other stakeholders in the project.

A DWER is calculated from the individual values of the major energy transfer mechanisms. It gives a single number to rank a specific window type on a scale of 1 to 100, the higher the number the more energy-efficient a window. BFRC Certified windows will carry a label with the DWER clearly indicated and values for the following:

- U-value, which measures how well a product prevents heat escaping;
- Solar Heat Gain Coefficient, which measures how well a product blocks heat caused by sunlight;
- Light Transmittance, which measures how much light comes through a product.

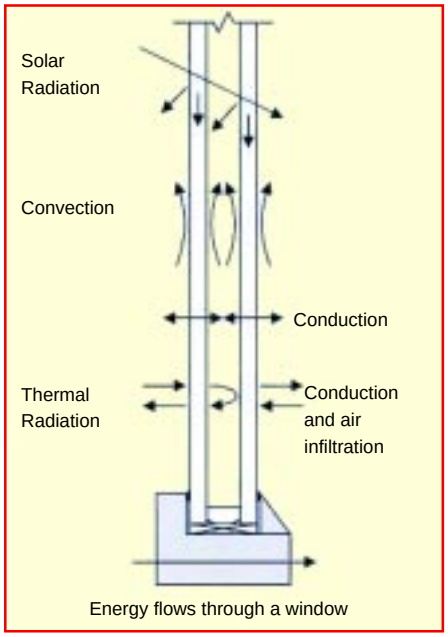
Air Infiltration, which measures how much air leaks into or out of a window when it is closed, is part of the DWER formula but is not given on the label.

The BFRC rating is provided for two size ranges of windows to represent 'small' and 'large' window sizes. A BFRC rating is not an indication of absolute window performance: this will vary with exact size, location, direction the window is facing and other factors. Rather, the DWER is designed to allow accurate comparison of the performance of windows under identical conditions.

Independent Assessors and Accredited Laboratories are now being selected by BFRC to enable window manufacturers to obtain their BFRC ratings.

The results of the BFRC Domestic Window Energy Rating Scheme will be displayed not only on the window label, but also on a publicly accessible and publicly searchable database of all current window energy rating results. Access to the database, held on the BFRC website, will be free to all.

The BFRC energy performance label and database will help everyone concerned with windows to determine how well a window will perform the functions of warming the building in the winter, cooling it in summer, keeping out the wind and resisting condensation.



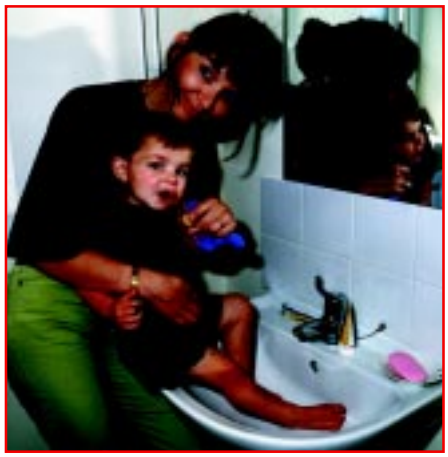
Energy flows through a window

The BFRC Scheme is directed at windows used in all new housing and domestic replacement work

For further information please contact The British Fenestration Rating Council, PO Box 24, Hitchin, SG5 2FP (07000 780971; fax : 07000 782 777; E-mail : info@bfrc.org). Full details are available through the Council's website: www.bfrc.org.

Water-efficient housing results

A two-year project to investigate the effective use of water-efficient appliances and products in housing has been completed by BRE for Essex and Suffolk Water.


Tenants at the Heybridge development

Water use was monitored in a new development of 37 houses in Heybridge, near Maldon, Essex. Water-efficient appliances (eg low-water-use WCs and showers) were fitted in 12 of the houses; greywater systems (taking water from baths and sinks, treating it and using it to flush WCs) in three, and the remaining 22 acted as control houses.

The project was designed to establish:

- the practicalities of specifying and installing water-efficiency measures;
- the water consumption of water-efficient appliances and products;
- the reaction of users to water-efficient measures;
- a specification for water-efficient homes.

The houses with water efficiency measures achieved water-use savings per person of 10% for WCs, 10% for baths and showers, and 31% for basins. Issues regarding specifying and installing the water efficient measures are discussed in the project report along with a detailed analysis of the tenants' views on the measures in their homes. The report also presents a modified BRE water-efficient performance specification for new housing, based on lessons learned during the project.

The Environment Agency, the British Bathroom Council and Moat Housing Group on behalf of Plume Housing Association contributed to the project.

For further information please contact Adam Comerford at BRE (01923 664467; fax: 01923 4465; E-mail: comerforda@bre.co.uk).

EMPHASYSing environmental impact in estuaries

Specialists have been pooling their expertise to give an overview of the techniques and tools available for studying morphological (shape and form) changes in estuaries. The findings, which are available in report format and on the internet, should interest anyone working in estuary science and management.

Project manager Richard Whitehouse explains: 'Estuaries are important both economically and ecologically. They are affected by human activity, water and sediment movement and in turn they influence flood defence, navigation and water quality.' Though much data is available about estuaries and many tools exist to study them, they are widely scattered.

Members of the 13-member EMPHASYS consortium provided information on a wide range of UK estuaries. 'Data for the broad properties of 79 UK estuaries were incorporated into a database held by ABP,' explains Whitehouse. Once common data had been established, six estuaries – the Blackwater, Humber, Mersey, Ribble, Tamar and Southampton Water – were selected for test modelling using existing techniques.

The Camel estuary in Cornwall an example of a sensitive location to which this research can be applied

A key research output has been *A guide to the prediction of morphological change in estuarine systems*. 'This provides information for estuary managers, stakeholders and interest groups on the key questions that might arise on estuary morphology. There is also a worked example showing how guidance can be applied,' explains Whitehouse. 'An important plus point is the breadth of knowledge and direct experience of applying predictive techniques that underpin the work.'

The project was part of Phase 1 of the Estuaries Research Programme and the team has also set out recommendations for Phase 2. These are grouped under data collection, development of improved predictive methods and fundamental 'blue skies' research.

For further information please contact Dr Richard Whitehouse at HR Wallingford (01491 822434; fax: 01491 825743; E-mail: rjsw@hrwallingford.co.uk) or visit the project website: http://www.hrwallingford.co.uk/ERP/.

INNOVATION & CONSTRUCTION FUTURES

Construction COGENT

BRE's Centre for Performance Improvement in Construction is collaborating with Cranfield University to transfer to the UK construction industry some of the lessons learned on performance improvement in the automotive sector.

Many reports have detailed the need for construction to raise its efficiency levels, and calls for improvements of up to 30% have been made. Many current industry initiatives are focusing on improvement at site level. This BRE project with Cranfield University aims to address the pre-construction stages – involving the whole supply chain – because this is the area where most value can be added, and waste and cost can be reduced.

The basis for the project is Cranfield's work with Nissen on the COGENT programme, a 3-year initiative to reduce design costs and time and, more notably, the costs of components by over 30%. These targets were met and it is felt that similar or more challenging goals could be achieved by the construction industry.

BRE is now working with Slough Estates plc and Crown House Engineering on translating the car industry's experience, expertise and knowledge into cost benefits for the construction sector.

On completion of this feasibility stage (in May 2001), the Project Team plans to seek further funding to implement Construction COGENT on construction projects. The team is looking to offer the benefits of this work to the whole construction sector, and is actively seeking comments and input. The project plans and benefits will be presented at a Seminar at BRE on 17 May 2001.

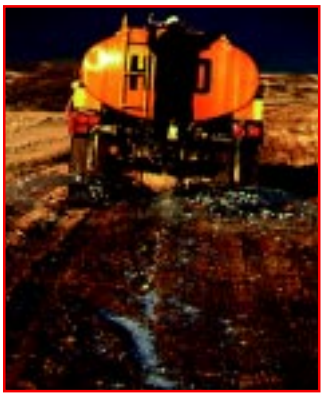
For further information about the Seminar and/or the project, please contact Peter Deer at BRE (01923-664127; fax: 01923 664398; E-mail: deerep@bre.co.uk).

GROUND ENGINEERING

Improving soil engineering properties with additives

Investment in road infrastructure in developing countries has recently been concentrated in rural areas, where roads are relatively lightly trafficked (below 200 vehicles per day). These roads are often constructed with locally available, sub-standard materials, more susceptible than standard materials to erosion or deformation by traffic in wet weather.

Increasingly, proprietary chemical stabilisation products, including ionic soil stabilisers such as sulphonated petroleum products (SPPs), are being marketed as a cost-effective solution for improving the durability of rural paved and unpaved roads. TRL, in collaboration with the CSIR in South Africa, have undertaken a DFID-funded study to examine the effects of additives on a range of materials and develop a strategy whereby engineers can make rational judgement on the selection and use of such additives. Field studies carried out in South Africa and the Middle East have shown that, where additives have been used, both densities and strengths can be significantly higher than control sections.



Tanker spreading additives prior to mixing

For further information please contact Tony Greening or Colin Gourley at TRL (01344 726631; fax: 01344 770491; E-mail: international_enquiries@trl.co.uk).

DFID Department for International Development

BRIDGES

Vibration of footbridges

TRL's past research and long-standing experience of footbridge vibration has been called into action again recently. Measurements have been made on two footbridges considered lively by their owners, who commissioned TRL to assess their dynamic performance. The issue is of course public acceptability, not safety.

Public acceptability of the dynamic performance of footbridges is far from being a new problem. Footbridges designed for structural efficiency and pleasing appearance tend naturally to be susceptible to pedestrian excitation, particularly longer-span structures. These often have low stiffness and damping values, and natural frequencies in the normal pacing-frequency range.

Apart from establishing their basic dynamic characteristics, measurements are made of acceleration while the structure is responding to people walking and running on it. Measured values are compared with the tolerance defined in the relevant standard, and an assessment made after allowing for research findings.

The most common requirement is to check vertical vibration, but sometimes longitudinal and transverse movements are the issues. Light steel structures can be susceptible to these movements, for example when the supports are unbraced portal frames.

Solutions to troublesome vibrations can be very simple, such as adding an intermediate support when conditions permit (see photograph). On other occasions, passive tuned vibration absorbers can offer the best solution and TRL has fitted two devices of this type.

For further information please contact David Cullington (01344 770836; fax: 01344 770356; E-mail: dcullington@tr.co.uk).

A40 Cutteslowe Bridge showing additional ramp support

IT AND CONSTRUCTION

Guides to BS5950-1:2000

BS 5950-1: 2000, the fundamental code for structural design of steel, has been amended.To help designers, the SCI has produced electronic and paper guides to the very extensive changes.

The electronic guide gives a complete, clause-by-clause comparison of the old and new versions. This allows interactive navigation through the text of both the 1990 and 2000 versions of the code and access to a comprehensive commentary. There are flow charts to guide designers through the new design procedures, worked examples and a key-word search facility.

Home page for the electronic guide to BS 5950-1: 2000.

In addition, the 'Blue Book', of section property data and member resistances – *Steelwork Design Guide to BS5950 Part 1: 2000*, and the 'Red Book' – *Handbook of Structural Steelwork* have also been revised. The two 'Green Books' on *Joints in Simple Construction – Design methods and Practical applications* – are being combined into one volume and revised to include additional connections (in particular to tubular sections). A further publication on the design of steel portal frames in Europe will be published shortly.

For further information please contact The Steel Construction Institute (01344 623345; fax: 01344 622944): for sales enquiries (CD of the Guide to BS 5950-1: 2000) please contact Martin Homer (E-mail: m.homer@steel-sci.com) and for publications please contact Nicky Christie (E-mail: n.christie@steel-sci.com)

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