

# Research Focus

Issue No. 47

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PROMOTING THE APPLICATION OF RESEARCH IN BUILDING AND CIVIL ENGINEERING

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## Building with cardboard

Completion of the cardboard building at Westborough School has shown that cardboard can be used in construction more than it is now.

As cardboard is made from post-consumer waste paper, it has the potential to be a very 'green' building material. With mass production it can also be cost-effective. The challenge for the industry is to identify and deliver products made from cardboard that can work in the future. In the Westborough School building project, supported by the Partners in Innovation scheme, cardboard was used as:

- structural tubes (supporting the roof);
- structural panels (frame stiffening);
- insulation (for walls and roof);
- surface layers;
- the whole structure of the bridge, tested on Tomorrow's World Livelab.

There is a need to account for the main weaknesses of cardboard. Self-evidently, cardboard burns, but solid card tends to char like timber rather than burning quickly. It can be fire-treated with chemicals, but this tends to reduce the environmental benefits. The challenge is to incorporate it where it is protected from fire.

Cardboard is recycled by making it wet and stirring it around, so it must be protected from water when used in buildings. There are possible surface treatments for card to make it much more water-resistant but these also tend to change the nature of the material and make it less recyclable.

Card has limited but known strength, and the useful strength is reduced greatly by its



Strength testing of a cardboard bridge

Courtesy of Andrew Cripps, Buro Happold

tendency to creep under load. This limits the loads it can carry, restricting applications to single storey buildings or a range of in-fill panels, while tubes can continue to be used for unusual structures, void formers and pile sleeves, permanent or temporary formwork for columns, and air conditioning systems.

For further information on the 'Cardboard School' please contact Dr Andrew Cripps of Buro Happold, 17 Newman St, London, W1T 1PD (020 7927 9700; fax: 020 7927 9701; E-mail: [andrew.cripps@burohappold.com](mailto:andrew.cripps@burohappold.com); Website: [www.cardboardschool.co.uk](http://www.cardboardschool.co.uk))



## SUPPORT TO STANDARDS & IT

## CWCT Standards Database

CWCT recently launched a web-based database of standards used in the UK relevant to façades, façade components, façade performance and materials.

The database is searchable by both text and keyword and the results of searches are automatically sorted according to relevance. The database currently includes Building Regulations, British Standards, European and ISO Standards, CWCT Standards, and overseas standards where these are used in the UK. Almost 400 standards are currently referenced.

The database is regularly maintained and updated to ensure that changes to standards are reflected in the database. During the next few months it is envisaged that the scope of the database will be extended to incorporate an increasing

number of international standards, making it a convenient and effective resource for a wide range of façade professionals.

The database is accessible by CWCT members via the CWCT website at [www.cwct.co.uk](http://www.cwct.co.uk). The index to the database also includes links to the appropriate national and international standards bodies.

For further details please contact Brenda Apted of CWCT (01225 826541; fax: 01225 826556; E-mail: [b.a.apted@bath.ac.uk](mailto:b.a.apted@bath.ac.uk); website: [www.cwct.co.uk](http://www.cwct.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 Panel which comprises:

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**Editor:** Eur Ing Roger Venables

**Secretary:** Abigail Dua (ICE).

Roger Venables, the Editor, is at Venables Consultancy, 12 Cranes Drive, Surbiton, Surrey, KT5 8AL  
(020 8399 4389; fax 020 8390 9368;  
E-mail: rf@venablesconsultancy.co.uk).

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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 Abigail Dua at the Institution of Civil Engineers, 1 Great George Street, London SW1P 3AA (020 7665 2230; fax 020 7799 1325;  
E-mail: abigail.dua@ice.org.uk).

*Research Focus* is also downloadable from the ICE website ([www.ice.org.uk](http://www.ice.org.uk)) and readable using Acrobat software.

## Bituminous surfacings in tropical environments

Roads carrying high volumes of traffic can justify the use of bituminous surfacings based on savings in road user costs. At the other end of the traffic spectrum, when access to a rural area is a priority, the choice of bituminous surfacing is now based on the desire to provide all-weather access rather than merely the need to reduce the running costs of vehicles.



Several DFID-funded research projects being carried out by TRL are designed to enhance present knowledge on the design and construction of bituminous materials, including hot mix asphalt (HMA) and surface dressings. This includes *Longer-life surfacings using bitumen modifiers* (ref: R6473) and *A guide to dense bituminous surfacings for developing countries* (ref: R6897).

In tropical environments, bituminous surfacings must withstand high temperatures, strong sunlight and, frequently, high axle loads. HMA laid on heavily trafficked roads must therefore be designed both to resist premature deformation and 'top down' cracking, which results from hardening of the bitumen at the surface of the layer. This makes mix design particularly difficult because the mix properties that prevent one form of deterioration are exactly those that promote the other.



Top-down cracking of hot mix asphalt

A variety of modified bitumens containing additives designed to improve their properties have been incorporated into HMA briquettes and surface dressings, so that the effects of natural ageing can be examined and compared. The results show that, in general, the ageing of the modified bitumens, although much more rapid in tropical climates than temperate climates, is nevertheless slower than for the unmodified bitumens. In addition, in surface dressings, the modified bitumens have better early adhesion with the chippings and higher bitumen application rates can be used, hence improving durability.

Because of the increasing numbers of bitumen modifiers being introduced to the market, a test to assess the durability of binders using the Pressure Ageing Vessel is being developed. It is intended that this test will be used in laboratory tests of new products, thus avoiding the need for onerous field-testing.

Information on this and earlier research will soon be accessible through the 'Transport Links' website [www.transport-links.org](http://www.transport-links.org). A recent relevant publication is the revised *TRL Guide for Surface Dressing (Overseas Road Note 3)*.

For further information please contact Colin Jones at TRL (01344 770554; fax: 01344 770356; E-mail: [international\\_enquiries@trl.co.uk](mailto:international_enquiries@trl.co.uk)).

**DFID** Department for International Development

# Extreme floods from dam breaks: impact and uncertainty

Dambreaks, and the uncontrolled release of water that follows them, can cause death, injury and destruction on a large scale. Between 1998 and 2000, researchers from HR Wallingford (HRW) worked with colleagues across Europe in a Concerted Action on Dam Break (CADAM) to understand the underlying processes of dambreak more fully. A new research project investigating the impacts of extreme floods and dam failure is expected to start soon.

CADAM highlighted areas where there is a need for further investigation', says Mark Morris of HRW. 'The proposed new project (IMPACT – Investigation of extreme flood processes & uncertainty) will concentrate on three of these – breach formation, flood propagation and sediment movement – looking at how these may be predicted and considered within a risk assessment.'

IMPACT formally involves nine organisations from eight European countries. 'A range of partners will work with HRW, from universities to dam owners and operators, so the project will maintain a practical focus', explains Morris. Contact with additional organisations in the United States and around the world will also be maintained to encourage dissemination and exchange of research findings.

A key aim of IMPACT is to investigate ways of predicting the location and development of breaches in embankments. Researchers will study factors that might affect breach location including, for example, the type of building material used, the presence or absence of surface protection, the potential for overtopping, piping, and attack by burrowing animals.

Breach formation research will include scale physical modelling and destructive field tests on five 6m high embankment dams near Røssvatnet Lake in northern Norway. Based on the observations and a review of case studies, the research team will develop new mathematical models to determine future performance and help predict failure. Work on this project will also complement and inform a separate study on the performance of flood defence funded by the UK Environment Agency.

On flood propagation, whilst natural river flows have been studied in several EU-funded projects, different approaches may be needed for dambreak floods. These floods pose a hazard to areas that are normally considered to be outside the flood plain or not subject to frequent flooding). 'We plan to draw on data collected during CADAM, and will look at floods both in rural valleys and in urban settings', explains Morris. This is of particular relevance to Europe where many large dams and flood defences lie close to centres of population and industry. The research team will compare mathematical techniques for modelling these flows (in particular urban flood routing) and assess which give the most reliable results. 'We



Severe flood flows during the Baldwin Hills dam failure (US, 14/12/1963)  
Photo courtesy of Wayne Graham, U.S. Bureau of Reclamation, original source unknown.

partners aim to develop an understanding of these sediment movements, involving physical experiments and theoretical studies looking at flow resistance, bank erosion mechanisms and deposition patterns. This will include looking at the formation of 'secondary dams', which can significantly affect and alter the progression of a flood.

Prediction of each element – breach formation, flood propagation and sediment deposition – carries with it a degree of uncertainty. The overall flood risk is a complex amalgam of these three elements. In seeking to understand these mechanisms better, IMPACT will aid the move towards a more reliable assessment of the overall flood risk and of extreme flood conditions.

plan to develop guidelines for an appropriate strategy for modelling techniques,' says Morris.

During a dambreak, huge sediment movements can dramatically change the topography of a valley or urban area. The

For further information please contact Mark Morris at HR Wallingford (01491 822283; fax: 01491 825539; E-mail: m.morris@hrwallingford.co.uk; Web:www.impact-project.net).



## BRIDGES & HISTORIC STRUCTURES

### Iron Bridge railings safety check

Iron Bridge in Shropshire is a designated world heritage site, as it is the first bridge to be constructed of cast iron. When questions were asked about the safety of the bridge's iron handrails, English Heritage commissioned TRL to develop a solution.

The work comprised three main activities.

- Computer models were developed to predict the behaviour of the handrails under typical working stresses, using finite element analysis techniques.
- A set of replica handrails was produced in Coalbrookdale, by one of the foundries that produced the original castings.
- Laboratory testing which consisted of two tests on the rails.

First was a crowd load test to investigate the effects of people pushing the railings. This gave useful information about the displacement of the railings under likely imposed loads. Second was a destructive test of the handrails that showed that the maximum sustainable load before failure was 15.7kN. This is equivalent to 259 people pushing on one section of the handrail, equivalent to a crowd some 50 rows deep!



Based on the data supplied by TRL, English Heritage has devised and implemented a conservation plan for the railings, which are expected to be reopened to the public soon.

For further information please contact Trevor Bradbury at TRL (01344 770817; fax: 01344 770356; E-mail: tbradbury@trl.co.uk).



# Running CPN events on the web

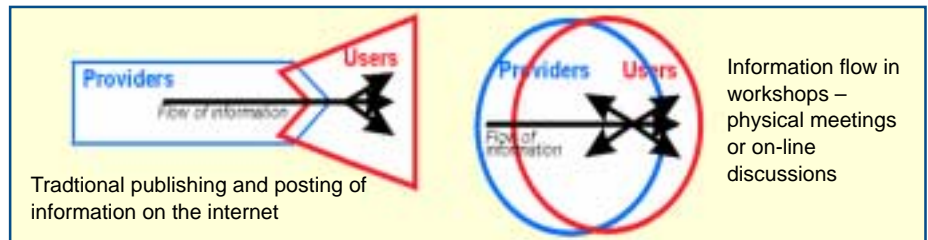
The construction industry faces a significant dilemma in trying to identify and implement measures to improve its performance, while still delivering the day-to-day work that pays the bills. The internet has been seen as a tremendous opportunity to make information available to all, such that much initial research for improvement can now be done from the desktop. However, this is still mainly a one-way flow of knowledge and information from the providers to the users, with relatively little overlap between these groups.

Learning networks aim to create a much larger overlap between the information providers and users, through a workshop environment where multi-party debate and discussion can happen.

The Construction Productivity Network (CPN) enables interested individuals to meet and discuss topics of interest, with the discussion sparked off by presentations from leading thinkers and practitioners. However, there are constraints on the size of any workshop, such as the willingness of people to travel and the practicalities of debate in large groups. These are barriers to the effective exchange of knowledge and experience.

To overcome these barriers, CIRIA will shortly be starting an experiment to run a series of five pilot events for CPN over the internet, funded by DTI and CIRIA's Core Members.

CIRIA hopes this pilot will answer questions like: 'Will practitioners participate in on-line discussions?', 'Can internet conferences replace physical workshops?', and 'What topics and features are likely to encourage online visitors?'. In answering these questions CIRIA will be able to see if



Comparison of information flows in publishing and workshops.

internet technology can be used to improve the way CPN functions. The events will focus on the use of IT in construction.

A steering group set up through CIRIA will guide the experiment. If you have experience of organising or participating in online workshops, or knowledge of current IT issues in construction, and you are interested in joining this steering group, please contact CIRIA – details below.

*CIRIA contact details: 020 7222 8891; fax: 020 7222 1708; E-mail: rfoc@ciria.org.uk; website: www.ciria.org.uk).*



## BRIDGES

# Masonry arch assessment software tested

TRL was commissioned by Railtrack to examine currently available computer software for the analysis and assessment of masonry arches. The objective of the work was to make recommendations on the suitability of particular programs for differing levels of assessment and different structural geometry.



Typical output from the Sheffield University RING Program (with acknowledgement to Author Mathew Gilbert and Sheffield University)

Nine software packages suitable for assessing masonry arch bridges were considered, ranging from a simple spreadsheet to a discrete element package. A review of the data requirements for each package was included.

It was found that even the simplest programs require a good knowledge of the geometry of arches, the way in which forces are distributed within them, and appropriate selection of key parameters representing the arch barrel and structural configuration.

For further information please contact Alastair Macfarlane at TRL (01344 770829; fax: 01344 770748; E-mail: amacfarlane@trl.co.uk).



## DURABILITY & CONSTRUCTION PROCESS

# Benefits of durability assessment

Although their benefits are increasingly recognised, durability assessments are still seldom carried out, according to recent BRE research on construction industry attitudes to them.

Government and commercial clients want to know what construction projects will cost, both to build and to operate. They want buildings to deliver specified functional performance over a set period of time. A durability assessment is one means of providing this risk management information, and of helping to determine the viability of a project. It can be used throughout the construction process, from the brief, through design and construction to operation and, finally, disposal.

BRE's consultation exercise to gauge industry attitudes – part of a programme sponsored by the Construction Industry Directorate of the DTI – found that:

- while there is a clear understanding of the benefits of durability assessments, too few are actually conducted;
- the costs of durability assessment would be acceptable to industry if proven to be offset

- by reduced running costs of the structure;
- more than 50% of the respondents in the consultation currently include, or seek to include, specific service life requirements in project briefs, whereas a 1998 whole-life-costing consultation indicated that only one third of briefs contained this type of information;
- currently, where durability is specified in the project brief, designs are checked against this specification, yet practical tools need to be developed to assist this activity.

The consultation exercise concluded that there is a need to promote the benefits and methods of durability assessment and to develop tools to help implement them.

For further information please contact Rebecca Hooper at BRE (01923 664255; fax: 01923 664786; E-mail hooperr@bre.co.uk).



# Promoting sustainable solutions for rural roads

Unpaved roads carrying low volumes of traffic comprise approximately 70% of the total road network of the Southern African Development Community (SADC) region. These roads, generally connecting the productive agricultural areas to the primary road network, play a vital social and economic role in the development of rural areas.

Unpaved roads demand constant maintenance to arrest damage by both traffic and the environment. With re-gravelling needed after only one or two years, an unsustainable demand is put on scarce financial, manpower and natural resources.

Provision of thin bituminous seals could mitigate the problem, but it is often difficult to justify this type of upgrading solely on economic criteria, principally because of the relatively low volumes of traffic and the associated negligible user benefits generated. However, it also reflects inappropriately high design and construction standards that originated from developed countries and are often applied to these types of road.

TRL has been actively involved for some years in research programmes concerning low volume sealed roads in the region. The aim of the SADC Highway Engineering Research Programme was to establish the guiding principles for the provision of low volume sealed roads in rural areas. It has been demonstrated that unpaved roads can be economically sealed when more appropriate design standards and innovative construction approaches are adopted. Large cost savings and increases in efficiency can be achieved by:

- revising traditional approaches to economic appraisal;
- applying appropriate geometric and pavement design standards;
- using local materials for construction and maintenance;
- adopting innovative construction methods (including labour-based approaches);
- making greater use of local and private-sector participation in maintenance.

The challenge now is to raise awareness of the research achievements in the region and to increase opportunities for their uptake and implementation. In recognition of this, British, Norwegian and Swedish Aid organisations (DFID, NORAD and Sida) and the Southern African Transport and Communications Commission have commissioned a *Guideline for Low Volume Sealed Roads in the SADC Region*.

Local stakeholder participation in all aspects of the provision of infrastructure and transport services can increase awareness of the benefits, ensure the application of appropriate technical solutions, reduce perceived risks and is essential for sustainability. Engineers from the 14 SADC-member countries are playing a full part in the development of the guideline.

Methods of increasing the participation of indigenous professionals from the public and private sectors are included in both the project itself and in the published guidelines. A key aspect of the project design is that most of the tasks associated with its preparation will be carried out by teams of professionals from the

region, drawing on local experience as well as the outputs of the international research effort.

The guideline is produced by working groups, comprising experts from local government and consultancies, supported by researchers from the region. This method ensures that the guideline captures local knowledge and that the final product reflects the needs of the region. If the recommendations in the guideline are applied, cost savings on expected investments in low-volume sealed roads

are estimated to be at least £15 million per annum. Additional benefits from the reduction of environmental impacts and improved social benefits will further increase this figure.

*For further information please contact Colin Gourley at TRL(01344 770491; fax: 01344 770356; E-mail: international\_enquiries@trl.co.uk).*

**DFID** Department for International Development



Surfacing a low volume road in Southern Africa using an Otta seal

## DRAINAGE

# Urban drainage modelling guide

HR Wallingford has produced a best practice guide to urban drainage modelling for Europe, on CD-ROM, which brings the Wallingford Procedure up to date and includes information about European urban drainage practices.

We aimed to provide a best practice manual for European engineers carrying out drainage modelling to assess system performance' says Richard Kellagher of HRW, who has been responsible, with a steering committee, for compiling the guide. The work has been part-funded by the former DETR, several UK water companies and leading modellers.

The first of four parts, the Executive Summary gives an overview of the whole manual and explains what the Wallingford Procedure is and the context in which it is used.



Surface water with culvert

Part 2 covers background and theory, providing a detailed scientific statement of the main hydrological and hydraulic factors used in drainage modelling. This part also details the changes (such as run-off modelling) that have taken place in the Wallingford Procedure since 1981.

The third section looks at best practice and explores what it means for practising engineers, with the aim of ensuring that system models are built and used correctly. Part 4 gives electronic versions of the (UK) meteorological and hydrological maps produced with the original Wallingford Procedure in 1981.

To purchase a copy of *'The Wallingford Procedure for Europe – Best practice guide to urban drainage modelling'* (ref: WP5), please contact Publications at HR Wallingford Ltd, (01491 835381; fax: 01491 832233; E-mail: info@hrwallingford.co.uk). The CD is priced at £47.50 VAT (p&p applies outside the UK).

*For further information please contact Richard Kellagher at HR Wallingford (01491 822419; fax: 01491 825916; E-mail: rbbk@hrwallingford.co.uk).*



## Improving the construction demand chain

At Mid City Place, a £46 million, 470,000ft<sup>2</sup> office development in London, Bovis Lend Lease and Stanhope Plc introduced lean manufacturing techniques into the supply chain. This was part of their constant drive to improve both the delivery of their projects but also the quality of the finished product.

**W**ith a grant by the former DETR's Partners in Innovation Programme, Bovis Lend Lease employed two companies to introduce techniques used in the automotive industry to improve the construction of this development. There are obvious differences between the industries, but it is clear that there are commonalities where techniques can be transferred.

The aim of the supply chain improvement project was to change the way that construction works are planned by introducing build planning, which in the automotive industry has been responsible for improved production cycles and quality levels. Architectural 3D Ltd were commissioned to construct a 4D model of the project, i.e. including time as the fourth dimension. The result is a series of models that not only reflect the proposed construction sequence, but also the actual building. These models differ from visual models by being a working tool that can be interrogated, examined and the construction sequence rehearsed.

Whilst the same level of results are not seen on Mid City Place that the UK motor industry has seen, there were significant benefits.

- The project was constructed task by task via the model, enabling programming options and phasing to be rehearsed prior to their implementation on site.



Mid City Place (Courtesy of Bovis Lend Lease)

- The works on site were monitored on a daily basis and an 'as-built' model was constructed. This enabled comparison between planned and actual construction at a more detailed level than normal. It was possible to implement recovery measures in the model to establish the most cost-efficient method of recovering any delay, or the model was used to show how the benefits of any advancement could be maximised.
- All materials were delivered in accordance

with a strict schedule that also controlled whether materials were delivered just in time, to the work face, or stored in what is known as 'The Market Place'. A logistics gang delivered the materials in the correct quantity and at the right time to enable the trade contractors to continue working at optimum efficiency, confident that the materials would be there when they were needed.

- Finally waste allowances were exposed as very wasteful. Up to 30% of waste leaving sites in skips are often unused materials arising from over-ordering or inefficient working. This was reduced by working through the supply chain, ensuring only the correct quantity of materials were delivered to site at the right time, packaged correctly, and then stored correctly.

The project was completed eleven weeks ahead of programme, and within cost plan. The techniques used on Mid City Place are now being used on other Stanhope/Bovis Lend Lease projects, where they will be further developed.

For further information please contact Nigel Grace at Bovis Lend Lease (020 7248 2878 / mobile: 07801 033170; E-Mail: [nigel.grace@eu.bovislendlease.com](mailto:nigel.grace@eu.bovislendlease.com); Website: [www.bovislendlease.com](http://www.bovislendlease.com)).



## STRUCTURES

### Guidance on residual service life of concrete structures

BCA has been the lead partner in a project funded under the EC Innovation Programme entitled 'CONTECVET: A validated Users Manual for assessing the residual service life of concrete structures'. The issues covered were deterioration due to corrosion, frost action and alkali silica reaction.

**P**artners came from Spain (5), Sweden (6) and the UK (3) – BCA, TRL and National Car Parks. A notable feature of this fourteen-strong partnership was that eight were major owners of structures – users of the technology, rather than suppliers.

The project was completed in April 2001. The major deliverables are three generic User Manuals, one for each of the principal deterioration mechanisms considered.

Of equal importance are the steps being taken for take up and application. Owner-partners have already started integrating the new technology into their existing asset management procedures. In some cases, for some types of structure, this will lead to national guidance documents. In the UK, for example, a new guide outlines how the technology can best be integrated into existing procedures, published by the Highways Agency for assessing concrete bridges. Also



in the UK, the technology has been made available to those involved in providing national guidance for multi-storey car parks, via the Institution of Civil Engineers.

The major contribution from CONTECVET lies in providing new guidance on structural assessment. Our understand-

ing of the mechanisms and science of deterioration has been developing for decades. It has led to better understanding of the processes and, in some cases, has led to procedures, targeted at condition assessment, based on some form of subjective damage classification. Condition assessment does not necessarily correlate with residual structural capacity. The new procedures, therefore, permit more rational decisions to be made economically, based on safety criteria as well as serviceability and function.

Copies of the three manuals on CD are available from the Concrete Bookshop ([www.concretebookshop.com](http://www.concretebookshop.com)) at £33.50 (plus £1.00 p&p).

For further information please contact Professor George Somerville or Dr Pal Chana of BCA (01344 762676; fax: 01344 761. E-mail: [skean@bca.org.uk](mailto:skean@bca.org.uk)).



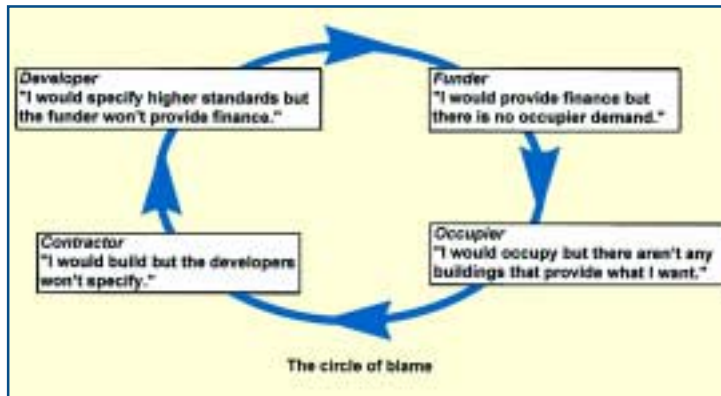
# Indoor air quality – breaking the circle of blame

A project to promote the provision of good indoor air quality in urban buildings started recently. The project, led by BRE with DTI funding, is focusing on external air pollution as a source of indoor air problems. It will also examine how to minimise external air pollution during urban construction and from the operation of the building.

If properly designed, a new building can improve the local environment and also provide a high quality of indoor air. As well as benefitting the occupants and those living and working nearby, this may increasingly be a factor in gaining planning permission.

New guidance on designing urban buildings to minimise the ingress of external pollution, and the adverse impact of these buildings on the urban environment, is due to be published in Autumn 2001. These

and other related factors are usually not considered by building specifiers and designers, often because they are not given adequate information on local environment and air quality issues. In addition, a lack of effective dialogue between those involved in the design process (designer, developer, funder, client, contractor, etc) has apparently led to a 'circle of blame' among them (see diagram), which in turn has led to



buildings not being effectively designed. The two-year project aims to:

- review the implications of existing regulations and good practice guidance, and the likely impact of future regulation;
- identify and analyse examples of good practice in minimising external air pollution and providing good indoor air quality;
- identify and analyse the technical and

commercial barriers to good practice;

- develop and promote integrated protocols for use by all key players in the construction process.

A steering group of key players, representing developers, planners, designers and specifiers, facilities managers and property surveyors, will give guidance and practical advice to the project. They will help with the development and promotion of the protocols, and the implementation and dissemination of the

project's findings as it proceeds. In addition to the input of this core group, the project team hopes to obtain the input of as many in the industry as possible.

For further information or to provide input to the project, please contact Vina Kukadia at BRE (01923 664878; fax: 01923 664095; E-mail: [kukadiav@bre.co.uk](mailto:kukadiav@bre.co.uk)).



## INFORMATION & COMMUNICATION TECHNOLOGY

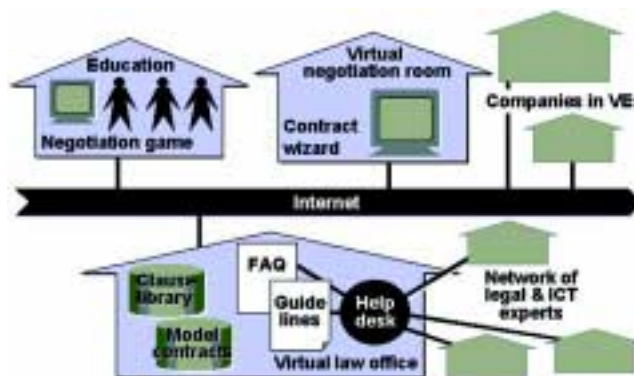
# eLEGAL: towards legally admissible use of ICT in construction

The use of IT in project-based business such as construction and large-scale engineering is impeded by the lack of contractual frameworks that define legal conditions and contracts, and of tools that provide such legal support. The full use of inter-enterprise ICT (Information and Communication Technologies) is hampered by poorly defined responsibilities, overlapping communication techniques and mistrust. This causes difficulties to construction companies who enter into 'Virtual Enterprise' arrangements, which rely heavily on electronic exchange of information and documentation and which are currently not legally admissible. This results in a duplication of work, being done electronically and on paper, rendering ICT to be an extra cost rather than an enabler.

The eLEGAL project will develop a framework for legal conditions and contracts that will enable the use of ICT in project business. The project will specify user requirements for legal and ICT support, implement legal support tools, and promote an enhanced business practice in which the use of ICT in inter-enterprise information exchange is contractually stipulated and acceptable.

eLEGAL will also develop software tools for contract configuration, negotiation and authoring, which will be used as a 'Contract Wizard'.

The €1.5M project is funded by the European Commission under the Information



The structure of eLEGAL

Society Technologies (IST) Programme of the EU Fifth Framework Programme, started in November 2000 and will last two years. It in-

cludes eight other partners from Germany, Finland, Italy and the UK, representing software developers, ICT and legal experts, end-user construction companies and research institutes. The Civil and Building Engineering Department of Loughborough University is the co-ordinating partner.

For further information please contact the Project's Coordinator: Dr Tarek Hassan, Civil and Building Engineering Department, Loughborough University (01509 222602, fax: 01509 223981, E-mail: [T.Hassan@Lboro.ac.uk](mailto:T.Hassan@Lboro.ac.uk),

or visit the eLEGAL web site on <http://elegal.vtt.fi>.



# FABIG gets recognition and goes onshore

The Fire and Blast Information Group (FABIG) was established by the SCI in 1992. Its Technical Meetings activity is increasing and has recently been confirmed as meeting the continuous Professional Development requirements of the Royal Institution of Naval Architects. It is also expanding its activities to cover fire and explosion issues in onshore oil and gas petrochemical plants.



Results from hydrocarbon fire tests are used to generate typical heat-flux values to be used in estimating fire loading and response of offshore structures

**F**ABIG is a membership-based group comprising oil companies, the SCI, the HSE and organisations worldwide involved in safety in the offshore industry. It was formed in the wake of the Pipe Alpha disaster to improve safety on offshore installations through the development and sharing of expert knowledge on structural design to mitigate the effects of hydrocarbon fires and explosions.

FABIG issued the *Interim Guidance Notes for the Design and Protection of Topsides Structures against Explosion and Fire* in 1992. This continues to be the most complete and authoritative document on the subject and has become the *de facto* industry standard. FABIG maintains the *Interim Guidance* through:

- **Technical Notes** – incorporating the latest in-depth research results;
- **Quarterly Newsletters** – which give news of the latest developments on fire and explosion related work;
- **Open Technical Meetings** – where invited specialists give presentations followed by free discussion;
- **Website** – where all the above deliverables are listed in a searchable format – the FABIG website is at [www.fabig.com](http://www.fabig.com).

Technical meetings on the same topic are repeated in both London and Aberdeen. The Technical Meeting held in June 2001 addressed *Human Factors Engineering versus the Design*

*of Offshore Structures*. The September Meeting focused on *Fire and Blast issues in Deepwater Platforms*, where representatives from the Minerals Management Service (USA), HSE, TotalFinaElf and Lloyds Register spoke. The December Meeting concerns *Process Integrity versus the Design of Offshore Structures*.

There are many similarities between fire and blast design criteria for offshore platforms and those of onshore petrochemical plants. The Technical Meeting scheduled for February/March 2002 will focus on the *Control of Major Accidents Hazards Regulations (COMAH) safety case for onshore petrochemical plants*.

FABIG Newsletters and Technical Notes will also soon start containing articles related to fire and blast issues in onshore petrochemical plants. For example, the last Technical Note (August 2001) on *Elevated Temperature and High-Strain Rate Properties of Offshore Steels* is equally applicable to onshore plants. So are the two forthcoming Technical Notes on *Simplified analysis for response of structures and blast walls to explosions* and *Structural integrity of piping subject to fire and blast*.

*For further information or if you are interested in attending a FABIG Technical Meeting, please contact Dr Fadi Hamdan, FABIG Manager, The Steel Construction Institute (01344 623345; fax: 01344 622944;*

*E-mail: [f.hamdan@steel-sci.com](mailto:f.hamdan@steel-sci.com).*



## SPONSORING ORGANISATIONS

### GOVERNMENT

**Department of Trade and Industry,**  
Eland House, Bressenden Place,  
London SW1E 5DU  
(020 7944 5704; fax: 020 7944 5759)  
Website: [www.dti.gov.uk/construction/](http://www.dti.gov.uk/construction/)  
E-mail: [Construction.Research@dti.gov.uk](mailto:Construction.Research@dti.gov.uk)

### Department for International Development,

94 Victoria Street, London SW1E 5JL  
(020 7917 7000; fax: 020 7917 0019)  
Website: [www.dfid.gov.uk](http://www.dfid.gov.uk)  
E-mail: [enquiry@dfid.gov.uk](mailto:enquiry@dfid.gov.uk)

## RESEARCH ORGANISATIONS

**British Cement Association,**  
Century House, Telford Avenue, Crowthorne,  
Berkshire, RG11 6YS  
(01344 762676; fax: 01344 761214)  
Website: [www.bca.org.uk](http://www.bca.org.uk)  
E-mail: [library@bca.org.uk](mailto:library@bca.org.uk)

### BRE,

Garston, Watford, Hertfordshire, WD25 9XX  
(01923 664000; fax: 01923 664010)  
Website: [www.bre.co.uk](http://www.bre.co.uk)  
E-mail: [enquiries@bre.co.uk](mailto:enquiries@bre.co.uk)

### Centre for Innovative Construction Engineering,

Loughborough University, Loughborough,  
LE11 3TU (01509 228549; fax: 01509 223982)  
Website: [www.lboro.ac.uk/cice](http://www.lboro.ac.uk/cice)  
E-mail: [j.c.brewin@lboro.ac.uk](mailto:j.c.brewin@lboro.ac.uk)

### Centre for Window and Cladding Technology,

University of Bath, Claverton Down, Bath,  
BA2 7AY (01225 826541; fax: 01225 826556)  
Website: [www.cwct.co.uk](http://www.cwct.co.uk)  
E-mail: [cwct@bath.co.uk](mailto:cwct@bath.co.uk)

### CIRIA,

6 Storey's Gate, Westminster, London, SW1P 3AU  
(020 7222 8891; fax: 020 7222 1708)  
Website: [www.ciria.org.uk](http://www.ciria.org.uk)  
E-mail: [rfocus@ciria.org.uk](mailto:rfocus@ciria.org.uk)

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Wallingford, Oxfordshire, OX10 8BA  
(01491 835381; fax: 01491 832233)  
Website: [www.hrwallingford.co.uk](http://www.hrwallingford.co.uk)  
E-mail: [hrinfo@hrwallingford.co.uk](mailto:hrinfo@hrwallingford.co.uk)

### The Steel Construction Institute,

Silwood Park, Ascot, Berkshire, SL5 7QN  
(01344 623345; fax: 01344 622944)  
Website: [www.steel-sci.org](http://www.steel-sci.org)  
E-mail: [reception@steel-sci.com](mailto:reception@steel-sci.com)

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E-mail: [marketing@trl.co.uk](mailto:marketing@trl.co.uk)

## PROFESSIONAL INSTITUTIONS

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1 Great George Street, Westminster, London, SW1P  
3AA (020 7222 7722; fax: 020 7222 7500)  
Website: [www.ice.org.uk](http://www.ice.org.uk)  
E-mail: [enquiries@ice.org.uk](mailto:enquiries@ice.org.uk)

### Institution of Structural Engineers,

11 Upper Belgrave Street, London SW1X 8BH (020  
7235 4535; fax: 020 7235 4294)  
Website: [www.istructe.org.uk](http://www.istructe.org.uk)  
E-mail: [mail@istructe.org.uk](mailto:mail@istructe.org.uk)

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