

Research Focus

Issue No. 34

AUGUST 1998

PROMOTING THE APPLICATION OF RESEARCH IN BUILDING AND CIVIL ENGINEERING

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Launch of exports project results

Results from the ICE's £330,000 Project on Technology Support for Civil Engineering Exports are to be launched at the ICE on Tuesday 22 September.

Sponsored by the Department of the Environment, Transport & the Regions (DETR) under the Partners in Technology Programme, the 28-month project has built on the Technology Foresight activity in the construction sector, with overall objectives to:

- identify technologies that are considered critical to export success in civil engineering;
- identify and promote appropriate research programmes to cultivate UK expertise in the identified areas;
- engender a greater export promotion culture in the UK civil engineering research community, industry and professions.

The project has focused on the following market areas:

- Transport planning & infrastructure;
- Water & waste-water engineering;
- Coastal & river engineering;
- Infrastructure for urban development and megacities;
- Environmental improvement and sustainable development

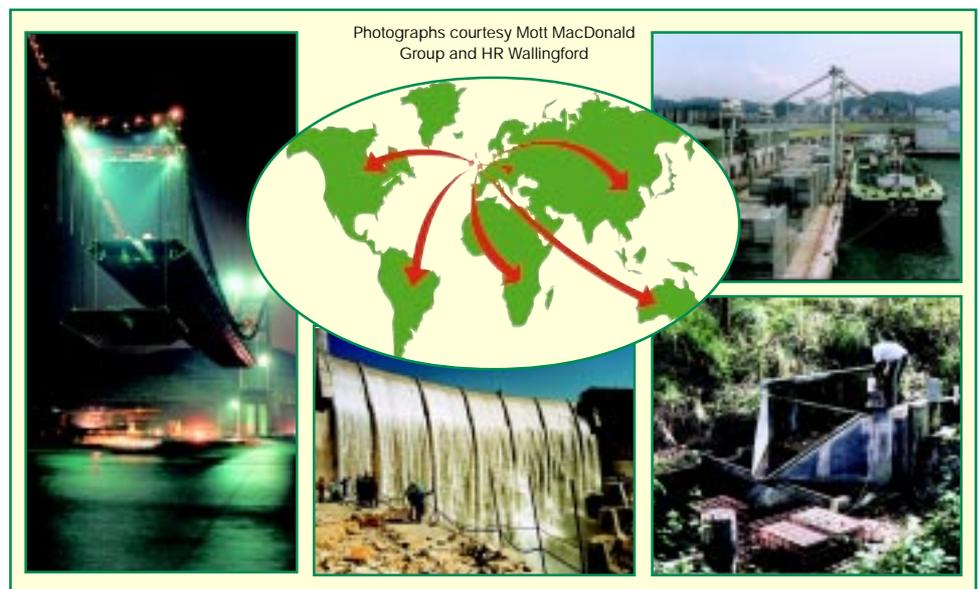
Stage 1 involved an overview of the international engineering and construction market. Stage 2, the major research phase largely undertaken by the Department of Construction Management and Engineering at the University of Reading, has included substantial involvement of consultants, contractors, specialists and suppliers involved in, or seeking to be involved in, civil

engineering exporting and/or technology development.

The results to be presented in September seek to inspire all involved or potentially involved in civil engineering exporting to examine their use of technology for delivering competitive advantage and to consider how they can invest in the appropriate part of the Innovation-Research-Development-Application spectrum to underpin the industry's future.

The research may be complete, but the project is not over since there is a Stage 3 aimed at actively promoting the project results to those best able to take it forward. The September meeting launches this process. It will then include a series of regional meetings and discussions with export-related and/or technology development-related organisations to present and promote the results to them. The challenge to them will be to see how best they can take those recommendations forward.

For further information about the reports from the project and how to obtain them, about the seminars planned, or about other work in Stage 3 of the project, please contact Roger Venables, Project Manager, ICE Technology for Exports Project, 12 Cranes Drive, Surbiton, Surrey, KT5 8AL (0181-399 4389; fax 0181-390 9368; E-mail: 101722.374@compuserve.com).



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 or, in the case of EPSRC's research programme, from Catherine Coates at EPSRC (01793 444176).

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 (0171-665 2242; fax 0171-799 1325; Email wilson_l@ice.org.uk).

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RIVER ENGINEERING

New ways of shaping rivers

Recent work carried out at HR Wallingford should help engineers to design more effective river training schemes. The research has involved verifying a computational river model against results from laboratory tests, then using it to develop guidelines for the design of training works in relatively straight channels

River training is a way of stabilising a natural river, either by protecting its banks or by building groynes into the river to modify its flow behaviour. In some parts of the world, large braided or meandering rivers can pose a threat to engineering structures, houses and valuable arable land. Inland ports can be vulnerable to changes in river plan shape and river training is often carried out to maintain viable shipping lanes. Training works are therefore an important feature in the management of mobile rivers.

Richard May, project leader at HR explains: 'We can use physical models to predict changes in river depth and shape, but they are expensive and tend to be more appropriate for studying small areas in great detail. We set out to determine whether computational modelling could provide an alternative to physical modelling in such investigations'.

Results of a review of various 3D computational river flow models confirmed that, for flows of engineering significance, it was acceptable to choose models which represented turbulence using just two parameters, turbulent kinetic energy and turbulent dissipation rate. 'We finally selected SSIIM (Sediment Simulation In Intakes with Multiblock option), for further study because of its general availability,' says May. After extensive tests SSIIM was acceptable in predicting flows around impermeable groynes: flow velocities from an individual simulation could be relied on to within about $\pm 20\%$ in most situations.

Once they had verified the model, researchers used it to develop general guidelines for groyne layout, covering:

- groyne shape, length and spacing
- the angle between groynes and river bank
- groynes along one or both river banks
- permeable and impermeable groynes
- bank slope
- bed roughness.

Although it was not possible to study all combinations, researchers compiled a Manual summarising the main factors that should be considered when designing river training works in relatively straight lengths of channel.

A river training rock groyne in Pakistan.



It provides a procedure for calculating the effect of groynes on flow velocities at key points in a river and includes a worked example.

The study (part-funded by the DETR) has also highlighted the potential for computer models to simulate very complex 3D river regimes. This development should help hydraulic engineers to predict the effects of training works more accurately, and at an earlier stage in the design process, than is currently possible.

For further information about the project or guidelines please contact Richard May at HR Wallingford (01491 835381; fax: 01491 832233; E-mail: rwpm@hrwallingford.co.uk)



CONSTRUCTION FUTURES

Sustainability consultation

As part of its review of the national strategy for sustainable development, for which it issued a consultation paper *Opportunities for Change* in February, DETR is consulting in some depth on sustainable construction. In May, a supplement dealing specifically with the UK strategy for sustainable construction was issued for comment.

This supplement invites views on areas such as waste minimisation, energy efficiency and use of water in buildings, as well as raising the wider issue of global environmental change and its implications for the construction industry. DETR aims to stimulate debate and generate imaginative responses to inform future policy development and practice by government in liaison with the industry, clients, users and stakeholders. The last date for responses is 18 September 1998.

Opportunities For Change – Consultation Paper on a UK Strategy for Sustainable Construction can be found on the DETR Website at www.construction.detr.gov.uk – or as a hard copy from Alan Turnbull, DETR, 3/H2, Eland House, Bressenden Place, London SW1E 5DU (0171-890 5703; fax: 0171-890-5759; E-mail: aturnbull@detr-cirm.demon.co.uk).



Launch of 'Partners in Innovation'

DETR's annual invitation to apply for collaborative research funding is now open. However, seasoned respondents will notice changes in the process compared with previous years.

The scheme is now entitled *Partners in Innovation* (it was formerly known as *Partners in Technology*). This more accurately reflects the overall thrust of the scheme, which aims to fund a wide range of research projects across such diverse areas as construction process improvement, safety and health, sustainable development, improving understanding and bringing about change. It is, therefore, far from limited to improving the technology and performance of materials or construction techniques, although this aspect of the programme remains fully in place.

The main practical difference between PII (as it will no doubt become known) and PIT is that, under the new arrangements, applications will go through a two-stage process.

Applicants must firstly set out a brief description of the project (no more than two sides of A4), including a justification and proposed output(s). The closing date for these submissions is 30 September.

Proposals will be assessed on how they meet the requirements of the Construction Research Business Plan. Where it is felt that the proposals may be worth proceeding with, a substantive application will be invited to set out the project in full detail. The closing date for these second responses will be 29 January 1999. This second stage will be similar to the all-in-one application process of previous years.

The main advantage of adopting a two stage process is that applicants will not spend much valuable time putting together projects which are unlikely to succeed. Despite the best intentions, some applications may not meet any of the priorities of the Business Plan, or they may cover work which is already underway elsewhere.

PIT (as was) has, since its inception, been an

intensely competitive process. Of 434 proposals submitted in 1997, only 130 succeeded in obtaining financial support from DETR. This 30% success rate is in line with other competitive schemes. However, from an applicant's point of view, it represents a failure rate of about three quarters all applications. It is with this in mind that the new procedure has been developed. Applicants can subsequently concentrate on proposals which reach the second stage and are thus more likely to succeed.

At the time of going to press, it is not yet clear how much money will be available for successful PII projects, all of which will be expected to get under way between April and September 1999. Last year, however, some £8m of DETR support was secured by successful applicants. The accompanying figure shows the likely percentage allocation of resources across the five key priorities within the Business Plan.

Partners in Innovation is open to everyone

involved in construction research, innovation and technology transfer activities, or organisations with specific interests in developing capabilities to enhance the performance and competitiveness of the construction sector. DETR typically funds up to 50% of the costs of successful projects.

Copies of the PII 1998 Guidelines for Proposers (which includes the application forms) and the Construction Research Business Plan can be obtained from the DETR Website at: www.construction.detr.gov.uk.

For further information, or if you wish to order hard copies of the above documents, please contact Alan Turnbull, DETR, 3/H2, Eland House, Bressenden Place, London SW1E 5DU (0171-890 5703; fax: 0171-890 5759; E-mail: aturnbull@detr-cirm.demon.co.uk).



HIGHWAYS, MATERIALS & ENVIRONMENT

Increasing alternative materials use in roads

The construction and repair of highways consumes about one third of primary aggregate production in the UK. Increasing the amount of alternative materials used in these applications reduces the consumption of primary aggregates and solves the problem of the disposal of the alternative materials. TRL is coordinating a collaborative European research project called ALT-MAT to develop suitable tests to predict the behaviour of alternative materials in road construction.

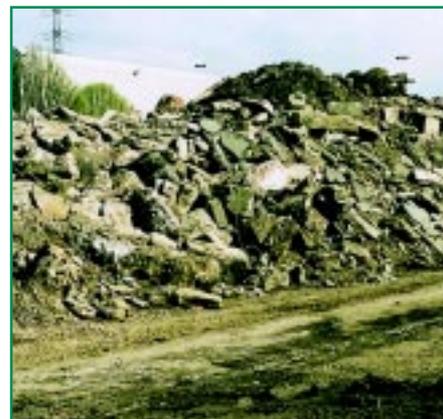
Some materials, such as crushed concrete, blastfurnace slag, steel slag and pfa are already used to some extent in UK roads, and there is scope for increased use of these and other materials in highway

schemes. However, the use of such materials is often limited by concerns about their mechanical properties and the potential leaching of contaminants into controlled waters.

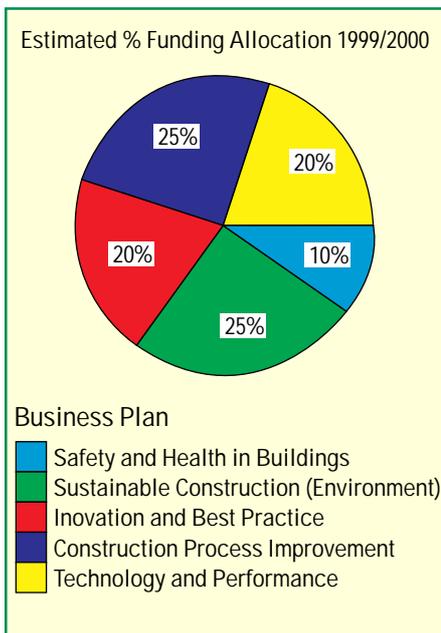
The purpose of the ALT-MAT project is to address these issues, with the research concentrating on unbound granular materials for use in capping layers, sub-base and road base. The project is part-funded by the European Commission Directorate General for Transport, with balancing funds provided by the UK Highways Agency. Work started in January 1998 and will last for two years.

TRL is keen to establish links with producers, users and specifiers of alternative materials and will be holding a workshop for end-users early in 1999.

For further information please contact Murray Reid at TRL (01344 770283; fax: 01344 770748; E-mail: murrayr@b.trl.co.uk).



Stockpile of demolition rubble awaiting processing to produce capping layer material.



Specifying slope glazing

Slope glazing is defined as all glazing applications with a slope angle between horizontal and 15° from vertical at which point it is defined as curtain walling. To assist designers and installers of such glazing, the Centre for Window and Cladding Technology has now published its Standard for Slope Glazing Systems.

A companion Standard to the Centre's internationally-acclaimed Standard for Curtain Walling, the slope glazing document has been developed by a process of industry review, drawing on the best available practice for the performance, specification and testing of slope glazing systems. This required a major search of international standards, guidance documents, papers and articles, which was then distilled to form guidance which is based on performance rather than prescription.

Few systems are excluded from the new Standard and, even for those that are, the Standard can be used to guide the specifier on the appropriate performance issues to consider. As the UK has previously applied the British Standard Code of Practice for Patent Glazing to many other types of slope glazing system, this new document represents a major step forward in the proper specification of modern slope glazing systems.

A description is provided for many of the different types of slope glazing system, with figures to guide the reader (see the illustration for an example), and clear guidance is given on which types of glazing to select for different applications.

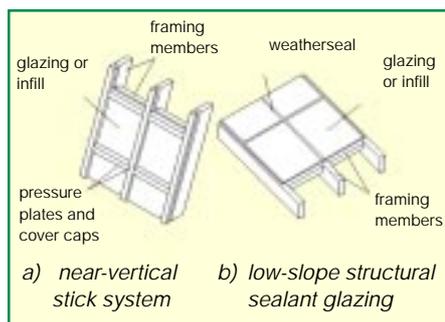
New air- and water-tightness tests have been developed which can be applied to systems with unsealed joints traditionally known as 'patent glazing'. Guidance is also given on interpreting snow- and wind-loading criteria for roofs of complex shape.

For further information please contact Richard Harris at the CWCT (01225 826541; fax: 01225 826556).

For ordering details, please see the CWCT web-pages at <http://www.cwct.co.uk>.

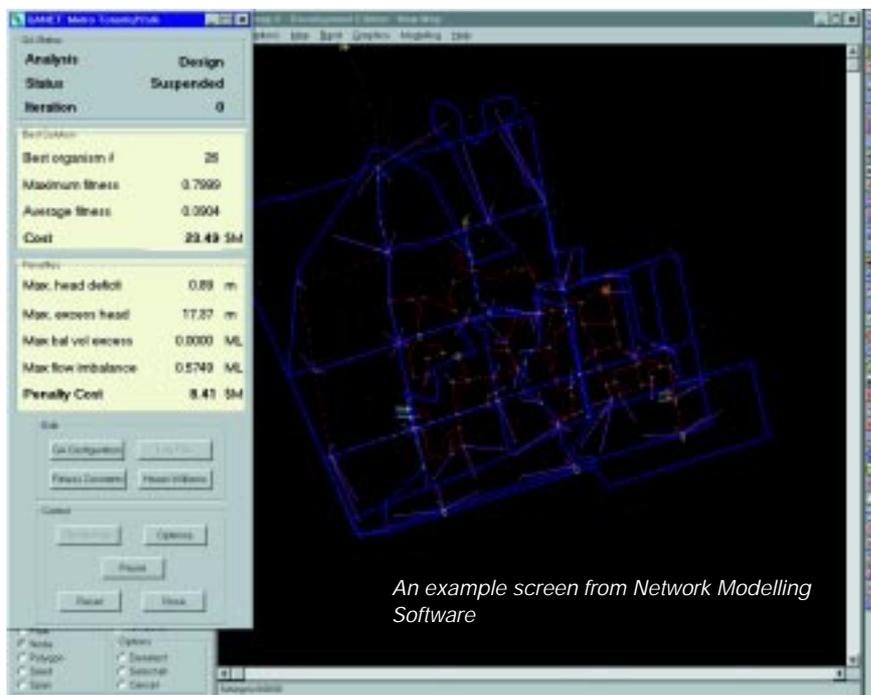


An example illustration from the new Standard for Slope Glazing Systems.



What genetics and pipe networks have in common

Machine intelligence technologies offer new approaches to computer modelling methods for the planning, control and operation of complex water supply systems. A new EPSRC-funded project is to investigate potential water industry applications of one of the newest machine intelligence technologies, genetic programming.



An example screen from Network Modelling Software

Genetic programming is an approach to the automated generation of computer programs based on genetic algorithms. These are optimisation techniques that find optimal or near-optimal solutions to problems by simulating the process of natural evolution.

Genetic algorithms begin the optimisation process with a collection of solutions to the problem produced by random generation. The randomly generated starting solutions are generally very poor. Then procedures similar to reproduction, mutation and natural selection act on the population of solutions which evolves through successive generations towards progressively better solutions.

Genetic programming differs from genetic algorithms in the nature of solutions sought. Genetic programming seeks solutions that are themselves mathematical models or computer programs. The material that evolves over successive generations represents executable computer code and is more complex than the data typically used with genetic algorithms.

The genetic programming technique must operate on evolving genetic material that is of variable length and contains recursive structures typical of computer programs. All of the genetic programming operations must ensure that a meaningful and executable syntax exists in all the solution programs the evolutionary process creates.

The research project, led by Dr Dragan Savic and Dr Godfrey Walters at the

University of Exeter in collaboration with Optimal Solutions, a division of Ewan Associates Ltd, will investigate the suitability of genetic programming to water industry applications. It will combine theoretical and practical work and focus on the following applications:

- development of optimal water supply control strategies;
- forecasting demands on water supply systems for both short and long term;
- the use of genetic programs to efficiently simulate the behaviour of complex water supply systems as a replacement for more computationally intensive simulation models (see Figure).

The aim of the project is the improvement of modelling methods used by the water industry. The potential benefit is increased efficiency of operation of water supply reservoirs, water distribution systems and treatment plants, which would result in reduced cost for water utilities and increased consumer satisfaction.

For further information please contact Dr Dragan Savic, Lecturer at School of Engineering, University of Exeter (01392 263637; fax: 01392 217965; E-mail: d.savic@exeter.ac.uk).

Information on all related projects available on web site:

<http://www.ex.ac.uk/ESE/people/dsavic.html>.



Equality Guidelines launched

If it wishes to maximise its future business performance, construction needs to catch up with other industries by recognising and involving women and other under-represented groups. This was the clear message arising from an industry forum to launch the *Business Equality in Construction Good Practice Guidelines* in Manchester on May 6.



Reproduced courtesy of Women's Education in Building

The Guidelines are the result of a research project carried out by UMIST (see Research Focus No.33). Construction Industry Board Chief Executive Don Ward, who chaired the forum, said: 'Equality is not just a question of social justice, it is a matter of economic and business necessity for the UK construction industry'. Mr Ward noted that the UMIST report complemented the Construction Industry Board Working Group report *Tomorrow's Team: Women and Men in Construction*. He added: 'The practical level of the ideas in the report is excellent and many of us at the seminar agreed that these could be put straight into practice by companies'.

Ray Porter, Chairman of Birkenhead firm Porter Builders Ltd, who has become well known nationally for his part in TV and cinema commercials promoting the New Deal, made an impassioned plea for the industry to take equal opportunities more seriously. He argued that it would suffer in the long term if it did not make best use of the full range of talent in the workforce.

Practical steps to attract more recruits into construction, particularly female recruits, include a suggestion for firms to raise their profile through school- and community-based projects. Comments made by a female pupil (noted in the report) during a site visit by Tarmac illustrate the potential and show how girls' negative perceptions of the industry can be turned around. 'Our visit was a real eye opener. We were amazed at the diversity of professional jobs available and how these were not gender biased. Everyone on the site seemed to work together as a team towards a set

goal and each team had a good skills mix'.

Other steps set out in the Guidelines include bringing workplace practices up to date (for example, allowing more flexible working hours), targeting new sources of recruitment of staff and ensuring that a commitment to equal opportunities is understood and applied by the present workforce and subcontractors.

The project team believes that the success of this regional project can be replicated nationally. To take the process a stage further, the feasibility of forming an 'exchange' to act as a co-ordinating body – particularly in widening existing initiatives, monitoring progress and linking with a charter scheme for the industry – is currently being considered. Informal

networks have already been established following discussion amongst a wide number of participants at the project's Focus Group Meetings.

Copies of the Guidelines can be obtained from RhysJones Consultants Ltd, Halley House, 49 Burney Street, London SE10 8EX (0181-305 2277; fax: 0181-853 3281; E-mail: sandi@rhysjones.com).

For further information on the research project, please contact Dr Andrew Gale, Department of Building Engineering, UMIST, P O Box 88, Manchester M60 1QD (0161-200 4236; fax: 0161-200 4252; E-mail: andrew.gale@umist.ac.uk).



STRUCTURES & MATERIALS

New specification and guidance for reinforced concrete frames

Two important, research-based documents for designers of reinforced concrete frames have recently been published, with the active involvement of the Reinforced Concrete Council (RCC) which is managed and partly sponsored by BCA.

The *National Concrete Frame Specification* addresses the need for an overall specification in three parts. First, it identifies essential clauses for standard concrete construction to ensure that all parties involved – clients, designers, and frame contractors – fully understand the normal requirements of efficient concrete construction. Secondly, it provides a clear and separate statement of the specific requirements for individual projects. This highlights 'by exception' the required amendments to the standard requirements outlined in Part 1. Finally, guidance in Part 3 explains the philosophy of the specification and background to individual clauses.

Adoption of the specification by industry is expected to have significant benefits in terms of improved quality, increase speed of construction and reduced cost.

A revolutionary pre-scheme design handbook *Economic Concrete Frame Elements*, the result of seven years of RCC work on building economics and structural design spreadsheets, is also now available. It allows designers, contractors, clients and their advisers to quickly size and compare different concrete options at design stage by removing much of the guesswork and effort previously involved.

With endorsement from CONSTRUCT, the



Research is driving efficiency improvements in concrete frame construction.

Structural Precast Association and the Precast Flooring Federation, publication of the handbook is a testimony to the growing co-operation between the in-situ and precast concrete industries in their drive for efficiency and cost savings for their customers.

The NCFS is available from CRC Ltd, @ £19.50 – p&p (0171-505 6622; Quote Ref: BR337). *Economic Concrete Frame Elements* is available from BCA Publications Sales, @ £14.50 – p&p (01344 725704).

For further information please contact Martin Southcott, Project Director of the Reinforced Concrete Council (01344 725733; fax: 01344 761214).



Risk and reliability of autonomous intelligent cruise control for road vehicles

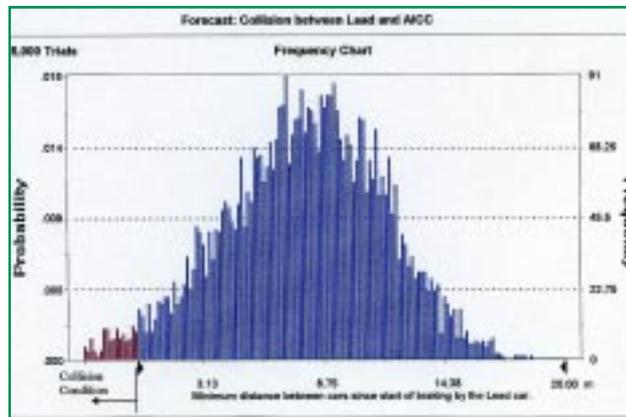
Several manufacturers are developing Autonomous Intelligent Cruise Control (AICC) for road vehicles, the promise being an increase in road capacity and an improvement in traffic safety. The Transportation Research Group (TRG) at the University of Southampton is working on a project to assess the safety risks and benefits of AICC.

Funded by the EPSRC, this project is evaluating the safety of AICC under extreme driving conditions. The safety issues being studied are divided into two main categories: device safety and the human-machine interface. Though initially directed mainly at the use of AICC in cars, such systems could also be used in trucks and other vehicles.

Device safety has been evaluated by studying the effect of device failure on traffic safety. Traditional reliability engineering approaches, using Failure Modes and Effects Analysis (FMEA) and Fault Tree Analysis (FTA), have been used for this purpose.

Human-machine interface issues are being evaluated using computerised car collision models developed at TRG. These computer models compare the safety performance of a number of vehicles with and without AICC.

AICC characteristics were incorporated into one model by developing a set of realistic specifications for the device using available data from industry and research.



A typical output of the collision model

Many of the model parameters are subject to inherent variability. Random variables were used to model human response times and human machine interaction.

In each case the probability of collision between pairs of cars in a car 'train' was calculated. The models calculate the expected number of cars involved in any collision scenario and thus allow the effect of AICC on all cars to be considered, rather than just on

the car ahead. Preliminary results show that equipping a car with AICC can significantly reduce the probability of collision with the car ahead; however, the effect of the device on the following cars in dense traffic may not be as good.

Future work will refine the results as more input data becomes available. Under another EPSRC grant, the TRG has assembled an instrumented car equipped with radar, optical speedometer, and video-audio monitoring system. This car can detect traffic characteristics of surrounding vehicles. Later this year, data collected by this vehicle will be used to refine input data into the collision models and validate many of the assumptions.

For further information please contact Professor Mike McDonald at the TRG, University of Southampton, Department of Civil & Environmental Engineering, Highfield, Southampton, SO17 1BJ (01703 592 192; fax: 01703 593 152; E-mail: mm7@oton.ac.uk). 

MANAGEMENT & ENVIRONMENT

BRE working to outlaw exclusion lists

Materials considered to be deleterious are frequently listed in the legal contracts for the design and construction of buildings. Although the use of these so-called exclusion lists is believed to protect the value of the investment in a building, it has been shown that there are considerable adverse effects of such lists on the competitiveness of the industry and on the development of a rational approach to environmental and investment issues.

The basis for establishing these lists and the culture of their use is being investigated in a project funded by the DETR. It will build on the achievements of a previous Partners in Technology (PIT) project, which involved representatives of BRE, the National Council of Building Material Producers (BMP) and the wider construction industry. As the aim is to change practice within the industry, the project's findings and recommendations will be promoted through the new DETR Construction Best Practice Programme. The project comprises two main activities.

A consultation process is to be expanded to a wider range of contacts within key sectors and organisations, and will be shaped by the recommendations of the steering group collaborators. Aimed at identifying the key decision-makers who



The effects of buildings on the environment is one of the continuing important themes in BRE's work

influence the incorporation of lists, and the tools used by professionals that promote or perpetuate this practice, it will enable BRE to identify the critical decision points and target further guidance.

In a survey of existing practice, BRE will measure the impact of existing guidance, such as the BRE Digest *Lists of excluded materials: a change in practice*, using targeted questionnaires. Groups to be specifically monitored include lawyers, materials producers, surveyors, architects and developers. The objective is to assess effects on practices within the industry, and identify further barriers to change.

If you wish to contribute to the consultation or are prepared to complete a questionnaire, please contact Ed Suttie at BRE (01923 664158; fax: 01923 664785; E-mail: suttiee@bre.co.uk). The questionnaire is available on the BRE website: www.bre.co.uk in the construction section 

Protection and management of urban groundwater: handling risks from industrial and sewage pollution

What is the best use for urban groundwater? Is it too polluted – or at too great a risk of pollution – for public supply? Industrial use through individual factory boreholes would give greater benefits by scavenging pollutants, controlling rising groundwater, and simultaneously reducing demand on high quality public supplies. Or perhaps urban areas would be better left as recharge zones, with occasional pumping to support rivers and canals at times of low flows. A new project in the University of Sheffield's Groundwater Protection & Restoration Group is addressing these issues.

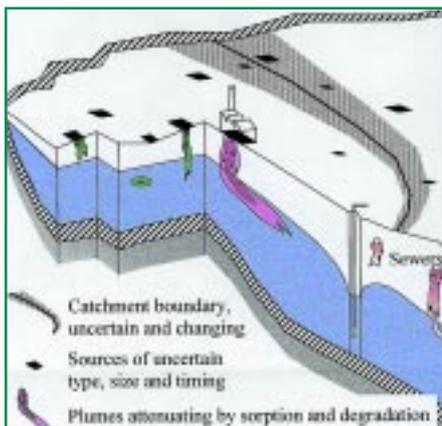
David Lerner (University of Sheffield) and John Tellam (University of Birmingham), through their studies of Birmingham and Coventry, have demonstrated that virtually all industrial sites pollute groundwater. In a major step forward in understanding urban groundwater, their research team recently made the first substantiated estimates of recharge from leaking water mains and sewers in a study of Nottingham. This field and modelling study also quantified the urban loadings of some pollutants.

Leaking water mains contribute about 65% of recharge through the city, a much higher proportion than previously estimated. Sewers definitely leak, and pollute groundwater with micro-organisms and chemicals. Sewer leakage contributes to the overall nitrogen loading from the city on groundwater of 23 kg/ha/yr. This is comparable to agricultural loadings and explains why most British cities have similar NO₃ concentrations in groundwater as the surrounding rural areas.

The new project will also study Nottingham. Lerner's team aims to construct a GIS-based model for risk analysis of individual boreholes, with the conceptual model sketched in the figure. Many of the ideas in CONSIM, a model under development by Golder Associates for the Environment Agency, will be used, but the perspective will change.

Instead of looking from the pollution source towards the receptor, the view will be from the borehole upstream towards the multiplicity of possible sources. The work will include an analysis of the uncertainty of defining borehole catchments in the complex and changing environment of a

Conceptual model of risks to urban groundwater supplies



modern city. These tools will be used in close co-operation with the industrial steering group to analyse the options for groundwater usage. Thus the project is intended to deliver both technical tools and a decision-making process.

For further information please contact Professor David Lerner (0114 222 5743; fax: 0114 222 5701; E-mail: d.n.lerner@shef.ac.uk) or see project descriptions and reference lists at the website: www.sheffield.ac.uk/~cse.



ENVIRONMENT & BUILDING

Quantifying green buildings using LCA

A Life Cycle Assessment (LCA) is the compilation and evaluation of all the inputs and outputs, and the potential environmental impacts, of a product system throughout its life cycle. Such an LCA will enable users to accurately quantify the impacts, and enable them to make decisions about the product from an environmental viewpoint.

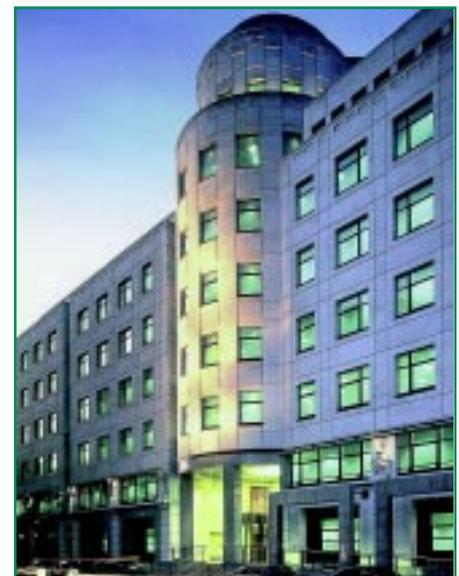
The Steel Construction Institute has completed a three-year comparative LCA study on office buildings, and now present the results in *A comparative environmental life cycle assessment of modern office buildings*.

The study considered two office buildings, a straightforward four-storey building and a higher-specification, eight-storey building with an atrium. Both buildings were modified in the calculations to permit five types of structural system, and to incorporate a range of services options ranging from natural ventilation to full air-conditioning. The complete life-cycle energy and CO₂ requirements for all these alternative structures and all the HVAC options were considered and periodic refurbishment, replacements and improvements were modelled throughout the notional 60-year building life.

This work on environmental life cycle assessments of office buildings is one of the first known studies where a comparative methodology has been used to produce quantitative building life cycle energy and CO₂ profiles for a series of structural alternatives together with a range of service options. Results demonstrate the proportional relationship between initial and life cycle embodied energy and CO₂, and between life cycle operational energy and CO₂ over a notional 60 year life.

The main conclusions of this study, part-funded by the DETR, are as follows.

- There is no significant difference between the environmental performance (in terms of embodied and operational energy and CO₂) of steel and concrete framed office buildings.
- There is no operational energy benefit in passive thermal performance of modern



concrete framed office buildings compared to modern steel framed office buildings.

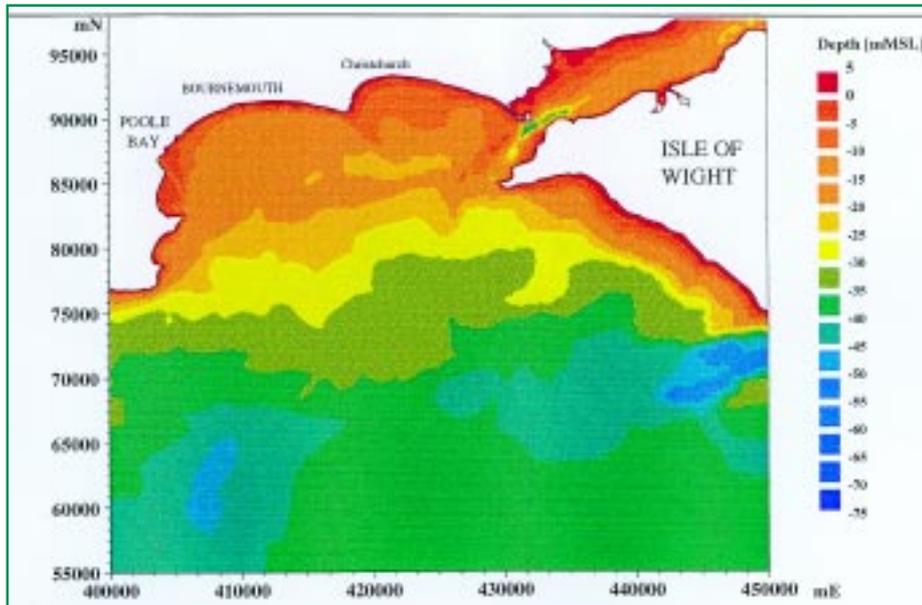
- The relative values of embodied energy compared with operational energy have now been assessed and this can assist with assessing future energy implications arising from improvements in the building fabric.
- A comparative life cycle assessment methodology now exists, and this could be further developed for other LCA studies.

To order the publication telephone SCI Publications Sales on 01344 872775. For further information about the project please contact Dr Keith Eaton, SCI (01344 623345; fax: 01344 622944; E-mail: k.eaton@steel-sci.com).



Seabed sediment mobility guides

Understanding of the seabed, and the relationship between it and the coastline, has not received sufficient attention in the past, partly because of the scarcity of detailed surveys or observations. New reports which will be available from CIRIA in the autumn of 1998 will provide generic guidance on how to approach regional assessments of seabed sediment mobility, and will provide site-specific information to those involved with resources, management, and planning in the area of seabed to the south west of the Isle of Wight.



Interpolated bathymetry over the model area south west of the Isle of Wight.

The mobility and transport of sediments on the seabed may have a bearing on the development of beaches and hence on the evolution of the coast. In addition, a regional seabed sediment study can provide valuable information for activities such as the installation of pipelines, building structures on the seabed and dredging. The results from such a study would also be useful for other purposes, for example in connection with fisheries, marine biology and marine archaeology.

CIRIA's work on seabed sediment mobility, undertaken by HR Wallingford in partnership with BGS and Southampton University, has used detailed investigation of a local area (south west of the Isle of Wight) to produce generic guidance on regional seabed sediment studies.

The project is producing two main reports. The first (*Regional seabed sediment studies and assessment of marine aggregate dredging*) is aimed at organisations producing and evaluating environmental assessments of marine dredging and other marine developments. It provides generic guidance on how to approach regional assessments of seabed sediment mobility, an issue of great interest to the dredging and coastal development industries and to coastal managers.

This report offers a conceptual model for the assessment of seabed sediment mobility, to which more definitive observations on

seabed sediment mobility can be linked. The report emphasises the importance of collecting data on physical processes and on the benefits of reliable geological information and offers guidance on information requirements for decision makers in the coastal zone. An up-to-date guide on the procedures for dredging licence applications is also given. Issues relating to the assessment of dredging and seabed sediment mobility are reviewed and advice given on the procedures required.

The second report is more site-specific and will be relevant to those involved with resources, management, and planning in the area of seabed south west of the Isle of Wight. It provides detailed information that will be of interest to those in the area and may also help others determine the extent of studies in their own local areas.

The two reports taken together offer new approaches to assessing the mobility of seabed sediment and the techniques employed to assess sediment movements. They represent the latest scientific methods for assessing seabed sediment mobility and the interaction of offshore marine developments, including marine dredging.

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