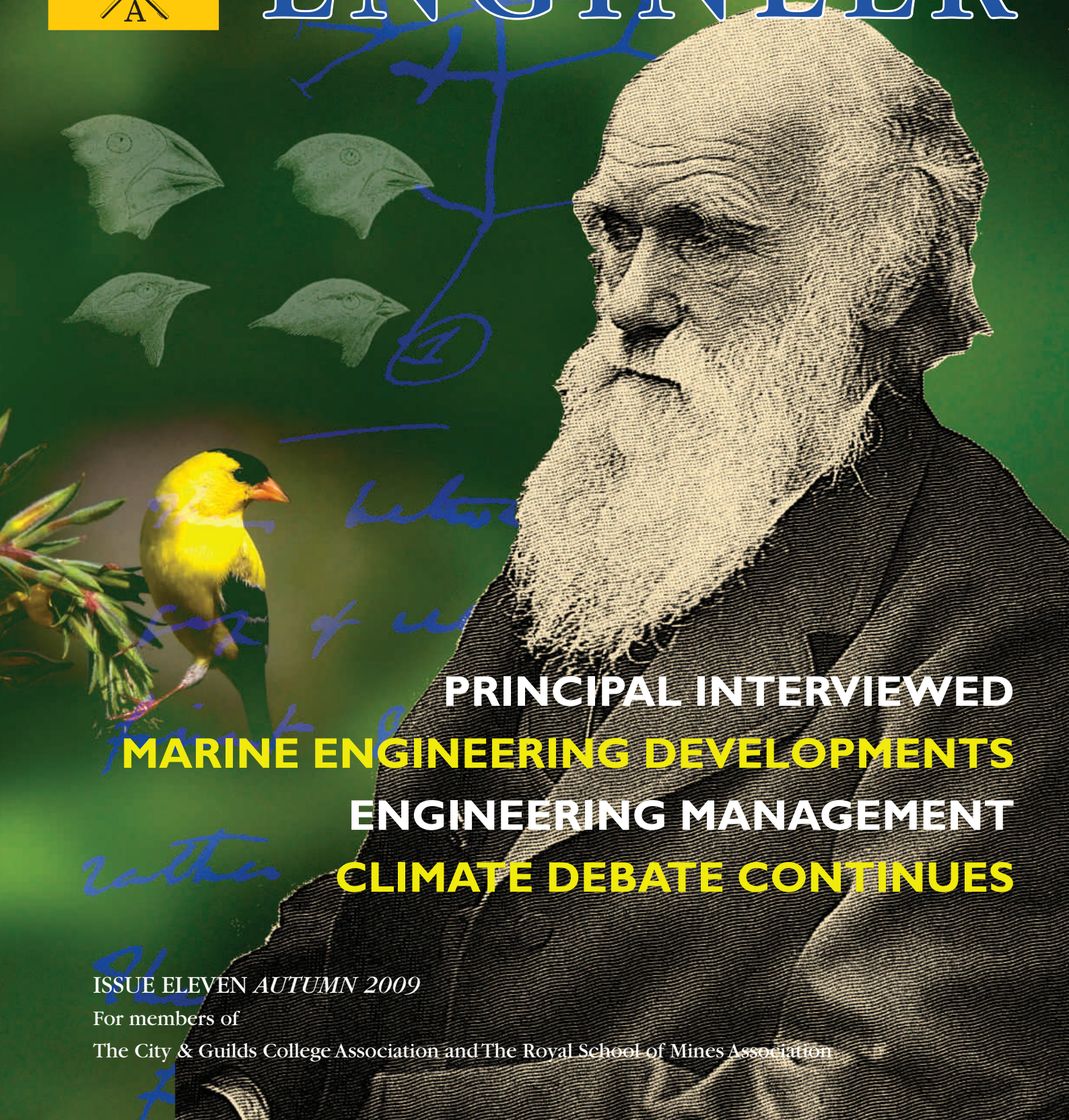




I think Imperial ENGINEER



PRINCIPAL INTERVIEWED
MARINE ENGINEERING DEVELOPMENTS
ENGINEERING MANAGEMENT
CLIMATE DEBATE CONTINUES

ISSUE ELEVEN *AUTUMN 2009*

For members of

The City & Guilds College Association and The Royal School of Mines Association

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Imperial ENGINEER

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STORY IDEAS FOR THE NEXT ISSUE BY FEBRUARY 8 2010.

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The editorial board of *Imperial Engineer* reserves the right to edit copy for style and length
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WHEN I completed my time as a student at Imperial, and moved from London to start my industrial career I expected that that was the end of my contact with the College. So after years working in various parts of the UK and Europe it was a surprise to find myself moving back to South Kensington.

While much has changed, the culture of excellence and ambition remains and it is, as ever, an invigorating atmosphere in which to work. It has also given me the opportunity to serve this year as president of CGCA which has proved in the first few months to be a rewarding and rich experience. At the President's Evening in May the principal speaker was Professor Nigel Brandon, director of the Energy Futures Lab and EPSRC Senior Energy Research Fellow. His authoritative review of the world's energy challenges sparked a vigorous and engaging discussion. It was also the opportunity to thank my predecessor, Professor Dame Julia Higgins for her excellent contributions as president over the previous year.

CGCA continues to connect alumni with today's students and is supporting the Faculty Networking event in October. We shall also welcome students to the Annual Dinner on March 16 at Carpenters' Hall, which again promises to be a great occasion. Our speaker will be Dr Paul Golby, CEO of E.ON UK, a key figure in the public debate over future electricity supply. I look forward to meeting many of you there.

Last year, Dame Julia spoke of working to ensure CGCA became even more relevant to alumni, and I'm pleased to tell you that we are continuing those efforts, with the support of the truly dedicated members of the CGCA committees. I think it fitting that I close by thanking them all, on your behalf, for their efforts.



John
Loughhead

PRESIDENTS REPORT



Coen
Louwarts

ONE OF the unique characteristics of the Royal School of Mines is the close connection between its students, staff and alumni. Students and graduates of RSM come from various backgrounds and ultimately end up working all over the world. It is not unusual for me, when travelling for business, to meet someone who has studied at RSM. Straight away there is a sense of familiarity or connection. This is attributable to the sense of pride individuals feel at having had the opportunity to be part of an institution that not only provides world class education, but where the importance of developing relationships amongst students, staff and the alumni are fostered. The basis of these relationships are often created by the social events organised by the student body and the alumni.

For a lot of us in the mining and related industries, the past year has been a turbulent one. In times such as these, the importance of a good network cannot be underestimated. We are fortunate to have the RSMA, which organises numerous events where members of the RSMA can network. I would encourage you to sign up to www.linkedin.com where RSMA has over 150 members already signed up. You can ensure your contact details with the Chapter Office remain current and you can continue to be kept up to date with the activities of the RSMA. Over the next year, the RSMA Committee will continue to focus on promoting events that create networking opportunities enabling fellow RSM alumni to meet and develop those all important relationships. We will keep you up to date on future events by email and through this magazine.

A key focus of the RSMA Constitution is to support students and the RSM both financially and in other ways. Over the past year there has been a significant increase in student loans, bursaries and hardship payments. To enable the RSMA to continue to support students the decision was taken to increase membership fees. After I wrote to you in August, it was very encouraging that a significant number of alumni contacted the Chapter Office to update their payments. If you haven't done so already, please use the enclosed form or contact Teresa or Rosie at Imperial College to do so.

This year's Annual Dinner, on November 20, will be the RSMA's 125th. We are aiming to get 125 attendees and tickets are selling fast. This will be a great opportunity to get in touch with your contemporaries and I am looking forward to meeting many of you there.

As I take over from Kurt Budge, the challenge will rest with me to continue the progress he made in refreshing and rejuvenating the Association and its link with members. This couldn't have been done without the efforts of the RSMA Committee and Trust members who enthusiastically volunteer much of their time in the interests of the RSM. I would also like to extend special thanks to Kurt for the excellent work he has done over the last two years and, of course, Teresa and Rosie in the Chapter Office who are critical in keeping the RSMA going.

EDITORIAL

EVEN though he's not one of our own (he studied at Edinburgh and Cambridge), we have chosen to use our cover to tip our hat to Charles Darwin in this anniversary year. It is a tribute to his extraordinary achievement in revolutionising the way in which we look at the development of life on our planet.

Our knowledge is constantly expanding and many of his original speculations have been modified over the last 150 years. Nonetheless, he ranks with Newton and Einstein as one of the intellectual giants of scientific discovery.

His eclectic career (medicine, theology and natural history) is echoed in our mix of articles in this edition where we review the prospects for UK wave power, the hydrogen economy and the management of engineering activities.

These are ongoing themes to which we will be returning in future issues.

This time, we're also taking a look at alumni jobs which seem far-removed from their degree subjects.

Helped by the internet, Imperial's communications department and Teresa and Rosie, the News and Reviews sections are as lively as ever. Thank you also to those who supplied the alumni news. Our Letters page crackles with comments on our previous features.

I hope you find this a good and informative read. As always, please keep your contributions coming!

Bill McAuley
managing editor

London walks take next steps

'WALKS with a Past President' through London and its environs, run so successfully for many years by David Hattersley (Civils 55), is being revived.

As John Backhurst (Chem Eng 56), the new organiser, says: 'We enjoyed each other's company while, at the same time, learning from registered City guide, Malcolm Dick, how London has developed both socially and structurally'.

The first walk of a new series has been arranged for

Saturday 21 November. It will cover the City bridges from Millennium to Tower Bridge.

All those taking part should meet at St Paul's tube station booking office at 10.45am. The walk will end at Wether- spoon's pub, Tower Bridge, at about 1pm.

The cost of any walk is £10 for CGCA and RSMA members, £9 for current IC students and £11 family and friends; including the cost of a drink of your choice at our destination.

Please make your bookings with John, including a cheque made out to CGCA and send to Dr John Backhurst, Sharrow Point, Pembury Road, Tunbridge Wells, Kent, TN2 4NE. Tel: 01892 822925 and mobile 07941319495. johnsheilabackhurst@tiscali.co.uk

For the schedule of Saturday walks from now till next June, see Diary Dates on page six of this issue.

All suggestions, for future venues, themes and even repeats, will be gratefully received.

Top prize for Imperial engineer

THE GOLD Medal of the Institution of Structural Engineers' – its highest accolade – has been presented to Professor David Nethercot, head of the Department of Civil and Environmental Engineering. He has been honoured for his serv-

ices to structural engineering.

David is currently researching a phenomenon called 'progressive collapse'. As he explains: The World Trade Centre is an example of a building that progressively collapsed; where each floor fell like a pancake

into the floor beneath it, causing the building to plummet to the ground. We have been devising new methodologies that will enable engineers to better manage how buildings withstand impacts to prevent them from collapsing'.

Students and alumni enjoy networking

FOLLOWING the Engineering Careers Fair on Thursday October 22, the Engineering Chapter held its annual Networking Reception for engineering students and alumni.

This evening, sponsored by Baker Hughes Ltd and the

CGCA, provided an informal social environment for students of all levels of study to meet alumni and talk to them about their career experience and insights.

Over 100 students and 52 alumni attended the reception and the atmosphere

was positively buzzing. Student KaChun Liu said 'it was awesome'. Amir Latifi (Mech Eng 90), Imperial's university team leader for Baker Hughes was equally impressed with the organisation and the diversity of alumni and students present.

Two join editorial board

More experience added to Imperial Engineer's production team

AFTER taking an HND at the Camborne School of Mines, Peter Darling (below) spent nine years as an engineer in the oil industry. He returned to the UK to do his BEng(Hons) at the RSM.

Peter then worked as a technical editor for several industry publications including: *International Mining, Engineering and Mining Journal, Tunnels & Tunnelling, International Construction* and finally *Cement*. He travelled extensively (and frequently)

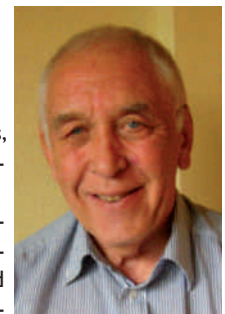
before becoming press officer for Rio Tinto.

He is now a freelance technical writer specialising in oil, gas, mining, quarrying, tunnelling, heavy construction and engineering. He

lives in Norfolk. For details, go to his website www.peterdarling.co.uk

Latest recruit, Bill Bradford (MinTech 57) has already had articles published in *Imperial Engineer*, including some in this issue. A metals specialist, Bill (right) has published papers and articles on a range of subjects over the years. One, on precious metals refining in the South Pacific, was implemented a few years later in eastern Australia.

Bill has worked for a number of employers, including GEC, Federal Nigerian Government, UNDP, Selection Trust, Seltrust Engineering, Mitchell Cotts and Matthew Hall. He was a flying officer in the RAF and a consultant and tutor for the Open University. He is a governor of a local school and active in Rotary.



Bo on holiday

TAKEN at Fishbourne, IoW, ferry terminal on August 25. (Picture by Chris Lumb). Bo toured the island and exhibited at the Isle of Wight Steam Show. Present were current driver David Hankin, previous driver Rik Smith, and Robert Carter and Bob Goodwill. Other alumni joined them. The aim was to test Bo's reliability after a recent engine rebuild, and renew an old tradition of making tours.



Meet the new presidents... John Loughhead

FRUSTRATED chef and wine lover John Loughhead is CGCA president for 2008-09. He was an undergraduate and postgraduate student in Mech Eng from 1967-75 before a long career with GEC.

This included developing a wide range of mechanical, electronic and control systems for energy, transport, defence industries and space vehicles. Before the last five years as executive director of UK Energy Research Centre, based at Imperial, John also worked coordinating major European programmes for energy and transport systems, while VP at Alstom. John's job now plays a central role in research for future energy systems here and abroad.

John is a fellow of a number of engineering bodies and the Royal Society of Arts. He lectures at Cardiff University and Queen Mary and is a Freeman of the City of London.

In his limited free time, John maintains his old MG and persuades plants to grow.

Engineering Geology 100 years to be celebrated

IN 1910, Dr Herbert Lapworth presented a series of 10 lectures on Engineering Geology to students at Imperial College. This marked the beginning of what next year will be 100 years of continuous teaching of the subject at College.

To celebrate this centenary a reunion is scheduled to take place over the weekend of July

9-11 2010. All Engineering Geology graduates are invited to attend, so save the date in your diaries to return to the College for this special occasion.

The programme for the reunion is currently being finalised but is anticipated to include lectures, tours and a gala dinner. If you are interested in finding out more about this event, including

information of when booking becomes available, please register your interest at: rosemary.tipples@imperial.ac.uk. An application form is on www.imperial.ac.uk/NetCommunitySSLPage.aspx?pid=1145&srcid=1145

Please pass on news about the reunion to colleagues who may no longer be in touch with College. **Rosie Tipples**

Glasshouse built aloft on Imperial

A **FUTURISTIC** £1m rooftop 'greenhouse', which opened in April, is enabling Imperial scientists to grow large quantities of plants for experiments ranging from developing new sources of biofuels to helping sequence the tomato genome.

The new GroDome, the only rooftop facility of its kind in London, provides plant scientists with over 200m² of temperature and light-controlled growing space, allowing them to carry out large-scale plant experiments in an urban location for the first time.

Three projects have already taken root. They are producing

biofuels from willows; studying tomato stress resistance and sequencing the tomato genome, and studying how aphids interact with plants.

Willows are a good potential biofuel crop because they contain a large amount of sugars and can grow quickly in the UK's climate and in a variety of soil types. However, getting the sugars out of their woody stems is difficult.

Research on tomato plants is concentrating on producing superior crops which are better able to survive in today's changing environment. It is also involved in an international project to sequence the tomato genome, because the tomato is a good model plant for studying traits in all fleshy fruit-bearing species.

The third research group has planted small legume – medicago truncatula or barrel medic – to investigate how plants defend themselves against aphids. Particular varieties tend to be either highly susceptible or highly resistant

to aphid attack. It is hoped that a better understanding of plant defence will help breed resistance into plants which are not naturally resistant.

RSMA reaches a milestone

NOVEMBER 20 sees RSMA hold its 125th Annual Dinner. Although the first annual dinner was held in 1873, breaks over the two world wars mean that we are only now reaching the 125th. Guest speaker is David Weston, technical director for Anglo American.

Felix mascot helps College team

AIDED by the reassuring presence of mascot Felix the Cat, Imperial students sailed through their first University Challenge round with an impressive 175 points compared to the University of Southampton's 135.

...Coen Louwarts

RSMA's president for the next two years is Coen Louwarts, who is from the south of the Netherlands. He started studying mining engineering in Delft, where he was vice-president of the Mijnbouwkundige Vereniging, the Delft equivalent of the RSMU, before coming to RSM in 1995 for his last year's study. Here, he started playing rugby (not successfully).

Through the RSM, Coen was offered a chance to work for BHP in Australia which he took up for about four years. A fulltime MBA followed, before returning to London where he worked on the privatisation of London Underground.

Rio Tinto offered him an opportunity back in mining which he jumped at. Coen is now with Rio Tinto's copper and diamonds product group, working on its copper joint venture operations such as Escondida and Grasberg, two of the largest copper mines in the world.

Online reading

High levels of contributions mean that some articles have been abbreviated. If there is an asterisk * at the end, go to www.imperial.ac.uk/engineering/about/alumni/imperialengineer to read them in full.

DIARY DATES

2009

Friday November 20

RSMA 125th Annual Dinner, Ballroom, Polish Club Ognisko, 55 Exhibition Road. 19:00 for 19:30.

Sat'day November 21

Walk – City Bridges, meet St Paul's tube booking office, 10:45. For all walks contact John Backhurst at johnsheilbackhurst@tiscali.co.uk

Sat'day November 28

CGCA Decade Reunion Luncheon, Polish Club Ognisko (as above), 12:00 for 12:30.

Th'sday December 10

CGCA Christmas Lunchtime Seminar, 170 Queen's Gate, 12:00 for 12:30.

2010

Saturday February 6

Walk round Smithfield, meet St Paul's tube booking office.

Tuesday March 16

CGCA Annual Dinner, Carpenters' Hall, 18:45 to 22:4. See booking form inserted in this issue.

Saturday April 10

Walk in Clerkenwell, meet Farringdon tube booking office.

Tuesday May 25

CGCA AGM & President's Evening, Read Lecture Theatre 17:30. Supper venue tbc.

Saturday June 5

Walk round Old Shoreditch. Meet Old Street tube booking office.

Tuesday June 15

Faculty of Engineering Teaching Awards Ceremony and Reception. Venue tbc.

Thursday June 24

RSMA AGM/Final Year barbecue. Venue tbc.

For more information and booking for any of these events, contact the Chapter Office (as page two) or phone 020 7594 1184

Associations continue support...

...at CGCA

CGCA's Old Centralians' Trust continues to generously support students on the UROP programme. In addition, its Student Activity Award for 2009-10 is supporting a third and a fourth year students from each of the nine departments within the Engineering Faculty.

Each of those selected from a long list of applicants, received £700 at the start of the autumn term.

Everyone who applied had to convince tutors, heads of department and the Dean of Engineering, that he or she needed the award to help them in their considerable commitment to social and academic life. The money is helping them live closer to College and be closely involved in activities that would be difficult for them to organise or support if they lived further away.

...and RSMA

JONATHAN Phillips, a first year research postgraduate in Materials won the RSMA annual essay competition which is open to all students in the Faculty of Engineering.

His essay, under the prescribed 2,000 words and on any topic making a link between the environment and engineering was entitled 'How can layered double hydroxides be employed to remedy current global environmental issues?'. Jonathan received an engraved silver medal and cheque at the Final Year Students' Barbecue which was, once again, a great success.

The RSMA continues to award loans and grants to assist students in financial difficulties. It also sponsored three students on the UROP programme for 50% of their maintenance costs for 10 weeks over the summer vacation.

The recently inaugurated Peter Harding Memorial Prize, awarded for outstanding service to the RSM was awarded posthumously to Bill Harman.

Dame Julia hands over at CGCA

AFTER the financial reports, John Loughhead was unanimously elected president at the CGCA's AGM in May. Over 50 members present watched past president Julia Higgins transfer the badge of office to him. The election of other officers followed and the meeting was adjourned shortly after 6pm.

Following the meeting, members enjoyed an illustrated talk by Dr Nigel Brandon, Shell Professor of Sustainable Development in Energy.

His talk, 'Engineering our Energy Future', started with an elegant dissection of the primary contributors to CO₂ emissions in the UK. He then discussed what might be done to meet the 'quite challenging' government target of 80% reduction by 2050.

After a broad review of the

various pathways to sustainability (conservation, renewables, nuclear and the other usual suspects), he concentrated on the transport sector as a major area for improvement since this represents about 25% of the total, with road transport alone accounting for 80% of this, or 20% of the total.

The two major avenues for tackling this challenge are obviously technological and behavioural change (better journey planning, lower driving speeds). Professor Brandon guided us smoothly through the facts and the options and, whilst offering no panaceas, left his audience with the feeling that progress is possible.

Bill McAuley

Julia Higgins with John Loughhead and senior vice president Chris Hankin.



Imperial alumni in the club

A LEAGUE table of the earning power of university degrees has revealed an elite of courses whose graduates go into jobs paying an average of more than £30,000. The '£30,000 club' in-

cludes medical graduates from seven institutions including Imperial, and graduates from Imperial's Departments of Mechanical Engineering and Computing.

WE NEED YOUR NEWS

Let us know your news and stories.

Or have you an idea for a feature?

Editorial assistance is available!

Contacts are Teresa or Rosie

(t.sergot@imperial.ac.uk

rosemary.tipples@imperial.ac.uk)

STORY IDEAS FOR THE NEXT ISSUE BY FEBRUARY 8.

FINAL COPY DEADLINE BY MARCH 26 2010

Consensus not dictating is the the way

I'VE BEEN principal of the Engineering Faculty now for 10 months and 13 days and I love it.

So Stephen Richardson (CTEC 69) began a description of his present job. Apart from four years at Cambridge, he has spent all his years from schooldays at Imperial. His PhD was in chemical engineering: his thesis being: Numerical Solution of the 3D Navier-Stokes Equations.

How did you like Cambridge after being at Imperial?

I liked it very much, although I was born and educated in London, which has a buzz about it. In Cambridge you tend to meet the same people in the evening as you've met during the day.

Tell me what your thoughts and actions have been since you have been Principal here?

Against the ethos of previous principals, I am a consensus person and try to keep telling people what to do to a minimum.

It's far better to have a group discussion where you refine the ideas and then better ideas come out of it such as setting up a new course or something like that.

What about so many foreign students? Do they cause a problem?

Several years ago there was a small problem where a group of chemical engineers called themselves 'The Brits', but that has completely disappeared now and it's great. Imperial is cosmopolitan in the best sense: multi international in the best sense.

Do you see a change in the students at Imperial over the last 31 years?

Yes and no. They are as bright as they ever were but now they can do some things less well than I could. But in some ways they are better than I was. I could do maths far better than they can when they come here, but on the other hand I couldn't have made a presentation to somebody. They are more confident and can put a case together: they can stand up in front of people and sound pretty convincing.

On the other hand they don't



Professor Stephen Richardson talks to Colleen Richardson (no relation) about being principal of the Engineering Faculty and his views on other subjects

know what algebra is about – they can do the machinery and the process but they don't realise that it's just a symbol. It's very easy to teach people techniques but it's harder to teach people what is behind it – like why are you doing any of it?

You need to be able to talk across the boundaries. As usual it's all about balance. For instance, if you become totally deep in one area, that's fine, but you'll never be able to talk to anyone about it.

The example I would give is my Blowdown computer program. I need to know chemical engineering to know what is going on inside the pipes, vessels or whatever; enough about materials and mechanical engineering to know what's going to happen with the containment; something about the atmosphere, and a little about the law.

Here, we give fourth year students a 'flexible Friday', where they break

down boundaries and study other subjects. It doesn't have to be in engineering either; it can be any subject that interests them.

With engineering you need to know your basic stuff and then you need to get the student to understand the social engineering that this entails.

When did your interests change from thermoplastics to blowdown research?

By accident. My colleague, Dr Graham Saville, and I got an enquiry from John Brown from just across the Park, asking if we would do a little job on a blowdown problem.

We realised that nobody really understood this blowdown area so, when the following year Shell said they had £150,000 to spend on research, we suggested the blowdown problem. That was in 1985.

The thermoplastic industry was disappearing in the UK at this time. It was going bankrupt faster than any other industry in the country, so we were very happy to change to something else.

We told Shell that we had identified the blowdown problem, which was the rapid depressurisation of a vessel or pipeline. This was to reduce the risk posed by a process emergency.

The computer program we developed, called Blowdown, can simulate and predict what happens during blowdown. It has been used to provide evidence in major accident investigations, such as those following the incident at Piper Alpha and Longford.

You talked about first year students learning the basic stuff about engineering, do you find them receptive to other disciplines?

Not at first. Engineering is still fairly compartmentalised but we are trying to break this down. 1st year students get a load of lectures about eminent people looking at big problems of which they have already heard about. So they realise that this is not just chemical, mechanical and electrical engineering but is engineering with a bit of social interruption, because in the end you're going to affect how human beings and the rest of the world behaves.

ENGINEERING DEVELOPMENTS IN & AROUND IMPERIAL

**College comment...
...on air storage**

'STORAGE technology is good, but it will be expensive to build and still more expensive than fossil-fuel power', comments Bikash Pal (EE), speaking about technology to use electricity from wind farms to compress air and store it below ground. When the skies are still, it can be released to drive turbines and generate electricity. 'If there was a way of capturing wider socio-economic benefits, it would make a big difference to the scheme's economics.'

...on oriental risk

CHINA and India both have strong appetites for developing low carbon technologies, contrary to popular belief, says Professor Nigel Brandon (ESE), a leader in the UK's drive for international collaborations in the energy sector. 'China knows that it is at risk of being one of the countries impacted at an early stage, not so much from rising sea waters but from rainfall and access to water'.

...on blackouts

SEVENTIES-STYLE blackouts may be looming, due to a predicted 3,000 megawatt hour shortage of energy supply by 2017. Dr Jon Gibbins (Mech Eng) says the UK has left it too late to start approving new nuclear stations and an over-reliance on gas-fired stations makes it vulnerable to the whims of countries such as Russia. Policies at the moment just look like somebody in a Government office making up numbers, he says.

...on new Sun

SUN specialist Dr Joanna Haigh says: 'If you thought the Earth was going to warm up because of more solar activity, you might perhaps expect it to get warmer everywhere. This is not the case'. She has found an apparent connection between solar activity and regions of warming around Earth's midsection and is furthering her research while the Sun is at its lowest activity for nearly 100 years.

Speed of light to fuel computers

THE ENGINEERING and Physical Sciences Research Council (EPSRC) is funding Imperial and Queen's University to establish a world-leading research programme to develop computers which can use light to process large amounts of data faster than ever before.

The £6 million research programme will use nano-plasmonic devices whose key components are tiny nanoscale metal structures – more than 100 times smaller than the width of a human hair – that guide and direct light.

The structures have been

tailor-made to interact with light in an unusual and highly controlled way. This means they could one day be used to build new kinds of super high-speed 'optical computers'.

At present, the speed with which computers process information is limited by the time it takes for information to be transferred between electronic components. Currently this is done using nanoscale metallic wires that transmit the signals as an electric current.

To speed up the process, the scientists hope to develop a way of sending the signals along the same wires in the form of light.

The project is also supported by INTEL, Seagate, Ericsson, Oxonica, IMEC and the National Physics Laboratory.

Computing tool is gene genius

RESEARCHERS in Computing at Imperial are developing a new tool to help scientists predict how plants will react to different environmental conditions, in order to create better crops. The prototype can analyse in a matter of minutes, instead of months, which genes are responsible for different processes inside a plant, and how different genes work together. Professor Stephen Muggleton says: 'We believe our computing tool will revolutionise agricultural research by making the process much faster than is currently possible using conventional techniques. We hope that our new technology will ultimately help farmers to produce hardier, longer lasting and more nutritious crops.'

Robot use for real-time

A ROBOTIC device to enable surgeons to control an endoscope remotely while a patient is inside a magnetic resonance imaging (MRI) machine is now in prototype in Mech Eng. This will give real-time images of organs during gastric procedures and prostate biopsies.

'We are trying to produce complex machines to replace surgical hand tools', says Dr Mike Rustic. 'It's like when industry moved from a chisel and hammer to machine tools.'

False bone gives hope

IMPERIAL researchers have been comparing the 'bone-like' material grown in laboratories using three different commonly used cell types. They have discovered significant differences between the quality of bone-like material formed.

Professor Molly Stevens (Materials): 'Many patients who have had bone removed because of tumours or accidents live in real pain. By repairing bone defect sites in the body with bone-like material that best mimics the properties of their real bone we could improve their lives immeasurably.'

Calculations don't add up

IMPERIAL'S Centre for Environmental Policy has warned that UN negotiations aimed at tackling climate change are based on substantial underestimates of the costs to adapt to its impacts. Real costs are likely to be two to three times greater. Lead author of the Centre's report, Professor Martin Parry says it would be fair to say they were based on back-of-the-envelope calculations. The numbers don't stack up.

Deforestation bad for Amazon communities

CLEARING the Amazon rainforest increases Brazilian communities' wealth and quality of life, but these improvements are short-lived, according to new research published by Imperial and Cambridge University.

The researchers' analysis revealed that the locals' quality of life – measured by income, literacy and longevity – increases quickly during the early stages of deforestation. This is prob-

ably because people capitalise on newly available natural resources, including timber, minerals and land for pasture, and higher incomes and new roads lead to improved access to education and medical care.

New results suggest that improvements are transitory. Quality of life pre- and post-deforestation was substantially lower than the Brazilian national average and has not changed.

One of the authors, Imperial's Dr Rob Ewers says: 'Along with environmental concerns, the fact these benefits are not sustained is another good reason to restrict further deforestation in the Amazon. 'And', he says 'in areas that are currently being deforested, the process needs to be better managed to ensure that, for local people, boom isn't necessarily followed by bust.'

ENGINEERING DEVELOPMENTS IN & AROUND IMPERIAL

Magnetic development story of 'green' fridge

IMPERIAL researchers are a step closer to making 'magnetic' refrigerators and air conditioning systems a reality. They have discovered the pattern of crystals inside different alloys – known as their microstructure – has a direct effect on how well they could perform. Such technology

could provide a 'green' alternative to energy-guzzling fridges and air conditioners.

The technology, based on research funded in the UK by the Engineering and Physical Sciences Research Council (EPSRC), has proved possible in the lab but researchers are still looking for

improved materials that provide highly efficient cooling at normal room temperatures, so that the technology can be rolled out from the lab to people's homes and businesses.

The scientists developing the technology are looking for a material that can heat and cool

efficiently when a magnetic field is applied and removed.

This is an exciting discovery because it means they may one day be able to tailor-make a material from the 'bottom up', starting with the microstructure, so it ticks all the boxes required to run a magnetic fridge.

Plants show the way

'IF THE leaf can do it, we can do it, but even better.' So says Professor James Barber of Imperial about mimicking green plants' ability to turn carbon dioxide to oxygen while photosynthesising. He adds: 'But it doesn't mean you try to build exactly what a leaf has'.

In fact, his Imperial team believes a process could be even more effective than plants in creating a never-ending supply of clean power.

'Cub' robot

WORLDWIDE a humanoid robot the size of a three year old child, is being used by researchers trying to understand how humans learn and think.

At Imperial, Professor Murray Shanahan (Computing) is teaching his iCub to carry out basic motor tasks, such as making circular hand movements, using a network of artificial neurons. He believes it is a more biologically plausible model than typical networks – one in which the temporal dynamics of neurons is also modelled.

Health imaging

A CHEMICAL imaging technique for use by doctors to characterise the chemistry of lesions and identify the ones that are likely to rupture and cause heart attacks and strokes is being developed in the Department of Chemical Engineering. Lead author, Professor Sergei Kazarian said: 'Atherosclerosis can be dangerous and our hope is that our approaches could ultimately be used to determine which patients are most at risk of complications'.

Acid in meteorite key in Earth's kitchen

FORMIC acid, a molecule implicated in the origins of life, has been found in levels four times higher than previously recorded on other meteorites, on one that fell into a Canadian lake in 2000.

The particular types, or isotopes, of hydrogen that are found in the formic acid show that it most likely formed in the cold regions of space before our solar system existed.

Professor Mark Sephton, whose team has recently been studying formic acid found in an Australian meteorite, says: 'It is likely to have been an important 'ingredient in the kitchen on Earth before life began'.

Formic acid is known to act as a reducing agent – acting as a magnet for oxygen atoms during chemical reactions – and facilitate the conversion of some amino acids into others.

Imperial inspiring space-age generation

IMPERIAL is organising a contest to select a UK team to enter the 16th Annual International Space Settlement Design Competition.

'The winning UK team will get the chance to talk to world-leading scientists at NASA who are at the cutting edge of space exploration. We hope they will

be inspired and see that there are many exciting and varied career opportunities in science and engineering', says Dr Randall Perry (Earth Science and Engineering). 'Who knows, we could be inspiring the next generation of engineers who will actually design real space settlements for colonists of the future.'

NOWHERE UK

A NEW Royal Academy of Engineering report has called for a minimum investment of £350m over 10 years in synthetic biology – the science of engineering genes to transform micro-organisms and potentially create new ones.

The source of some of these articles and some of the words come from Reporter, newspaper of Imperial College.

'The UK missed out in the 1970s microchip revolution because the government and decision-makers were not fully informed by experts about its potential', lead author Professor Richard Kitney (Bio-engineering) comments. He adds: 'Academics in the UK are probably number two to the US in synthetic biology. But in terms of industry we're nowhere'.

Read about synthetic biology research at Imperial: www3.imperial.ac.uk/systemsbiology

College comment...**Biomass doubt**

GOVERNMENT support for power produced through biomass may be encouraging an increase in the amount of plant and organic waste imported into the UK, potentially undermining the benefits of using the low carbon fuel in place of coal or gas.

According to consultants Ernst & Young, the UK would need about 25 million tonnes of biomass to fuel the power plants now planned, but only a fraction of that could be produced within UK borders.

In addition, Professor Richard Templer, director of Imperial's Porter Institute for Sustainable Bioenergy Research, comments: 'With importing, you don't know if the trees are being logged sustainably, or if they are being replanted'.

Aussie aid

'TRYING to interpret what happened in the early solar system without knowing where meteorites are from is like trying to interpret the geology of Britain from random rocks dumped in your garden', says Dr Phil Bland (ESE).

However, the new Desert Fireball Network in Western Australia will help solve this problem. It has four robotic cameras spread over roughly 250,000 square kilometres, which record bright meteors, or fireballs, falling through Earth's atmosphere. It has already found a rare meteorite that may have been born in Earth's neighbourhood.

This time our feature articles take us from current engineering topics to those from alumni involved in fields far removed from their degree subjects.

BASED on a survey of more than 1,500 supply chain executives from 10 industries in 21 countries, the Accenture High Performance Supply Chain study is among the most extensive research efforts ever conducted in the arena of supply chain management.

Covering six supply chain functions – fulfillment, manufacturing, planning, sourcing and procurement, service management and product development – it defined supply chain ‘masters’ as those organisations that were in the top 10% within each specific functions.

In conjunction with the Chartered Institute of Logistics and Transport (UK), Accenture has now surveyed a group of predominantly UK-based logistics, supply chain and transport executives, probing the effect of the present recession on their operations, and identifying those responses to the downturn that best enables organisations to tackle the adversity they face.

The outline findings make for sombre reading. Without doubt, the speed of change and the far-reaching effects of the current global economy have adversely impacted UK supply chains on a significant scale.

But while the majority of organisations surveyed are indeed attempting to adapt their supply chains to changing market conditions, they do so handicapped by three challenges: excess inventory, inflexible contract frameworks with logistics service providers, and a limited understanding of how customer needs have changed.

In short, there is a significant gap between the current supply chain capabilities of many of these organisations and those capabilities that Accenture has found representative of supply chain ‘masters’ – organisations that enjoy flexible, lean and dynamic supply chains, with end-to-end collaboration and visibility, and which continually deliver superior customer service and operational cost performance.

The issue, then, is how big is this gap – and what can be done to close it?

Right Inventory, Right Place, Right Time?

Inventory management is an obvious problem area. Nearly two-thirds of survey respondents reported that the level of inventory in their organisations was inhibiting their ability to respond to

Closing the gap

A survey of UK logistics professionals finds responses to the recession at variance with best practice

by Rup Banerjee

changing market conditions effectively.

Right across industry sectors, the story was the same: too much working capital was tied up in stagnant inventory – either simply too much product in relation to current demand, or worse, the wrong type of product as well.

Given that the ability to manage working capital effectively is a major determinant of business viability, this was worrying. And, of course, surplus inventory adds to operating costs, as well as tying up financial resources. That said, nearly three-quarters of respondents – 74% – reported that actions were underway to rectify the situation.

Those changes included:

- Selling-off inventory, which provides short-term relief, but which may condition customers to expect deep discounting
- Reducing lead time and boosting flexibility by sourcing closer to home, albeit at the cost of further investment in supplier qualification exercises
- Reviewing and changing suppliers or wholesalers – making strategic *vs* tactical decisions, in other words, based on guarantees of supply or the ability to serve customers

Will these tactics work? Supply chain ‘masters’, which not only tend to turn over their finished goods inventory four times faster than supply chain low-performers, but which also achieve a 5% better performance in customer order fill rates, offer some pointers.

Rather than operating along purely functional lines, successful organisations operate with truly cross-functional processes and management structures. Equally, supply chain ‘masters’ plan for – and rapidly respond to – disruptive

events of the sort that have characterised recent months. As a result, they continue to effectively balance supply and demand at optimum inventory levels.

A true partnership?

In theory, today’s more rigorous approach to service provider selection and procurement should have resulted in organisations enjoying strong partnerships with their providers, resulting in levels of flexibility and responsiveness that help meet the challenges of the present downturn.

In fact, the survey found that half the respondents indicated that their supply chain agreements with service providers did not in practice facilitate extraordinary changes, and were consequently more inflexible than they would wish.

Typically, it turned out, organisations are contracted to and tied-in with service providers for specific periods of between one and five years, together with those contracts’ fixed fees, volumes, predetermined activities and operating models. These are constraints that in the current market are undoubtedly challenging, given the importance of flexibility and adaptability to business survival.

Yet the evidence is that it’s possible to go much further towards meeting current market conditions. Leading organisations, the survey found, put considerable effort into building flexibility into their supply chain contracts, with supply chain ‘masters’ working collaboratively with logistics service providers to develop flexibility within their supply chain operations.

Meeting customer expectations?

In today’s economy, meeting customer expectations is more important than ever. And more than ever, ‘on time in full’ – the key metric for logistics opera-

tions – involves defining precisely what ‘on time’ and ‘in full’ actually mean to multiple customer segments, particularly when different customers have different needs and a different cost-to-serve.

Yet ironically, this service differentiation has become more difficult to undertake. Customer bases have been segmented, and service offerings customised to a point which in some cases comes close to constituting a unique offering.

Evidence of this clearly appears in the survey: while most organisations reported that they were able to partly segment and quantify the cost of serving their customers, only 39 percent reported being able to fully adjust their offering and service levels to the requirements of their customer base.

In contrast, Accenture’s High Performance Supply Chain study shows that supply chain ‘masters’ have a channel strategy that is driven by product and customer needs, and that these organisations actively manage the trade-off between the cost and service for each channel. As a result, ‘masters’ on average achieve an ‘on time in full’ performance that is some 13% better than low-performers.

Of course, adjusting offerings and service levels in an environment constrained by an over-supply of inventory, inflexible supply chain contracts and volatile ever-changing customer requirements is challenging.

Yet the good news highlighted by the survey is that despite the increased complexities of customer segmentation, there is evidence that organisations are starting to respond to the need to improve their ability to differentiate their offerings.

Organisations are reviewing and redefining their service offerings by re-

RUP BANERJEE graduated in 1992 from the RSM with a BEng (Hons) in materials science and engineering. His career has taken him from Esso Petroleum in multiple roles across the downstream supply chain to Accenture (UK) Ltd. which he joined in 2000. Rup is a senior manager within its Supply Chain Management practice and is a chartered member of the Chartered Institute of Logistics and Transport (UK). A longer version of this article appeared in its June Focus magazine. Rup maintains close contact with the RSMA and is hon treasurer of the RSMA. Reach him at rup.banerjee@accenture.com



examining their costs to serve, understanding their customers’ strategic value and establishing their customers’ ability to respond to supplier service changes. In turn, this process delivers additional benefits as organisations come to better understand the need to rationalise distributors, improve operational efficiency, and increase their focus on key customers and accounts.

Sustainable performance?

Despite the present downturn, the issue of environmental responsibility hasn’t gone away. Again and again, we hear of a heightened boardroom focus on the ‘carbon agenda’.

Yet ironically, the present economic conditions force organisations to justify the expenditure and effort spent on new initiatives based only on the most tangible of returns. Consequently – and unsurprisingly – half of the survey respondents indicated that they were unable to quantify the savings achieved through carbon initiatives.

As a result, 67% of the survey respondents indicate their organisations

are turning to traditional cost-reduction initiatives rather than carbon-centric ones. Here lies danger. Although many organisations are de-emphasising their green initiatives, they must be careful. A properly-managed green initiative often cuts costs as well as cutting carbon emissions.

Accenture’s High Performance Supply Chain study demonstrates that supply chain ‘masters’ understand all too well the link between such carbon-reducing tactics as route optimisation and improved load factors, and the consequent impact on overall logistics costs. Taking established and proven technologies and initiative – including streamlined vehicle design, centralised transport planning, and low-resistance tires – they deliver carbon benefits alongside undoubted improvements in operational performance.

And, in truth, delivering cost-justifiable carbon initiatives need not be complex. They are easily integrated into traditional cost-reduction initiatives, and as such can be considered as a missed opportunity in the current operating environment.

WHAT picture emerges, then, from this brief snapshot of UK logistics practices at a time of major economic upset?

First, there can be no doubt that changed market conditions have had a major impact on the physical supply chains of UK businesses. Most organisations have recognised the imperative for rapid changes, and have put actions in place. While some of these actions have had a positive effect on the ability of organisations to operate effectively, others have been less effective – generally as a result of the limited capabilities still evident within some areas of the supply chain.

Second, the downturn has seen a reduction in the focus on carbon initiatives. This may well prove to be a

Conclusion

slowly to market changes mistake, given the positive impact on traditional cost-cutting initiatives that can come from actions to reduce carbon emissions. In short, organisations are missing out on an opportunity to develop operations that are more sustainable as well as more cost-effective.

Third, the survey concluded that while the majority of organisations are taking action to make changes in the way they operate, obstacles still remain. In particular:

- Excess inventory is making change painful and impacting cost and service levels
- Current supply chain agreements are not flexible and as a result adjust only

slowly to market changes

- Customer offerings are not easily adjustable to changing market conditions

The stark message is that in an increasingly volatile and multi-polar world, the organisations that are succeeding in the logistics arena are precisely those that have the characteristics associated with supply chain ‘masters’ – lean and flexible supply chains, end-to-end visibility across those supply chains, fair-but-flexible contracts with service providers, and an understanding of how best to harness carbon-based initiatives to the broader operational agenda. The trick, for those not so fortunate, lies in learning how to emulate them – and quickly.

FEATURES

THERE CAN be few people in the developed world who have not heard of the potential of hydrogen as a clean 'fuel' which used in 'fuel cells' or burnt in internal combustion engines, would produce power with only water as a by-product. More correctly, since hydrogen has to be extracted from hydrocarbons, rather than extracted from the earth, it would be an energy carrier, like electricity, rather than a fuel.

In which case, what is wrong with electricity? The simple answer is that whilst electricity can be made in a variety of ways that would reduce emissions, it is very difficult to store in any large quantities and, unless battery technology undergoes a step-change in energy density, it is not conveniently portable.

Versatile

Hydrogen has been viewed as having the potential to provide both a means of transmitting energy and of being both storable and transportable.

The modern story really starts in California in the late 1980s when legislation was proposed to reduce pollution from urban transport against some key deadlines. Since then billions of dollars have been spent both by governments and private organisations to identify and test the best technological solutions.

The driving force for much of the effort was not just the huge current energy demand, but the prospective demand as developing nations improved their standard of living. Few of us realise that over 1.6 billion people have no access to electricity and 2.6 billion have only biomass for heating and cooking. Projections look at how

With his expertise in the production and marketing of gases, Professor Keith Guy (Chem Eng 70) writes about a subject of supreme interest

The Hydrogen Economy

the energy need could be met, but do not comment on how the energy would be distributed. Many of the sources shown also have problems of seasonality or diurnal changes. The wind doesn't blow all the time and, even in deserts, night falls on solar arrays of all types.

This emphasises the need to provide an energy storage system.

The other trend that needs to be dealt with is that with development comes increased ownership of private transport and this becomes a significant source of emissions, particularly in the urban environment.

One proposed solution to this is to use 'fuel cells' where hydrogen combines with oxygen from the air to produce electricity in an efficient manner. The concept was invented by Sir William Grove in 1839 and first used in the Apollo Space programme in the 1960s. Significant progress has been made in recent years in increasing the compactness of fuel cells, increasing their lifetime and thus reducing their evaluated cost. Most major car manufacturers, energy companies and numerous technology companies have been involved in joint venture activities aimed at one of two ends; automotive systems or distributed stationary power systems.

There are a number of challenges to be met.

Most fuel cells use hydrogen to generate electricity, and hydrogen is the least dense gas. A tonne of hydrogen has a volume of more than 11000m³ at atmospheric pressure, compared with about 800m³ in the case of air and just over 1m³ in the case of a liquid fuel like gasoline. Even allowing for the fact that hydrogen delivers more than three times as much energy as gasoline by weight, it is obvious that one of the main challenges is storage.

Chemical or physical

Many research programmes are underway to identify storage systems that are better than high-pressure cylinders or liquid hydrogen, the current main options. Systems studied are either chemical or physical. In the former, hydrogen is reacted with a carrier to produce a stable solid or liquid and this is then converted back to the carrier and hydrogen by some combination of catalysis, heat and pressure change.

The carrier can either be recycled or replenished. Typical carriers are metals like nickel which form hydrides, chemicals like benzene which can be made into hydrogen-rich cyclohexane and simple molecules like nitrogen (to ammonia) and carbon monoxide (to methanol).

Many of the carriers proposed have undesirable safety, health and environmental side-issues, carry too little hydrogen or have poor economics. Nonetheless a number of them have found niche applications. The poor hydrogen density of nickel hydrides may be unimportant in stationary use or in ships where it could replace ballast. The boron hydride system, which offers good potential for disposable plug-in cartridges, has obvious benefits for military applications and may be developed to larger scale applications.

The physical systems generally involve the adsorption of hydrogen onto

KEITH GUY went up to Imperial in 1962 and stayed and stayed. While chairman of the entertainments committee for three years, he had the pleasure of putting on many of the top acts of the day, including Hendrix's last concert at the Albert Hall.

In 1970, he persuaded oil refineries to remove sulphur from most of their products and developed an expertise in production and marketing of large volumes of hydrogen, primarily for sale to oil companies. This developed into an interest in the hydrogen economy and 15 years later he's still writing articles about it.

Keith left Air Products after 28 years to start an industrial gas consultancy business. He says the last 10 years have been wonderfully unpredictable, advising major companies about industrial gases and industrial gas companies about their customers' needs. Best of all, he has become a visiting professor at Imperial and chaired a number of university spin-off companies through their early years.

No two days are ever the same and that's the way he likes it.



or into a micro- or nano- porous body. In spite of hype about carbon nano-tubes, the weight ratio of most systems fall significantly short of the 9% target set by the US DOE and do not compare with cylinders. However a recent development, at the Technical University of Denmark, has found a way of storing ammonia which is an excellent but toxic carrier of hydrogen, on magnesium chloride tablets. This produces a safe storage system that holds 9.1% of hydrogen by weight. It is now attracting significant interest.

The second major challenge to the development of the hydrogen economy is the cost of fuel cells. Currently they cost about \$1600+ per kW depending on type. Whilst this is acceptable for demonstration projects, the additional cost for a 40kW car drive system is clearly unacceptable. The costs need to fall to \$60-\$100 per kW for them to become acceptable for significant market penetration in the transport system.

Significant progress continues to be made and fuel cells are finding applications in niche applications, such as secure power systems for remote telecommunications centres and urban transport demonstrations. Fuel cell sales, in 2004, were 3000 units and, by 2008, about 11000 units world-wide, so clearly there is a long way to go.

The final challenge is how to generate and deliver hydrogen in an economic manner, compared with conventional fuels, and be more efficient over the whole energy cycle - 'well to wheel'. There are clearly many ways of delivering hydrogen to fuel cells.

Significant research has been spent on 'on-board' processing of fossil fuels, like gasoline, to produce hydrogen for the fuel cell drive system. Similarly, attention is focused on a new generation of high temperature fuel cells that could process hydrocarbon fuels directly.

However, none of these offer the same reduction in environmental impact that would be available from hydrogen produced from benign or renewable sources or from fossil fuels with carbon capture technology. Much of this research was to unlock the 'Catch-22' problem of no fuel, nobody buys fuel-cell cars: no fuel-cell cars, nobody builds fuel stations.

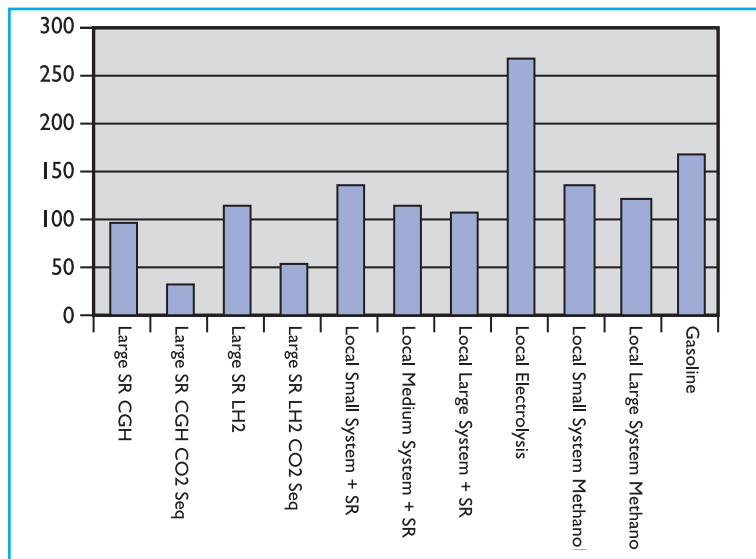
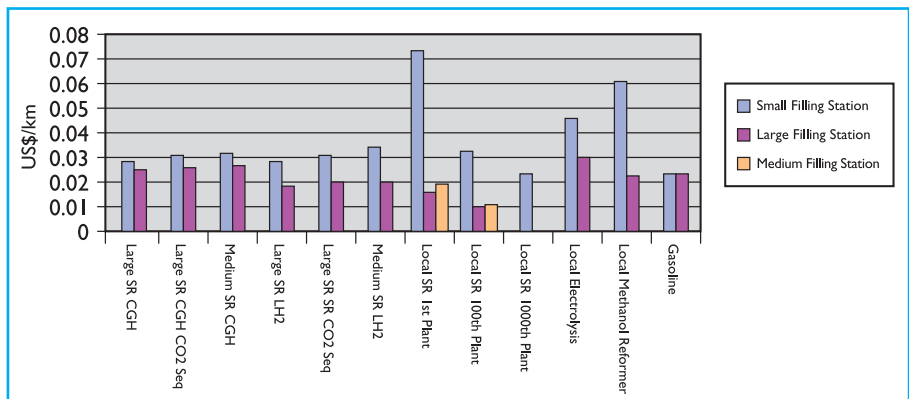
Fortunately, many of the demonstration projects have shown that it is possible to provide hydrogen filling stations which can operate safely and reliably. The first US public hydrogen filling station opened two year ago in Washington DC and there are now many more worldwide, particularly in California and Japan. A recent announcement in Germany, of a hydrogen infrastructure by 2015, is a key step to a Europe-wide hydrogen filling network.

The most common way that on-purpose hydrogen is produced today is by

nately this is also the least economic method.

On the other hand, large steam reformer hydrogen production facilities with gas or liquid transport to filling stations offer the best economics and, with certain techniques for carbon dioxide capture, acceptable environmental impact, but they still use hydrocarbon feedstocks. The worst of all worlds is using fossil-fuel-generated electricity to power electrolysis at the filling station.

The graphs show the cost per kilometre of fuel cell system light vehicles



compared with untaxed gasoline, using feedstock costs that are aligned. The various options considered include the average size of the filling station and, in the case of small local steam reformers, how many have been

built, since this influence the capital cost. The second chart shows the carbon dioxide emissions per 1000 kilometres for various supply schemes all of which, except electrolysis from grid power, have lower emissions than gasoline.

So when will all of this come about? Optimistic, early 21st century announcements by the motor industry promised the first mass market hydrogen powered vehicles in 2008-2010. The Honda Company has just leased 200 fuel cell powered vehicles in Cali-

Studies have been made of the cost and environmental impact of a number of schemes. The least impact comes from wind generation driving electrolysis at the filling station, but unfortu-

nately this is also the least economic method.

(Continued on page 16)

What is CEEQUAL?

CEEQUAL is the assessment & awards scheme for improving sustainability in civil engineering and public realm projects. Its objective is to encourage the attainment of excellence in environmental and social performance on such projects, through improved project specification, design and construction. CEEQUAL Awards are achievement awards, rather than the result of a competition, and can be applied for at any time.

CEEQUAL is not, in the strict definition of sustainability, a 'sustainability assessment tool'. It does not assess a client's economic and financial analysis, nor does it judge whether planning permission was a wise decision. But with exception of health and safety performance, CEEQUAL does assess all environmental issues on civil engineering and public realm projects and many of the social issues affecting neighbours - see the chart, right.

CEEQUAL was developed between 1999 and 2004 by a team led by the Institution of Civil Engineers (ICE). CEEQUAL Ltd now operates the Scheme and is owned by a group of 15 organisations actively involved in originating the project. They include the ICE, the Association for Consultancy & Engineering, the Civil Engineering Contractors Association and the Chartered Institution of Water & Environmental Management. It is presently a tool for the UK and the Republic of Ireland, with discussions underway with possible collaborators for the development of CEEQUAL schemes, or equivalents, in a number of countries or regions outside the UK.

Who can get a CEEQUAL Award?

CEEQUAL Awards can be applied to civil engineering and public realm projects of

CEEQUAL assessment and social quality

Professor Roger Venables outlines CEEQUAL – the Civil Engineering Environmental Quality Assessment and Awards Scheme. He reports on its recent progress and explains how CEEQUAL is improving sustainability on civil engineering and public realm projects.

any size or description. An award is given to schemes that have been assessed and verified against 200 scored questions organised in 12 sections. Awards are made to projects for which

ment; energy and carbon; material use; waste management; transport; effects on neighbours, and relations with the local community and other stakeholders.

Five types of award are available:

- Whole Project Award (WPA) – the most-used Award, for a joint application by the client, designer and principal contractor;
- Client & Design Award – for a joint application by the client and designer;
- Design Award – for principal designers only;
- Design & Build Award – for a joint application by the contractor and their designer;
- Construction Award – for principal contractors only.

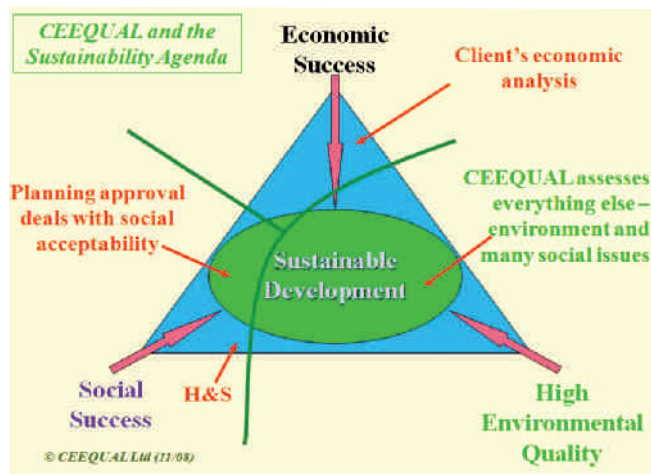
In addition, the Client & (Out-line) Design Award is available

as an integrated interim award *en route* to a Whole Project Award.

CEEQUAL has made significant progress in uptake in the five years since it was launched for public use in mid-2004. Further details are available at www.ceequal.com, from where the *Scheme Description & Process Manual* and the *Assessment Manual for Projects Version 4* can be downloaded.

Progress with the CEEQUAL Scheme includes these key achievements.

- 208 project teams have applied to use the formal Scheme for verified assessments.
- 45 projects have completed verified assessments and received awards, with an additional 14 interim awards presented.
- A further 160 or so projects are being assessed.
- The total construction value of all projects that have been, or are being assessed, now exceeds £12.5 billion.
- CEEQUAL is being used for all types and sizes of civil engineering and public realm projects, from a £50,000 canal bridge refurbishments, through a wide range of water and wastewater projects to £1bn motorway



clients, designers and constructors can demonstrate, with evidence, that they have gone beyond legal and environmental minima to achieve distinctive environmental and social standards in their work.

CEEQUAL has 12 sections for assessment - project management; land use; landscape issues (includes rural landscape and townscape); ecology and biodiversity; the historic environment; water resources and the water environ-

ROGER VENABLES, BSc(Eng) DipM CEng CEnv FICE MCIM ACGI, was at Imperial from 1966 to 1969, where he met (and married in 1970) fellow student Jean, who is president 2008-9 of the Institution of Civil Engineers (ICE).

With Wimpey, when it was still a major civil engineering company, he then spent 15 years at CIRIA before joining Jean in their own firm, Venables Consultancy in 1989. In 1994, they established Crane Environmental with friend and ecologist John Newton, to assist construction-related organisations improve their environmental and sustainability performance.

In 1999, Roger triggered the start of an ICE-led project to develop what turned into CEEQUAL. It went fully operational in 2004. He is now its chief executive, on a consultancy basis through Crane Environmental. Roger is also Royal Academy of Engineering visiting professor in engineering design for sustainable development at Queens University, Belfast.



es environmental ty of engineering



How does CEEQUAL work?

CEEQUAL is a self-assessment process, carried out with a trained CEEQUAL assessor. The completed assessment is then independently verified by a CEEQUAL-appointed verifier.

Applying for a CEEQUAL assessment early in the project is best, so that the CEEQUAL questions can be considered by the project team at the most appropriate stage and a CEEQUAL file of evidence (physical or electronic as the assessor chooses) can be compiled as the project progresses. But retrospective assessments and awards are also possible. An interim verification and award is also available after some or all of the design has been completed.

upgrades and the circa-£2bn Forth Replacement Crossing.

- CEEQUAL has gained a contract from the Olympic Delivery Authority for all of the infrastructure and public realm projects at the Olympic Park to be assessed and verified, as well as individual related projects such as the Orient Way Carriage Sidings Depot Project.
- Version 4 of the Scheme, which now includes questions on carbon performance as well as other significant upgrades to the Scheme, was published in December 2008.
- A term contracts version is under development.

Benefits of a CEEQUAL Award

Applicants for awards report a range of benefits from having their project assessed under CEEQUAL. For example:

- Reputation-building and good PR;
- Enhanced team spirit;
- Demonstrating commitment to the environmental agenda;
- Improvements to projects and best practice.

Example projects

CEEQUAL Awards have been made to a very wide range of projects – water and wastewater treatment plants, flood alleviation schemes, roads, motorways, railway works and canal improvements. The following brief examples illustrate the range of projects we have covered so far.

At the smaller end of the scale, the Victoria Footbridge in Hereford (pictured right) is a Grade II Listed structure and was built in 1898 to commemorate the Diamond Jubilee of Queen Victoria. The three-span suspension bridge carries a public footway and cycleway over the River Wye. Detailed inspection carried out without mechanical plant, on foot and using rope access, revealed significant corro-

sion to structural elements necessitating works beyond routine maintenance to ensure public safety.

The restoration works, costing around £700,000, included

- restoration and repair of structural elements affected by corrosion;
- strengthening structural elements;
- replacement of the bridge deck;
- restoration and refurbishment of the handrails, decorative features; approach pilasters and concrete detailing at the top of the piers and abutments;
- replacement and restoration of lighting.

The project team gained a CEEQUAL Excellent Award with a score of 75.8%.

The Castleford Footbridge, a £4.8 million landmark structure. This is the final and most ambitious of 11 schemes that form The Castleford Project. This is a ground-breaking urban renewal scheme that aims to spark regeneration and a new confidence in this former

coalmining town. The S-shaped footbridge, 4 metres wide and spanning more than 130 metres across the River Aire, features innovative engineering solutions adopted during its design and construction. The construction of the river piers was one of the most high-risk activities of the project. The three piers had to be constructed within 8 metres of an existing, fast-flowing weir and in river depths that varied from just 0.5 metres to 7 metres. The project team gained a CEEQUAL 'Very Good Award'.

The Cross Valley Link Road is key infrastructure for South West Northampton. The scheme provides a direct 1.45-km road link connecting the A45 Weedon Road from Daventry to the west and the A45 Upton Way/Danes Camp Way heading to Towcester to the south. It links residential and employment land being developed on either side of the River Nene floodplain and is aimed at contributing to the regeneration aspirations of English Partnerships, West Northamptonshire Development Corporation and Northamptonshire County Council.

The engineering design is for a B-road with 40mph speed and 7.3 metre-wide carriageways, incorporating a three-span bridge across the River Nene and two further flood-relief bridges within the floodplain. The project team gained a CEEQUAL Excellent Award with a score of 84.8%.

More details of many CEEQUAL awards made so far are at www.ceequal.com/awards.asp. These summaries demonstrate that many civil engineering project teams do 'go the extra mile' on many environmental and social issues and, as a result, are improving the sustainability of civil engineering in the UK.

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FEATURES

MANY patent agents now give fixed price quotes for drafting and filing patents. Budget £2,500 for Britain, and ask for search and examination together. One year later, budget £3,000 for Europe and £3,500 for America.

Alternatively, file a PCT patent. This acts as a 'staging post' for overseas filings and gives you another 18 months to think about most places (not all) where you can file abroad. A PCT filing costs about £3,500. These are filing costs – prosecution costs (persuading the examiner that you have an invention) can be twice as much in the USA.

Renewals will also cost at least as much as filing if you keep patents for the full 20 years. Beware of renewal invoices from anyone other than your agent – they could be a scam.

Trade marks

Several national trade mark offices offer free internet search facilities for identical marks. Be prepared to use some lateral thinking – SMITH and SMYTH are identical legally, but not according to a search engine.

The Madrid Protocol is to trade marks what the PCT is to patents – a 'bulk discount' for 'almost global' filing. You can file in some 108 countries for about £12,000.

Trade marks can be renewed for as long as you like – often at 10 year intervals. Unlike patents, an identical trade mark filed overseas is no bar to

PUZZLED BY PATENTS?

*Ken Strachan
(Mech Eng 81) offers
pithy advice on
intellectual property
of several kinds.*

filing the mark in Britain. Trade marks are also divided into classes – a previously registered mark for fan belts shouldn't stop you getting the same mark for toothpaste. Both patents and trade marks should be used to prevent competitors applying for revocation.

Journals

Many companies – often with surprisingly similar letterheads – offer to publish details of your patent or trade mark in journals. They sound official, but they aren't. Real, official, journals publish your applications as a statutory duty. They don't ask you first; the fees will have already been paid by your agent.

Domain names

It is often worth buying several similar domains – including popular mis-spellings – and pointing them to a single website. Try using hyphens. puzzled-by-patents.com makes more sense than puzzledbypatents.com. The cheapest domain providers have no telephone support.

However, if someone rings or emails you and tells you that someone wants to buy a domain very similar to yours – then offers to sell said domain to you instead – hang up politely. Reputable traders will never name such a third party; and will often charge less for domains than cold callers do. Beware also, of people trying to hijack your domain renewals.



KEN STRACHAN,
*principal consultant at
KIROS IP Consultants,
was born 18 years after
his parents met at
Imperial. He gradu-*

ated in Total Technology (mechanical engineering with management) in 1981 and followed his mother into the jet engine trade, starting his career with Rolls-Royce in Derby. Later motor industry employers included Lucas, Bosch, and Breed. Five years in the UK Patent Office gave him the background knowledge to manage the IP portfolio for Gibbs Technologies Ltd, makers of the Aquada amphibious car.

Contact on 07790 777709 or enqs@kirosipc.com.

(Continued from page 13)

The Hydrogen Economy

fornia for \$600 per month with more to come. The storage on these cars is still compressed gas, but they have a range of more than 300 km and can be refilled in a few minutes. Comparable electric vehicles have half the range and take several hours to recharge.

We can also expect to see further progress in the urban transport systems as the price of hydrogen powered buses comes down. Stationary power systems will also continue to find new applications.

The challenge and opportunity is awesome. If the total volume of hydrogen sold today by the industrial gas industry were used for fuel cell energy generation it would only represent about 110GwH compared with the 180 million GwH being used world-wide today.

Another relevant fact is that modern cars have a very long life and any change to alternate fuel sources will be a slow process unless legislation forces the change. Such legislation would be political suicide. Government would be better advised to focus on regional standards for the supply of hydrogen and uniformity in regulations and restrictions.

Currently a hydrogen-powered vehicle would not be allowed to use the Channel Tunnel and even if it could there would be no guarantee that the systems at the other end would be compatible, in spite of concerted activity by the European Union.

There are, however, many positive developments in storage, fuels cells and small hydrogen delivery systems. There is also an additional emphasis on the potential of hydrogen in the strong political push for renewable power sources, many of which will need energy storage and back-up systems. Carbon capture technology power generation, such as the

current project in Abu Dhabi, are based on benign production of hydrogen from fossil fuels which is then burnt in gas turbines. Such plants could also provide merchant hydrogen for transport systems.

Finally, even if the global political will was there to drive the use of hydrogen as an energy vector, it would still take generations. The longevity and replacement cost of many current energy system components inhibits change. At best, it would take at least 25 years for hydrogen to play any significant role in the global energy scene and the reduction of global warming. However in the meantime hydrogen can have a beneficial impact on atmospheric and noise pollution in selected urban environments. It can provide benefits in niche stationary power generation and storage, and at the same time can begin to make a small contribution to the reduction of carbon dioxide emissions.

The Oak Island cofferdam

Graham Harris adds recent findings of 18th century engineering on a 'treasure island' to his article published in Imperial College Engineer in 2002

OAK ISLAND and its 'mystery', off Nova Scotia's coast, has intrigued generations since signs in 1795 indicated 'something' lay buried in the island's depths.

The underground workings on the island comprise two markedly dissimilar elements – a vertical shaft (The Money Pit), about 13 feet in diameter and 200 feet deep, and a 500-foot-long tunnel (The Flood Tunnel) 2.5 feet wide by 4 feet high, connecting the shaft to the sea. At the seaward end of the tunnel there are filter beds which formed part of the inlet works, and evidence of an ancient cofferdam constructed to protect the inlet works during construction.

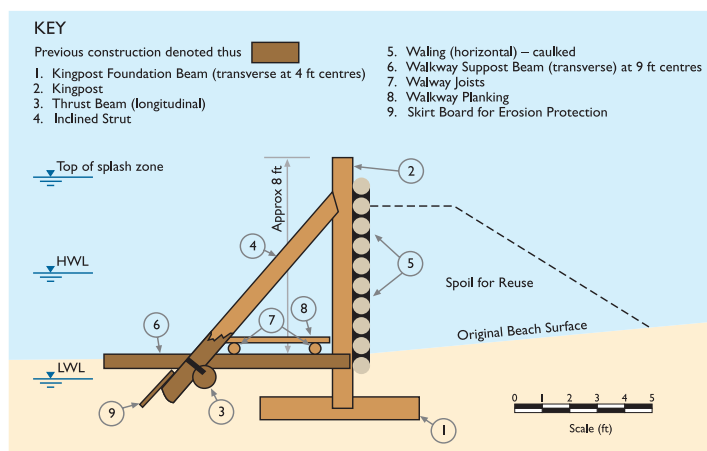
The excavation of the Money Pit has been linked to Sir William Phips (1651-95), who discovered the wreck of the *Concepción* from which he recovered 25 tons of silver. Circumstantial evidence links Phips to Oak Island as one of those conspiring to fund the revolution in England.

Treasure not used by the 1688 invasion force of William, Prince of Orange – gemstones, plate, Ming and other Chinese goods – was confined to the imagined security of the depths of Oak Island. The excavation of the Money Pit can be dated to 1688, but the treasure was to be lost because of a 'blow out' within the underlying gypsum/anhydrite bedrock.

A number of attempts appear to have been made to recover the treasure from 1690-97, but it appears to have lain neglected until the mid-18th century. The Flood Tunnel and ancillary features, including the cofferdam, can be dated to 1752-54. It shows the hallmarks of a military engineering project conducted in secret.

Excavations in 1967 revealed the

remains of a horizontal U-shaped log structure carrying remnants of inclined timbers marked with Roman numerals, and fixed in place with dowels. The excavations were open for a limited time, before being inundated by the sea, and did not extend to any great depth. Therefore, it is certain parts of the



foundations of the ancient cofferdam were never uncovered. Nevertheless, the constituent elements that were disclosed have been used to reconstruct how the original cofferdam may have looked, based upon the obvious resemblance to palisade walls in forts constructed by the British military in North America. The overall height of the cofferdam is open to conjecture.

The first stage in construction would have been to install the kingpost foundation beams (1) within the inter-tidal zone at as low a level as could be attained. These beams would have been massive baulks of timber, with pre-cut slots to accommodate the base of the kingposts (2). A longitudinal thrust beam (3) would have been placed outside the intended line of seaward side of the cofferdam. Such a beam would mobilize the passive resistance of the soil to resist the thrust of the soil stockpiled behind the timber wall.

The second construction stage would have been to position and fix the inclined struts (4) at the same time as the kingposts were raised. It

is likely the upper connections were made before raising took place. Trennels (wooden dowels) were used to fix the lower connections with the longitudinal thrust beam. It is possible they were used also for the upper connections on the kingposts. With the necessity of ensuring verticality of the kingposts, any adjustment could be made by installing the lower trennels after the kingposts had been positioned. Since the inclined struts are likely to have varied in length from one kingpost to another, they may have been marked by a chisel - crude Roman numerals would have sufficed.

The third stage in construction would have been to place the horizontal timbers (5), often referred to as walers, behind the kingposts, and caulk the gaps with oakum or coconut fibre. This was used in the construction of the filter drains inside the cofferdam. These wall timbers may have been lashed to the kingposts. Excavated spoil from drain excavation would have buttressed the timber wall.

To ensure the cofferdam wall was watertight, access to its outside at low tide was essential for recaulking. Crossmembers (6), joists (7) and walkway planking (8) were, therefore, necessary. Finally, to limit scour from tidal backwash, which might undermine the structure, a protective skirt (9) was provided in the form of a wide board securely fixed to the bottom section of the inclined struts, with its leading edge buried as deep as possible.

A number of cofferdam details are likely to remain unknown without further exploratory work. It has been concluded the project was carried out under the control of Captain John Bastide, chief engineer for North America (later Lieutenant-General). He played a prominent role in many important engineering works, including the construction of Halifax Citadel and Halifax Harbour defences. Engineer in charge of cofferdam construction was William Cowley. Labour was from the 47th Regiment of Foot under Colonel Peregrine Lascelles.

For more detail, read G Harris & L MacPhie: *Oak Island and its Lost Treasure*, Formac, 2005. grabambarrispei@hotmail.com

Firth among equals

Scotland sets out to meet tough climate targets

by Louise Smith, Pentland First Marine Energy Project manager

THE PENTLAND Firth Marine Energy Project, the successful regional initiative for wave and tidal energy developments in Scotland, is led by a co-ordination committee comprising representatives from Highlands and Islands Enterprise (HIE), the regional development agency, The Crown Estate, who own the sea bed, and the Scottish Government. In September 2008, The Crown Estate announced that the Pentland Firth and waters around Orkney – the Pentland Firth Strategic Area – are the first areas in the UK to be made available for commercial-scale marine energy developments.

Scotland has set itself climate change targets well above those of the EU and the UK. With less than 1% of the EU population, Scotland benefits from 10% of the EU's wave and wind

to help support the sustainable growth of this new industry.

Other key organisations such as the Highland Council, Orkney Islands Council, Scottish Natural Heritage and the Nuclear Decommissioning Authority (NDA), who have a socio-economic remit in the region, help to guide the Pentland Firth Marine Energy Project through its Stakeholder Advisory Group. A Developers' Forum will also be formed by the successful bidders for the seabed leases, providing a co-ordinated view of infrastructure and supply chain requirements.

The region is already home to the European Marine Energy Centre (EMEC) in Orkney. Opened in 2004, and backed by Scottish and UK government funding as well as additional support from local agencies and the

wave device, Oyster, at EMEC is Edinburgh-based Aquamarine Power.

Oyster is a hydro-electric wave energy converter, consisting of an oscillator fitted with pistons, fixed to the sea bed. Waves passing the oscillator pump high-pressure water through a subsea pipeline to onshore, conventional, hydro-electric generators, generating electrical power.

The advantage of Aquamarine Power's technology is that it utilises proven conventional hydro-electric components easily accessible and maintainable onshore. It is designed to be deployed at depths of 10 to 12 metres, using the more consistent near-shore wave climate.

Aquamarine Power's installation of Oyster in Atlantic waters at EMEC involved working with 27 different businesses in Orkney and Caithness, with more than 70 people from both sides of the Pentland Firth working with Aquamarine Power's seven-strong team. In addition, the device was fabricated utilising 60 staff from Ross-shire engineering company, Isleburn at its Nigg facility.

Aquamarine Power was recently honoured with the 'Best Green Industry SME Award' at the Scottish Green Awards, held in Glasgow in October. Earlier this year, it also won the 'Innovator Award 2009' at the British Renewable Energy Awards.

Supplementing and also working with EMEC are Heriot-Watt University and the UHI Millennium Institute.

Significant studies involving resource assessment, flow data and the marine environment have already been undertaken by the Environmental Research Institute (ERI) (part of UHI Millennium Institute) and the North Highland College and the International Centre for Island Technology (ICIT) (part of Heriot-Watt University) as well as local businesses which are involved in ground-breaking data collection and environmental studies.

Local research capabilities are growing considerably, enhanced by the summer 2009 announcement of



resource, and 25% of the tidal energy resource making its 2020 target of 50% of its electricity from renewables a realistic ambition.

To meet this challenge, the Scottish Government has led the formation of two driving forces, the Marine Energy Spatial Planning Group (MESPG) and the Forum for Renewable Energy Development in Scotland (FREDS) Marine Energy Group (MEG) who are providing the road map and framework for Scotland's lead in the field. MESPG is leading on environmental monitoring, developing a programme for environmental studies

EU, EMEC is the world's first grid connected, independently verified test facility for new technologies involved in converting the power of waves and tidal currents into electricity. The wave and tidal test sites have already seen landmark achievements for the industry through the testing and connection of cutting-edge marine energy technologies. EMEC's niche position has been further supported by the summer 2009 announcement of a further £8 million investment package from the Department of Energy and Climate Change (DECC).

One company that is trialling their



OPPOSITE PAGE: The Oyster hydro-electric wave energy converter is towed into place at EMEC.
LEFT: Oyster complete in the factory.

the £14 million investment at North Highland College in Thurso. The planned £3 million Centre for Energy and the Environment (CfEE) will be a teaching facility offering postgraduate qualifications and provide space for the ERI's future development. This will sit alongside a £7 million engineering skills centre which will become a hub of vocational skills training for science and engineering developments across the North.

In addition, the £4 million Marine Renewable Energy and Environment Research programme (MaREE), headed by the ERI and the Scottish Association for Marine Science (SAMS) will create 17 jobs looking at grid constraints, design expertise, environmental impacts and synergies between the oil and renewable industries.

All of this comes in addition to the investments made by industry and the public sector in ICIT's Marine Renewable Energy Development in Scotland (MREDS) programme. This programme's aim is to overcome the technical, social and environmental challenges which could hinder the development of marine renewables.

The Pentland Firth Co-ordination Committee drives eight project workstreams, some led by HIE and some by The Crown Estate. All include representation from all partners. These include a Pentland Firth grid group, including planning and consents, research and development, stakeholder management and communications and supply chain.

Four of the workstreams are led by HIE and four by The Crown Estate, but

all involve members from each of the project partners.

The Pentland Firth Grid Group involves the project partners working with Scottish and Southern Energy (the transmission network operator) and National Grid to investigate options for grid connections in the region, which is at the limit of the land-based grid transmission system. Subsea transmission cables are likely to form part of the solution, hopefully helping the associated infrastructure work obtain planning approval.

Highlands and Islands Enterprise has also been involved in leading two key pieces of work - HIE's January

LOUISE SMITH (Civ-ils 85) comes from the county of Caithness which borders the Pentland Firth. She built a successful career as a bridge engineer working for consultancies including Ove Arup, Hyder Consulting and Jacobs Babbie.



Returning to Thurso in 2004, she initially pursuing her interest in renewable energy through voluntary work and helped establish the Caithness Renewable Energy Forum. With the Caithness Energy Alliance, which united Caithness companies to target renewable energy opportunities, she was involved in organising a key marine energy industry conference, 'Marine energy and the Caithness economy' in February 2008 with Scotland's First Minister as keynote speaker.

Her first job back north involved her in nuclear decommissioning

projects at Dounreay. Over the next 10-15 years, this will mean the loss of about 2,000 jobs. This socio-economic factor is hugely significant to the area and marine energy has

the additional benefit of being able to provide significant skilled jobs over the same timescale.

Her next job, with a local community group, resulted in the successful set up of Caithness Energy Advice, a service for householders and community groups, tackling fuel poverty. It attracted £140k funding for four energy advisers, and was also runner up in Energy Action Scotland's Energy Savers Award 2007.

Louise's latest post, aimed at bringing the marine energy industry to the area, is co-funded by the NDA and HIE, a good example of how local agencies working collaboratively can provide a catalyst for change.

THE INDIAN STEEL

INDUSTRY: Market projections and strategies for steelmakers out to 2015

Published by Metal Bulletin Research (MBR) September 2009

To find out more, visit www.metalbulletinresearch.com and www.chrglobal.com

THE INDIAN steel industry has had a somewhat mixed press in the UK over the last few years. Possibly some of this follows on from negative feelings at the decline of much of the domestic British steel industry. There can, however, be no denying the emergence of India as one of the economic movers and shakers of the early 21st century.

Over 25 years ago, I presented a paper on iron ore processing at a steel conference in Frankfurt organised by Metal Bulletin so reviewing this study brought back pleasant memories. MBR has produced what is essentially a global investor guide. Chapters cover country market projections and strategies covering the period to 2015.

The Executive Summary includes the following points:

- We are facing an extended period of

BOOKS & REVIEWS

global economic, political and financial uncertainty, with growth rates in industrialised countries likely to be low for several years. Steel executives are faced with a scenario that very few of them have experienced before.

- A number of countries/areas are the probable sites for new primary steelmaking capacity – China, India, Brazil/Latin America, SE Asia, Russia (CIS), and the Middle East. Each has its own characteristics, eg fuel availability/type/quality, iron ore availability/quality, scrap metal supply.
- India has a very low per capita domestic consumption of steel in comparison with Europe (overall well below 10% of the EU usage).
- Much new Indian production capacity is planned for the immediate future, but it is unclear whether all the planned expansions will be implemented as scheduled.
- There is a possibility of a steel production capacity overhang develop-

ing during the period to 2015.

At close to £7,000 a copy, this is a corporate buy. MBR has a history of producing excellent analysis under



its Head of Research, Brian Levich, who has a deep personal knowledge of the global steel industry.

Co-author is Satyabir Bhattacharyya (above), a graduate of Imperial's Business School. He also studied operations research at the LSE. Satyabir has 30 years of rich experience in management consulting and industry, mainly in India. His CV includes spells with Andersen Consulting (now Accenture), KPMG and IBM as well as a prestigious list of domestic Indian associations including Tata Motors, Mahindra British Telecom, Tech Mahindra and Jet Airways. He is currently director of management consulting business at CHR Global.

Bill Bradford

Contact satyabir@yahoo.com*

CLIMATE CHANGE

BY JOLYON NOVE

An e-book available for purchase as a download or CD from www.climate-changethebook.com.

It was also given as a paper, *The Business of Climate Change* at EcoForum April 2009, in Australia

NO PRIZES for guessing the subject matter here, but Jolyon Nove (Civils 60) takes the apocalyptic view that global efforts to control greenhouse gases will fail and in about 50 years time will be replaced by local solutions – for those of us who survive, that is. Those survivors will need to be in sustainable clusters with self-sufficient food, energy and water supplies

A long-term resident of Australia, Jolyon believes that the country is well placed for the survivable future and coastal cities will be the best places for these clusters. His preference is for greenfield sites but he recognises the political reality that modifications to existing conurbations will be more likely.

In his own words: 'the Australia of the future will be a continent that has

learned and applied the importance of analysis, forethought and recognition of the engineering and financial and human relations realities in the long-term impact of climate change'.

jolyon@optusnet.com.au

Bill McAuley

COOL IT

BY BJORN LOMBORG

Vintage Books

ISBN 978-0-307-38652-6

THE best-known contributions to handling climate change debate have probably been *An Inconvenient Truth* by Al Gore (a politician) and *The Skeptical Environmentalist* by Bjorn Lomborg (an economist). Not surprisingly they are in many respects contradictory, since the skill sets and viewpoints of the two authors are very different. There are, however, indications that their recommendations are beginning to converge. A straw in the wind is the recent appointment of Cambridge academic David Mackay as an advisor by the UK Government. He is reported as saying on the subject of energy supply, "I'm pro-arithmetic".

Meetings at Rio de Janeiro (1992)

and Kyoto (1997) on climate change produced only limited agreement and implementation, although they did much to encourage debate. The Vintage edition of 'Cool It' is Lomborg's most recent summary on the matter. There is an extended version with the same title, published by Cyan. They could be regarded as his input to the UN climate meeting in December 2009 in Copenhagen. Much of their content is an update on or restatement of his earlier report, *Global Crises, Global Solutions*, published in 2004.

One matter should concern us all. We are talking of the possibility of politicians spending very big public money, of the order of trillions of US dollars. Most of this would come from taxes; private finance is unlikely to show much enthusiasm unless subsidised.

I would not claim that Lomborg propounds the whole truth, although I feel he and his associates are rigorous in their approach. Economics is after all an inexact subject. What I can say is that I find his economic arguments more persuasive than political anecdotes.

Bill Bradford

Alumni share their views... Alumni share their views...

Reactions read with alarm

FROM STEPHEN QUIN (ESE 80)

UNFORTUNATELY, I missed Lord Monckton's original article on the causes of climate change but did read some of the reaction in your most recent issue, and with some alarm. When did scientific theories become no longer open to debate?

The whole basis of science is to evaluate data, present analysis and present conclusions based on the author's interpretation. The debate cannot be 'had' until the interpretation is indisputable and even then, more knowledge can redefine even those items... look at Newton's Laws of Motion through to Einstein's theory of relativity and beyond. I find it disturbing when scientists reject open debate

of issues, especially some as important as global climate change.

In respect of climate change, there are many respected and reputable scientists who disagree with aspects of the current climate change debate. Recently there was an advert in one of the large US newspapers signed by dozens of Ph.D. scientists taking exception to the direction of the US policy on the climate change issue. There are many respectable scientific publications questioning the relationships between emissions (and especially human based emissions) and climate change. I do not know which position is right but I am encouraged by healthy debate. And what I do know, as a geoscientist, is that climate change has been happening on a geologic scale

long before humans had any influence. As a scientist I look at data and draw conclusions, not join a group think because it is popular.
*squin@capstonemining.com **

See Stephen's letter on the website (address on page 2). It includes illustrations of subjects which contribute to the debate.

Disappointed

FROM CHRIS JOSEF (Civils 72)

I AM disappointed that *Imperial Engineer* gave the space for Lord Monckton to express his views. That was a poor editorial decision.
chris.josef@arup.com

Editorial policy is to publish both sides of any argument. Ed

Climate change cat among pigeons

With not enough room to publish Charles Brindley's (Civils 78) complete article and because we thought it unfair to paraphrase, we start his argument here and continue it on the website (address page two)

ORDINARILY, I choose to sit on the sidelines and listen whenever global warming is debated, but in view of your last issue, I shall make an exception, foolishly perhaps. A cat let loose amongst the pigeons can sometimes cause a mildly amusing stir of no lasting consequence.

Climate Change: Global Warming, or Cooling?

To an ignorant bystander, the general consensus seems to be that current climate change is largely attributable to the increasing amount of CO₂ in the atmosphere causing the earth to warm up at an alarming rate, and giving cause for great concern of impending catastrophic consequences for mankind and most, if not all other life on our fragile planet.

Whatever may be happening in the short-term, and whatever may be the causative factors, it is important to appreciate that it is only the surface of the earth to a very small depth that may, on balance, presently be warming, together with the lower atmosphere in contact with it. As this thin shell, however, does constitute most, if not all, of the 'biosphere', we do have reason to be alarmed.

It is suggested that 'global warming' should more accurately be regarded as a steepening of the thermal gradient across the 'biosphere' as a consequence of possible changes to the thermal conductivity of the atmosphere. An alternative causative factor, whether secondary or primary, may be direct heating of the surface, itself, by insolation, as a consequence of increasing areas denuded of vegetation, especially tree cover; desiccation, desertification and urban expansion, resulting in lesser overall cloud cover and a drier, less humid atmosphere, rains less predictable and of shorter duration, greater extremes of temperature difference, increased atmospheric instability, torrential rainfall of disastrous

intensity, storms of increasingly destructive violence. It is suggested that this latter combination of factors, all attributable to mankind also, may be the more significant of the two.

However we may apportion the blame, allowing even a relatively small increase in average ambient temperature to continue unchecked may be crucial to whether we survive or perish. It could be prudent, perhaps, to engage the problem on both fronts.

I have not the remotest idea as to how we shall fare as regards curbing our seemingly insatiable demand for more and more power; to what extent we may be able to convert to 'clean', 'green' alternative energy sources, by how much we shall succeed in reducing the size of our 'carbon footprint', nor how long we shall need to pursue such a quest, nor at what cost. But I imagine we could make an immediate start in the right direction by being far less needlessly extravagant, more thoughtfully economical in our use of power generally. All this may entail a drastic change in 'lifestyle', materially less rewarding, but, who knows, greatly enriched spiritually, perhaps.

I would tentatively suggest that we could turn our thoughts more towards tackling our global problem of a deteriorating biosphere on the second front with more certainty of some success within a time scale of half a century, and a significant tangible improvement within twenty years, possibly sooner. This approach of restoring our tropical rainforests to their pre-1940 extent, re-afforestation of all upland catchments, major and minor, re-greening our prairies, savannahs, and other grasslands, cleaning up our rivers, lakes and oceans, and allowing sorely depleted animal species to recover... *

NOW READ ON *csbrindley@ukonline.co.uk*

Digital age no problem

JEFFREY Borinsky (EE 78) has won a competition organised by Digital UK to find Britain's oldest working TV. The aim was to show that you can convert any set, no matter how old, to work with digital transmissions.

The TV is a Marconiphone 702 and was probably used to watch the start of BBC transmissions from Alexandra Palace in November 1936. An ordinary Freeview box feeds a special 'Aurora' converter which gives the 405 line signal needed by TVs made before 1964. The 12 inch CRT is so long that it is mounted vertically and viewed through a mirror.

Jeffrey (right) BSc(Eng) ACGI CEng FIEE is a consultant engineer. See website www.borinsky.co.uk

ALUMNI NEWS & VIEWS

Six pages of who's doing what and where



Calling all Chaps

THE CHAPS CLUB needs to update its members' contact list as many of the current details are incorrect or are missing', reports Daniel Hill ICU deputy president (finance & services)

Can all members send current contact details (email, postal address and phone) to the new club email address – chapsclub@imperial.ac.uk

Even if you have received the Chaps Club newsletter recently, they'd still like to hear from you.

Other current officers are Ali Philpott (president 2009–2010) and vice president Ben Hanson.

Award for leading statistician



ADDING to his already considerable list of awards and publications, Tony Greenfield (above) has been awarded the Box Medal by the European Network of Business and Industrial Statistics (ENBIS).

This, and the American Society for Quality Statistics 2004 William G Hudson award recognises his life work, contributing to the development and application of statistical methods

Tony (Mech Eng 52), formerly head of process computing and statistics at the British Iron and Steel Research Association and professor of medical computing and statistics at Queen's, Belfast, is a visiting professor to the Industrial Statistics Research Unit, the University of Newcastle-upon-Tyne and past president of European Network for Business and Industrial Statistics. Tony is on tony@greenfieldresearch.co.uk

Paff tells of part in Battle of the Beams

A WRITE-UP in issue nine of *Imperial Engineer* instigated a website connection for a BBC correspondent to contact one of the last members of the team at Ally Pally (Alexandra Palace) which fought the Luftwaffe.

Paff (Wilfred Pafford, EE 31) is now 101 and living in a nursing home in Sussex, but, in October 1940, as a BBC engineer, he returned to the previously mothballed Ally Pally. He had worked there since 1932 and was to head the top-secret Operation Dynamo.

This was formed following Britain's discovery that the Luft-

waffe had the ability to use radio beams to guide their bombers to targets all over Britain.

Paff and team, and a tracking station in nearby Highgate, used the BBC's transmitter and radio wave scanner to block the enemy's Y-Gerat system.

By good fortune, the Y-Gerat system worked within the same frequency spectrum (40-50MHz) as the Ally Pally one.

Once the operators at Swains Lane, Highgate decided that the Luftwaffe navigator had missed his opportunity to identify his target, Ally Pally returned to standby. It was ready to diso-

rientate the next bomb aimer with its ear-splitting, howl, rather like the sound of a microphone turned up too high.

The jamming system may have been relatively crude but it's claimed that no more than 25% of bombers on the Y-Gerat raids released their load.

Very little is known about this life-saving operation, so if you can add anything, please contact the addresses on page two. Read the BBC article on http://news.bbc.co.uk/local/london/hi/people_and_places/history/newsid_8231000/8231874.stm

Music gives life lessons to top CEO

MEHER Pudumjee (right) has been named 'CEO of the Year' by the *Business Standard*, India's leading business newspaper.

Meher, chair of energy and environmental engineering company Thermax, was recognised for steadily increasing its sales and profits without compromising on corporate ethics.

She took the top job in 2004, having joined Thermax in 1990 as a trainee engineer after completing her postgraduate studies in chemical engineering at Imperial. Her progression through the company included a stint managing Thermax's UK subsidiary, before returning to India in 1996 to join the board.

Meher is a keen piano player and an enthusiastic member of the Pune Choir Group Chambers. She believes music has a lot of lessons for life in general.



Tales to tell of Min Tech alumni?

The Mineral Technology Department existed for around 40 years.

Bill Bradford (Min Tech 57) calls for previously unrecorded information about its graduates and their careers.

OFFICIAL records of Min Tech are buried in the College archives: many achievements of its graduates are not. I think it's well worth collecting them before the memories are lost.

The Department was created in the early 1950s, as an offshoot of the well-established Mining and Metallurgy Depart-

ments of the RSM. It was a course of the type now becoming fashionable again; tailored to meet a specific market. As economically-attractive deposits became more mineralogically complex in character, the technology needed to create a profitable mining operation became more sophisticated.

It produced its first graduates in 1956, when the Department was called 'Mineral Dressing'. For a short period of time in the 1960s, I personally held the job title of 'Ore Dresser'.

The most unusual graduate was probably Brendan Soane, who graduated with me in 1957. He ended up as a senior cleric

in the Vatican. John Bramley and others collected information some years ago on his early mining-related life for a biography being written after Bren's death.

Can you match or add to that? Contributions (or questions) please to Bill Bradford at bbradf0110@aol.com

A CHRISTMAS Antarctic visit took Philip Varley's (inset) total of countries visited to 80 and continents to seven. The number is now 83.

He writes: 'My next long trip will be to hike the Annapurna Circuit, next October. I'm in training here in the Colorado Rockies to ensure I can do the daily mileage at above 11,000 feet.

Philip (Chem Eng 79) was a chartered accountant and worked with Andersen before emigrating to the US to gain an MBA. 'I'm now a turnaround specialist with The Barrington Group, acting as interim CEO or CFO for private equity groups who want to enhance the performance of their portfolio companies.' pvar@earthlink.net

Now it's on to Annapurna



Engineer exercises his right to drive sheep over London Bridge



Still seeking 'Jim' and that team

After two successive snippets in Imperial Engineer, Dave Goodman (Min Eng 61) writes:

THE JIM'S TEAM in my recollection, only 50 years ago (gulp!) was one 'organised' by Jim Carter who was in Aero 55 or 56 onwards. Jim was an all-rounder, as I remember, having played soccer and hockey too. Jim's rugby team was a real mixture, many of them accomplished athletes in other sports, which made it

very formidable. There was one common talent however; they could out-drink any team in the home counties.

I would be very interested to hear of any 'sightings' of Jim over the years. There is another one of Jim's team out here in California, Duane Johnson (Petrol 60).

IF IT were not for the foresight and commitment of our 19th century forebears in the City of London Corporation, 16 livery companies, and the City & Guilds of London Institute, we would not be here today, writes CGCA past-president Barry Brooks (EE 71). This investment in engineering education is all the more impressive when there was no engineering livery company in 1878.

It was not until 1983 that the Worshipful Company of Engineers was established with the strong support of the Lord Mayor of the City of London and Alderman Sir Peter Gadsden, the founder master.

As a modern livery company, with a royal charter, the Engineers Livery Company has some specific entry criteria, requiring engineers to be freemen of the City of London and char-

tered engineers. To become liverymen, they have also to be fellows of a recognised engineering institution or of the Royal Academy of Engineering. The number is limited to 350.

So, what has all this to do with driving sheep over London Bridge? Not a lot, really, but it is an excuse to do what livery companies do – raise funds for charity. In this case, Barry (the one with the Australian bush hat!) is an assistant to the Court of the Engineers' Livery Company and supported the Lord Mayor's Appeal, with a bit of fun (for the spectators) and without cruelty to animals (or the sheep drovers!).

If you are interested in joining the Livery, take a look at www.engineerscompany.org.uk/ and ask Barry about the privileges, responsibilities, networking and other benefits.

Excitement, friendship and challenge for £53

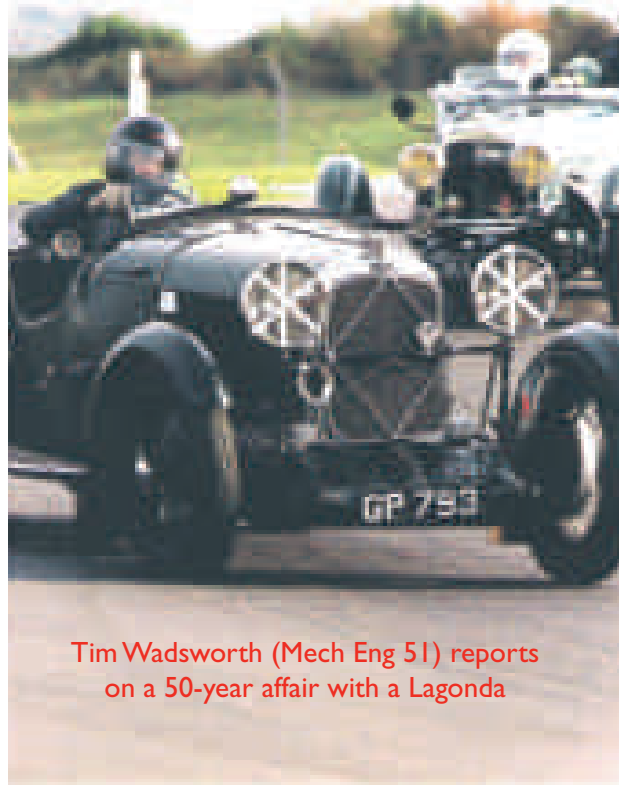
TURN back the clock almost exactly 50 years and you find two third year mechanical engineering students contemplating an abandoned vintage Lagonda, parked for the last two years in the middle of Queens Gate.

The start

'You're keen on vintage cars, you should buy this'. These words from my fellow student Dick Ainger began an ownership which over the years has brought me adventure, excitement, friendship, engineering challenge, and now a modest retirement income. And all for £53!

My first trip with Dick Lance and Barry Coleman was to Brighton, following Bo in the annual Veteran Run. Bo made it; we didn't. The bitter cold I endured being towed back from Brighton behind Chris Pack's Riley has never been forgotten.

After graduation, I spent six months on a major rebuild (the first of many) and then set off with total abandon and a full load of passengers for the south of Spain. We had no idea what we would do if we broke down,



Tim Wadsworth (Mech Eng 51) reports on a 50-year affair with a Lagonda

which we did, but somehow got ourselves back home.

Over the years my wife and I have made many more overseas trips, even going as far as Greece one year for an international rally, but it was

early retirement that has really allowed me to make full use of the Lagonda.

The Lagonda is a heavy car with a modest two-litre engine but its twin-cam design is capable of considerable development.

I was lucky to be able to consult ex Guildsman Mike Monaghan, then technical director of Ricardo for advice. First results were sufficiently encouraging to try my hand at a vintage hill climb.

This has led on to circuit racing and further engine development, to the point where the car can keep well up with its peer group, albeit at the back of the field.

All this work comes at a cost. It is, therefore, fortunate that the Lagonda is an ideal wedding car and can earn its keep.

The finish

Transporting pretty girls round in your vintage car can't be a bad way to earn a bob or two. Although they do express some surprise when I tell them that the week after their wedding, I'll be racing the same car at Silverstone or some other circuit.

I am now celebrating 50 years of ownership with the car going faster, and looking better, than ever - if only the same could be said of the driver! tim@lagondahire.co.uk

Can you name these journalists?

JOHN POWNALL (Min Eng 55) has sent in these pictures of the *Felix* editorial board in 1954 (top) and 1955 in the hope that someone will be able to identify those pictured.

As John writes: 'In both photos I'm the person seated at far left and standing behind me (red hair and beard) is Bill Hudson (also RSM). In the 1955 photo, seated far right is John Bramley (MinTech 59). The chap in the middle of the back row in the 1954 photo is Dinesh Kale (RSM 55). The 1954 editor's name was Geoff, but I have forgotten his surname.'

'I was on the editorial board of *Felix* in the mid-1950s, although concerned with the commercial aspects rather than editorial content.'

John Bramley's memory also fails him but writes: 'I was editor of *Felix* in part of the '56-'57 year. In '55 I think I was fea-

tures editor and wrote a regular gossip column called Nelson's Column (very corny!).

'Incidentally, I'm pleased that this email correspondence has given me John Pownall's whereabouts.'

Can anyone out there supply any other names or contact addresses. Email john.h.pownall@btinternet.com or jvbsheff@googlemail.com



Bourton Plowman writes...

AFTER graduating from Guilds in 1945 and service in the Sappers, Professor Pippard arranged for John Plowman to join the new Concrete Department for a post grad concrete technology course. He gained a DIC and then his doctorate.

'I rejoined the Boat Club where I had rowed during the war years', writes John, 'par-

ticularly in the Heads of the River. Charlie was pleased to see us back but claimed there were too many..... ex-majors who didn't wish to train or listen!

I don't know if there are any of Pippard's or Baker's students left, but best wishes to them all! John lives in Bourton on the Water and is on 01451 822611.



New group in Windy City

John Head (Min Eng 70) has written to say there's now an Imperial alumni group in Chicago and they held their first meeting in June. The first speaker was Professor 'Dot' Griffiths of Tanaka Business School. Any RSM or Guilds alumni who want to be involved in the group should get in touch with me', says John. hjohn@ameritech.net, jhead@continentalplacer.com ABOVE: Jennifer and Scott Beall, Cathy Morley with Ted (Imperial's roving teddy bear) and Dot.

Contact call from Canada

VOLUME One of Parvez Kumar's bio/autobiography, which covers his days at Imperial (Aero 62) and with the Gliding and Rifle clubs, was published in September 2008.

He says that details can be seen at www.trafford.com/08-0858 if anyone is interested. 'A mention of it might get me back in touch with ex-colleagues', says Parvez, who now lives in Canada.

Contact Parvez at parvezk@telus.net



Alumni fund new scholarship

Yok Pongthunya, Earth Science PhD student (second left), has won the inaugural John Archer award, valued at £5,000. This award was set up by ex-students of John Archer, a former Professor of Petroleum Engineering in ESE. He was then dean, then pro rector and deputy rector in College before becoming the head of Heriot-Watt University. The award is to assist students in financial hardship to complete their PhD studies.



SINGAPORE MP since 2001, Siew Kim Wee, receives a certificate proclaiming him a fellow of City & Guilds from its chairman Michael Howard (right). Mr Wee, who graduated with first class honours in aeronautical engineering in 1984, is also deputy CEO and president (defence business) with Singapore Technologies Engineering. (Picture City & Guilds)

Septuagenarian sensation

QUICK as the lime that has been part in his working life, Ed Whitlock (Min Eng 52) is 13 times running age group, world record holder. And now, despite being told by a doctor it was 'game over' for him, he has just completed a half marathon in the fastest time for someone over 78 years old

Famous doesn't begin to describe Ed's star status. His 2:52:47 at the age of 69 in 2000 made him the oldest person to break three hours in the marathon. Three years later, after nearly a two-year layoff with arthritis in his left knee, Ed became the first person over the age of 70 to run a marathon under

three hours, clocking a 2:59:10. In 2004, he bettered his record with the current men's 70-74 world record, a mind-blowing 2:54:49, aged 73. He followed that up with successive 75-79 world records.

His personal bests of 4:31 for the mile at 17 and 14:54.4 for three miles were fast for their day. He also ran against Chris Chataway and even beat Gordon Pirie in cross-country.

The jaw-dropping performances haven't been without their challenges. On top of arthritis in both knees, Ed has struggled with a nagging Achilles injury since youth.

Although working life took Ed away from running for around 20 years, and to Canada, he was back in time for the masters movement when it caught on in the 70s. Running against others in his age bracket, he rose through the world ranks.

Runners say he floats along, hardly seeming to touch the ground and his running form seems to come naturally to him. And even if he never achieves his aim of another marathon, Ed has no plans to give up running yet! ewbw@sympatico.ca *



Ed running recently (left). Inset, in 1952, representing Imperial.

Arup chairman

PHILIP DILEY (Civil 76,) has been appointed as chairman of Arup. The position covers Arup's global operations.

Philip is a fellow of the Institution of Civil Engineers and a member of IStructE. Some of his landmark projects include Kansai International Airport (89-94), the Ashmolean Museum refurbishment (92-96) and the Scottish Parliament (98-04). More recently, he has been involved in Bishops Square, Spitalfields and T5 at Heathrow.

Flying higher

ANDREAS Mogensen (Aero 99) is one of six new astronauts selected by the European Space Agency out of over 8,400 candidates. He is part the first group of new recruits to join the European Astronaut Corps since 1992.

Aussie welcome

BILL MACMILLAN (Chem Eng 62) would like to hear when any student is provided with funds to deliver a paper in Sydney or elsewhere in NSW. That goes for alumni as well.

'We would be delighted to offer them hospitality during their time in Sydney. We should also be able to provide a 'cheer squad' at their presentation'. Contact Bill by email macmillanw@bigpond.

MBA through Sainsburys

JONATHAN McCallum, has been awarded a scholarship to study for an MBA at the elite INSEAD Business School. He has worked for Mott MacDonald in Singapore since completing a masters in civil engineering in 1999. He's one of several talented young engineers who have benefitted from more than £290,000 in funding awarded by the Royal Academy of Engineering on behalf of the Sainsbury Management Fellowship.

Kevin's Boys Own life remembered

Both *The Times* and *The Telegraph* paid tribute to a remarkable life when Kevin Walton (Civils 39) died on April 13. Here we try to sum up his life.

'ENGINEERING and mountaineering were prominent themes for much of Kevin Walton's varied life, and it was in the latter sphere that he won his Albert Medal for rescuing a member of an Antarctic survey team, from a crevasse in 1946.

Kevin served 10 years in the Royal Navy, joining as an engineer officer in 1939 and was aboard the *Rodney* during the decisive action against the *Bismarck*. He later served in destroyers and took part in the Barents Sea action. The *Onslow*, where Kevin was engineer officer, was holed. He received the Distinguished Service Cross after being lowered on a rope to put out the fires. Kevin was also mentioned in dispatches while aboard HMS *Duncan* in the North Atlantic,

In 1945, Kevin sailed for the Antarctic and carried out

his famous crevasse rescue and played a prominent part in the work of the Antarctic Survey. He scaled several previously unclimbed and is commemorated by Mount Walton in British Graham Land.

Kevin received the Polar Medal and, in 1952, its Clasp and Silver Commendation for a further crevasse rescue, and the Queen's Commendation.

'After return from Antarc-

tica he began a teaching career and taught workshop engineering at Oundle School, the Royal Naval College, Dartmouth, and at Malvern College. He was one of the original instructors at the Outward Bound Mountain School and later became involved in the construction of a nuclear power station in Wales and also in British Voluntary Service Overseas'. He wrote a number of books.*



Kevin with son Jonathan, also a holder of a Polar Medal, at the CGCA's 2007 dinner.

A truly mechanical man

Friend of the family Michael Gourd remembers colleague Harry Threlfall (DIC 56) who died on April 3.

I MET Harry Threlfall in 1966 when I joined Langley Alloys' German subsidiary – Deutsche Langley Alloys. Harry was sales director at its Langley foundry and works and was responsible on the main board for the German operation.

As part of restructuring operations in 1968, Harry and I became joint general managers of the GmbH with Harry based in Langley and me running the German day-to-day operation. Harry and I worked closely together and I can say I found his leadership inspiring. Indeed, we discovered that we shared a passionate interest in music (jazz), humour and cars.

When ownership of Langley Alloys passed to the Scottish company Low and Bonar in 1982, the Langley premises, were sold and others rented in Slough where the rolling mill was relocated. There followed

a number of years of consolidation when Harry spearheaded the introduction of Langley's FERRALIUM Alloy 255. It was so successful that it was used in the centenary refurbishment of the Statue of Liberty.

A management buy-out occurred in 1985 and Harry became joint managing director of Langley Alloys Ltd and chairman of the supervisory board. He remained in this capacity until early retirement to look after his wife, Doreen.

Harry was by nature, as in calling, a 'mechanical man' who had the ability to analyse complex commercial problems so that the way forward appeared to be the most logical of all solutions and readily understood by all involved.*

Journey from dockyard to the Ministry

FROM apprenticeship in Portsmouth Docks to assistant director for the Ministry of Defence at Chatham, via a scholarship and honours degree at Imperial, summarises the life of George Brombley. As was said at his funeral it was equivalent to the rank of rear admiral. Not a bad for a lad who started as a dockyard apprentice.

The tributes also mentioned his early career at English Electric and John Booth & Co, Birmingham and the 61 year marriage which started in Stafford.

During his time at Imperial, George rowed for the College (it was the only sport you can do sitting down!), leading to a life-long attendance at Henley.

George (EEE 44) died on July 22, aged 88.*

Complete versions of the obituaries, marked at the end with an asterisk *, can be found on the website address published on page two.

In at REME start

ELECTED as a member of Link in 1929, Major-General Denis Redman (EE 30) joined Midland Electric Light and Power after his course in electrical engineering at Imperial. He found his niche when he was commissioned into the Royal Army Ordnance Corp, transferring to REME on its formation in 1942. He died on August 10.

Distinguished service in the Middle East in WWII, led to two mentions in dispatches. He also helped set up REME there.

After time in the War Office as AQMG, Denis moved to REME Training Centre. He spent a year as deputy director of electrical and mechanical engineering for 1(BR) Corps in BAOR, before taking up the same appointment for the whole Corps at the War Office. In 1957, Denis became Commandant of the REME training centre

After retiring from the Army in 1962, Denis was military adviser to Sperry Gyroscope, and later chairman of the civil service selection board. Colonel Commandant of the Corps from 1963-68, he was appointed OBE in 1942 and CB in 1963.*

Friend of 73 years remembered

ALEC MACDONALD (Mech Eng 37) died, aged 94, on June 20, in Ascot, where he had lived for nearly 50 years.

We were both elected to the Links Club and he was captain of the Motor Club who looked after Bo. Alec was an usher at my wedding and I credit the Links Club and the Guilds for starting a friendship of 73 years

After college we went to the Engine Division of the Bristol Aeroplane Co for a two-year post graduate apprenticeship

During the war, Alec reached the rank of squadron leader.

Alec had some difficulty getting a job because he had little industrial experience. However, he was selected by Production Engineering (PE) to be one of its management consultants. He was so successful that he stayed with them for 32 years, retiring in 1982.

Alec had five children, who between them got six scholarships to public schools and Oxford. None is an engineer!

Robby Robinson



Geologists' geologist

AFTER graduating in mining geology in 1968, Steve Bugg joined Shell for its push into mining. He spent three years exploring for base metals in Western Australia. An MSc in applied geophysics and a PhD on lead/silver deposits in Kenya followed.

A long stint in pioneering exploration for gold in the Tanzanian Shield followed, with wife Corinne and their young family. Steve correctly predicted Tanzania was to become one of the world's great gold provinces.

Back in Australia, Steve explored for gold in the Solomons before going to Indonesia as exploration manager for Dominion Mining and later for Barrick Gold. Steve was one of the first to seriously question the claims of a major gold discovery in Kalimantan.

Steve suffered severe head injuries in a car crash while in charge of proving up the immense Rosia Montana gold deposit. Tragically, he had a bad fall this year, from which he never regained consciousness.

A geologist's geologist. Steve was always the adventurer, climbing Kilimanjaro (above) and many epic safaris among his exploits. **John Horsburgh**

Enthusiastic and devoted teacher

DAVID Hardwick, a former senior lecturer in hydraulics in Civil Engineering, died on May 18. He retired three years ago having served as senior tutor for many years.

He was an enthusiastic and

devoted teacher and supporter of the students, and will be sadly missed.

David had been ill for some time, spending his last weeks in hospital, where he died with his family at his bedside.

Sad return to England

PROFESSOR John Oldfield (EE54) died on July 6 while visiting the UK. He was 76.

John and his family settled in the USA in 1978 and until his retirement he was professor of

electrical and computer engineering at Syracuse University New York.

He leaves Julienne, his wife, two daughters and two sons. **David Baker (Min Eng 61)**

Electronic pioneer

CHARLES Sandbank (EE PhD 56), a world leader in the development of electronics, telecommunications and digital broadcasting, died last December 15.

Born in Vienna in 1939, Dr Sandbank's career included helping develop the first semiconductor integrated circuits in Europe. He was responsible also for the team that pioneered optical fibres for communications and, in 1976, built the world's first wideband digital optical fibre communication system.

Eminent ancestor

PATRICK (Bob) Tillard, who took his electrical engineering degree in 1938, died on April 8 aged 93. He was a self-employed consultant towards the end of his career. Bob was a descendant of the Earls of Chesterfield.

In 1984, Charlie (as he preferred to be called) became BBC deputy director of engineering. As head of research, he initiated the use of Nicam stereo sound. He was later broadcasting technology adviser at the Department of Trade and Industry and helped develop ITU-T J.2, a global standard approved by the International Telecommunication Union. It supports the development of interactive television content.

In 2000, Charlie was co-chairman of the European Digital Cinema Forum, lobbying government-backed bodies to invest in electronic digital projectors for cinemas.

He was a Royal Academy of Engineering visiting professor in the principles of information systems design at Bradford University which gave him an honorary degree.*

Mech Eng first

RAYMOND Sargent of Thornbury, South Gloucestershire, died on December 24 2008. He graduated with first class honours in mechanical engineering in 1949.

Relaxed and always laughing

FOLLOWING a brief mention of the death of Lt Col Geoffrey Wood, CBE, FCGI, FEng (Civil 32) on June 30 2008, we have found a few more details.

He was president of the CGCA in 1975-76, and had a distinguished 10-year Army career. During 30 years in partnership with Ove Arup, he remembered particularly working on the Sydney Opera House.

Geoffrey had an independent mind and a relaxed manner and was always laughing, says Rod Rhys Jones.

'I once visited him at his

home near Brentwood. It turned out to be a pre-fabricated house he had built in amongst the trees on steel columns. He'd discovered that the planning regulations didn't prevent doing this. Subsequently he added a ground floor.

'I also remember he said he always took a nap in the office after lunch. He said it made him more efficient at meetings in the afternoon and he could then continue business and social meetings late into the evening.

Geoffrey died in New Zealand, aged 96.

