

Innovation & Research



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Off-site masonry construction for 21st homes

The development by Hanson of an offsite masonry system has met the combined challenge of rapid construction and the need to address the impact of climate change on comfort in homes.



(Above left) One of the prefabricated cavity wall panels being craned into position



(Below left) The Hanson EcoHouse built at the BRE Innovation Park

system, comprising a stack-bonded facing brickwork outer leaf with an aircrete blockwork inner leaf. The blocks have a BRE Green Guide 'A' rating and the prefabricated walls achieved a U value of 0.15 W/m²K. Air tightness testing on the completed house demonstrated a very low infiltration rate below 5m³/hour/m².

The thermal mass characteristics of the glued masonry panels save energy during the heating season, and also provide passive cooling during hot weather, a quality that will become increasingly important if summers get warmer. To maximise the effectiveness of the thermal mass on warm days, the house has been designed for good natural ventilation, using a combination of high level roof openings and secure low level grills to provide a stack driven flow of fresh air through the building.

The goal of achieving comfortable, low and zero-carbon homes is a challenging target for house builders, particularly alongside the drive for more offsite assembly. In the masonry and concrete sector, Hanson has addressed this challenge through the development of a concept dwelling which brings together the latest techniques in off-site masonry construction, thermal mass and natural ventilation. The 'EcoHouse' was designed by architects TP Bennett, and demonstrates how this can be achieved with widely used traditional building materials precisely assembled to conform to the best principles of modern methods of construction, sustainability and affordability.

The house, which has been constructed at BRE's Innovation Park, was built on prepared foundations in around 3 days, using Hanson's prefabricated insulated cavity wall panel

The robustness and durability of a glued masonry walling system using such large panels had to be proven during the construction stage. But development and testing has confirmed that this system offers a rapid means of constructing traditional homes, which are well within the demands of the Code for Sustainable Homes Levels 4 and 5. Level 6 is also a distinct possibility as the company is looking to incorporate greater levels of renewable energy within the build.

For further information please contact Paul Regatzki at Hanson (01773 602432; E-mail: paul.regatzki@hanson.biz).



The Concrete Centre

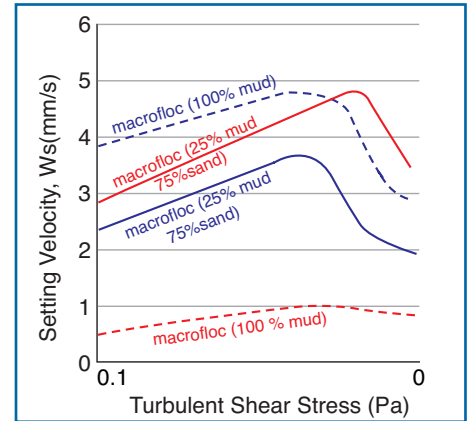
Mixing it: how marine mud and sand interact



Suspended sediments in the water influence the design and performance of many engineering projects in estuarine and coastal locations. However, the characteristics of these sediments vary considerably according to the relative proportions of clay, silt and sand. Although computational sediment transport models are routinely used to support these projects, they often simply assume that the sediment is predominantly muddy (cohesive) or sandy (non-cohesive). This is clearly an oversimplification. Although models for the transport of mud/sand mixtures do exist, their applicability is limited by the lack of knowledge about how cohesive and non-cohesive sediments interact when mixed together.

To advance present knowledge, HR Wallingford has funded measurements of the settling characteristics of a range of sediments in a laboratory flume. Mass settling fluxes of various mud/sand mixtures were measured by Dr Andrew Manning from the University of Plymouth who is a Visiting Research Fellow at HR. The tests covered a wide range of suspended sediment concentrations, mud/sand proportions, and turbulence levels.

His LabSFLOC measurements have improved understanding of how mud/sand mixtures settle under various combinations of shear stress, concentration and mud/sand proportions. Mud/sand suspensions were found to behave differently to mud-only or sand-only suspensions. The results highlight the need for wider investigations on erosion, transport and deposition of mixed sediments.



(Left) Sand and muddy sediments in close proximity, Eden Estuary, Fife
(Right) Relationships describing settling of sediments are not likely to be simple. For instance the presence of sand (75%) slows the settling of mud macroflocs [blue lines] (av. particles > 160mm). But it quickens the settling of smaller mud microflocs [red lines] (av. particles < 160 mm).

The next step will be to test the laboratory results in computational models and identify how we can extend accurate simulation of mixed sediments.

For further information please contact
Dr Richard Whitehouse, HR Wallingford
(01491 822434; E-mail
r.whitehouse@hrwallingford).

HIGHWAYS & ENVIRONMENT

Environmental Information System for Highways



Every one of the Highways Agency's projects on its 28,000 hectares, whether new build or maintenance, has to meet key environment targets. A vital part of scheme management for both the Agency and its contractors, the indicators used include air, water, noise, landscape, cultural heritage, waste management and biodiversity.

Up to now, this information has been held in different formats, on different systems and was coded differently by different contractors. In the worst cases, information has gone missing, and new contractors have had to re-acquire data already held by the previous management company. This 'known unknown' has also pushed up tender prices, with contractors effectively having to take a best guess as to the amount of work involved. The Agency's new Environmental Information System (EnvIS) will bring an end to that.

EnvIS is essentially a data warehouse rather than an application, allied to a mandatory coding protocol, which means all contractors supply their data in the same format, supported and trained by the Agency. While the core data is in a single format, the protocol is also flexible enough to allow contractors to integrate it with their own operational systems. This common approach to data specification pre-empts the Europe-wide INSPIRE (INfrastructure for SPatial InfoRmation in Europe) initiative to develop a common data

sharing format. The EnvIS definitions are on the INSPIRE website as an example of good practice (search for IAN 84/07 at <http://eu-geo-portal.jrc.it> to find them).

Every three months, the data entered on EnvIS by individual contractors, Agency managers and environmental specialists is rolled out across the network so that it is available to all users. While substantial amounts of data are already on the system, either in depth from pilot projects, or in breadth from easily accessible sources such as national designations, the dataset is likely to take up to three years to be comprehensively populated.

Using the existing Agency mapping system as a starting point, EnvIS displays the environmental data geographically together with Ordnance Survey maps and other relevant data from other Agency systems including management information, accidents, and compensation claims. It shows each type of data – vegetation, air quality, water, species structures, habitats, etc. – as though on transparent acetate layers. Users can select

as many or as few layers as they need, add and remove detail, and zoom in and out. It is an accessible and intuitive way to translate huge amounts of data into graspable knowledge. The system will also be able to produce off-the-shelf and customisable quantitative reports for further analysis, data mining and management information.

The benefit of integrating many sets of data into one, separating data from the application, and ensuring its longevity, will be a likely saving for the Agency of around £5 million in the first few years. In addition, the continuity achieved by Agency ownership will make consistent long term environmental benefits easier to demonstrate, and tendering less of a gamble for both contractors and, ultimately, the taxpayer.

Three example screen dumps from EnvIS are on the IRF website.

For further information please contact
Peter Groutage, Highways Agency,
Birmingham (0121 678 8208; Email:
peter.groutage@highways.gsi.gov.uk).

Technology Strategy Board: from mind to market

The Technology Strategy Board (TSB) became a Non-Departmental Public Body with effect from 1 July 2007. The TSB's vision is for the UK to be seen as a global leader in innovation and a magnet for technology-intensive companies, where new technology is applied rapidly and effectively to create wealth.



Collaborative R&D is a primary delivery mechanism of the Technology Strategy. It is designed to assist the industrial and research communities to work together on R&D projects in strategically important areas of science, engineering and technology – from which successful new products, processes and services can emerge.

Regular competitions for funding of Collaborative R&D projects have been held since 2004, and by June 2007 a portfolio of over 600 projects was being supported with a combined business and Government investment in excess of £900 million. In the past year the scope of the Collaborative R&D competitions has been expanded to support large projects as well as smaller projects approved within faster timescales.

Collaborative R&D is managed through a dedicated website, which includes a searchable database and guidance on the funding application process. Some examples from the TSB portfolio are summarized below.

The TSBs latest competition was launched in the Autumn and further competitions are planned for Spring and Autumn 2008.

Recycling Quarry Waste Dust

The key objective here is to develop a new, high-volume outlet for surplus dust produced at UK quarries, and from processing industrial slags from iron and steel making. The prime intention is to develop hydraulically bound materials (HBM) for road foundations able to accommodate high dust contents thereby providing high volume outlets, and with the additional benefit of enhanced durability.

It is estimated that 3–5 million tonnes of surplus dust per annum is produced in UK. Hydraulically bound materials, although used in mainland Europe, are relatively new to UK so this work will build on previous knowledge in this field and will address the barriers to utilisation. The project is led by Tarmac, with the Quarry Products Association and Liverpool John Moores University. Email: howard.robinson@tarmac.co.uk for further information.

Pavement Infrastructure Low Energy Recycling (PILER)

The aim of this project is to produce a consistent range of new generation low-energy high-performance construction materials for roadway and footway construction through the recycling of excavated materials. The specific objectives are:

- 1 Develop an understanding of the potential performance of blended recycled excavated roadway and footway materials, that can include low energy binders;
- 2 Proof of performance of new generation materials to form low energy fit-for-purpose roadways and footways;
- 3 Proof of consistency with commercial production of new generation materials.



Road and rail construction work

The project is led by Proficio Technology Ltd with City of Edinburgh Council, University of Abertay Dundee and George Killoughery Ltd. Email philliprhill@proficiotechnology.com for further information.

RaPPER (Rapid Pile Performance Evaluation Resource)

This project will develop a new tool that will enable designers to select the right rapid non-destructive test system to enable the safe re-use of foundations. Foundations can be safely re-used provided their integrity, geometry and load capacity are known. This project will use full-scale testing both on test-bed sites and commercial sites to create case studies and exemplars of the successful re-use of foundations. These exemplars will be embodied in the RaPPER (Rapid Pile Performance Evaluation

Resource) tool for designers. The project led by Stent Foundations with BRE, Profound UK Ltd and Testing and Analysis Ltd. Email viv.troughton@stent.co.uk for further information.

Ultra-fire resistant UV-cured composite products for rail and marine applications

Curon is a new structural composite material that is UV-cured and will last longer than conventional composites under fire, high temperature and hostile environmental conditions. It was formulated for military applications and as a result has ultra-high fire and temperature performance *and* mechanical strength. Three key industrial areas have been identified for this project:

- moulding of passenger seats, floors, doors, ceilings for public transport applications;
- use in marine walls, floors, doors, and ceilings and modules; and
- the use in repair of steel piping in the processing and oil & gas industries.

These all have strict (fire) performance specifications. This material is still in its infancy for use in these high-end applications and a focused R&D programme is required through to prototype validation. The project is led by MERL Ltd, with Curon Ltd and People Seating Ltd. Email rmartin@merl-ltd.co.uk for further information.

For further information on opportunities visit the TSB website at: www.technologyprogramme.org.uk or contact the Technology Strategy Board on 01793-442700

RESPECT FOR PEOPLE

Strategies for improved construction project performance



Empowerment offers the opportunity to create a workplace culture that promotes the participation and involvement of employees in the decisions that affect them, and is essential in retaining and developing a productive workforce in an increasingly demanding business environment. A recently completed two year project, funded by EPSRC and ICE and called *Respect for People: Strategies for Improved Construction Project Performance* developed a variety of tools, techniques and value-enhancing practices.

The project was aimed at improving:

- organisational empowerment and teamwork within the project supply chains; and
- operational employee empowerment and teamwork at an individual level.

The research represents close collaboration with a wide range of construction companies and industry bodies from both the construction and process sectors. The results, based

on a series of workshops, interviews, case studies and an extensive questionnaire survey, have been documented in several journal and conference papers, and the European Construction Institute handbook entitled *Managing People on Construction Projects*.

For further details please contact Professor Andrew Price at Loughborough University (01509 263171; Email: a.d.f.price@lboro.ac.uk).

UK tall Buildings: a market study report



An Engineering Doctorate (EngD) research study at Loughborough University is investigating innovative construction techniques for tall buildings. An interim investigation, the results of which will be published in the Municipal Engineer (ICE Proceedings), has focused on a study of the UK market for tall buildings. It concentrated on London, which forms almost 70% of the UK tall building market, but also considers all areas of the UK. It has twelve key findings, summarised below.



- 1 The tall building form is here to stay and is currently backed by the upper echelons of Central Government and popular public opinion.
- 2 In the UK, "tall building" is defined by the study as twenty stories plus, due primarily to the change in building methodology required, but this only equates to mid-rise on the international skyscraper stage.
- 3 Several new tall building clusters are being encouraged in London by Central Government, the Mayor's London Plan, CABE and by unsatisfied demand from the office, mixed use and residential sectors.
- 4 The UK Government's attitude to tall buildings appears to be becoming more positive.
- 5 There are four types of London tall buildings driven by four distinct areas of demand: the fat office tower (18% of market demand), the skinny or iconic office tower (36%), the mixed use tower (18%)

Future 150m+ Skyline of London?

- 6 The demand for tall buildings is at an unprecedented high – ten London tall buildings are due to start on site in 2007. This is comparable to the Manhattan skyscraper boom of the 1920s.
- 7 Capable main contractors for tall buildings are now becoming more selective, more risk averse and demanding a higher price while clients are increasingly having to use two stage or negotiated tenders to secure an experienced contractor.
- 8 High barriers to entry minimise the likelihood of increasing overseas competition for the construction of UK tall buildings.
- 9 London has thirty-nine tall buildings potentially reaching site in the next three to five years, the South East has four and the balance of the UK has fifteen. The

total estimated net trade cost of these is £10 billion.

- 10 Independent forecasts for 2007 to 2011 predict sustained growth for both commercial and residential markets, with an increasing focus on mixed use towers as the most efficient way forward.
- 11 Costing models indicate twenty stories as the optimum height for tall buildings - there is an exponential growth in cost from twenty to forty stories, which then levels out after the fiftieth storey.
- 12 Methods for increasing levels of prefabrication, sustainability and safety in tall building construction need further study, as does speed of construction vs cost and international best practice.

For further information please contact: Ian Skelton (i.skelton@lboro.ac.uk) or Prof. Chimay Anumba (01509 222615; E-mail: c.j.anumba@lboro.ac.uk).

BUILDINGS & ENERGY

Low energy cooling for buildings



Professor Dennis Loveday is the Royal Academy of Engineering/E.ON Research Chair in Low Carbon Energy Technology at Loughborough University. His research work has advanced the development of a prototype hybrid air-conditioning system, comprising special ceiling tiles that incorporate evaporative cooling technology and can save up to 50% of the energy required by a conventional central air-conditioning system. Sites for trials are now sought.

The approach is based on a false ceiling of individual cooling tiles. Within each tile is a wick surface that is maintained moist via a liquid distribution network. Air from the room is drawn through the tiles, passes over the wick, and cools the tile surface facing the room. This, in turn, removes heat from the room by radiation and convection.

Liquid is maintained below atmospheric pressure within the network, meaning that the system cannot leak or drip. There is no risk of legionella infection because there is no production of aerosolised water droplets – the evaporation process produces water vapour only – and the liquid is dosed with a biociding agent to eliminate the growth of any mould.

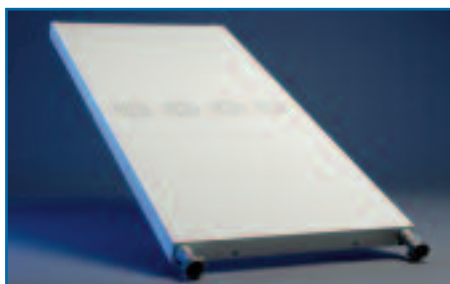
The system is silent, odourless and has the potential to be installed, either as a retrofitted refurbishment, or new as part of a central air-conditioning system. The system can operate as a hybrid with conventional air-condition-

ing, or in a stand-alone mode, for even greater energy savings. Patents have been awarded in Europe (EP1325266) and the USA (US7047752) for the innovation, and the concept was a finalist in the Carbon Trust / Sunday Telegraph Innovation Awards of 2003.

This innovative low energy cooling technique began as an EPSRC-funded feasibility

study. Its subsequent development was widely supported including significant contributions from Weatherite Manufacturing Ltd, regional innovation fellowships for its inventors, and support from the Carbon Trust.

Performances achieved in a laboratory-scale test room have been impressive, with energy savings of up to 50% having been measured for room cooling loads typical of those found in modern commercial offices equipped with computing and IT facilities. The research and development team are now looking for companies prepared to trial a prototype system in a realistic setting, and also prepared to allow monitoring and testing of its performance.



Prototype cooled ceiling tile

For further information please contact Dr Thor Slater of Loughborough University Enterprises Ltd (LUEL) (01509 228687; email: t.slater@lboro.ac.uk) or Prof Dennis Loveday (Email: d.l.loveday@lboro.ac.uk).

Cladding-structure interaction

Traditionally, cladding has been either load bearing or non-load bearing and in the latter case has had to accommodate movement of the supporting structure so that no loads are transferred to it. The use of larger cladding panels and glass panes, and the increasing flexibility of supporting structures, requires designers to re-think some of the assumptions made about the appropriateness of different cladding-structure combinations.



Cladding bridged across separate structures

The Centre for Window and Cladding Technology has produced a series of three Technical Notes (TN55, TN56 and TN57) covering the issues of design for movement and load transfer. The first in the series describes the issues and illustrates the need for early design co-ordination between the Architect, Structural Engineer and Cladding Designer. In particular it highlights the responsibilities of each designer and their contribution to successful design. It is aimed at designers and also Clients and Project Managers.

The second Technical Note describes how cladding systems can accommodate structural movement and the limitations of different systems. It shows that stick system walls can accommodate less movement than unitised walls and details the factors affecting movement accommodation. It also shows the importance, early in the structural design process, of establishing the weight of the cladding and the position of the cladding supports.

It has been convenient for structural engineers to categorise loads as live load or dead load. However, the weight of the cladding cannot be so easily classified. The weight of the cladding causes the structure to move as the cladding is installed. It is a dead load once the building is occupied but has to be considered as a live load during construction.

The third Technical Note describes inherent movement of cladding panels arising from changes of temperature and moisture and from loads applied to the cladding.

For further information please contact Stephen Ledbetter, Centre for Window and Cladding Technology (01225 386506; Email: cwct@bath.ac.uk; <http://www.cwct.co.uk>).

HIGHWAYS & MATERIALS

Plastic bridge for M6



An innovative fibre reinforced polymer (FRP) decked road bridge has recently been constructed for the Highways Agency over the M6, north of Preston. The lightweight structure was fabricated alongside the carriageway and lifted into position in May 2006 with minimum disruption to the network.

The Highways Agency had previously constructed two footbridges using different glass fibre deck systems on the A30 and A5 but this is the first time FRP has been used for road bridge construction on the trunk road network. Consequently, the fifty-two metre long, two-span structure was designed to carry forty tonne construction and use vehicles.

The deck is constructed from pultruded FRP sections and is supported on and bonded to steel girders spanning reinforced concrete abutments and a central reserve pier. The FRP material is resistant to water and does not corrode, giving it a substantial advantage over reinforced concrete and steel structures which have required costly maintenance over the last ten to fifteen years. It is able to withstand harsh environmental conditions, has good resistance to chemical and oil spillage and gives no concerns regarding the effects of de-icing salts or exhaust gases.

The bridge is about two thirds of the weight of the forty year old structure it replaced but is twice as strong. As the material is linear-elastic to failure, the safety factors are relatively high with working stresses well below ultimate or breaking stresses. Consequently the controlling factor is serviceability with the deck having a significant reserve of strength.

Although FRP is currently about three to four times more expensive than the equivalent conventional materials, for this £2m project the completed bridge was only five percent more expensive. The lightweight deck enabled rapid construction, which brought significant savings in overheads, simple installation in a short overnight closure, reduced labour costs and the benefits of much reduced traffic disruption. Furthermore, as the bridge will require less maintenance than conventional construction, it is estimated that there will be overall savings in whole life terms and that, with increased usage and larger markets, FRP



Mount Pleasant Visualisation

material costs will become even more competitive.

The bridge was designed using draft standard BD90 'Design of FRP Bridges and Highway Structures', with close liaison maintained between the Highways Agency structures teams and designers AmeyMouchel and MouchelParkman. During the course of the design, valuable feedback was provided and used to review and amend the standard, which has now been published as BD90/05.

Structural monitoring equipment has been installed on and in the bridge, and collected data from load tests will be used to continually evaluate the performance of the FRP units and the deck as a whole. This will allow design standards to be further refined to achieve a more efficient use of the materials in the future, with a view to accommodating longer spans. Data already collected has confirmed that the FRP deck and steel beams are acting compositely. Following the experience on the M6, it is hoped that FRP will soon be used more extensively for new and replacement bridges.

For further information please contact Tommy Dobson, Highways Agency, Manchester (0161 930 5697; Email: tommy.dobson@highways.gsi.gov.uk).

ERABUILD: An update

DEPARTMENT FOR BUSINESS
ENTERPRISE & REGULATORY REFORM



The construction sector has traditionally adopted incremental improvement but has rarely undertaken the long term strategic view of its needs or adopted "Step change" technologies required for more radical improvement. Recent years have, however, seen signs of a significant acceleration in the drive for both modernisation and in increasing efficiency. ERABUILD, the European research area for sustainable construction and operation of buildings, aims to tackle these issues across Europe. See IRF64 for an introduction to the programme.



Neue Zollhof buildings – Dusseldorf, Germany

Improved technologies – for example ICT tools and the development of off-site manufacturing techniques – are enabling a major change in the industry. In addition, issues such as climate change and sustainability, and resulting European and domestic legislation and regulation, are setting new targets for the construction and real estate sector – one of the primary consumers of energy across Europe.

ERABUILD aims at developing a synergy between national programmes by sharing strategies and establishing joint programmes and projects. It started in 2004 as a consortium of 8 countries sharing knowledge and resources of 10 national construction research programmes.

By 2007 this had expanded to 11 countries. Current participants in ERABUILD include the UK Department for Business, Enterprise and Regulatory Reform (BERR), as well as construction research sponsoring organisations from France, Germany, The Netherlands, Spain, Austria, Denmark, Finland, Sweden, Norway and Switzerland.

ERABUILD has fulfilled the need for networks at both strategic and operational levels. The aim is to build durable cooperation of European funding bodies in order to enable us to increase the impact of the sector-research, and thus also enhance the quality in research and performance of the industry.

There have been three main achievements of ERABUILD so far.

Joint calls. Six pilot calls have been issued by the ERABUILD consortium: three calls for proposals with a total sum of €6,100,000 and three calls for tenders with a total sum of €215,000. The pilot calls have successfully tested different forms of cooperation and identified barriers to effective cooperation. ERABUILD is one of the very few Eranets to have achieved joint calls between national

programmes, and has by far the largest number of calls.

Shadowing activities include sharing knowledge on national policies and implementation strategies to build understanding and trust amongst the ERABUILD partners. Clustering activities have brought together national research projects and researchers to identify shared interest areas suitable for transnational research.

Transnational Programmes. National research programmes and strategies have been shared to better enable future cooperation. Two topics, linked to the ECTPs

Strategic Research Agenda, have been selected for future possible transnational programmes: "sustainable renovation" and 'value driven processes'.

The first stage of ERABUILD, an EU funded project, will end in 2007. The ERABUILD consortium has applied to the commission to take forward ERABUILD for a further three years in order to continue to explore and develop new ways to unite and share both knowledge and resources in research and development.

For further information visit the ERABUILD website www.erabuild.net.

SAFETY & OIL AND GAS ENGINEERING

'Fire & Blast Technical Directory' now on FABIG website



The 'Fire & Blast Technical Directory' has been developed as a joint industry project carried out by the Fire & Blast Information Group and sponsored by OGP and Oil & Gas UK. The aim is to further disseminate knowledge in all areas relevant to hydrocarbon fires and explosions. It aims to be a comprehensive and up-to-date reference for both offshore and onshore engineers.

The Directory

The Technical Directory was recently uploaded onto the newly revamped FABIG website to provide detailed information in the 'Regulations', 'Technical Information' and 'Accidents' sections. Access is available to all and provides the following information.

- A summary of the onshore and offshore oil and gas regulatory environment and relevant legislation for hydrocarbon fires and explosions in the United Kingdom, Norway and USA.
- Listings of the relevant standards and approved codes of practice, listings and abstracts (where available) of technical how-to-do guidance and research publications indexed under the following topics:
 - Fire and Explosion Hazard Management
 - Human factors
 - Consequence and Numerical modelling
 - Explosion loading & response
 - Fire loading & response
 - Equipment/Piping loading & response
 - Prevention, detection, control & mitigation systems
 - Emergency, evacuation & rescue.
- Listing of major onshore and offshore accidents resulting from fires and explosions together with information on rele-

vant reports and websites.

- For each accident, an overview including a description, the consequences and the key lessons learnt is provided.

We invite IRF readers to browse this information on the website at <http://www.fabig.com>.

Invitation to submit other relevant documents

The Technical Directory currently comprises references to more than 400 standards and/or codes of practice, technical how-to-do guidance and research publications. It is a live resource and will be regularly updated to ensure that the content is accurate and up-to-date.

We therefore invite IRF readers to submit relevant documents which are currently not included within the various listings. The documents submitted or proposed for inclusion in the Fire & Blast Technical Directory must be either freely or commercially available. Internal documents solely for use within particular organisations will not be included.

For further information please contact Guillaume Vannier, FABIG Project Manager, SCI (01344 636 550; Fax: 01344 636 570; Email: g.vannier@steel-sci.com).

Infrastructure for the 21st century

DEPARTMENT FOR BUSINESS
ENTERPRISE & REGULATORY REFORM



Much of the UK's core transport and utility infrastructure is old. Indeed the bulk of the canal, rail and urban sewerage systems were installed before the start of the 20th Century. Their asset value is many £billions and the cost of replacement (if practicable) would be £trillions, notwithstanding the immense disruption to society during complete replacement of such fundamental assets.

Major asset custodians are wrestling with the twin challenges of ageing assets and increased demand (manifested in more vehicles on the roads, more rail travel, more demand for water and sewerage facilities, etc). More than ever, they are looking for innovative and forward-thinking solutions to provide greater assurance of performance and to extend the economic and service life of precious assets.

The Infrastructure Sector of the Modern Built Environment Knowledge Transfer Network (MBE KTN) is working with asset owners, academia and knowledge providers to create dynamic and flexible media to share knowledge and stimulate innovation. The MBE KTN (one of over twenty KTNs sponsored by the Technology Strategy Board) is a Partnership between Arup, BRE, BSRIA and CIRIA, which is initially focussed on three 'sectors' within the Construction industry: Healthcare, managed by BRE; Offices, managed by BSRIA; and Infrastructure, managed by CIRIA.

The Infrastructure Delivery Team (led by Dr Andrew Pitchford at CIRIA) is working with an influential Sector Board (chaired by Dr John Perry at Mott MacDonald) to create and deliver innovation and knowledge transfer between all parties and individuals active within infrastructure and to gather knowledge from other sectors with comparable experience and challenges.

Three current issues which are being actively considered by the Infrastructure Sector are outlined below. A longer version of this article is available on the IRF website.

Technologies to extend the life of assets that in many instances have exceeded their intended design and service life.

For further details on this issue please visit: www.ciria.org/cpn_event_240907.html for details of a seminar held in September 2000.

Effective techniques to monitor and obtain telemetry from linear assets often found in remote and inaccessible areas.

For further details on this issue please contact Philip Charles at CIRIA via philip.charles@ciria.org or on 020 7549 3300.

Better understanding of fluctuating societal aspirations on the requirements of assets, which could accelerate the need for replacement and highlight inherent inflexibility.

For further details please contact Philip Charles at CIRIA via philip.charles@ciria.org or on 020 7549 3300.

One of the key interfaces for the transfer and sharing of innovation and knowledge is the MBE KTN website which is being populated with information distilled from meetings,



Rebuilding of a drystone wall

engagement activities, short papers, online events and other knowledge building activities.

Drs Perry and Pitchford are keen to "promote the MBE KTN website as a portal to foster a culture of discussion and knowledge transfer to erode and dismantle some of the long-standing barriers to the effective take-up of innovation from the UK and international science base, and to encourage members of the UK (and international) infrastructure community to sign-up to the MBE KTN for free access to a wealth of infrastructure knowledge and innovation."

For further information contact Dr Andrew Pitchford, CIRIA, MBE KTN Infrastructure Sector Manager (020 7549 3300; E-mail: andrew.pitchford@mbektn.co.uk. Or visit www.MBEKTN.co.uk).

WATER ENGINEERING

Making a SPLASH



DFID Department for International Development

Stockholm World Water Week is one of the largest events in the water and sanitation sector, attended by more than 1500 professionals from around the world. What better venue to raise awareness about the SPLASH project, aimed at improving coordination of European-funded research on water for development?

SPLASH is the name of the European Union Water Research Area Network (EUWI ERA-Net), financed through the EC Framework Programme 6. Coordinated by the UK's Department for International Development, it is a consortium of 15 ministries, funding agencies and national research and development agencies from 11 countries in Europe. Its main objectives are to minimise duplication of research, identify areas where there are gaps, and share good research management practice, resulting ultimately in joint research programmes.

The presence of SPLASH at World Water Week allowed us to inform those outside the Consortium about the programme and to motivate people to get involved, through various

events including a report to the EU-WI Multi-stakeholder forum and poster presentations.

A 'speed networking event' was also held during the week, which provided a unique and fun experience for the 70 participants, at the same time allowing SPLASH to capture current thinking of how to enhance future water research. Topics covered included research priorities, demand, improved dialogue, impact of research and capacity development. There were some important findings, which were put forward to the World Water Week plenary:

- **Getting the research question right** involves making connections with local institutions to identify priority issues;
- **Getting the research into use** requires appropriate communication, with the support of enabling intermediaries;
- **Success requires flexible approaches** e.g. timeframes and funding mechanisms for research objectives to be met.

Clearly this is just the beginning but SPLASH is set to continue to make waves in water for development over the next four years, working towards making the European Research Area a reality.

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SPLASH speed networking event

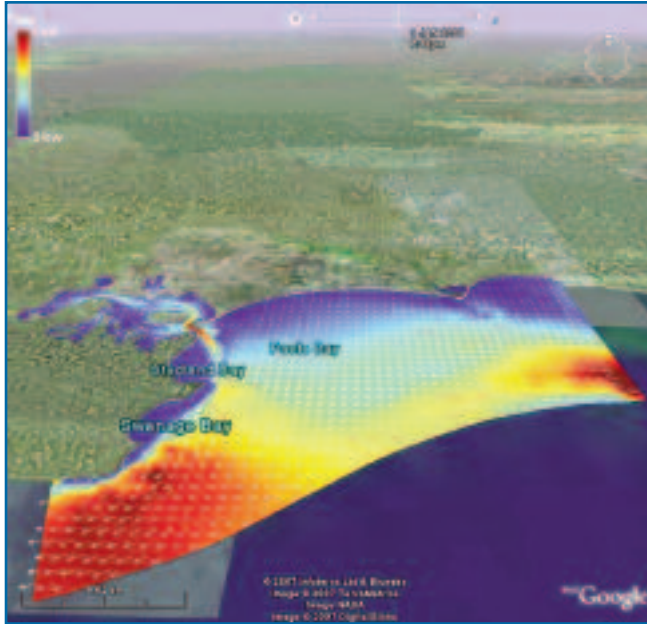
Adding context to modelling outputs – animation of tidal studies

Although much effort goes into the development of accurate mathematical models for water engineering projects, their detailed outputs can often be complex and difficult to explain to non-specialists. In order to assist clients with the presentation of outputs from hydraulic models – for example in explaining their proposed projects to stakeholders – HR Wallingford has been examining new presentation techniques.

An example of a particularly topical and effective presentation situation is the facility provided by Google Earth. This is essentially a geographic information system (GIS) that enables geographically-referenced information to be integrated, stored, edited, analyzed, shared and displayed.

The images (time-sequenced and geo-referenced) are played as an animation and since GIS-based mathematical models can produce their results in this format, their results can be made available on a Google Earth perspective view.

An example of the power of this capability is shown in the single image above. This is a single shot from an animation HR Wallingford have prepared to convert the results from one of their the hydrodynamic models into Google Earth file format (.KML). The model output can now be viewed in three dimensions within the Google Earth environment, with scrolling and zooming into areas of interest whilst the animation is running. Most strikingly, the model output is put directly into the context of the surrounding locations provided by Google Earth – thereby making it easy to understand



The distribution of tidal flow velocities for Poole Harbour in Dorset.

the significance and context of the model results.

Two images on the IRF website show a perspective and a close-up view of a typical model output from an HR Wallingford analysis. The distribution of tidal flow velocities is shown for Poole Harbour in Dorset. This type of analysis is important for scour and stability studies

as well as pollution plume predictions. The arrows show the velocity vectors predicted by the HR Wallingford models. The animation shows how the region of high velocities moves according to the tide and the local bathymetry.

This particular set of model results can be viewed as a series of animation files on the HR Wallingford web-site (www.hrwallingford.co.uk). This does not involve running or downloading Google-Earth. The specific kml files that generated these images under Google Earth are held by HR Wallingford.

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