

# Research Focus

Issue No. 38

AUGUST 1999

PROMOTING THE APPLICATION OF RESEARCH IN BUILDING AND CIVIL ENGINEERING

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## Whole-life costs of road networks

The choice of routes for new roads has for many years incorporated an assessment of the engineering costs, and of the costs to road users during the life of the road. More recently, TRL, on behalf of the Highways Agency, has developed a whole-life cost model for new road pavements. Called COMPARE, it has been used to estimate the costs of maintenance arising from using different types of pavement materials for the same road. These costs include the costs of the maintenance works and the costs incurred by users at the maintenance sites.

Management of road maintenance has traditionally been based on the condition of the road pavements rather than any analysis of the costs arising from maintenance alternatives. Pavement management systems now include techniques for analysing maintenance options on individual roads, using road condition data held in the systems, and taking account of the costs to road users as well as the costs of the current and future maintenance. Alternatively, management systems may be used to examine the condition and maintenance needs of a road network, but without the ability to include practical constraints.

To combine the techniques developed for analysis of whole-life costs at project level for individual roads with the requirements for the analysis of funding needs for the maintenance of a road network, the Highways Agency asked TRL to develop a whole-life cost model for road networks.

It is intended that the model will be used to examine the interaction of individual maintenance works on a network, or the overall funding needs to maintain a network in a specified condition. Based on analysis of condition data collected by survey machines on a routine basis on the trunk road network, the model should

be able to predict the surface and structural maintenance needs of the road pavements and prioritise the identified treatments taking into account the costs to road users caused by the disruption at road works.

The model will then enable highway managers to assess the longer-term consequences of different maintenance strategies, including the funding required to achieve and retain alternative levels of network condition. The model should be able to identify an overall level of funding for structural maintenance, and the new Highways Agency Pavement Management System then used to allocate funds to individual schemes.

The importance of whole-life costing in managing road networks was recognised in the 1998 *New Deal for Trunk Roads in England*. One of the Highway Agency's key objectives in 1999 is to minimise whole-life costs of maintenance of the road network. The tools being developed by TRL should prove to be valuable aids to achieving this new objective.

For further information please contact  
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fax: 01344 770686;  
E-mail: rabell@trl.co.uk).



Motorway maintenance costs are included in the COMPARE whole-life cost model.



## 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, lively 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.

### Distribution

If you receive *Research Focus* by direct mail (i.e. not with *Civil Engineering*) 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 Lesley Wilson at the Institution of Civil Engineers, 1 Great George Street, London SW1P 3AA (020 7655 2242; fax 020 7799 1325; Email [wilson\\_l@ice.org.uk](mailto:wilson_l@ice.org.uk)).

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## COASTAL ENGINEERING

# New design aid for seawalls

Overtopping at seawalls can pose a threat to pedestrians and property as well as to coastal defences. Over the past 20 years this problem has been the focus of much research in the UK and overseas. A new research-based publication, funded by the Environment Agency R&D programme and compiled by researchers at HR Wallingford, *Overtopping of Seawalls* is now available to help engineers assess the overtopping performance of seawalls.

The Manual draws existing information together for easy access,' says Dr Phillip Besley, project leader at HR. 'Where appropriate, we have also expanded and re-analysed data to give a set of consistent design techniques'.

The Manual has five sections. The first two provide background information and consider water levels, wave conditions and currents, and methods for assessing the joint probability of severe wave and water levels.

Most research to date has concentrated on techniques for predicting 'mean overtopping discharges' (ie the average flow rate of water over the wall). These are important when assessing flooding, as well as in the design of drainage works. Section 3 presents empirical methods for calculating these values for smooth impermeable slopes, rough or armoured slopes and wave return walls. Recent equations describing the overtopping performance of plain and composite vertical seawalls are also given.

When assessing damage, however, it is the instantaneous overtopping discharge that is of concern. 'We know that large single waves represent the greatest danger to vehicles and pedestrians,' explains Besley. 'They can also cause structural damage to the wall itself.' Section 4 of the Manual gives equations for estimating 'peak overtopping events' for different types of seawall. This process involves estimating how many waves overtop the structure, then predicting the largest overtopping volume using probability distributions derived from physical model tests.

The final section of the Manual considers 'tolerable discharges', summarising the results obtained by various researchers using 'human guinea pigs' to study the effects of overtopping behind test structures.

Although the methods outlined have limitations – they will not predict overtopping as accurately as site-specific physical model studies – researchers expect that the Manual will prove useful to anyone involved in the design of coastal structures.

*Overtopping of Seawalls – Design and Assessment Manual Technical Report 178*, £15 (plus £3.50 postage) is available from



Overtopping at Seaford prior to beach re-nourishment.

The Environment Agency Research & Development Dissemination Centre, c/o WRc, Frankland Road, Swindon, Wiltshire SN5 8YF (01793 865000; fax: 01793 514562; E-mail: [publications@wreplc.co.uk](mailto:publications@wreplc.co.uk) .

For further information about the project please contact Dr Phillip Besley at HR Wallingford (01491 822264.; fax: 01491 825539; E-mail: [phil@hrwallingford.co.uk](mailto:phil@hrwallingford.co.uk)).



## INNOVATION

# Partners in Innovation 1999

The deadline for applications under the DETR Partners in Innovation competitive funding scheme is 17 September 1999. The 1999 round was launched in June and was accompanied by a revised Business Plan for Construction Research and Innovation that sets out DETR's research priorities.

Copies of both documents can be found on the web at [www.construction.detr.gov.uk](http://www.construction.detr.gov.uk), or are available as a brochure from Alan Turnbull of DETR (020 7890 5703; fax: 020 7890 5759; E-mail: [alan\\_turnbull@detr.gsi.gov.uk](mailto:alan_turnbull@detr.gsi.gov.uk)).



## From negative cost material to high-strength boards

When the fibre-rich sludge derived from the waste residues that result from re-cycling wastepaper is combined with ordinary Portland cement, and then de-watered, cured, and dried, it provides boards of exceptional bending strength.

The exceptional strengths of these new board materials are related to the unusual microstructures that result from press de-watering the fibre-rich sludge. See *Research Focus 36*, February 1998, for details of the source of the sludge.

At a density of 1250 kg/m<sup>3</sup>, bending strengths of >35 N/mm<sup>2</sup> have been achieved together with moduli of elasticity >5000 N/mm<sup>2</sup>. These compare very favourably with the BS EN 634-2 Cement-bonded particleboards specifications. Hard-body

impact performance is also good and trials are in progress comparing this property with commercial cement particleboards.

Boards made from the de-watered fibre-rich sludge without additives have good properties, which meet many of the BS EN structural requirements for normal particleboards. At a density of 915 kg/m<sup>3</sup>, the bending strengths exceed 20 N/mm<sup>2</sup> and the moduli of elasticity exceed 2,400 N/mm<sup>2</sup>. The addition of gypsum plaster – which improves fire resistance – reduces

the bending strength but the elastic modulus remains reasonably constant. A 50% addition of gypsum would reduce the strength at this density to 12.7 N/mm<sup>2</sup>, a value still high compared to commercial gypsum fibreboards.

For further information please contact Professor John McNicholas or Professor Peter Webster, Salford University (0161 295 5413; fax: 0161 295 5060; E-mail: p.j.webster@civils.salford.ac.uk).

## INTERNAL ENVIRONMENT

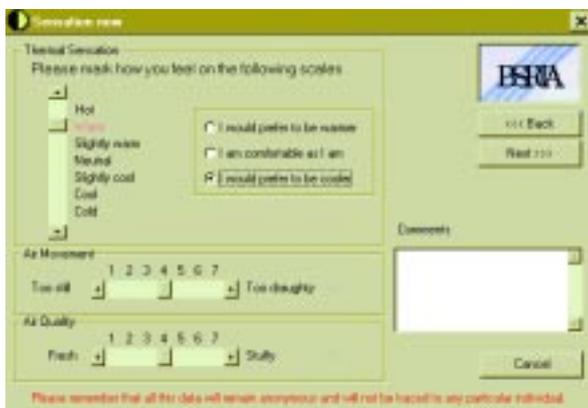
### Acquiring thermal comfort data

The DETR-sponsored and industry-funded BSRIA research project Thermal Comfort – Field Data Acquisition has demonstrated success in exploiting the near-universal use of personal computers to obtain individual perception of thermal comfort in real time. The need for acquiring field data in real-time has been demonstrated by the increasing concern over the disparity between the predictive methods based on current standards.

ISO 7730 *Moderate thermal environments – Determination of the PMV and PPD indices and specification of the conditions for thermal comfort* specifies predictive techniques that are largely based on the results of test chamber investigations conducted under closely controlled conditions. These conditions rarely occur in real life and may be the cause of disparity between predicted and actual thermal comfort.

The development of correct predictive methods for real-life situations requires thermal comfort perception data from a wide range of occupied building types. Correct and reliable predictive techniques are critically important, as issues of thermal comfort, occupant health, associated productivity and energy efficient design are of growing importance and, for many clients, are already central to their decision-making process.

Thermal comfort studies normally require a researcher or engineer to approach building occupants individually up to five times a day to obtain their perception of the indoor environment. This procedure is expensive and laborious. Using its software, which offers a cost-effective and less disruptive solution, BSRIA has conducted a real-time, thermal comfort survey in an operational, occupied building with minimum disruption to the daily working patterns of the occupiers. The cost-effectiveness of the survey was



demonstrated by reduction of the labour cost associated with such studies.

A second thermal comfort survey in an occupied, operational building was planned for April to June 1999. The data gathered will be used to test thermal comfort models and will form part of the database to provide the basis for an improved understanding of thermal comfort criteria. This will provide building services designers with the information to design for higher levels of energy efficiency, and for thermal comfort in the interests of improved occupant health and productivity.

For further information please contact Dr Rukhsana Adam at BSRIA (01344 750515; fax: 01344 750446; E-mail: Rukhsana.Adam@bsria.co.uk).



## BUILDINGS & MATERIALS

### Bracket angle systems

Bracket angle systems are used in cavity walls to support masonry cladding, but there is currently no generally accepted design method available. A recently completed project, funded by the DETR Partners in Innovation Scheme, undertook analytical non-linear finite element studies on these systems to form the first step towards developing a design method.

The study considered many geometries of bracket angle systems, which were calibrated using test data provided by the sponsors of the project: Ancon CCL Ltd, Halfen Unistrut Ltd and Metsec Building Products Ltd. It was found that increasing the thickness of the angle and/or decreasing the bolt space improved the stiffness of the system most effectively. Increasing the vertical leg length of the angle or the thickness of the bracket also improved performance. However, there are material and labour-cost implications associated with these measures.

Experimental tests also showed that the type of bricks used and the quality of the brickwork affects the deflection of the bracket angle. Unfortunately, data on this factor was limited and did not allow parametric studies to be performed, so further work has been recommended.

The results from this study will be used to develop simple design rules to ensure that stainless steel bracket angle systems are designed to support required loads safely and efficiently.

For further information please contact Angela Chew at The Steel Construction Institute (01344 623345; fax: 01344 628211; E-mail: a.chew@steel-sci.org).



# Construction interests in the EU Fifth Framework

The Department of the Environment, Transport and the Regions (DETR) has set up an advisory service for the UK construction industry, to promote the opportunities for companies in the sector to take advantage of the funding available in the European Union's latest Framework Programme on Research, Development and Demonstration. The service is being operated by the National Physical Laboratory with support from Taywood Engineering. Assistance can be obtained on what is on offer, the rules for participation and how to prepare proposals for the Programme.

**M**ain contractors, specialist subcontractors, suppliers, architects, engineers, service providers and clients, as well as universities and research organisations, can all participate. The Fifth Framework is designed to enhance the competitive position of Europe and to improve the quality of life of its citizens. It is to operate over the four years from 1999–2002 with a total budget of about £10 billion.

Participation in some parts of the programme will be of direct benefit to the industry in increasing efficiency, introducing sustainable technologies and improving working conditions. Collaboration with other sectors, such as transport and energy will lead to innovative solutions to the environmental problems now facing Europe.

The most obvious areas for involvement of the construction industry in Framework Five are in Key Actions on "Products, Processes and Organisation" and the "City of Tomorrow". A summary of some of these is given in the box opposite.

*For further information please contact The UK Contact Point for European Construction Research and Innovation (EUCRI), The National Physical Laboratory, Teddington, Middlesex, TW11 0LW (020 8943 6660;*

*fax: 020 8943 2989; E-Mail: eucri@npl.co.uk; Website: http://www.npl.co.uk/npl/fp5/eucri.*



## Programme: Energy, environment and sustainable development

### Key action: Sustainable management and quality of water

- Technologies for monitoring and prevention of pollution, protection and management of groundwater and surface water resources

### Key action: The city of tomorrow and cultural heritage

- Integrated approaches aiming at sustainable development of cities and rational management of resources
- Protection, conservation and enhancement of European cultural heritage
- Development and demonstration of technologies for safe, economic, clean, effective and sustainable preservation, renovation, construction, dismantling and demolition of the built environment, in particular for large groups of buildings
- Comparative assessment and cost-effective implementation of strategies for sustainable transport systems in an urban environment

### Key action: Cleaner energy systems, including renewables

- Development and demonstration, including for decentralised generation, of conversion technologies for the main new and renewable energy sources, in particular, biomass, fuel cells, wind and solar technologies

## STRUCTURES & MATERIALS

# Studded plate composite construction

High strength with shallow construction depth is an attractive structural combination and a principal characteristic of studded plate composite construction (SPC). In its simplest form, SPC comprises a steel plate with stud connectors covered by a layer of concrete. A recent SCI research programme, jointly funded by DETR and British Steel, has investigated the state of the art of SPC.

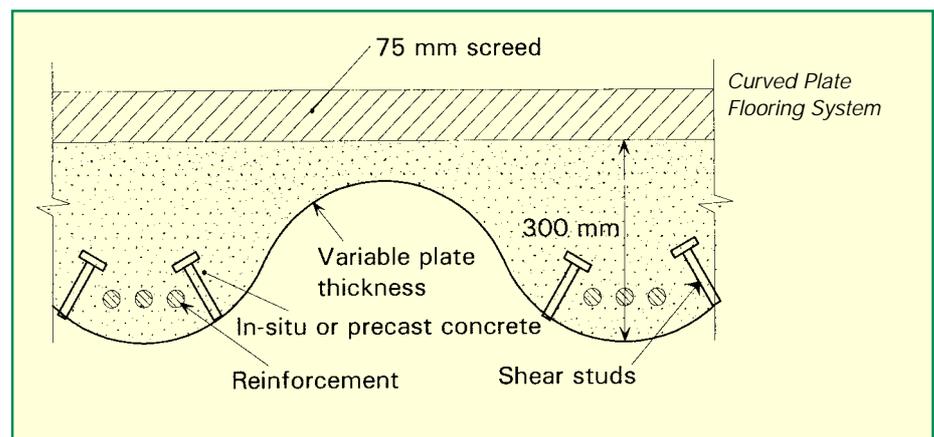
**B**y virtue of its highly efficient use of materials, combined with the potential for off-site fabrication of panels, SPC has the potential to speed up the construction process, improve safety and reduce costs.

Materials, design techniques and methods of construction have been investigated and preliminary studies carried out. Applications studied include tunnel linings, diaphragm walling, bridge decks and flooring.

Flooring, in particular, can offer a direct monetary expression of the thin construction depth, and a series of structural options has been developed. One option, which has generated particular interest among both architects and engineers, is the curved plate flooring system. This provides an aesthetically pleasing exposed steel soffit, and has excellent load-carrying capacity (up to 9m spans with conventional office loading). The exposed steel soffit has the potential for passive fabric energy stor-

age (FES). Buildings designs utilising FES may benefit from reduced initial investment in air conditioning systems and reduced whole-life costs associated with energy consumption in service.

*For further information please contact James Way at The Steel Construction Institute (01344 623345; fax: 01344 628211; E-mail: j.way@steel-sci.com).*



# ANEMONE: modelling for the future

Offshore waves follow a straightforward hydrodynamic pattern, but this changes as they near the coastline. Researchers at Wallingford are continuing to improve methods for predicting wave run-up and overtopping on beaches and at seawalls and have developed a suite of process-based computer models capable of simulating onshore/offshore wave motions up to and beyond the shoreline. Work on 'ANEMONE' (Advanced Non-linear Models for the Nearshore Environment) has been funded by MAFF and is led by Dr Nick Dodd.

**W**e can model deep water waves using linear wave theory, but these methods are less suitable in shallow water near the coastline,' explains Dodd. 'Waves here are better represented by the non-linear shallow water equations.'

One of the ANEMONE models, OTT-1D, resolves individual breakers as they encounter and overtop a beach or revetment. It acts like a numerical wave flume. Breaking waves are represented as 'shocks' – a natural way of simulating them and one already used to study dam breaks.

OTT-1D has been successfully validated

against wave flume results for sloping seawalls (using simple storm waves and more complex spectra) where it predicted mean overtopping rates that were consistently close to flume measurements (For details of this work see ASCE Journal of Waterway, Port, Coastal and Ocean Engineering, 124, pp 73-81).

OTT-1D models the behaviour of individual waves, so it is able to simulate the number of overtopping waves and the volume of individual events as well as instantaneous velocities.

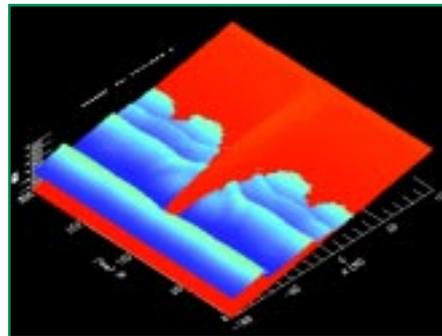
Another model, OTT-2D, has been developed to study wave action along coastlines.

OTT-1D and 2D are currently being tested on engineering studies. At present they need to be applied by experienced modellers, but the hope is that they will eventually become routine consultancy tools for solving coastal engineering problems.

For further information please contact Dr Nick Dodd at HR Wallingford (01491 822354; fax: 01491 825539; E-mail: [nxd@hrwallingford.co.uk](mailto:nxd@hrwallingford.co.uk)).



Wave run-up and overtopping at Hayling Island, March 1995



Wave run-up simulated by OTT-2d on a plane beach with a ridge down the centre.

## BUILDINGS & MATERIALS

# Glass in buildings

Glass has been used in buildings for hundreds of years. This long history formed the topic of the first paper at the research-based CWCT conference *Glass in buildings* held in April 1999. Glass used as a structural material and as a modifier of building environments was amply demonstrated.

Illustrations of the structural use of glass ranged from descriptions of complete projects, including a 52-metre high suspended glass wall, to new technologies, including the use of glass-adhesive structural elements, the construction of glass columns from laminated glass tubes and discussion of the elegant (appropriate) use of structural glass.

Use of glass as an internal climate modifier centred on its use in energy efficient buildings, both in passive and active solutions. These included vacuum glazing, sun-directing glazing, and measurement and evaluation of advanced glazing materials. Other aspects of comfort and safety in buildings covered included acoustics, daylighting and fire performance.

The conference attracted eighty papers of which forty-one were accepted for presentation and publication. Taken together, they represent the best and latest information and guidance on the use of glass in complex modern buildings. Authors were drawn from ten countries and included eminent engineers, architects and constructors.

The papers are now available from CWCT as bound proceedings. They are listed on the CWCT website at <http://www.bath.ac.uk>.

For further information please contact Dr Stephen Ledbetter, Centre for Window & Cladding Technology (01225 826541; fax: 01225 826556; E-mail: [cwct@bath.ac.uk](mailto:cwct@bath.ac.uk)).



## EXPORTS

# Exports project final report out

Stage 3 of the Institution of Civil Engineers' Project on Technology Support for Civil Engineering Exports (see Issue 35, Nov 1998, and Issue 37, Feb 1999), in which the results of the research phase of the project were actively promoted, has now been completed. As a supplement to the published report, a four-page Action Plan has been prepared.

The Action Plan presents 17 key messages and recommended actions to the UK Government, 14 to Industry, 13 to the UK Construction Research Community and 8 to the ICE. The Action Plan therefore complements and extends the published ICE Report from the project – *Thriving in a global market: Technology Strategies for UK Civil Engineering Exports*, published by the Institution of Civil Engineers in September 1998 (ISBN 0-7277-2705-2) – and the Plan needs to be read alongside that Report and its Appendices.

To obtain your copy of the Report, including the new supplement, (Price £30 to UK organisations and individuals), contact the Thomas Telford Bookshop at the ICE (Tel: 0171-665 2019; fax: 0171-222 7500; E-mail: [maddox\\_j@ice.org.uk](mailto:maddox_j@ice.org.uk)).

For further information about the project, please contact Roger Venables, Project Manager, ICE Exports Project, Venables Consultancy, 12 Cranes Drive, Surbiton, Surrey, KT5 8AL (020 8399 4389; fax 020 8390 9368; E-mail: [ice-exports@venablesconsultancy.co.uk](mailto:ice-exports@venablesconsultancy.co.uk)).



THE INSTITUTION OF CIVIL ENGINEERS

# Environmental Handbooks update demonstrates extensive environmental research output

The construction industry is experiencing more pressure than ever before to improve its environmental performance. The UK Government has set Sustainable Construction as a policy objective, so fiscal pressures and regulatory controls are increasing. Rising numbers of clients are also requesting evidence about environmental performance from their contractors and suppliers as part of the procurement process. In response to these increasing pressures, CIRIA, working in partnership with Crane Environmental, has recently updated its Environmental Handbooks. These provide guidance on sustainable and environmental issues relevant to construction, covering the legal and policy framework as well as listing the main good practice points and highlighting references for more detailed guidance on technical and managerial issues. The work, part-funded by the DETR under the Partners in Innovation scheme, revealed just how many changes have occurred in this field since the Handbooks were first prepared in 1994.

**T**he updated Environmental Handbooks provide practical guidance to all involved in construction projects, whether in design, construction or demolition and site clearance, on the environmental issues they are likely to face day to day. The updated Handbooks, which have recently been completed, will be published in a three-part loose-leaf format.

Legal issues and specific items of legislation are dealt with under headings of *Legal position at April 1999 and Policy and forthcoming legislation*, with references to match. Technical and managerial issues are covered under headings of *Background*, which explains why the issue is important, and *Good practice*, which provides, often in bullet-point format, succinct statements of acknowledged good practice. Extensive lists of references are provided and it is these references that are much more numerous than in 1994.

One important aspect of the update has been the extension of the guidance given on environmental issues in demolition and site clearance, and the gathering-together of that guidance in a separately-available part.

The main developments in legislation, industry practice and research results that have been addressed in the update are:

- waste legislation and policy, in particular on waste management and Landfill Tax;
- definitions of construction waste and actions required to deal with it.
- the Environment Act 1995, and the consequential changes in organisation names and responsibilities;
- the update of Section 33 of the Environmental Protection Act 1990;
- amendments to the Building Regulations;
- output from relevant CIRIA projects, especially on waste management and minimisation, and the Environmental Site Guides;
- publication of new versions of BREEAM;
- increased use and opportunities for recycling, including changes in standard specifications to allow use of recycled materials;
- the CIRIA strategic review of environmental issues in construction and recent research on sustainability indicators;
- development in the industry of Site Environmental Management Plans;
- publication and adoption of BS EN ISO 14001 on environmental management systems and of a redrafted Eco-Management

and Audit Scheme;

- integrated management systems;
- progress in understanding the concept of sustainable development and its application to construction;
- the output from Construction Industry Environmental Forum meetings (see below).

Updating the Handbook is an example of research projects undertaken under the auspices of the Construction Industry Environmental Forum, managed by CIRIA in partnership with BRE, BSRIA (the Building Services Research and Information Association) and CBPP (the Construction Best Practice Programme). The Forum has played a significant and leading role in developing the construction industry's understanding of, and response to, the growing environmental pressures it faces.

The Forum's main activity is holding regular evening or afternoon seminars on a wide range of environmental issues affecting the construction industry, including new or forthcoming legislation, current leading-edge practice and current or recent research.

A main focus of current Forum activity is

(Below) *The Bishops Wood Environmental Education Centre – an example of an environmentally positive design*

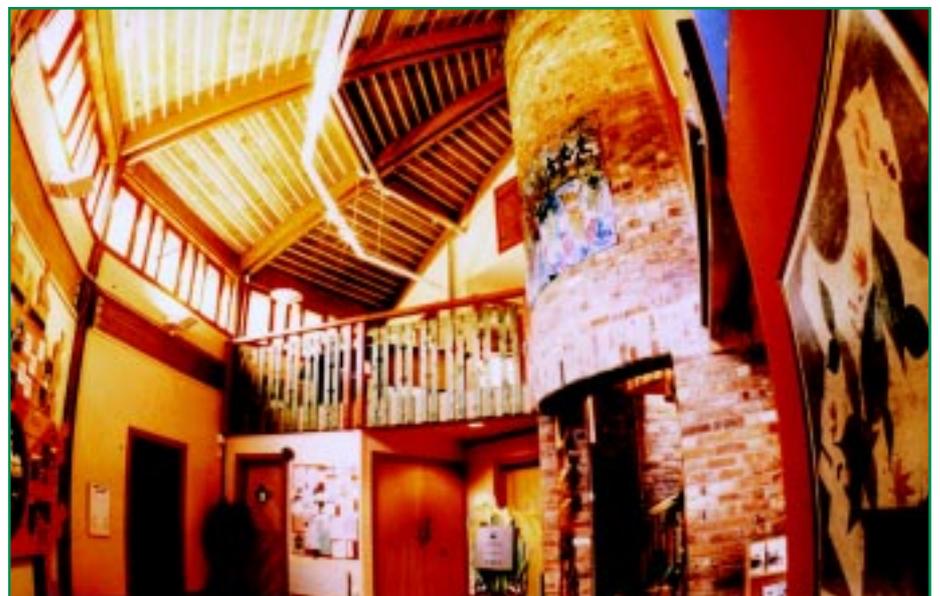
(Right) *Pollution prevention and control are crucial to effective site environmental management.*

addressing the progression from only dealing with environmental quality issues to deal with the concept and practice of sustainable construction, where economic and social dimensions are added to the environmental concerns.

Notes of each meeting are circulated to all Forum members, and add significantly to the growing body of knowledge in the industry.

The Forum's research programme focuses on environmental and sustainability issues that industry members will face in the medium-term future.

*For further information about the CIRIA Environmental Handbook or about the Construction Industry Environmental Forum please contact James Milne at CIRIA (020 7222 8891; fax: 020 7222 1708; e-mail: james.milne@ciria.org.uk).*



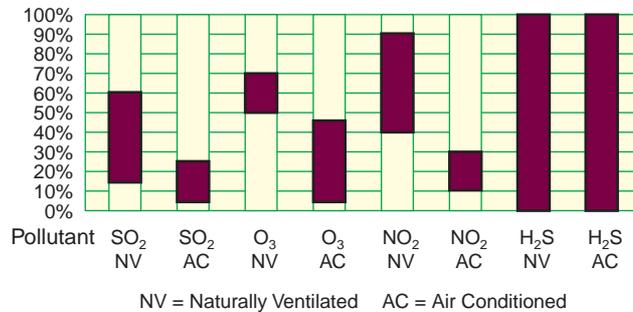
## Controlling pollution in museums and galleries

Museums have been one of the fastest expanding building sectors since 1995. To preserve collections on display and in storage, tight environmental controls are necessary. To balance the environmental control with the safety & health of occupants, many museums have opted for mechanically ventilated, air-conditioned systems, which can be costly in energy and maintenance terms. A DETR-funded project is under way to compare the effectiveness of pollution control in museum buildings and to investigate ways in which pollution can be controlled while achieving energy savings.

Concentrations of pollutants and particulates in and around air-conditioned museums and naturally ventilated museums are being measured during winter and summer monitoring campaigns. Preliminary results show that air-conditioning with chemical filtration has been effective at reducing concentrations of externally generated nitrogen dioxide and sulphur dioxide.

It has also been found that one of the naturally ventilated buildings, which is well sealed from external conditions, was able to control these pollutants well. Having small rooms and a cell-like building layout was found to assist passive pollution control.

Both air-borne and deposited particles have been measured. Human activity appears to be a significant factor in raising internal particulate levels. In galleries with many visitors, high particle concentrations



Indoor/outdoor ratios for pollutant gases in various buildings

sometimes exceeded levels measured externally. These levels were maintained throughout the day and they only declined slowly at night when the museum was closed.

A summer monitoring campaign will follow and alterations to the fabric and services in one of the air-conditioned museums and one of the naturally ventilated museums are

planned, in order to test a range of measures aimed at improving pollution control without incurring an energy penalty. The research will run till March 2000, following which guidelines for museums based on the findings of this project will be published.

The project is being led by the Museums and Galleries Commission, with EMCEL Filters Ltd as the industrial partner and the Victoria & Albert Museum, the Museum of London, The Manchester Museum and the Horniman Museum as hosts.

For further information please contact Ms May Cassar, Museums & Galleries Commission, 16 Queen Anne's Gate, London SW1H 9AA, (020 7233 4200; fax: 020 7233 3686; E-mail: m.cassar@mgcuk.co.uk).



## MATERIALS

### Conspec one year on

The Ready-mixed Concrete Bureau delivered the computerised version of BS 5328 to the DETR on the target date of 31 March 1998. It has been a busy year since then. First the Technical Committee of the Quarry Products Association gave its go ahead for a live launch from 1 July 1998. At two well-attended launch seminars the system was welcomed by the industry at large, with representatives from materials experts, consulting engineers, government departments, highways authorities, contractors, concrete specialists and ready-mixed concrete producers.

About 200 organisations were involved in the free trials of Conspec and the Chartered Institute of Purchasing and Supply carried out their own assessment of the system. A three-month free period of usage was granted to new users and just one advertisement attracted more than 900 requests to try out the software.

Seminars were held between November 1998 and February 1999 in Cardiff, Edinburgh and the English Regions. These were attended by clients, specifiers, contractors and ready-mixed concrete producers. Requests for the incorporation of the requirements for concrete in the NHBC Handbook and the Specification for Highway Works were made at several of these seminars. Standards for water retaining structures and marine standards had already been included.

Currently, over 1,000 organisations have

the Conspec concrete specification software disk, which runs under Windows 95 or Windows NT.

Conspec handles designed, designated, prescribed and standard mixes. The concrete can be reinforced or unreinforced and the various factors such as exposure to metals, sulfates, acids and the environment are all catered for. Conspec produces an invitation to tender document, which can be transmitted by post or e-mail to potential suppliers, thus achieving a more efficient supply chain. A specification log can be printed out at any time, setting out the detailed steps and decisions taken by the software so these can be examined and checked by users.

An annual fee of £100 covers the costs of any further developments of the system, including the incorporation of EN 206 when this becomes mandatory in the United Kingdom. Use of the helpdesk is included,

as is attendance at seminars and user groups. Conspec is being made available to all colleges and universities free of charge to ensure that all students are fully aware of the need for accurate and unambiguous specifications for concrete in accordance with the relevant British and European Standards.

Conspec users are to be surveyed soon to ensure their involvement in development of the system. The NHBC Handbook and the Specification for Highway Works requirements will be incorporated into Conspec over the next few months leaving the way clear to provide the free upgrade to EN 206 when this is required.

For further information and a free trial of Conspec please contact John Hannah, RCB (01344 774975; fax 01344 761214; e-mail:jhannah@rcb.org.uk).



# Dynamic insulation demonstration

The McLaren Community Leisure Centre in Callander, Stirlingshire is the first major building in the UK to use dynamic insulation, a "breathing construction" technique, in which the heat usually lost in conduction to the outside is collected by air drawn into the building through insulation.

**A**s well as controlling ventilation in buildings to reduce energy-expensive air-change losses, dynamic insulation can reduce reliance on mechanical systems. It is based on an approach to heating and ventilating of buildings that emerged in the 1960s, through an interest in developing the fabric of buildings rather than the supporting systems. It is an ecological approach to design.

The McLaren Sports Centre represents the state of the art in dynamic insulation, where the insulation acts as a counter-flow heat exchanger. It is the first major building in the UK to use dynamic insulation and the first in the world to use dynamic insulation in a wet environment. The building incorporates dynamically insulated squash courts, bowling hall, sports hall and swimming pool.

Previous use of dynamic insulation occurred in buildings with high moisture content in the internal air and which required a constantly high ventilation rate. The idea has slowly been introduced into housing, schools, office buildings and sports halls in Europe. The design of the McLaren building is the culmination of research undertaken by Gaia Architects funded by DETR.

The McLaren building has also been supported by the Scottish Sports Council. The Council is keen to identify cost-effective services for buildings with high running costs that maintain capital and running costs of sports buildings at levels that do not create long-term dependency on financial, human or environmental resources. It has also sought to ensure that its support of sporting activities for recreation and health is underpinned through the procurement of healthy buildings.

The performance of the Sports Centre is now being monitored by Gaia and the Scottish and English Sports Councils. Initial checks indicate that the dynamic insulation technique appears to be working effectively in both the swimming pool and the sports hall in exchanging heat between the room underneath and the incoming air, whilst at the same time largely resisting the backflow of moist air and water vapour. Based on the performance to date, it has been decided to



instal new fans with half the design duty of the original models with an option to have a turn down ration equivalent to 0.5 air changes per hour. Data on performance of the building is now being gathered on a regular basis and reports will be presented to the sponsors on a quarterly basis.

*For further information, including availability of summary of proceedings from a seminar held at the building in November 1998, please contact Howard Liddell, Gaia Architects, The Monastery, Hart Street Lane, Edinburgh EH1 3RG (0131-557 9191 ; fax: 0131-557 9292; E-mail:GaiaGroup@aol.com).*



## ENVIRONMENT & MATERIALS

# Environmental profiles of building products

A new method of presenting environmental data was launched in June 1999 to cut through the confusion of claims about the environmental performance of building materials.

**T**he growing demand for environmental information about building products has resulted in an uncoordinated range of life cycle assessment (LCA) approaches. A standard assessment method has been needed, and is what BRE set out to develop in a 3-year project supported by the construction materials industry and DETR.

The result is the publication of a set of common rules and guidelines for applying LCA to create Environmental Profiles of UK construction products. This standardised method of identifying and assessing the environmental effects of building materials over their life cycle – extraction, processing, use and maintenance, and eventual disposal – means that designers can have confidence in the 'level playing field' status of Environmental Profiles for every material type.

In addition, a UK environmental profiles database (available as an Internet subscription service) has been set up.

*For further information please contact Hilary John at BRE (01923 664462; fax: 01923 664084; E-mail: johnh@bre.co.uk).*



## SPONSORING ORGANISATIONS

### GOVERNMENT

**Department of the Environment, Transport and the Regions,**  
Eland House, Bressenden Place,  
London SW1E 5DU  
(020 7890 5704, fax 020 7890 5759)

### RESEARCH ORGANISATIONS

**British Cement Association,**  
Century House, Telford Avenue, Crowthorne,  
Berkshire, RG11 6YS  
(01344 762676, fax 01344 761214)

### BRE,

Garston, Watford, Hertfordshire, WD2 7JR  
(01923 664000, fax 01923 664010)

### Centre for Window and Cladding Technology,

University of Bath, Claverton Down, Bath,  
BA2 7AY (01225 826541, fax 01225 826556)

### Construction Industry Research and Information Association,

6 Storey's Gate, Westminster, London, SW1P  
3AU (020 7222 8891, fax 020 7222 1708)

### HR Wallingford Ltd,

Wallingford, Oxfordshire, OX10 8BA  
(01491 835381, fax 01491 832233)

### The Steel Construction Institute,

Silwood Park, Ascot, Berkshire, SL5 7QN  
(01344 623345, fax 01344 622944)

### Transport Research Laboratory,

Old Wokingham Road, Crowthorne, Berkshire,  
RG45 6AU (01344 773131, fax 01344 770356)

## PROFESSIONAL INSTITUTIONS

### The Chartered Institute of Building,

Englemere, King's Ride, Ascot, Berkshire,  
SL5 7TB (01344 630700, fax 01344 630777)

### Institution of Civil Engineers,

1 Great George Street, Westminster, London,  
SW1P 3AA (020 7222 7722, fax 020 7222 7500)

### Institution of Structural Engineers,

11 Upper Belgrave Street, London SW1X 8BH  
(020 7235 4535, fax 020 7235 4294)

## INDUSTRY

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