Research Focus

Issue No.48 FEBRUARY 2002

PROMOTING THE APPLICATION OF RESEARCH IN BUILDING AND CIVIL ENGINEERING

IN THIS ISSUE

Testing a concrete building in fire

A full-scale concrete fire test – funded by BCA, Febelcem, Cembureau, CONSTRUCT, RCC and BRE – was carried out successfully on the 7-storey concrete building at BRE Cardington on 26 September 2001. The overall objective was to investigate the behaviour of a full-scale concrete building subjected to a realistic compartment fire together with realistic applied static load.

The concrete building fire test in progress

The test was carried out on a ground floor compartment 15m x 15m in plan, including high strength concrete columns. The design fire load was 40 kg/m^2, representing typical office fire loading to the British Standards. The performance of the structure was recorded through extensive instrumentation, including thermocouple and displacement transducers, photographs, video recording and test specimens. The data is currently being collated by BRE, and will be analysed and made available for these follow-up projects that are currently being developed:

- Investigation of the effects of thermal expansion of the heated parts of the structure during a fire
- Identifying modes of whole-building behaviour that cannot be shown from standard small-scale fire tests
- Investigation of the performance of high-strength concrete in a realistic fire scenario
- Calibration and validation of computer models and the development of fire design methods using a performance-based approach
- Investigation of reinstatement options.

This test is part of a wider programme of development on the fire design of concrete structures in the UK and Europe. The aim is to put into practice the design benefits to be gained from previous and new research in order to deliver more-economical concrete frame construction whilst maintaining the current high levels of safety. This will be achieved by developing new fire engineering methods from the study of whole concrete structures. Current methods are based on isolated member behaviour, whereas the new methods will look at the whole structure, taking into account the inherent fire resistance and robustness of concrete construction.

For further information please contact Dr Pal Chana at BCA (01344 762676; fax: 01344 761214; E-mail: pchana@bca.org.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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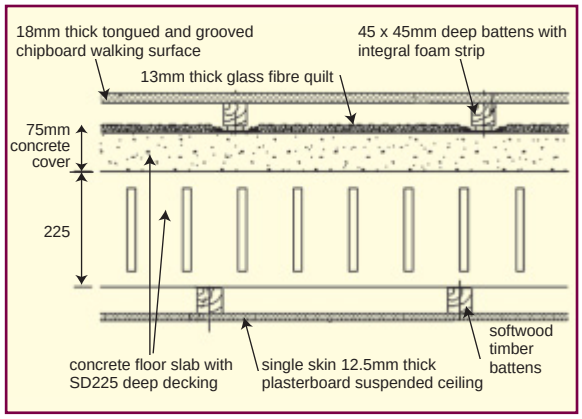
E-mail: abigail.dua@ice.org.uk).

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

Acoustic performance of *Slimdek*

Acoustic performance is increasingly important in residential developments as developers and occupants demand higher standards. The Building Regulations for such buildings include minimum standards of acoustic performance for walls and floors between dwellings, which are to be upgraded in 2002.

Slimdek floors and other forms of steel construction are increasingly being used in residential apartment buildings where the benefits of speed, quality and off-site prefabrication are important. To demonstrate the acoustic performance of *Slimdek,* SCI and Corus organised a series of acoustic tests in a residential development in Scotland, 8 storeys high and containing 49 high-quality apartments. The composite floors consist of 280 mm asymmetric *Slimflor* beams using deep decking with a resilient floor and suspended ceiling.



The tested floor

The results show that *Slimdek* can easily achieve acoustic insulation standards considerably better than current and proposed Building Regulations. The average airborne sound insulation (D_{nTw}) was found to be 62 dB. This compares well with the minimum acceptable in the Regulations of 52 dB. The average impact sound transmission (L'_{nTw}) was found to be 48 dB, compared to the Regulations' requirement of less than 61 dB. Furthermore, the test results meet the optional 'Enhanced Acoustic Standards' set out in a recent BRE publication for developers who wish to specify a standard higher than the Regulations.

The SCI and Corus plan to carry out further acoustic testing of steel frame buildings with composite floor slabs to demonstrate the high standards that can be achieved.

For further information please contact Dr Mark Gorgolewski, The Steel Construction Institute (01344 623345; fax: 01344 622944; E-mail: markgorgolewski@aecb.net)

Legionnaires' disease

Recent research strongly indicates a link between Legionnaires' Disease and the presence of Legionella in water systems in homes.

Legionnaires' disease is a serious form of pneumonia responsible for an estimated 1000 UK hospital admissions a year. Caused by inhaling Legionella bacteria, found in many hot and cold water systems, particularly large complex systems such as those in hospitals, hotels, office blocks and factories. But many cases are sporadic (apparently unconnected with any other case) and community-acquired – called SCA cases. It has been suggested that these SCA cases are caused by Legionella in home water systems, but this has not been established in previous research. A Government-funded project led by BRE investigated the issue.

Water samples were taken from the homes of 81 sufferers of SCA Legionnaires' disease. In 12 cases, clinical isolates of Legionella were obtained, so that the exact 'strain' of the organism could be determined. A water sample was also taken from 81 controls.

About 10% of the 162 homes tested had Legionella in the water. About three times as many patient homes as control homes had Legionella. In two out of the 12 cases with a patient isolate, Legionella typing showed indistinguishable organisms in the water sample – very strong evidence that these two cases were contracted from water in the home.

The research team commented that: 'When Legionnaires' disease is diagnosed, it would be useful to obtain water samples from the patient's home and to collect patient isolates more routinely as part of the diagnosis. This will help to establish whether the home is the source of the illness. Apart from identifying a potential risk to other occupants and visitors at the same address, this practice will help to quantify the risks to a greater extent than was possible in our study.'

For further information please contact Professor Gary Raw of BRE (01923 664507; fax: 01923 664443; E-mail: rawgj@bre.co.uk).

Demonstrating benefits of prefabricated housing

Although prefabrication has been widely promoted as a way of improving construction processes, its use in the UK housing market has been very limited. BRE research, as part of a Government-sponsored, industry-led project, has assessed the design, construction, cost and appeal of prefabricated housing.

The project included two case studies of prefabricated social housing developments – the Peabody Trust's Murray Grove development (30 one- and two-bedroom apartments – see picture) in London, and the Joseph Rowntree Foundation's CASPAR II development (a five-storey building of 45 flats) in Leeds.

The two cases indicate that, through good design, aesthetically appealing, practicable and flexible buildings can be achieved with modular construction. They also show that prefabrication is not synonymous with low quality, badly insulated, damp and noisy units, as its current image suggests.

Murray Grove development under construction

On construction processes, the case studies showed that prefabrication can reduce construction time significantly – it is easier to predict and meet the completion date, less time is needed for snagging (ie putting right faults before handover to the client) and it is not so weather-dependent as conventional construction. However, more time needs to be spent on planning for a prefabrication project, as it is vital that the timing and logistics of the project are well thought out early.

While both projects were slightly more expensive than conventionally built social housing, the additional costs can largely be attributed to their prototype nature and higher than normal specification.However, the faster construction time enabled the client to collect rental income at a much earlier stage, this being roughly equivalent to the price of an additional flat.

Finally, any concerns that tenants might object to prefabricated construction – equating it with poor quality – proved unfounded, as the clients had no difficulty in letting the flats. Satisfaction surveys on both developments showed tenants to be very happy living there, that all tenants found their flats to be warm and comfortable and that they had not needed to make much use of their heating systems.

For further information please contact Cecilia Bagenholm at BRE (01923 664317; fax: 01923 664084; E-mail Bagenholmc@bre.co.uk).

BRE

New flitch brings added value

dti
Department of Trade and Industry

'Timber 2005,' the research and innovation strategy developed through the UK Government for timber in construction, stressed that added value, ease of fabrication and guaranteed performance in use are all vital issues to drive forward the British timber sector. 'Best value from UK timber' was identified as a specific Priority Area. The Partners in Innovation Competition 2000 and 'Roots for Growth,' the Action Plan of the Scottish Forest Industries Cluster, also identified the creation of specific innovative products, together with the sharing of knowledge about them, as vital stages in their future strategy.

The aims of a recent, small, but highly successful 'New Age Flitch' Partners in Innovation project were to:

- demonstrate the transfer of innovation into practice within the UK timber supply chain;
- develop a specific, new, value-added use for UK-grown softwoods, within the construction sector;
- disseminate the results during and after project completion, to provide a Case Study for further such commercial and technical ventures.

The initial phase of work on the new flitch beams has been completed by TRADA Technology and a group of forest products and timber industry partners. The intention is to drive forward the concept into the market, and to continue with further improvements and extensions. Future Europe-wide consortia are also being considered, since value-addition from the basic products of the plantation softwood supply chain is a common theme throughout NW Europe.

The new flitch system shows the potential for utilising simple, dried, strength-graded, solid softwood members. Abundant production facilities for these exist at modern UK sawmills. Having invested more recently than competitors elsewhere in the temperate globe, UK producers have some of the best and most up-to-date sawing, grading and drying equipment anywhere.

Conventional plain carbon steel strip, in structural grades, is used for the central flitches. A manufacturing innovation is the use of ballistically-fired fasteners and tooling. These enable accurate assembly by driving fasteners through both the timber and the steel without the need for pre-drilling.

Footbridge using the new flitch system
Courtesy of Trada Technology Ltd

Investigations have so far included:

- viability of products incorporating the new flitch technology;
- specific applications and likely costs;
- fixing developments;
- durability evaluations, covering a range of applications and environments;
- preliminary determination of long-term performance;
- development of a simple design method.

As part of the continuous dissemination strategy, a footbridge was built, recorded, and described in a feature in View Point, the TRADA Membership Newsletter.

For further information contact Pia Larsen of Trada Technology Ltd, Stocking Lane, High Wycombe, Bucks, HP14 4ND (01494 569600; fax: 01494 565487; E-mail: plarsen@tradatechnology.co.uk).
Project website: www.ttlchiltern.co.uk/research_projects/pif284/index.htm

Understanding river flooding

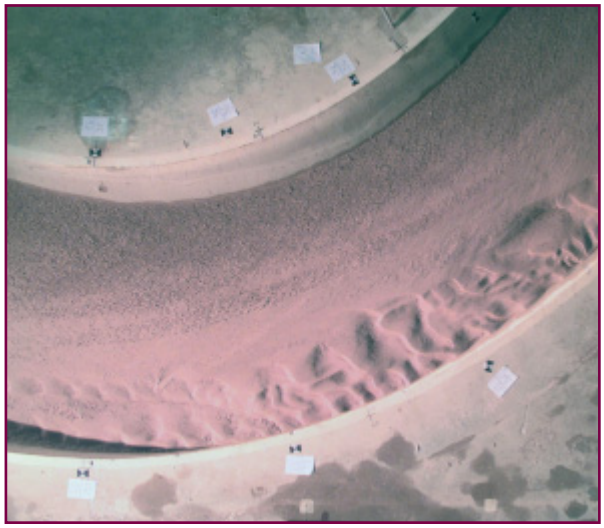
Photogrammetry has been used to compile topographic maps for decades. Now modern and automated close-range digital photogrammetry has provided hydraulic engineers with an insight into why rivers flood. In a research project funded by the EPSRC, the Department of Civil and Building Engineering at Loughborough University has been conducting work on two physical flumes that simulate flow within a flooding river channel and flood plain.

To prevent flood events such as those of November 2000, the flow processes leading to flooding of rivers need to be better understood. The research at Hydraulics Research, (Wallingford) and Loughborough University has been able to assist in this.

Numerical flow models are important to hydraulics research but are insufficiently accurate to simulate the complex interaction of fluid flow, sediment entrainment and bedform development. Experiments conducted in physical models (two flumes of different sizes) allow the real world to be simplified so that critical parameters can be controlled and measured.

To measure the detailed bed-forms created by the flowing water in the flume rapidly, digital photogrammetry was used, generating accurate and dense digital elevation models (DEMs) to represent the bed-surface.

When a river floods, the flow structure becomes complex in the main channel owing to floodplain flow plunging into the main channel – see figure. This become more prominent as water depth increases. The interaction between main channel flow, flood plain flow and bed-form increases overall flow resistance, which raises the water level and causes increased incidence and extent of flooding. Designing methods to prevent the development of such complex flow could therefore allow a reduction in flooding incidence in the future.



Digital image of bed-surface of flume

The data gathered during the flume experiments combined with other fluvial parameters has been used to increase our understanding of the processes involved in a flooding river and the critical controls. The photogrammetric methods have also been applied successfully in monitoring bed changes in a real braided river in the Canadian Rockies using oblique, ground-based digital photographs.

For further information please contact Dr Jim Chandler, Department of Civil and Building Engineering, Loughborough University, LE11 3TU (01509 222624, fax: (01509 223981; E-mail: J.H.Chandler@lboro.ac.uk).

Catchment flood management planning

HR Wallingford is leading a team developing a Modelling and Decision Support Framework (MDSF) to support the implementation of Catchment Flood Management Plans in the UK. The work has been funded by DEFRA and the Environment Agency and the partners include Halcrow, CEH Wallingford and the Flood Hazard Research Centre.

Flooding is often the result of rainfall and drainage conditions some distance away from the affected area. DEFRA and the Environment Agency are now developing 'Catchment Flood Management Plans' (CFMPs), the aim being to identify preferred flood management policies under present and future conditions, taking account of whole catchments rather than just individual rivers. These must be based on a sound understanding of the hydrological, hydraulic and hydrogeological processes at work in each catchment.

The purpose of the MDSF is to provide a customised geographical information system to help with data management, along with computational tools that undertake the complex calculations needed within a CFMP. The MDSF obtains flood water levels from hydrological and hydraulic models, and advice on appropriate catchment models is provided within the system.

The MDSF allows the rapid appraisal of different flood management policies to help the user select the preferred policy. Policies are assessed under present-day and predicted future conditions of land use and climate change, and provides advice on climate change and land use scenarios.

'Pilot CFMPs are being prepared by consultants on five different UK catchments. Two of these – the Medway and the Irwell – are being used to trial the MDSF,' explains David Ramsbottom who leads the project at HRW. 'Core data has been collected on each river catchment, including OS background maps, indicative flood plain maps and a digital elevation model needed to predict flood depths.' Data sets for the economic damage and social impact calculations were assembled for use in the MDSF.

HRW coordinated the EUROTAS project (European River Flood Occurrence and Total Risk Assessment System) from 1997 to 2000 and their involvement with this study has informed development of the MDSF, particularly the modelling approaches.

The first release of the MDSF was completed in January 2002. The system will be further enhanced as more and better data and procedures become available in the future.

For further information about this work, or a CD presentation / demonstration, please contact David Ramsbottom at HR Wallingford (01491 822218; fax: 01491 825916; E-mail: dmr@hrwallingford.co.uk).

Guide for the drainage of development sites

Specialists at HR Wallingford have recently produced a guidance manual for the planning and design of drainage of development sites. The work has been carried out under the Partners in Innovation scheme run by the DTI.

'The Manual is intended for use by general engineering practitioners, as well as developers and architects,' says Richard Kellagher who co-led the project. 'It is a useful reference for guidance and information on all aspects relating to the hydraulics of site drainage.'

General information on the planning process and the approach needed to obtain planning consent is provided in the first section. This process can involve a range of different organisations depending on the type of development and the pipe system or river receiving the discharges.

Subsequent chapters provide technical information on the design of drainage systems, starting with roofs and progressing 'downhill' to pavements and basements.

A balancing pond in a new development

A section on Sustainable Drainage Systems (SUDS) sets out the various types of unit and the design principles that need to be considered. The final chapter, on site storage design, includes a summary of research carried out by HRW on behalf of Government into drainage storage assessment for greenfield sites.

Copies of *Guide for the Drainage of Development Sites* (SR 574), costing £50 (plus p&p outside the UK), are available from: Publications, HR Wallingford Ltd, (01491 835381; fax: 01491 832233; E-mail: *info@hrwallingford.co.uk).*

For further information about this work, please contact Richard Kellagher (01491 822419; fax: 01491 825916; E-mail: rbbk@hrwallingford.co.uk).

Guidance on improving the flood resistance of domestic and small business properties

dti
Department of Trade and Industry

Recent flooding events across the UK have shown the devastating impact that flooding can have on people's lives and businesses. During the Autumn 2000 floods alone, over 10,000 homes and businesses were flooded, causing damage to property and severe distress to thousands of people across the country. Whilst it is not possible to eliminate the risk of flooding, many practical steps can be taken to reduce the cost of flood damage repairs and speed up recovery times.

A new DTLR guidance document *Preparing for floods* aims to provide best practice information on measures that can be taken to improve the flood resistance of both new and existing properties at risk of flooding. The document has been prepared in response to a recommendation made by the Parliamentary Select Committee for the Environment, Transport and Regional Affairs following the Autumn 2000 floods. The guide is aimed at:

- existing homeowners and small businesses whose properties are at risk of flooding;
- developers, builders, local planning authorities, building control bodies and others involved with:
  - construction of new properties in areas of flood risk
  - renovation of existing buildings in areas of flood risk.

During the preparation of the guide, information was drawn from Government, the insurance industry, local authorities and, most importantly, families and small businesses who have been through the experience of a major flood. This is the first time that best available information on improving flood resistance of buildings has been collated within one document.

The guide does not attempt to solve all problems associated with flood damage but it provides a range of common-sense solutions and references to more detailed reading. It provides advice to existing homeowners and small businesses on how to assess the risk of flooding in a particular location, and guidance on selecting appropriate measures to improve flood resistance of property. These include measures to prevent or reduce the volume of floodwater entering a building, including the use of temporary flood barriers, and on permanent measures to improve the flood resistance of the building structure (including walls, floors, building services and fittings).

Autumn 2000 flooding

Guidance is also provided for developers, local authorities, building control bodies and others to use on new development in high flood risk areas. It provides a general introduction to the role of the Government's Planning and Policy Note 25: *Development and Flood Risk*, and guidance on the forms of construction that are most appropriate for developments at risk of flooding.

The project has been undertaken by WS Atkins Consultants Ltd with joint funding provided by DTLR, DTI Construction Industries Directorate, Environment Agency, Scottish Executive, Association of British Insurers, National House Building Council, and the House Builders Federation. The steering group included the funders together with CIRIA, BRE and HR Wallingford.

The guide is published as 'Interim Guidance' and will be periodically reviewed and updated as comments are received and new information becomes available. An electronic version of the guide will be made available on the DTLR website.

For further information please contact Jim Leat of WS Atkins, Woodcote Grove, Ashley Road, Epsom, Surrey, KT18 5BW (01372 726140; fax: 01372 740055; E-mail: jim.leat@wsatkins.com). Website: http://www.wsatkins.com/wsainternet/

Data handling through object technology

dti Department of Trade and Industry

The Stent Integrated Rig Instrumentation System (SIRIS) is an example of applied object technology in construction. SIRIS was developed from the OTICS (Object Technology in a Construction SME) research project, funded by the former DETR and led by Stent in collaboration with Ove Arup and Lancaster University. The project aimed to use product and process modelling in the electronic handling of project data throughout the pile construction process.

SIRIS-equipped piling rig

SIRIS was developed in close liaison with site workers and clients, and designed to align with current working practices. It was designed to produce a system that would close the loop between estimating, design and construction. Initial emphasis was on monitoring the piling process on site by placing instrumentation on the piling rigs to record quality and production information.

Piling contractors are usually one of the first organisations on site. The contract may be of very short duration, so communications must be easy to set up and, once developed, the IT infrastructure must require minimal support and operate reliably in a hostile environment.

Each SIRIS piling rig is fitted with an industrial PC with a high-brightness, colour, touch-sensitive screen and is connected to several sensors on the rig. All interaction with the rig driver is through this simple interface. SIRIS provides the driver with the rig schedule created by the foreman, records the time taken for the rig to get onto position and allows the driver to indicate the cause of any delays. During piling, the system displays the current depth of the auger, the required depth of the pile, the auger torque, average boring rate and other conditions critical to the process.

The system provides the driver with a continuous indication of concrete pressure, flow and a graph showing the overbreak as the auger is extracted. Together with the concrete pressure, this graph helps to ensure a sound pile is always produced.

All information is recorded in a pile log, compressed, and then transmitted via GSM modem back to the office. A soft copy remains with the rig as a backup. The pile logs are used to populate a database residing on the internal network that can be accessed throughout the company.

The key benefits of SIRIS are that the system could be introduced gradually, and integrated with existing site working practices. It allowed workers with little previous experience of IT to adopt the system with relative ease and the prompt availability of conformance data and process control information helped to shift the cultural emphasis on site away from production rates and towards quality assurance and 'customer' service. The database can be accessed throughout the company and be used to produce client documentation in an electronic format.

For further information please contact IT Construction Best Practice at itcbp@davislangdon-uk.com, website: www.itcbp.org.uk.

HYDROPOWER & IT

Himalayan hydropower software

Research Focus 41 of May 2000 led with an account of the DFID-funded project called REFRESHA (REgional Flow REgimes for Small-scale Hydropower Assessment). This work has resulted in two versions of a hydropower estimation software package – HydrA-Nepal and HydrA-HP. These PC-based software enable a user to rapidly estimate the hydrological regime and, hence, the hydropower potential at any prospective site in the Himalayan and sub-Himalayan regions of Nepal or the Indian state of Himachal Pradesh.

Further details of the REFRESHA project and the HydrA-Nepal or HydrA-HP software can be obtained from:

- *In UK: Mr Gwyn Rees, Project Manager, Centre for Ecology and Hydrology, Wallingford, Oxfordshire, OX10 8BB, UK (+44 (0) 1491 838800; fax: +44 (0) 1491 692424; E-mail: hydra@ceh.ac.uk).*
- *In India: Mr Arun Kumar, Director Alternate Hydro Energy Centre (AHEC), Indian Institute of Technology-Roorkee, Roorkee - 247 667 (Uttaranchal) India (+91 (0) 1332 74254; fax: +91 (0) 1332 73517; E-mail: ahec@rurkiu.ernet.in).*
- *In Nepal: Mr Arun K. Dhungana, Managing Director, ITECO Nepal (P) Ltd., PO Box 2147, Min Bhawan, New Baneshwor, Kathmandu, Nepal (+977 1 482385; fax: +977 1 482298; E-mail: iteco@mos.com.np).*

DFID Department for International Development

WATER & HEALTH

New approaches to arsenic testing and treatment

Testing and analysis in the field

In Bangladesh a change in rural water supply sources in the last 20 years, from surface water to ground-water, has resulted in a drop of 250,000 deaths each year from diarrhoeal-related diseases. However, Bangladesh is facing a major problem with high concentrations of arsenic in its groundwater affecting 60 million people. In a recent DFID-funded study, WS Atkins were commissioned to carry out a rapid assessment of nine currently available technologies that had been developed to remove arsenic at the well head.

This was the first such independent and comparative assessment of its kind and required development of new survey techniques and new, previously untried, testing equipment.

For further information please contact David Sutherland at DFID (020 7023 0994; fax: 020 7023 0072; E-mail: d-sutherland@dfid.gov.uk).

DFID Department for International Development

Guides to thermal performance of curtain walls

Revisions to Part L of the Building Regulations have prompted the Centre for Window and Cladding Technology to re-publish its guidance on thermal performance of curtain walls.

Heat flow through curtain walling, and other forms of cladding with metal and glass components, is complex due to lateral heat flow within the components, and to cold bridging. Calculation of U-values (heat transfer values) should take full account of all heat flow through the wall by conduction. Furthermore it is necessary to know the temperatures accurately when determining the risk of condensation. The revised CWCT guides draw together previous work on heat flow through glazing systems and more recent work on lateral heat flow in insulated metal panels.

The U-value of a wall may be determined by applying the area-weighted method to sum the U-values of separate parts of the wall. Individual parts of the wall may be assessed for U-value using either a hot-box or calculation by finite element or finite difference method. However, it is normally incorrect to divide a wall into its individual components and correct assessment of an overall U-value for a wall is dependent on the analyst's skills when dividing the wall into elements.

When applying the area-weighted method, it is essential that heat flows only through the assessed element of the wall and not laterally between elements. The wall must be divided into a series of elements separated by adiabatic boundaries. Thus an element for the purposes of U-value assessment may comprise half of a glazing unit, a glazing frame and half of an insulated panel.

The elements to be assessed are thus complex and may not be realisable, as they comprise several incomplete components. It is very difficult to test elements in a hot-box if they include partial components with little structural integrity such as half of a gas-filled glazing unit. It is easier and more flexible to assess U-value by calculation than measurement. Analysis allows the rapid assessment of part components and substitution of one component for another and may be used to show whether correct boundaries have been assumed.

The complex geometry of many components used in building envelopes leads to a risk of inclusion of cold bridges within the envelope. This effect becomes more significant for walls that are otherwise better insulated with lower overall U-value. The problem is particularly acute where materials with very low thermal conductivity are used. Whilst hot-box testing may show surface temperatures, calculation by the finite difference or finite element methods will clearly show temperatures throughout the wall and the presence of cold bridges within the wall.

Cold areas of the inner surface may cause surface condensation that is normally a nuisance rather than a cause of serious damage. However, cold bridges can reduce the temperature within the wall below the local dew-point and cause interstitial condensation. This may lead to corrosion of metals or degradation of insulation. Presence of moisture within any insulation will increase its thermal conductivity and the overall U-value of the wall. Accurate condensation risk analysis is necessary to ensure that cold bridging is minimised and that adequate vapour barriers are included.

The CWCT thermal guides comprise:

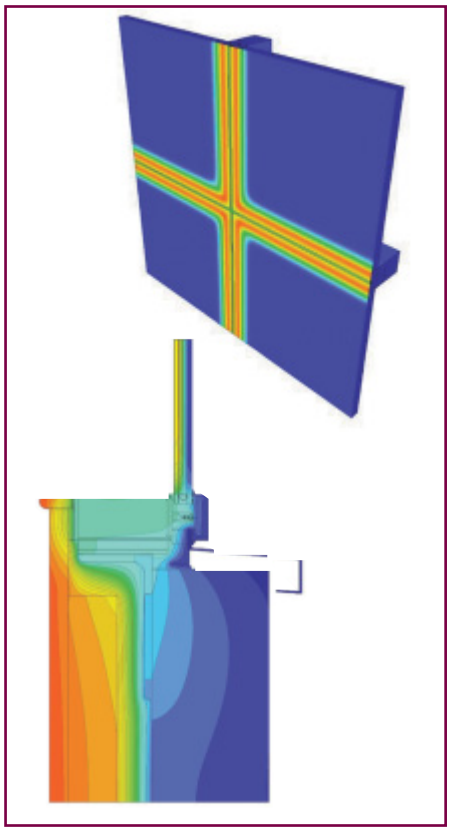
- *Standard for specifying and assessing for heat transfer (the U-value)*
- *Guide to good practice for assessing glazing frame U-values*
- *Standard for specifying and assessing for condensation risk*
- *Guide to good practice for assessing heat transfer and condensation risk for a curtain wall.*

The guides show worked examples of U-value calculation and give guidance on:

- specification of U-value assessment;
- the selection of appropriate elements for calculation;
- calculation of overall U-values;
- identification of cold bridges;
- condensation risk analysis;
- appropriate software for analysis;
- current UK codes and regulations.

Part L of the Building Regulations (England and Wales) may be found at *http://www.safety.dtlr.gov.uk/bregs/brads.htm*. The CWCT maintains a website, *http://www.cwct.co.uk/thermal* that gives guidance on standards, software and certification schemes.

For further information please contact Brenda Apted at CWCT (01225 826541; fax: 01225 826556; E-mail: b.a.spted@bath.ac.uk).



(Top)Thermal distribution at panel edges (Above) Temperature distribution at a window head showing cold bridging

Winter challenges on the highway network

For many years, the practice of salting highways has been derived through 'custom and practice', rather than being based upon scientific research. Prompted by the challenge of procurement on the basis of Best Value, organisations across the UK are now asking questions such as – With budget and resource constraints, is the service currently delivered the best that can be achieved?

TRL was asked by the National Salt Spreading Research Group to undertake independent trials to advance the understanding of salt spreader performance with different salt systems, the effective de-icing of highways under the effects of traffic, and measurement of residual salt.

The research will lead to a far greater understanding of the salting of carriageways which will, in turn, lead to greater efficiency, cost savings, improved service delivery and safety, and environmental benefits.

For further information please contact Marilyn Burtwell (01344 770214; fax: 01344 770356; E-mail: mburtwell@trl.co.uk).

Innovative technologies for contaminated land

The practicalities of land remediation in the UK have been brought to the fore by the UK Government's pledge to ensure that 60% of all domestic construction is on brownfield sites. It is pressing developers to reclaim contaminated land.

Excavation and disposal is the most frequently applied route to remediate contaminated land. However, there is now a wealth of new techniques that can be used to avoid off-site disposal. These incorporate biological, chemical or physical processes such as bioremediation and bioventing, vacuum extractions, air sparging, soil washing and vapour extraction, and cement-based fixation. In most cases, they enable contaminants to be destroyed, removed or immobilised without resorting to extraction and off-site disposal. They offer an attractive and more-sustainable alternative.

On-site bioremediation in progress (Photo courtesy of Entec UK Ltd)

If the market for these new methods is to realise its potential, perceptions about appropriate technologies and methods need to change substantially and CIRIA is working on a range of projects aimed at achieving this change.

One such project has involved an analysis of all case studies in the UK of sites remediated using biological techniques. The objective was to make the lessons learned from current commercial practices available to all. The findings of the case study assessments have been used to generate guidance on the selection and application of biological techniques on contaminated sites.

The resulting handbook covers the broad range of applications for biological systems, from the early stages of contaminated site risk assessment through remediation design and planning, to implementation, validation and after-care. It also fully addresses the technical, financial, legal, regulatory, practical and social issues surrounding biological systems. CIRIA hopes that the handbook will help greatly to improve the confidence and understanding of practitioners in this area.

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

Mitigating utility works disruption

The New Roads and Street Works Act 1991 (NRSWA) introduced a new system of managing utilities' works in streets, the intention being to reduce disruption from such activities. It was anticipated that the Act would lead to an increase in the use of trenchless techniques for such works, but this has not been the case.

The Pipe Jacking Association set up a working group to investigate the lack of market growth in the use of trenchless techniques and commissioned TRL with Jason Consultants Ltd to review the available information.

The research team surveyed motoring organisations, contractors and highway authorities. The consensus was that the Act has not led to any noticeable reduction in the disruption caused by utility works. This view is supported by changes in the way the Act has been implemented and also by recent Government initiatives such as the planned introduction of pilot rental schemes in Camden and Middlesbrough.

There is a pressing need to collect and validate data on the impacts and indirect costs of street works. This needs to be followed by open debate on the options available for introducing new working practices and how they might be implemented.

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