



the centre for the **BUILT ENVIRONMENT**

CBE NEWS



STUDENT SUCCESS

Sewage as a construction material?
Virtual lab examines building accessibility
Knowledge transfer: an overview of expertise and research



GLASGOW
MACKINTOSH SCHOOL
OF ARCHITECTURE
THE GLASGOW
SCHOOL OF ART



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Issue 9
October 2004

EDITORIAL

Welcome to the all new CBE News! (formerly *Cyber News*) We hope you approve of our new appearance and that you enjoy every page! In this issue we take the opportunity to remind you of the role of CBE in the construction industry in the West of Scotland and provide you with an overview of our complete range of services.

For more information please visit our website on www.cbe.org.uk.

October 2004 has arrived – A date that has been talked about in the industry for a long time in relation to the enforcement of the **Disability Discrimination Act (DDA)**. Read about the **Wheelchair Simulator Project** carried out in the Virtual Environment Laboratory within the ABACUS Unit of Department of Architecture in the University of Strathclyde.

Our cover story features Hazel Ritchie, an interior design student who was successful in reaching the finals of the **prestigious RSA competition** with her entry on a new approach to accident and emergency waiting areas.

Inside are details of a variety of courses and we also highlight the extensive laboratory facilities in the Department of Engineering at the University of Strathclyde.

In the area of research in this issue we have articles on two new patents in lock gate operating systems, an article on the use of sewage sludge in revitalizing contaminated land and it's use in building material and an experiment in **colour switching** in Dr Mike Hepher's article "*Colour in Buildings*".

Please keep this issue for your future reference as we have included a complete listing of all the areas of **expertise** you can access through CBE.

Make your bookings now, select from the list of forthcoming CBE events including the next half day Health & Safety seminar on "**Factors Influencing Scottish Construction Accidents**"

We always welcome your suggestions for seminar and workshop topics which would be of interest to your organisation. We can organise **bespoke seminars in your company** as part of your CPD programme and general training or for all CBE clients at our regular venues. If you would like to find out how to sponsor a CBE event, please refer to page 22.

The staff at CBE are always happy to help you with your enquiries. We look forward to hearing from you and hope you enjoy this edition.



Dr Branka Dimitrijevic
Director of the Centre of the Built Environment

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CBE News is designed by:



CBE SERVICES

The CBE is an ERDF funded Partnership established jointly in June 2002 by:

- **University of Strathclyde**
Department of Architecture and Department of Civil Engineering and
- **Glasgow Caledonian University**
School of the Built and Natural Environment

with the aim of providing a central point of contact for the construction industry in the West of Scotland linking these organisations to the resources, expertise and facilities available within the built environment faculties of the two universities.

CBE's Aim

Knowledge Transfer

To promote a range of activities and initiatives relevant to all who are involved in: design, construction, maintenance and management of the built environment through facilitating a two way knowledge, innovation and information transfer between construction industry SME's, academia of the two universities and development agencies. CBE also integrates with regional business and development partnerships and initiatives and with environmental and equal opportunities programmes.

Consultancy and Advice

Academics at the two universities cover virtually every aspect of the built environment. Many of them are leading experts in their field and gained considerable industry expertise before joining academia. The CBE acts as a channel for the provision of consultancy/advice to allow SME's in the construction industry and related professions to access and benefit from this expertise.

CBE Seminar Series

CBE organise a series of lunchtime seminars on topics relating to all aspects of the built environment/construction industry.

Lifelong Learning

CBE encourages the uptake of life long learning courses.

In conclusion

CBE can assist companies to:

- Learn new skills
- Obtain resources to support research & training
- Access business support schemes
- Establish contacts and forge collaborative partnerships
- Adopt initiative development and best practice techniques
- Promote equal opportunities
- Develop new products and processes

It is anticipated that the facilitation service provided by CBE will improve dialogue between industry and academia, adding value to the performance of the construction sector and enhance the quality and sustainability of the built environment in the West of Scotland.

We hope we can be of service to your organisation.

BUSINESS DEVELOPMENT MANAGER



We are pleased to announce that Anne Blacklock has been appointed to the post of Business Development Manager.

Anne's main role within CBE is to make direct contact with our clients to establish their needs and help implement plans to meet these. In particular, we want to identify areas where SME's (small to medium enterprises) feel they could benefit from advice from our academics.

Glasgow Caledonian University has recently established the Sustainability Centre, the first of its kind in Scotland, with dedicated resources to advise and research all aspects of sustainability.

There are, many areas in which specialist advice from our academics can be offered and CBE acts as a channel to allow businesses to access this. Initial advice (up to half a day) to determine the nature of the issue and discuss potential solutions and develop a project brief, is free. Thereafter there are a number of grant and financial support schemes designed to help SME's obtain consultancy and research advice.

If you have a technical, operational or management issue you would like some advice on, please contact Anne at CBE and she will be happy to arrange a meeting to discuss your requirements.

tel: 0141 249 9888

email: anneb@cbe.org.uk

SEMINAR BOOKING FORM



Contact Name: _____

Organisation: _____

Address: _____

Town/City: _____

Postcode: _____

Telephone: _____

Fax: _____

Please tick the appropriate box

I would like to book 10 places for £200 (a saving of £100)
(organisations taking up this offer can advise CBE on seminar/delegate choices up to one week before each event)

I would like to book for events on an individual basis

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Name: _____ Seminar: _____ Date: _____

Please copy and fax this form back to CBE on 0141 249 9906.
Alternatively, send it by post to CBE, The Lighthouse, 56 Mitchell Street, Glasgow G1 3NU.

You will be invoiced on receipt of your booking form

FORTHCOMING SEMINARS

Thurs, 7th October
Practice Based Routes to Professional Qualification in the Construction Industry
 Colin Gordon, Lintol, Edinburgh

Thurs, 14th October
From Allotments to Urban Forests and Agriculture: the sustainable use of open space in the city and city region
 Hildebrand Frey, SU, and Judy Wilkinson, Scottish Allotments and Gardens Society

11th - 16th October, Exhibition
From Allotments to Urban Forests and Agriculture
 Department of Architecture, SU, and Scottish Allotments and Gardens Society

Thursday, 21st October, 15.00-18.00 hrs
 Joint research event of GCU, SU and Mackintosh School of Architecture

Thurs, 28th October
The impact of urban form on travel behaviour
 Neil Ferguson, SU

2nd - 4th November
ScotBuild exhibition and seminars

Wed, 3rd November, 13.00-14.00 hrs
Environmental Assessment of Buildings
 Michael Corcoran, SU (at ScotBuild)

Thurs, 4th November, 12.00-13.00 hrs
Value management and best value procurement
 John Kelly, GCU (at ScotBuild)

Thurs, 4th November
Disease Pathways in the Home (hazard, risk and assessment)
 Mike Hepher, GCU

Thurs, 11th November
Race, residence and identity: integration vs urban diversity, a comparative survey of racialised and multicultural residence and space in Glasgow and Liverpool
 Ola Odoku, SU

Thurs, 18th November
Project complexity and risk management
 Peter Edwards, RMIT University Melbourne, Australia

Thurs, 25th November
Off Site Manufacturing
 Andrew Carpenter, Board Member of Constructing Excellence, Secretary of Bristol Constructing Excellence Club, Commercial Manager of F.I. Systems, Business Development Manager of Forticrete Ltd

Thurs, 2nd December
Construction Waste Minimisation
 Bob Gilmoure, GCU

Tues, 7th December - ESRC workshop
Discrimination & Promoting Inclusive Employment Practices

Thurs, 9th December
Digital Design and Fabrication
 Alan Bridges, SU

2005

Thurs, 6th January

Thurs, 13th January
Managing the Innovation Process: Challenges and Opportunities
 Charles Egbu, GCU

Thurs, 20th January
Church Modernisation and Disability Discrimination Act
 Nick Lunan, GCU

Thurs, 27th January
Solidification & stabilisation of marginal materials and in specific sewer sludge
 Nick Hytiris, GCU

Thurs, 3rd February (half-day seminar)
Factors Influencing Scottish Construction Accidents
 Iain Cameron and Billy Hare, GCU

Thurs, 10th February
Renewable Energy: Opportunities for Development and Tools for Feasibility Studies
 Stas Burek, GCU

Thurs, 17th February
Quiet Site
 Nick Charlton Smith
 Charlton Smith Partnership

Thurs, 24rd February
E-nose systems for Health in the Built Environment
 Mike Hepher, GCU

Tues, 1st March, 9.30-14.30 hrs
ESRC workshop
Risk, Safety & the Working Environment

Thurs, 3rd March

Thurs, 10th March
Saving money on materials movement in construction
 John Tookey, GCU

Thurs, 17th March
Safety in Design - CDM best practice development
 Iain Cameron, GCU

Thurs, 24th March,
Knowledge Transfer Partnership
 Jamie Henderson (West of Scotland KTP Centre) and Andrew Reid (Mastclimbers)

Thurs, 31st March

Thurs, 7th April
Air Quality modelling for the Urban Environment
 John Crowther, GCU

Thurs, 14th April
Thurs, 21st April
Thurs, 28th April
Thurs, 5th May
Thurs, 12th May

Thurs, 19th May 17.00-19.00 hrs
The use of scenarios for strategic planning in construction (workshop)
 David Langford, SU

Thurs, 26th May

Tues, 5th July - ESRC workshop
Socio-Digital Systems

KEY

- lunchtime seminars 12.00-14.00 hrs
- exhibitions
- networking events
- half day workshops
- dates available for seminars

HAZEL RITCHIE: STUDENT SUCCESS

'A NEW APPROACH TO ACCIDENT AND EMERGENCY WAITING AREAS'.

As part of her honours Interior Design Programme, Hazel Ritchie participated in the Royal Society of Art (RSA) competition, one of the most prestigious design competitions in the UK, and internationally renowned for the recognition of excellence.

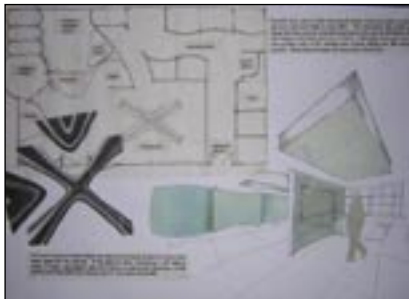
Hazel, studied Interior Design at GCBP (Florence Street) for her NC and HND, articulated into level 3 of the degree programme at Glasgow Caledonian University in August 2002, and has now completed her final honours year.



top: Hazel, with course tutors, Paul Cifelli (centre) and John Gigli (left)



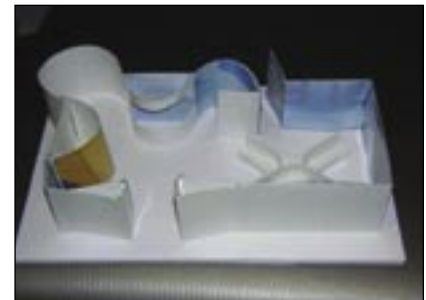
left: Two of the 'A New Approach to Accident and Emergency Waiting Areas' presentation boards submitted
A 3D model of the design



Hazel's scheme was selected from an extensive list of over eighty entries from the UK's universities, colleges and art schools for her innovative and exciting interior design scheme, 'A New Approach to Accident and Emergency Waiting Areas'.

Hazel was short-listed for interview and invited to London to present her design to a group of distinguished judges from the Government and the design world. Her work was judged on the viability of her proposals.

We congratulate Hazel wholeheartedly on an excellent achievement, and applaud the professional staff support, not only to Hazel, but to the degree programme generally, by Mr Paul Cifelli and Mr John Gigli, both highly qualified interior designers themselves.



BSC INTERIOR DESIGN

Interior Design is about the creation and regeneration of practical interior spaces within an existing environment, engaging in a visual narrative with the people who will ultimately use the space.

The Interior Design programme is delivered as a two year Higher National Diploma course offered by Glasgow College of Building and Printing, plus a two year BSc honours degree offered by Glasgow Caledonian University.

In order to develop a visual intellectual understanding of creative two and three dimensional problem solving skills, the studio culture at Florence Street is an ideas driven approach to design. These skills are to underpin a knowledge of management, environmental and technological issues.

The course is intended to develop design skills that strive to find new solutions to old problems, solve them in a real way and communicate these ideas with clarity and innovation. With a strong emphasis on traditional creative skills and new media skills - in line with current professional practice - content has been designed in consultation with the profession to ensure a meshing with the needs of industry in a real world situation.

Graduates are employed across the creative industries, including architectural & interior design, lighting design, CAD, video and computer games, TV/theatre set and exhibition design and teaching. Students are given opportunities to enter design competitions and exhibit work at the annual end of year exhibition, which is well attended by the profession.

For more information please contact:

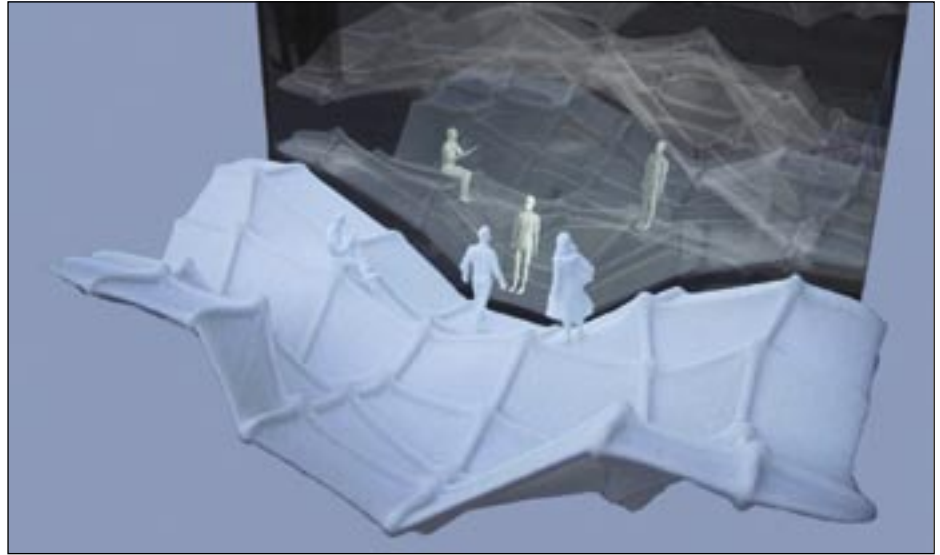
Paul Cifelli

Glasgow College of Building & Printing

tel: 0141 332 9969

email: Paul.Cifelli@gcbp.ac.uk

ARCHITECTURAL COMPUTING STUDIES AT THE UNIVERSITY OF STRATHCLYDE



The discipline of computer aided design is no longer regarded as a separate domain: most design now occurs with the aid of modern information technologies. Within a design practice, computer applications are employed in every aspect of the design process, from the exploration of initial concepts to the production of working drawings and the visualisation of final designs. This offers a wide variety of possibilities for the exploration of the use of computers in design.

The 5th year architectural computing curriculum at the University of Strathclyde has been renamed Architectural Computing and is now one of three pathways of a newly integrated 5th year MArch course.

In addition to 'traditional' design fields such as architecture and engineering, students acquire a well-rounded introduction to the use of digital media in design, developing skills in modelling, visualisation and communication.

Design studio projects typically involve the application of knowledge and skills acquired in the taught classes.

Students learn to critically appraise a brief and formulate an appropriate response, then generate and systematically test, analyse and appraise design options, while being able to select and apply visual, verbal and written methods to communicate design concepts.

Projects often include designs other than those of buildings, and include both individual and group work.

For further information contact:

Dr. Scott Chase

Department of Architecture

University of Strathclyde

tel: 0141 548 3007

email: s.c.chase@strath.ac.uk



<http://www.strath.ac.uk/Departments/Architecture>

S/S TECHNOLOGY

A NOVEL TECHNIQUE FOR SEWAGE SLUDGE SOLIDIFICATION/STABILIZATION*

Presently in the UK, greater concern about environmental issues, and pressures from the European Community through the new Directives, has led to considerable research and development.

Glasgow Caledonian University's School of the Built and Natural Environment is currently undertaking a research program in the field of Solidification and Stabilisation technology.

S/S technology is being used to treat a wide variety of wastes. S/S methods limit the solubility or mobility of hazardous substances and contaminants present in the environment, converting them into a less mobile chemical form and /or binding them within an insoluble matrix offering low leaching characteristics. Several binders are used such as Portland Cement, Pozzolan Materials, Lime Silicates, Clays and Polymers. In the USA, S/S methods are being assessed as a waste minimisation technique and remediation method for contaminated land.

Remediation of contaminated land

The aim of this research is to examine the strengthening of poor quality soil, control and remediation of contaminated land and mainly the use of sewage sludge as a construction material when mixing with cement improvers. An example of such an improver is a cement additive, consisting of artificial and natural zeolites, earth alcalis, alcalis and lime at specific proportions.

So far testing has been undertaken using land contaminated by a high alkaline substance, produced during soap manufacturing process. The use of the cement additive resulted in an increase of the tensile and compressive strength to meet the requirements of loading for future site usage.

Another advantage was the considerable reduction in the pH value. The following stage of this research is to examine the effect of the cement additive in a poor quality soil as high-way construction material.

Potential construction material

The final and most important part of this research is to examine the effect of the S/S technology using the cement additive in sewage sludge. Samples of sewage sludge will be mixed with the cement improver and a series of tests including; CBR, Compressive Strength, Thermal Behaviour Shrinking, Triaxial

Permeability and Frost Heave, will be conducted to examine the potential use of sewage sludge as a construction material.

An attempt will be made to establish a model for optimum mix design and to understand the long-term behaviour of the composite material under static and cyclic loading.

For further information contact:

*Dr. Nicholas Hytiris,
Senior Lecturer GCU
0141 331 3686*

**Subject of CBE Seminar: Thurs, 27th January 2005*

MSC IN HEALTHCARE PROPERTY AND FACILITIES MANAGEMENT

This flexible, web-based programme has been developed by the School of the Built and Natural Environment in partnership with the Property and Environment Forum Executive of NHS Scotland

Subjects included in this programme are contextualised for the property and facilities management needs of the healthcare sector. These include Strategic Facilities Management, Project Management in Healthcare, Research Methods, Risk Safety Management, Environmental Management Systems, Innovative Procurement in Healthcare, Healthcare Engineering Services Management, Strategic Planning and Change Management, Occupational Health and Safety Management and Value Management.

The Masters degree comprises 6 modules and a dissertation (and can be completed within two years or over a longer period to suit the demands of home and work).

Applicants should hold a good honours degree, corporate membership of an appropriate professional body or be able to demonstrate through their achievements to date that they will benefit from this programme. It is anticipated that the typical applicant will work within the healthcare sector or with the many consultants and contractors who provide services to this sector.

For further information on this programme please contact Melissa Kramer telephone on 0141 331 8088 or by e-mail at m.kramer@gcal.ac.uk or you can write to The School of the Built and Natural Environment, Glasgow Caledonian University, Cowcaddens Road, Glasgow G4 0BA. You can also check our webpage at www.healthcarepropertymsc.com

GLASGOW CALEDONIAN UNIVERSITY
WHERE CAREERS COME FIRST

CBE STAFF

MEET THE TEAM



Dr Branka Dimitrijevic, Director

email: branka@cbe.org.uk

Branka has been Director of CBE since June 2002. Those of you who have met her will know how enthusiastic and dedicated she is to the organisation. Branka strongly believes in listening to clients and finding out about their business activities, ensuring that CBE delivers the most beneficial and relevant range of activities possible. Originally from Sarajevo, Branka is an architect with research expertise in the history of architecture, restoration and the revitalization of buildings, urban heritage, sustainable urban planning and building design.

**Anne Blacklock,
Business Development Manager**

email: anneb@cbe.org.uk

Anne joined CBE in August in this new post within the organisation. Many of you will know her, as she has worked in the construction industry in Glasgow most of her career, primarily in business development for construction firms. Please contact Anne to arrange an appointment to discuss any areas of your business you would like some advice on, and she will be happy to call in to discuss how CBE can assist.



**Professor John Kelly BSc, MPhil, MRICS
Academic Co-Director**

email: J.R.Kelly@gcal.ac.uk

Professor Kelly is the holder of the Morrison Chair in Construction Innovation at Glasgow Caledonian University and is a Chartered Surveyor with industrial and academic experience. His research into value management began in 1983 and numerous publications include, co-authored, the first UK textbook on value management. Professor Kelly is a firm believer in the principal of putting research into practice and has undertaken value management studies as research consultancy on a variety of construction projects.



**Professor Michael Corcoran, BEng
Academic Co-Director**

email: m.j.corcoran@strath.ac.uk

Professor Corcoran is the Course Director in the Department of Architecture, University of Strathclyde.



Lucy Pringle, Project Administrator

Many of you will have contacted Lucy to book CBE seminars and events over the last year. Sadly, Lucy recently resigned, having decided to take an MLitt in Journalism at the University of Strathclyde. During her time, Lucy has made a significant contribution to CBE's success. We would like to take this opportunity to thank her for all her hard work and wish her every success in her studies and future career.



Denise Jackson, Project Administrator

email: denise.jackson@cbe.org.uk

Denise joined the team in May 2004. Her role includes liaising with the academic staff involved in CBE, event co-ordination and the maintenance of our website. Denise has taken over responsibility for seminar and event bookings. For further information on our seminar programme, contact Denise.



David O'Neill, Project Administrator

email: info@cbe.org.uk

David recently joined us to carry out the financial administration of the organisation and to assist in business development and marketing of CBE.

ABACUS

WHEELCHAIR SIMULATOR PROJECT

ABACUS Unit (*Architecture and Building Aids Computer Unit*)
Department of Architecture, University of Strathclyde

The wheelchair simulator makes use of a "Virtual Environment Laboratory" (VEL), housed in the Department of Architecture, which incorporates a three-channel projection system employing high resolution imaging and edge blending, in order to generate a 150 degree seamless panoramic display allowing a high quality immersive experience.

This VEL is also used for more general design visualisation projects, but, in the case of the Wheelchair Project, a motion platform is used to map the wheelchair travel into the virtual world, including feedback to the user of changes in floor surface characteristics and gradients.

Virtual Environment Laboratory: a valuable tool in assessing building accessibility

The provision of this sense of "feel" augments immersion within the virtual environment and also provides the basis from which both qualitative and quantitative measures of a building's access performance can be gained.



A motion platform is used to map wheelchair travel in the virtual world.



ABACUS was one of the first CAD research groups established in the U.K. Founded by Prof. Tom Maver some thirty years ago, ABACUS's initial remit was to test the possibility of using computers to assist in building design.

This pioneering work led to the development (and subsequent marketing) of some of the first specialist architectural design software in the world.

Techniques that are now taken for granted, such as design visualisation, were pioneered by ABACUS. Design simulation has always been an important theme and a number of strands of interest are brought together in the "Wheelchair Simulator Project", described here.

Given that the statutory obligations defined in the Disability Discrimination Act 1995 come into force on October 1st 2004, tools such as this Wheelchair Project provide invaluable insight into assessing accessibility.

Other main areas of work carried out in the VEL include computer based historical reconstruction; visual impact assessment and urban simulation. Away from the Laboratory the group is working on computer applications in early stage design modelling, including the use of shape grammars.

For further information contact:
tel: 0141 548 4219
email: architecture@strath.ac.uk

NEW PATENTS FOR LOCK GATE OPERATING SYSTEMS

A conservative approach is typical of the key structures that provide the essential lock systems for canals and tidal ports throughout the world. The traditional lock gate, the mitre gate, has been used with very few changes in the key design concepts, since Leonardo da Vinci recorded design modifications in lock gates for the Milan Canal (1480-85)¹.

Design assumptions haven't changed, in the British Standard for Maritime Structures², a specific statement reinforces this point: "Mitre gates cannot resist a reverse head".



As can be seen above, the gates lose their water retaining efficiency with wear and tear. Repairs are often left until the costs associated with the leakage justify overhaul or replacement. More effective styles of gate have been developed over the last century, but are so different to mitre gates that modifications to the lock can cost up to ten times the cost of a replacement gate. With the accepted rise in sea levels, the traditional gate's inability to resist a reverse head of water is a serious situation. Gates installed to retain water can not repel water, and floods become likely.

With the support of GCU's Research and Commercial Development Office (RCDO), two patents have been developed to address this global environmental problem.

The first of these patents deals with the operating mechanism that opens and closes the gate. Traditional operating systems cannot resist the loadings resulting from potential flood conditions. A number of locks have been modified to include a backup system which prepares gates for flood conditions.

Unfortunately, these systems depend on accurate metrological forecasting to allow time to engage the system, assuming it is in good working order, as it will be mostly in storage. Therefore, justifiable concerns are raised regarding the effectiveness of such systems. An alternative solution that radically changes the operating mechanism to become a permanent prop was patented to provide an inherent means of resisting the reverse head loading (Figure 1).

There were no similar systems identified when the UK patent was applied for, however, others were listed as possible prior knowledge during research carried out for the international patent application. Substantial differences resulted in the international patent being granted.

With the patent being pursued, the system was installed and satisfactorily commissioned in the Abbey River lock on the Park Canal in Limerick, Ireland, establishing the practical application. The system can be applied to existing lock structures with minimal modification, providing an economical solution to a difficult engineering problem.

The second patent is less well advanced, but is more significant because of the potential uses that can be applied to the scheme.

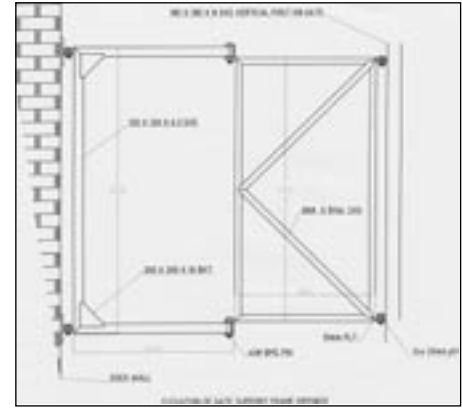


Figure 1

The **Tension Membrane Water Retaining Structure (TMWRS)** discounts the basic principle that water retaining gates have to be rigid. The fundamental problem is the supporting structure can only be rigid. The means and methods of linking the flexible gate structure with the rigid masonry support structure are among the innovations that are listed in the patent applications. The international patent for this development is now in the final stage.

Funding has already been sourced from the Scottish Executive and the exciting concept of the TMWRS has gained sufficient support from industry to construct a full scale prototype:

- **MMS Shiprepair and Drydock Co. Ltd.:** to host the prototype
- **Jacobs Babbie:** to provide independent design checks
- **John Heathcoat & Co.:** in the development of a suitable membrane

For further information please contact:

Martin Cullen

Glasgow Caledonian University

tel: 0141 331 3544

email: M.N.Cullen@gcal.ac.uk

¹ Enclopedia Britannica 2002, Standard Edition, britannica.co.uk, London, 2002.

² BS6349 part3:1988 British Standards Code of Practice for Maritime Structures Design of dry docks, locks, slipways and shipbuilding berths, shiplifts and dock and lock gates. 1988 British Standards Institution, London.

CHAMELEONS

COLOUR IN BUILDINGS

Introduction

In CyBER News Issue 2, July 2003, the article on knowledge transfer referred to biomimicking and geomimicking, these are useful concepts when considering colour and achieving effects commonly observed in the natural world.

Wouldn't it be wonderful if we could change the colour scheme of a room at the flick of a switch. We can do this already, I hear some of you say, and through lighting effects that is true, but I am thinking of materials changing colour, i.e. walls, floors, carpets and so forth.

The truth is that these ideas are not as far fetched as they first seem, with the advent of photochromic and electrochromic materials and the improvement in the understanding of the energy management of molecules colour change at the flick of a switch is possible.

Colour is a great stimuli and mood controller and therefore it is important to provide workplaces that are suitably decorated to achieve maximum productivity and the least stress. For example, pale green is known to have a soothing effect on a person's temperament, red causes aggression and pale blue is seen as a cold colour, to name just three induced effects from colour.

Surface finish is also an important factor in how the colour is perceived in terms of shade and reflective glare; e.g. matt and eggshell finishes will cause much less of a problem than gloss and super gloss, from the point of view of glare and associated eye strain.

Innovative Colour Switching

So can texture as well as colour be controlled in advanced buildings with the flick of a switch?

CHAMELEONS is a potential "Blue Skys" project with such aims in mind, a project looking for venture capital investment. The rather long acronym stands for **CH**romatic **A**ctive **M**aterials with **E**lect**R**ON **S**timulation, with the implication of colour control in selected materials via electron rearrangements.

The chromophore centres within a molecule (specific chemical functional groups) responsible for major absorbance of energy from the visual spectrum, and transmittance of the remaining energy in the form of light, can be switched through a variety of means. In our research, we term these events as *electron stimulation*, which refers to both inter-molecular and intramolecular events, i.e. either reversible chemical reactions with a second reactant to alternate coloured products, or reversible electron and functional group rearrangements within the molecule to provide an isomer with differing colour to the original molecule. In each case the colour needs to be fade free, i.e. it should not be UV sensitive, moisture sensitive, temperature sensitive etc., within the normal comfortable workplace indoor environment specification.

To obtain an idea of colour switching, the perception of colour and how the human eye sees colour, try the simple experiments above, they relate to retina operation, eye sensor saturation and image retention.

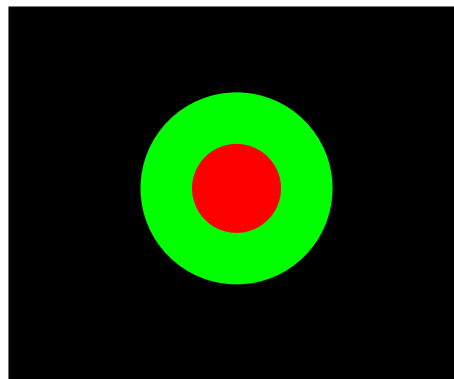


Figure 1

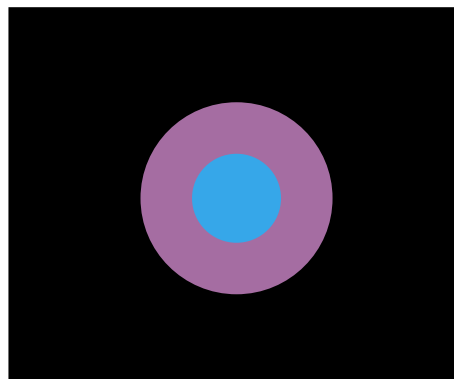


Figure 2

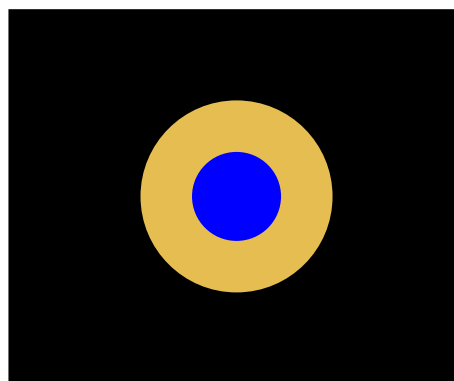


Figure 3

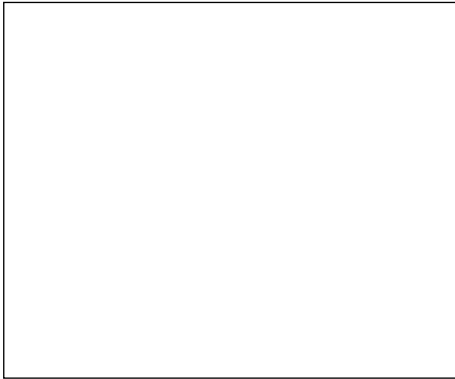


Figure 4



Figure 5



Figure 6

The implications are important in relation to eyestrain and how we perceive colour when we are tired. Firstly concentrate on Figure 1 for 45 seconds, now look at the apparently blank Figure 2 for 30 seconds and note the colour switching observed.

The phenomenon that you have experienced is the CHAMELEONS effect, unfortunately though, it is unstable and short lived in this form.

Research is required to investigate such effects in molecules, so that real applications - of the type indicated by the title of this article - are achieved in smart buildings. The colour switching can be repeated to illustrate reversibility, Figures 3 & 4.

The effect may also be observed across the whole range of the visual spectrum (350 nm to ~850 nm), another example may be experienced using Figures 5 & 6.

Commentary

In Figure 2 the centre circle should now appear pale blue and the outer circle mauve. By now performing the experiment using these two colours as the starter colours in Figure 3 it should be observed that the effect is reversible and thus in Figure 4 a red inner circle and bright green outer circle are observed. Figures 5 & 6 illustrate two other regions in the visual spectrum where colour switching is easily observed; vivid blue to yellow and orange to a medium shade of blue, though in theory it is possible make observations over the full colour spectrum.

Of course these experiments are explained by the short term saturation of the colour receptors in the eye to the original colours and then the subsequent detection of the components in white light that are reflected in the second test square each time. Some people take slightly longer to see these effects: if you are not observing them make sure you are in a well lit room and look at the original test square for longer. When moving to the second white square allow enough time for the image to develop, at first the white square will begin to glow emitting a luminescent bright white colour, then the coloured circles will gradually appear and remain in vision for up to ten seconds.

Potential Markets

Although in the current article the principle aim is towards colour in buildings, with such drivers as innovative decor and smart buildings, changeable decor and consideration of stress relief in the workplace.

Other commercial markets for "CHAMELEONS" include the clothing and footwear industry, the transport industry, e.g. changing the colour of your car and its interior, in the soft furnishings industry and so on.

Thus there is a huge potential market linked to excellent returns on initial investments for those willing to speculate; however this is not, as with so many venture capital projects, a short 3 year return cycle on investment but more realistically a six to ten year investment.

For further information please contact:

Dr Mike Hepher

Glasgow Caledonian University

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e-mail: mjhe@gcal.ac.uk

EVENTS

Thursday 28th October:

- 14:00 Coffee and Registration
- 14:30 **Sustainable Construction**
Prof. George Fleming
- 15:00 **Construction Law Update**
Macroberts Solicitors
- 15:30 Coffee
- 16:00 **Morgan Academy**
– **Partnering in Practice**
Dundee City Council/Mansell
- 17:00 Coffee
- 17:30 **SCQS AGM**

Friday 29th October:

- 09:15 Coffee and Registration
- 09:30 **Prudential Financial Management**
Andrew Leck, IPF
- 10:00 **Asset Management in Practice**
John Plumb, IPF
- 10:30 Coffee
- 11:00 **Energy Management**
Prof. Joe Clark
- 11:30 **Addressing the Skill Shortage**
Ian Eker, Hays
- 12:00 Question/Answer Session
- 12:30 Lunch
- 14:00 **Whole Life Costing Framework**
Prof. John Kelly
- 15:00 Coffee
- 15:30 **Future of the Profession**
Launce Morgan, RICS
- 16:00 **Future of the Profession**
Roger Knowles, IQS
- 16:30 Question/Answer Session
- 17:00 President's Closing Remarks

SCQS ANNUAL SEMINAR

Prudential Property Management at the Thistle Hotel, Glasgow

Speakers' contact details

Sustainable Construction:

Prof. George Fleming
MD EnviroCentre
107 Rottenrow
Glasgow, G4 0NW
Tel No: 0141 548 4567
Fax No: 0141 553 4186
E-mail: g.fleming@strath.ac.uk

Construction Law Update:

David Henderson/Craig Turnbull
Macroberts Solicitors
152 Bath Street
Glasgow, G2 4TB
Tel No: 0141 332 9988
Fax No: 0141 332 8886

Partnering in Practice:

Please contact John Porter at Dundee for contact details, profiles, etc, for speakers;
Mac Roberts, Architect, Dundee City;
Derek Currie, Education Client, Dundee City;
George Hood, Contractor, Mansell.

Prudential Financial Management:

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AM in Practice:

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Energy Management:

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Tel No: 0141 331 3696
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Future of the Profession:

Launce Morgan
RICS
12 Great George Street,
London, SW1P 3AD

Future of the Profession:

Roger Knowles
E-Mail: roger.knowles@jrknowles.com

REVITALISING SAFETY IN SCOTLAND

Dr Iain Cameron, Head of the Division of Construction Management and Economics, School of the Built and Natural Environment, presented his findings on two Health and Safety Executive (HSE) projects at CBE's workshop on 24th June 2004. The reports, into "*Fall Prevention and Protection Methods*", and "*Safety Management on Scottish Building Sites*" focussed on Dr Cameron's estimate that up to 90% of on-site accidents could be prevented by better planning, particularly in relation to working at heights.

Over 100 delegates from the Scottish Construction industry were in attendance, including Stewart Campbell the Director of HSE in Scotland, and Andrew East, the Specialist Principal Inspector for the HSE Work at Height Programme.

Health and Safety records from 1997-2002 show that, by proportion, Scottish construction killed 50% more of its employees than in the rest of Britain put together; and 15% more people were seriously injured. Dr Cameron's latest project will aim to confirm the validity of these statistics, identifying cultural and demographic factors that may be affecting the accident rate.



The follow-up of this workshop will take place on 3rd February 2005 as a half-day seminar "*Factors Influencing Scottish Construction Accidents*".

Other CBE seminars on health and safety in the construction industry:

Tues, 1st March 2005, ESRC workshop
"*Risk, Safety and the Working Environment*"
Mike Murray, The University of Strathclyde

Thurs, 17th March 2005
"*Safety in Design - CDM best practice development*"
Dr Iain Cameron, Glasgow Caledonian University

Glasgow Caledonian University in partnership with the NHS Scotland Property & Environment Forum

Controlling HAI (Healthcare Associated Infection)



This is a module offered on the MSc Healthcare Property and Facilities Management Programme, as with all our modules, is also run as a CPD (Continuing Professional Development) course for CPD credits.

This module will run during Semester B – February 2005 – May 2005, subject to interest.

This module is relevant to anyone in the area of the built environment or facilities management who are involved in healthcare projects and contracts. Controlling HAI is taught via distance learning on Blackboard software, which involves high quality on-line resources.

If you are interested in this module for CPD, or the MSc as a whole, please contact Melissa Kramer on 0141 331 8088 or at M.Kramer@gcal.ac.uk for more information.

EXPERTISE AND RECENT RESEARCH

AT GLASGOW CALEDONIAN UNIVERSITY AND THE UNIVERSITY OF STRATHCLYDE

EXPERTISE

RESEARCH PROJECTS

Sustainable planning and urbanisation

- Quality and impact of proposals/buildings on the built environment
- Sustainable Urban Environment
- Use of GIS in environmental decision-making
- Urban issues in Sustainability
- Urban ecology and environmental quality
- Urban design and urban aesthetics
- Urban renewal and community planning
- Sustainable urban regeneration
- Inner city regeneration
- Local economic development
- Integration of transport and urban planning
- Integration of transport systems
- Integration of transport and the environment
- Sustainable urban housing
- Sustainable and affordable urban infrastructure and housing systems in developing countries

- The Built Environment of Loch Lomond and the Trossachs National Park
- Sustainable Urban Environment Scoping Study: Metrics, Models and toolkits for Whole Life Sustainable Urban Development
- The Glasgow Sustainability Centre, Castlemilk Windfarm
- Sustainable co-housing
- Influence of urban form on travel behaviour

Social issues

- Community participation in planning decisions
- Minority groups
- Resourcing women in the work place
- Sustainable co-housing for older people
- Fuel Poverty and Excess Winter Deaths
- Sustainability in Architecture

- Ethnic identities in Liverpool

Sustainable buildings, technologies and materials

- Building technology
- Dry-rot detection
- Using timber in structures
- The design of low allergen/toxin/energy/carbon dwellings
- Environmental impact of durable materials including contribution of re-used materials to more sustainable constructions
- Glass recycling technology
- Heat transfer in solar collectors and applications to buildings
- Church renovation, restoration and maintenance procedures
- Technology management and sustainable development
- Innovation and environmental trends in the UK construction industry
- Computational Fluid Dynamics and Refrigeration

- Sustainable Building Design and Renewable Energy Strategies for East Govan and Ibrox Phase One (*Proposed Housing Development*)
- Development of a Sustainable Building Design Management System
- Development of a polymer based dry-rot detector and novel treatment regimes
- Housing and Health - are our homes causing the asthma pandemic?

EXPERTISE

Environmental management systems

- Environmental management system
- ISO 14001
- Environmental management and planning
- Implications of environmental legislation on business practices and on environmental standards, such as CEN or ISO 14000
- Environmental Impact Assessment
- Environmental Impact of the Health Care sector and its waste management
- Waste water treatment
- Solid waste management, composting and anaerobic digestion
- Environmental biology, management, pollution control and monitoring

Waste management

- Waste management
- Resource Use / Waste Minimisation
- Waste water treatment
- Management of biological wastes
- Landfill technology and waste management
- Engineering aspects of waste management
- Landfill Engineering

Air and water quality

- Indoor Air Quality
- Indoor air quality: Asthma and Buildings
- Environmental impact assessments for air and water quality
- Water pollution
- Water quality of freshwater for drinking water suitability
- Air quality management
- Air quality modelling
- Air pollution prevention and control systems for urban air quality
- Sensor technology for the built and natural environment
- Indoor climate and health
- Sick building syndrome and sick environment syndrome diagnostics
- Health, safety and environmental issues and the workplace
- Health impacts of airborne pollution: Environmental epidemiology and exposure assessment
- Water pollution and health impacts of waterborne parasites
- Health impacts of contamination of food

RESEARCH PROJECTS

- Development of a coherent Environmental Management System
- Development of an Environmental Management System for Victoria Quay
- Stability study and chemical analysis of biowaste
- Investigation of anaerobic digestion of MBT treated waste

- Treatment of Organic Wastes
- Strategic Planning for Waste Facilities in Scotland
- IPPC Application for Glasgow City Council: Polmadie Hazardous Waste Incinerator
- Remade Scotland - Developing Markets for Recycled Materials
- An Economic Appraisal of Collection Systems for Waste Electrical and Electronic Equipment (WEEE)
- The Monitoring & Statistical Evaluation of Shallow Landfill Test Cells

- Advanced Tomographic Sensors for Industrial Multiphase Imaging
- Wind Speed Study within Glasgow Queen Street
- Sensor Array Technologies for electronic nose design
- Air pollution & health: identification of chemical & physical exposure metrics for epidemiological research
- Health effects of long-term exposure to air pollutants in Scotland
- Exposure assessment & characterisation in air pollution epidemiology
- The impact of a short-term closure of the CORUS steel mill on the chemical composition & biological activity of Redcar & Cleveland PM
- Chemical analysis of PM10 samples
- Pilot project: Assessing possible human health risks associated with exposure to airborne particles released from landfill waste disposal
- Factors contributing to susceptibility to cardiopulmonary mortality from particulate air pollution
- Toxicological & chemical characteristics of airborne particles in occupational & ambient environments
- Metal content of airborne particulate material:
 - (1) investigation of differences of speciation between urban and non-urban environments;
 - (2) using models of determinants of heavy metal concentrations in epidemiological research.

EXPERTISE AND RECENT RESEARCH

AT GLASGOW CALEDONIAN UNIVERSITY AND STRATHCLYDE UNIVERSITY

EXPERTISE

RESEARCH PROJECTS

Sustainable energy

- Testing and analysis of the thermosyphoning solar collector systems to determine heat transfer and airflow characteristics
- Heat transfer in solar collectors

- Wind farms, Castlemilk Wind Farm

Building performance

- Performance measurement
- Building refurbishment
- Fire risk engineering
- Crystallisation processes in capillary porous materials and its destructive effects
- Durability and long term performance of building partitions
- Durability and prediction of degradation during the service life
- Coupled processes of heat and mass transfer in materials and building structures together with associated processes (*phase transition 'water to ice', water vapour condensation & surface phenomena*)
- High performance ceramic and cementitious materials with improved resistance to alternating environmental conditions
- Non-contact methods of monitoring condensation process
- Multicriterion optimisation in a design process of cementitious composites & non-contact methods of monitoring condensation process
- Laser cleaning of building surfaces
- Refurbishment, modernisation and maintenance management
- Building survey reports and expert witness regarding workmanship and quality of buildings
- Property evaluation

- The performance measurement of building
- A study to develop a good practice framework for client retail refurbishment programme
- Application of Laser Speckles for detection of surface condensation
- Optimisation of composite materials
- Laser Cleaning and Modification of Surface Layer

Architectural Theory, History and Design

- How Architects Learn
- Integrating real time spatial experimentation in design process
- Developing creativity for individuals and teams
- Architecture as Practice
- Architectural History
- History of Architecture and Urban Design
- Planning the Dense City in 20th Century
- Modern architectural movements in Africa
- School design in Africa
- Learning and teaching architecture
- Architectural design
- Product Design
- Design Management

- Group work in architectural education
- Interdisciplinarity and transdisciplinarity as modes and metaphors for the design process
- Performance and performative as metaphors and analytical devices, as both theory as well as tools in refiguring the way we actualise the architectural design process
- Contemporary architecture in Switzerland and Germany
- Dance and architecture
- Architecture and contemporary culture
- Modernism in Africa
- Design Management and Practice

EXPERTISE

RESEARCH PROJECTS

Knowledge management

- Knowledge management
 - Education and training for improved performance in small and medium enterprise construction
 - Developing skills for continuous improvement in public services
- Knowledge management and Intellectual Capital assets in diverse project management environments
 - Knowledge management for sustainable construction competitiveness
 - Knowledge Mapping and Bringing about Change for the Sustainable Urban Environment
 - Mapping Knowledge on Controlling and Avoiding
 - Healthcare Acquired Infections (HAIs)
 - An approach for knowledge management for SMEs
 - Investigating a web based modular approach to developing skills for continuous improvement in public services

IT in architectural design and the construction industry

- Architectural Computing
 - Interoperability of computing systems for Architecture
 - IT in construction and design
 - Artificial intelligence applications in engineering design
 - Information technology and its impact on team-working, communication and productivity
 - Environmental Software Development
 - Computer systems for environmental and safety modelling
 - Innovative use of IT tools in construction: simulations, visualisations, communications and collaborative workspaces
 - Electronic document management systems
- Development of an Integrated Ground Modelling System
 - Development of CAD System for Tree House Design
 - Developing the Sysdox document management system into a commercial product
 - Development of a snagging system on EDMS and handwriting application based ANOTO

Structural engineering

- Soil-structure interaction: under dynamic loads using different finite and scaled boundary finite elements
 - Premature plate failure: applied to externally plated beams
 - Upgrading and strengthening reinforced concrete structures
 - Structural Engineering
- Extending the scaled boundary finite element method to model dynamic two-phase soil structure interaction
 - Debonding of externally strengthened RC beams

EXPERTISE AND RECENT RESEARCH

AT GLASGOW CALEDONIAN UNIVERSITY AND STRATHCLYDE UNIVERSITY

EXPERTISE

RESEARCH PROJECTS

Water engineering

- Coastal Hydraulics
- Fish Pass Hydraulics
- Maritime Engineering, Ports and Harbours

- Patented: Dock-gate operation system
- Patented: Flood Prevention System: Tension Membrane Water Retaining Structure

Geotechnical engineering

- Geosynthetics: applications in shallow foundations, reinforced slopes and retaining walls
- Geosynthetics, Foundation engineering, Geo-environmental engineering and sustainable materials
- Foundation engineering: the bearing capacity of foundations on layered soils; the continuous flight auger piling technique and new rotary auger displacement piles
- Remediation of contaminated land: an approach that integrates geotechnical engineering with public health engineering by involving chemical and microbiological techniques, toxicology and ground water chemistry
- Stability of flood defence embankments
- Geo-environmental engineering: The re-use in construction of recycled materials
- Ground engineering including soil (and marginal soil) stabilisation/solidification and ground remediation
- Ground Monitoring and Ground measurement of Micro-movements, using conventional and GPS techniques
- Site investigation, in-site and laboratory testing
- Geotechnical design of various types of foundations

- The use of recycled rubber for low cost materials for the construction industry

Project management

- Project briefing
- Project Management processes, tools & techniques

- A best practice framework for systematic identification and precise representation of client requirements in the briefing process

Health and Safety

- Heights safety and fall prevention when working at heights
- Behavioural Safety
- Safety Planning
- Safety Management Systems
- Risk Assessment
- DM Regulations including Designer involvement
- Asbestos Management

- Prevention of falls from heights in construction
- Safety decking as a passive means of fall prevention/arrest
- An Evaluation of the Practical Usefulness of Current Fall Prevention and Protection Methods when Working at Heights
- Scotland's Fatal and Major Accident Experience
- An Investigation of Work Process Planning for Safety and Health in Construction
- Integration of the CDM Regulations with other supervisory and managerial practices

EXPERTISE

RESEARCH PROJECTS

Construction management

- Strategic management in construction
- Management innovation (process, product, technology, service and market) in construction
- Lean and agile management in construction
- Benchmarking and key performance indicators
- Skills, knowledge and competencies for construction management
- Business process optimisation
- Micro-enterprises
- Team-building
- Total Quality Management
- Integration of Logistics Management into the construction process
- Human Resource Management
- Culture in construction
- Work Life Balance in the Construction Industry
- Gender issues in Construction Human Resource Management
- Adjudication legislation

- Re-engineering construction using payment systems (Recoups)
- Product development of the Metrix™ performance management system
- Improve the Quality of Service provided by use of QFD, QMS and AMS
- Use of RFID to track industrial stillages
- Delivering Cultural Change in the Construction Industry
- Work Life Balance in the Construction Industry

Construction procurement and economics

- Construction procurement practices
(including *partnering, prime contracting*)
- Construction procurement - risk management
- Construction inventory management - supply chain management
- Construction cost estimating models
- Construction prices - formation, modelling and prediction
- Procurement: Corporate social responsibility
- New procurement methods in the public sector and partnerships of the private public and private sector in the regeneration of urban communities
- Risk, quality, health & safety management in diverse project environments
- Construction inventory management - supply chain management
- Construction value management: value systems & value structures
- Life cycle costing
- Best value
- Construction economics - construction marketing
(*nature, management, modelling and prediction*)
- Construction cost estimating models
- Construction prices - formation, modelling and prediction
- Transaction cost economics in relation to construction temporary multi-organisations
- Economic structure of the construction sector including economic forecasting, construction productivity and financial management

- Procurement code for the NHS Scotland Property and Environment Forum Executive
- Economic Profiles of PFI Projects in Scotland
- Standardised framework for risk assessment and management of Private Finance Initiative projects
- The measurement of best value
- Application of Value Management techniques to a partnered housing project
- European Construction Market Review: Scoping study Scottish Building Futures

BECOME A CBE SPONSOR

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CBE Newsletter

To continue the free distribution of CBE's newsletter we invite everyone wishing to support its publication to become a sponsor. The sponsorship fee is only £50 per issue and your organisation's logo and url will be published acknowledging your support and promoting your organisation to our 4000 readers in the construction industry! If you are interested in sponsoring the next issue in January - please make your cheque out to The University of Strathclyde and send it to CBE at the address below.

CBE Website

Sponsor our website! For only £50, sponsorship will be acknowledged on the sponsors page of CBE's website, displaying your logo and link to your website. If your organisation is interested in sponsoring CBE's website, please make your cheque out to Glasgow Caledonian University and send to CBE at the address below.

Event and Seminar Sponsorship

CBE plans to organise **sponsored events** hosted by various organisations, offering seminars related to the academic research outcomes. CBE will promote the host organisation as a sponsor through its publicity material, e.g. CBE News, CBE website and email information. The sponsorship fee will be £250.

Is your organisation interested in hosting these types of CBE events?

Yes No

CBE intends to offer **sponsorship of its seminars**, publicised on www.cbe.org.uk. The sponsorship fee will be £250.

Is your organisation interested in sponsoring CBE seminars?

Yes No

CBE plans to organise **networking events** which would feature themes related to the development opportunities in the built environment sector, thus attracting both the clients and construction industry representatives. The sponsorship fee will be £250. Is your organisation interested in sponsoring CBE networking events?

Yes No

Please use the space below to suggest other activities that CBE could organise, and which would be of interest to your organisation.

Contact Name: _____

Organisation: _____

Address: _____

Town/City: _____

Postcode: _____

Telephone: _____

Fax: _____

Please copy and fax this form back to CBE on 0141 249 9906.
Alternatively, send it by post to CBE, The Lighthouse, 56 Mitchell Street, Glasgow G1 3NU.

SHOWCASE - IMPRESSIVE FACILITIES...

DEPARTMENT OF CIVIL ENGINEERING, THE UNIVERSITY OF STRATHCLYDE



above: Hydraulics Laboratory
middle: Heavy Structures Laboratory

Digital Data Laboratory for Environmental Research

Investment has been acquired to establish a Digital Data Laboratory for Environmental Research. The main objective of the Laboratory is to provide the infrastructure required for spatial and temporal monitoring and modelling of complex environmental problems.

Furthermore, benefits of the Laboratory will be distributed throughout the department, using LAN connectivity, so that data captured by new sensors on existing equipment can be analysed and modelled in new and more effective ways.

The main benefit will be to enhance existing research strengths in transportation, air quality and impacts on health, and coastal modelling but it will also support other areas of research. High performance workstations will run GIS and other analytical, mapping and visualisation software.

The laboratory will enable new research themes to be investigated, such as land use and geophysical modelling, indoor environment modelling, waste and resource management, and water quality and health. An additional benefit is that it strengthens the growing links between researchers in Civil Engineering and in Architecture and Building Science.



Public Health Laboratories

The facilities in the public health laboratories will be developed to support research in remediation of contaminated land. This line of research will provide a new link between civil (geotechnical) engineering and the laboratories that support environmental health research.

Structural Engineering, Hydraulics and Geotechnical Engineering Laboratories

The department has well equipped Structural Engineering, Hydraulics and Geotechnical Engineering laboratories, as well as a range of field testing and monitoring equipment. The Hydraulics laboratory has 12m and 30m tilting flumes, with pumps and sumps available for the construction of large physical models.

There is a large heavy structures laboratory with reinforced floor, 3 storey headroom and hydraulic actuators with a capacity up to 3000 kN. The soils and geotechnical laboratories have experience in testing geotextiles, along with a tri-axial testing machine and facilities for a range of standard procedures.

Environmental Health Laboratories

Research in Environmental Health is supported by well-equipped public health laboratories and experienced technical staff. Analytical equipment includes an Inductively Coupled Plasma detector for trace metals, High Performance



above: Roadside testing

Liquid and Ion chromatography apparatus for organics, polymers and anions, a fluorescent microscope for protozoa parasites, a level 2 microbiological laboratory and a water treatment laboratory capable of the majority of standard water quality tests.

The David Livingstone Institute of International Development Studies

The Department also includes the David Livingstone Institute of International Development Studies. In accordance with its remit, research in the Institute largely relates to problems in developing countries such as science, technology and environmental policy; innovation strategies; infrastructure development and management; disaster management; and sustainability of the built environment in developing countries.

For further information contact:

Dr Graham M. Copeland

The University of Strathclyde

tel: 0141 548 3251

email: G.M.Copeland@strath.ac.uk

VISIT US AT SCOTBUILD... STAND NUMBER 1110



The Centre for the Built Environment will be on stand 1110 and will be pleased to welcome you there. We want to find out more about your company's activities and discuss how we can assist in future developments.

CPD seminars and demonstrations are always among the highlights of the show, and we are pleased to announce that CBE's academic co-directors will both be speaking at the event:

Professor Michael Corcoran
Department of Architecture,
University of Strathclyde

"Environmental Assessment of Buildings"

Location - Architects Seminar Suite
3/11/04 13.00-14.00 hrs

Professor John Kelly
School of the Built and Natural Environment,
Glasgow Caledonian University

**"Value management and
best value procurement"**

Location - Main Seminar Suite
4/11/04 12.00 hrs

Exhibition opening times:

Tues 2 Nov 10.00-17.00 hrs
Wed 3 Nov 10.00-19.00 hrs
Thurs 4 Nov 10.00-16.00 hrs

To register now for free entry, or for more information, visit the Scotbuild website.
www.scotbuild.co.uk

We look forward to seeing you there...

SCOTBUILD IS THE BIGGEST CONSTRUCTION EVENT IN SCOTLAND, FOR OVER 30 YEARS IT HAS PROVIDED US WITH ACCESS TO NEW PRODUCTS, INNOVATIONS AND THE OPPORTUNITY TO LEARN MORE ABOUT THE INDUSTRY.



Case Study Request for Nominations

Rethinking Construction Using Payment Systems
(ReCoUPS)



Rethinking Construction Using Payment Systems (ReCoUPS) is an Engineering and Physical Sciences Research Council (EPSRC) funded research project, being undertaken by the University of Strathclyde, Glasgow, and Heriot-Watt University, Edinburgh, with the collaboration of industrial partners forming up the project steering group.

The project is to identify and analyse innovative payment systems used in the UK building industry, with the aim of promoting their use. The project is, at present, at a crucial stage where it requires to review innovative case study projects.

The interviews held and the data collected will all be done in the strictest confidence. The research team is therefore, hereby requesting nominations of such case studies which should preferably be of a partnering nature.

Nominations should be forwarded to Gibril Njie:

University of Strathclyde
Department of Architecture
131 Rottenrow
GLASGOW, G4 0NG

Tel: 0141 548 2035
Fax: 0141 552 3916