The Royal Academy of Engineering

News
Spring 2007

Academy to move to 3 Carlton House Terrace

In what may prove to be one of the most exciting developments in the Academy's history, we have acquired the lease of adjoining Grade 1 listed buildings at 3 and 4 Carlton House Terrace, London SW1. The President identifies the vital importance of this relocation in his President's Column; he also sets out the longer term opportunities created through this strategically located new home.

The building overlooks The Mall and St James's Park, and is near the Royal Society and the Institute of Materials, Mining and Minerals. It is well served by public transport and still conveniently close to the government departments regularly visited by Fellows.

The increased size (25,000 sq ft) and much better layout (including ceiling heights!) of the principal floors will provide excellent facilities for meetings, conferences and dining. There are eight large rooms on the ground and first floors which can seat between 40 and 90 people. The upper two open plan floors have capacity for around 75 staff. When funds permit, the basement could provide high quality lecture facilities for around 130 people.

The running costs of the building are much lower than one might expect given its size and location - a very important factor in Council's decision to acquire the lease. The capital cost of c. £5 million reflects the low rental; in addition significant funds will be needed to cover upfront refurbishment and other transition costs. In the short term, these upfront costs will be met from the Building Fund and a mortgage, topped up from General Reserves. The longer term redevelopment of the basement area may cost in the order of £7 million; a sustained fund-raising campaign will be needed to achieve this. The Academy's Building Project Committee has appointed an architect and construction experts, and we expect greater clarity about the building's potential and costed options to emerge shortly. Good engineering and sustainability will be key considerations. Consultation is also in hand so that we understand what facilities Fellows would like to have.

To date well over £3 million has been raised through the Fellowship which is a terrific achievement. With the energetic help of the Academy's Development Steering Group chaired by Sir John Parker, efforts will now be stepped up to raise the additional amounts required. We have a good story to tell. It is very much hoped that more Fellows will be inspired to offer their own support, given this 'once in a lifetime' nature to the Academy's move and the exceptional opportunity it provides to raise the profile of engineering in the UK.

We expect to take occupancy in late 2007.

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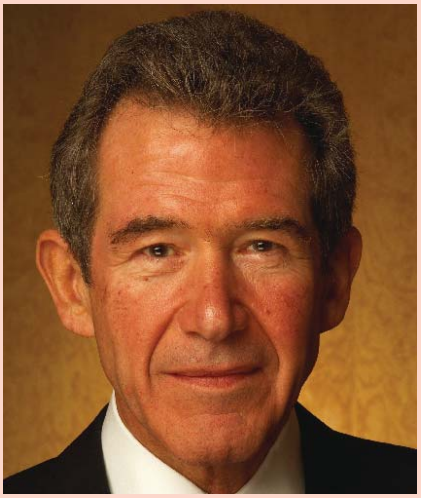
Carlton House Terrace viewed from The Mall, with nos 3 and 4 highlighted in white

The President's Column



I am delighted to be able to report to you that The Royal Academy of Engineering has acquired the lease of 3 Carlton House Terrace and will move its headquarters there from 29 Great Peter Street in late 2007.

3 Carlton House Terrace provides an exciting new base from which to raise the profile of engineering and will offer improved facilities to deliver an extensive range of activities, events and campaigns. The Academy's new home will provide 50 per cent more floor space compared to its Great Peter Street premises at a substantially lower rent. This will give us more space to share the achievements and potential of engineering.

The move will also enable the Academy to work more closely with the other national academies based in Carlton House Terrace. We already collaborate on joint projects with our sister academies. For example, we recently worked with The Academy of Medical Sciences to produce the report *Systems Biology: a vision for engineering and medicine*. The move to 3 Carlton House Terrace will make collaboration of this kind easier and enable us to build on our track record of sharing knowledge with the other national academies.

The new premises will enhance the Academy's operational effectiveness. Staff and Fellows will be able to work in a modern, spacious, open-plan environment. This will transform internal communications and strengthen the coherence of the Academy's activities.

Our move to Carlton House Terrace is emblematic of the Academy's progress and growth. Just as The Academy outgrew its original offices at 2 Little Smith Street, so our Great Peter Street premises, despite serving us well for so long, no longer meet our needs. Our existing premises do not provide sufficient space for the Academy's staff or Fellows. Nor does Great Peter Street provide us with a building that demonstrates the importance and vitality of engineering. Moving to 3 Carlton House Terrace will address these deficiencies.

As you know, it is my firm intention to move engineering from the fringe of society towards its very heart. This is vital if more of our young people are to be inspired by the role of engineering in solving many of the great problems of our time: climate change and energy provision; poverty reduction; health and wellbeing; and education. Moving the Academy to 3 Carlton House Terrace is crucial to achieving this objective. Our new, more visible, premises will enable us to promote and celebrate excellence in engineering more effectively. Engagement with the public and with policy makers will be strengthened. The Academy already does much valuable work in promoting innovation, developing engineering skills and engaging with the public and the policy process. Our new home will enable us to build on existing achievements and take on new challenges.

Homer tells us in the Odyssey that Odysseus' journey home from Troy to Ithaca took a decade and cost him the lives of all of his men. The Academy's search for Carlton House Terrace has not been as traumatic as Odysseus' search for his home, but it has been time consuming and involved a considerable amount of hard work on the part of many Fellows and staff. I greatly appreciate the efforts of those who have made this move possible. In particular, I am extremely grateful to the Academy's Fellows and supporters who, in contributing to the Building Fund, have transformed our hopes of journeying to Carlton House Terrace into reality.

While 3 Carlton House Terrace is a fine building with great potential, it requires substantial work before it will satisfy all our requirements – it was seriously damaged by fire some 20 years ago and the renovation leaves something to be desired. We plan this work in two principal phases: phase 1 will get us in, with some refurbishment of key areas of the building; phase 2 will follow as resources allow. Our fundraising effort assumes great importance and I do hope that those of you who are able to do so will continue to contribute to the Building Fund. You will be helping to create a base from which we can enhance the effectiveness of your Academy and raise the profile of engineering. Thank you for your ongoing support.

Meetings and Visitors

The President has recently met with:

Sir Keith O'Nions HonFREng FRS
Director General of Science and Innovation, Office of Science and Innovation, Department of Trade and Industry

Lord Rees of Ludlow
President of the Royal Society

Lord Sainsbury of Turville HonFREng
Former Parliamentary Under-Secretary of State for Science and Innovation

Briefing: high power lasers and large optical systems

On 7 February at the DTI Conference Centre in Westminster, in the presence of the Royal Fellow, HRH The Duke of Kent KG GCMG GCVO, approximately 100 Fellows and guests gathered to learn about the state of the art in high power lasers and large optical systems. Under the chairmanship of Professor Pat McKeown OBE FREng, Founding President of the European Society for Precision Engineering and Nanotechnology, the audience were entertained, educated and enthralled by what the three speakers had to say.

First off was Dr Ed Moses, Director of the National Ignition Facility at Lawrence Livermore National Laboratory. He reported on progress with the construction of the 192-beam Nd-glass laser system for studying inertial confinement fusion and the physics of extreme energy densities and pressures. Described as 'nanotechnology on a large scale', the specifications for the component parts test the ability of high precision engineering. The eventual conditions created to produce fusion, by compressing and heating the thermonuclear deuterium-tritium fuel contained in millimetre-size capsules, are those found in the centre of stars. The goal is to achieve ignition by 2010 – the golden anniversary of the invention of the laser.

Following the description of the US venture it was time to hear of the UK's achievements. Professor Mike Dunne, Director of the Central Laser Facility at the Rutherford Appleton Laboratory spoke of the next generation of ultra high power lasers. For many years the UK has held a leading role in high power laser science with the world's most intense laser, the Vulcan Petawatt. He described how techniques need to be learned from other industries if the UK is to remain scientifically productive and advance towards laser-driven fusion power.
The third speaker was Professor Paul Shore, Head of the Precision Engineering Centre, Cranfield University and Director of the IKC for Ultra Precision and Structured Surfaces. He explained the pivotal role played by ultra precision surfaces in securing the required functionality of advanced technology systems. He spoke of the UK's new national centre for Ultra Precision and Structured Surfaces – a collaboration between Cranfield, UCL and Cambridge Universities together with UK and US companies.

The speakers were followed by a lively discussion session before the formal part of the evening was brought to a close. An article on the subject may appear in a future edition of *Ingenia* and a transcript of the meeting with the PowerPoint presentations can be found at **www.raeng.org.uk/events/pastevents.htm**

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Fellows' visit to the Grain LNG Terminal

Thanks to National Grid plc, the Academy was able to organise a Fellows' visit to the Grain LNG (liquid natural gas) terminal on the North Kent coast in January. With the UK becoming a net importer of natural gas for the first time in twenty years or so, such a visit provided an opportunity to see at first hand the scale of this change and the level of investment required to ensure the future of the UK's gas supplies.

The Grain facility started life in the 1970s when British Gas speculatively bought the site of the BP oil refinery, which was to be closed imminently. Initially, LNG was to be imported to a facility at Canvey, on the Essex side of the Thames Estuary, by the original Methane Queen, but this requirement disappeared when North Sea gas came on line later that decade. At Grain, British Gas built a peak shaving plant, which took gas from the grid and liquefied it, filling its tanks over a 100-day period in the summer, for release back to the grid during winter peaks.

Although a useful facility, with the changing state of the UK's gas supply (becoming more dependent on imports), it was decided in 2003 that Grain should be adapted to become an LNG import terminal. This involved the building of a jetty into the Medway, a 4.5km cryogenic pipeline to the plant and upgrades of the compressors and other machinery. Having completed the work, Grain accepted its first cargo of LNG in 2005.

Currently Grain houses four cryogenic tanks that can hold 200,000 cubic metres of LNG at -160°C. It accepts one LNG tanker per week, meaning that it is responsible for putting 3.3 million tonnes – 4% of the UK demand – in to the gas network. Expansion of the site is currently underway with the construction of three 190,000 cubic metre tanks (each the size of the Albert Hall) that will take capacity to 12 million tonnes per annum, or 12% of UK gas demand.

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Fellows visit the Grain LNG Terminal, able to hold 200,000 cubic metres of LNG at -160°C

Research News

Research Chairs and Senior Research Fellowships

We are pleased to announce the creation of a new Royal Academy of Engineering Research Chair and a new Senior Research Fellowship. In each instance, these are five-year appointments, co-sponsored with industry.

Professor Nina Thornhill has been appointed the ABB/Royal Academy of Engineering Research Chair in Process Automation at Imperial College London. Professor Thornhill, the second woman appointed to a Chair, has substantial experience working with industry and plans to use this Chair to enhance productivity and efficiency in the process and power industries by optimising the operation of installed industrial equipment. Process optimisation requires the prediction, detection, diagnosis and finally elimination of the causes of equipment breakdown, disturbance and malfunction. The result is a more efficient and effective industry.

Dr Sethu Vijayakumar of the University of Edinburgh has been awarded an Academy Senior Research Fellowship in Learning Robotics, co-sponsored by Microsoft Research. Dr Vijayakumar aims to develop machine learning techniques for autonomous systems in the areas of adaptive sensorimotor control and sensing, and to integrate and test these developments on an anthropomorphic robot platform.

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RAEng/Daphne Jackson Trust Research Fellowship

We are very pleased to announce the award of a Royal Academy of Engineering/ Daphne Jackson Trust Research Fellowship to **Dr Liping Zhang**. Dr Zhang will carry out a project to develop her expertise in metallurgy for application to the electronics industry. This will be conducted as part of a placement to combine re-training and R&D which will be conducted at both the University of Liverpool and industrial partner Thermacore Europe Ltd.

The Daphne Jackson Trust is a charitable organisation which aids and enables scientists, engineers and IT specialists to return to work after career breaks. These Research Fellowships are typically available for two years part-time or one year full-time, during which Fellows carry out a supervised research project and appropriate retraining.

This placement forms part of a scheme developed by Equalitec to promote careers and employment opportunities in IT, electronics and communications, particularly for women. Both the Academy and the Daphne Jackson Trust are Equalitec partners.

See **www.daphnejackson.org** for information on the Trust and **www.equalitec.org.uk** for information on the Equalitec project.

Global Research Awards

The Academy's Global Research Award (GRA) scheme funds UK-based engineers to undertake research at centres of excellence overseas. In the past three months, four new GRAs have been awarded:

Dr Andrew Adams of Reading University will work at Meiji University in Tokyo, Japan to carry out research on 'Privacy and Data Protection in the Global Village: Anglo-Japanese and Euro-Asian Comparisons'. Dr Adams is a computer scientist with legal training and also a speaker of Japanese, making him an ideal candidate for this timely research.

Dr Nicholas Dodd of Nottingham University will carry out his period of secondment at the National Postgraduate Naval College in Monterey, California, USA. The college is a renowned centre for the study of coastal dynamics and the data they have gathered there will allow him to progress his research on 'Beach Engineering: Field Validation of a Morphodynamical Stability Model'

Dr Venketesh Dubey of Bournemouth University will travel to the University of Delaware to work with Professor S K Agrawal, an expert in the growing field of Rehabilitation Robotics. Dr Dubey's previous expertise in experimental robotics will, he believes, substantially augment his project, 'Design of a Gravity-Balancing Upper-Arm Orthosis for Older People'.

Professor Jin Ooi of the University of Edinburgh is seconded for eight months to the University of New South Wales, Australia. Professor Ooi will carry out a project on the topic of 'Applications of Discrete Element Modelling to Industrial Handling of Particulate Solids'.

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Industrial Secondments Scheme

The Industrial Secondments Scheme aims to provide an opportunity for engineering teaching staff in higher education institutions to spend three to six months in industry with a view to improving the quality and industrial relevance of their teaching on their return. 12 awards have been made since April 2006. The successful awardees and their host organisations are as follows:

- **Dr Hanifa Shah** from Staffordshire University was seconded to Britvic Soft Drinks Ltd.
- **Dr Sue Black** from London South Bank University was seconded to the Software Development and Computer Networking department of IBM UK Ltd.
- **Professor Jin Wang** from Liverpool John Moores University was seconded to ABS Consulting Ltd.
- **Dr Markus Kraft** from the University of Cambridge was seconded to Computational Dynamics Ltd.
- **Dr Shuang-Hua Yang** from Loughborough University was seconded to Systems Engineering Innovation Centre of BAE Systems.
- **Dr John Collomosse** from the University of Bath was seconded to HP Labs.
- **Professor Adrian Cole** from the University of Central England was seconded to WDP Consulting Ltd.
- **Dr Marylin W T Goh** from the University

of Sheffield was seconded to Airbus UK Ltd.
• **Dr Kathy Simmons** from the University of Nottingham was seconded to E-On UK Plc.
• **Dr Lulu Basheer** from Queen's University Belfast was seconded to Taylor & Boyd LLP.
• **Dr James Bown** from the University of Abertay Dundee was seconded to NHS Tayside King's Cross Hospital.
• **Dr Richard Hibberd** from Nottingham Trent University was seconded to Siemens Enterprise Communications Ltd.

The Industrial Secondments awards provide a grant which is paid to the university to fund a replacement for the secondee's teaching (and teaching-related) duties. There is no closing date and applications are accepted throughout the year. For more information visit: **www.raeng.org.uk/research/univ/secondment/default.htm**

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Distinguished Visiting Fellowship Scheme

We are pleased to announce the launch of the Distinguished Visiting Fellowship Scheme in April 2007. The scheme will provide funding to enable an academic engineering department in a United Kingdom university to be a host for up to a month to a Distinguished Visiting Fellow from an overseas academic centre of excellence.

The aims of the scheme are to enable and promote international relations and networking at a senior level within the academic engineering community, to receive first-hand insight into world-class cutting-edge engineering knowledge and its applications and to harness world-class research capability by enabling collaboration with international experts.

There will be two rounds of applications. The deadline for the submission of the first round of applications is 29 June 2007. The deadline for the second round of applications is 26 October 2007.

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Council News

Council held its first meeting of the year on 15 January. The President reported on a new Academy initiative called 'Engineering for Society', being delivered in partnership with the principal engineering institutions. The aim is to raise the profile and enhance the recognition of engineering, to move engineering towards the centre of society. Climate Change and Energy is the first of a series of priority themes to be pursued.

On 22 December 2006, the Academy exchanged contracts with the Work Foundation to acquire the lease of 3 and 4 Carlton House Terrace, London SW1. This will become the Academy's new home, with the move likely to happen in late 2007. The New Building Project Committee is overseeing the appointment of an architect and other firms.

Philip Greenish reported that the bid for Grant-in-Aid funding under the 2007 Comprehensive Spending Review was presented to the Office of Science and Innovation (OSI). A number of meetings have been held with OSI to discuss the bid in more detail. The result of the spending review should be known in mid 2008.

In the face of a mounting deficit in the Academy's defined benefit pension scheme, closed to new members since 1 January 2000, Council took the decision to close it to future accruals with effect from 31 March 2007. The 13 remaining staff in the scheme will be transferred to the defined contribution scheme which replaced the original scheme in 2000.

Council adopted a 'Statement of Ethical Principles' which had been developed by the Academy following an extensive study. The statement has also been adopted by 14 other engineering institutions.

Prior to the Council meeting Dr Sue Ion, Chair of the Engineering Policy Committee, Professor Rodney Eatock Taylor, Chair of the Research and Secondments Committee, and Mr Peter Saraga, Chair of the International Committee, presented the work of the Engineering Affairs department during the last year.

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Engineering for Society

Lord Browne is determined during his time as President of The Royal Academy of Engineering to move engineering from the periphery of society to its very heart. This means demonstrating that engineering and engineers are crucial to solving the big challenges of the day, of which the most urgent is probably climate change and energy. The best way to achieve this objective is to work in partnership with the principal engineering institutions. Accordingly, under the chairmanship of Lord Browne, the major engineering institutions have convened a round table of experts from the engineering led profession to provide an engineering response to ***the Stern Review on the economics of climate change.*** The panel of experts has met twice since December 2006. It believes that the engineering profession has a crucial role to play in reducing carbon dioxide emissions. Over the coming months the round table will set out a practical approach for achieving this goal. The Royal Academy of Engineering will lead this process and Fellows will be regularly informed on the round table's progress.

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Summer Soirée

This year the Academy's Summer Soirée will be on the subject of 'Wealth Creation through Partnerships'. It will take place at Queen's University Belfast on 27 June and promises to be a most enjoyable event at a beautiful location. For details and bookings contact: *jacqueline.cox@raeng.org.uk*

Policy News

Management of Nuclear Waste

The Academy held a briefing on 13 December 2006 to discuss the future of radioactive waste management in the light of the final report from the Committee on Radioactive Waste Management (CoRWM).

Sue Ion OBE FREng opened the briefing with a review of the current state of legacy waste, showing the inadequacy of the old stores and demonstrating the urgency of finding a permanent solution in the UK. Gordon MacKerron detailed the process which CoRWM went through to produce their recommendations, stressing the concept of 'volunteerism' for communities willing to host a repository and detailed the Government's response.

In its response to the CoRWM final report, the Government charged the Nuclear Decommissioning Authority (NDA) with implementation. Phil Davis, Head of Waste and Nuclear Materials Strategy, outlined the changes within the NDA to gear up for the next phase of implementation of a waste strategy.

As a potential customer or user of a nuclear waste repository, British Energy has a keen interest in its development. Tony Free, Nuclear Liabilities Manager for British Energy, reported that CoRWM's recommendations were welcomed as was the Government response. British Energy had always planned on a 40 year timeframe for the availability of a repository and had set its interim storage requirements accordingly. Therefore, CoRWM's recommendation had not made a significant impact since they closely matched British Energy's expectations.

As the UK moves towards implementation, public engagement will become more important, in terms of the public in general and CoRWM's model of 'volunteerism' for host communities. Dr Doug Parr, Chief Scientist for Greenpeace UK, outlined Greenpeace's concerns over the interpretation of a waste solution being a go-ahead signal for new nuclear build. However, he did concede that legacy waste needed to be dealt with urgently.

A full transcript of the briefing along with the presentations is available at **www.raeng.org.uk**

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Watching the brain at work: breakthroughs in functional imaging

Functional imaging of the brain has made remarkable progress in recent years, particularly with functional MRI. Neurologists and neuroscientists are now able to investigate difficult problems like consciousness and perception and can map brain regions involved in particular mental tasks. New methods are being developed and there is now a great potential for rapid progress in neuroscience based on these exciting engineering developments.

Functional imaging was the topic of the UK Focus seminar that took place at the Academy on 23 January. The event was organised by Professor David Edwards FMedSci and Dr Mark Tooley and was attended by about 50 delegates. Presentations were given by Professor David Delpy FREng FRS and Geraint Rees, both from University College London, and Dr Adrian Chung from Imperial College London. After an introductory address, the proceedings focused on the use of imaging to study consciousness and perception. The event ended with a lively discussion and was followed by a reception.

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Dilemmas of Privacy and Surveillance

Everyday there are more newspaper stories about 'Big Brother Britain', reports exposing increases in the amount of data about ordinary citizens which is regularly collected, retained and shared. On the 26 March The Royal Academy of Engineering published a report examining the technology behind and the social impacts of this data gathering. The report, *Dilemmas of Privacy and Surveillance: Challenges of Technological Change*, reviews recent and future changes in surveillance technologies and argues that these technologies raise thorny dilemmas.

On the one hand, we need surveillance to prevent crime and we want the convenience of automated travel passes, such as Transport for London's Oyster

Low-level waste repository at Drigg. Copyright: British Nuclear Group Ltd

card; on the other, we might feel that the constant surveillance of law-abiding individuals is excessively intrusive and that it is unnecessary for our travel pass to create a record of every journey we take.

Can these dilemmas be negotiated successfully? The report offers a number of suggestions for managing them: from allowing more services to be used anonymously, to calling for a 'digital charter' outlining people's rights over their personal data. Privacy is an issue that raises serious concerns and the major conclusion of the report is that research is needed into designing systems that protect, rather than diminish, the privacy of their users.

The report's conclusions have been applied in responses to a number of public consultations; most recently the Nuffield Council on Bioethics' consultation on the forensic use of bioinformation. The Academy argued that DNA samples taken from people who have not been convicted of a crime, especially witnesses and volunteers, should not be retained indefinitely.

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Efficiency and Effectiveness of Peer Review Process

The Academy submitted a response to a Research Councils' consultation which was part of its 'Efficiency and Effectiveness of Peer Review Process'. The consultation proposed a number of ways in which the peer review process of awarding grants could be improved. Of these, the Academy supported a consolidation of research grant funding and a greater use of outlines, while rejecting the proposal of institutional level quotas. The response also gave some guidance on how to improve the assessment of potential economic impact of proposed research and emphasised the importance of finding reviewers who have sufficient expertise in the relevant field.

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Systems Biology: a vision for engineering and medicine

The Royal Academy of Engineering and Academy of Medical Sciences report, *Systems Biology: a vision for engineering and medicine*, was successfully launched on 1 February with a press briefing at the Science Media Centre. It was followed by a very well attended stakeholders discussion meeting at The Royal Academy of Engineering in the afternoon.

Systems Biology can be described as 'a groundbreaking scientific approach that seeks to understand how all the individual components of a biological system interact in time and space to determine the functioning of the system'. Engineering applications of Systems Biology will lead to the production of stronger and lighter materials for use in transport; energy-intensive biofuels; defence from biological weapons of mass destruction and prevention of harmful consequences of their use. Biomedical applications will improve our understanding of severe medical conditions such as heart disease, cancer and dementia and their treatment with better, safer and cheaper drugs.

However, UK resources in the field are currently scarce and international competitiveness poor. The report recommends the investment of £325 million over 10 years to establish three to five new Systems Biology centres of excellence and reforms in higher education to ensure that interested and capable students have access to the necessary interdisciplinary training.

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Responses to Government and other bodies

All the Academy's policy responses can be downloaded from:
www.raeng.org.uk/policy

International News

The Academy is in the process of stepping up its international affairs and has participated in a range of international activities in the past few months. In December 2006, Peter Saraga OBE FREng, Honorary International Secretary, and Dr Stephen Bold FREng (pictured below) travelled to Beijing to present papers at the International Forum on the Globalisation of R&D, organised by the Chinese Academy of Engineering (CAE), Chinese Ministry of Commerce and UNCTAD. The forum provided an interesting insight into the Chinese perspective on these matters, as well as serving as a valuable opportunity to strengthen relations with the CAE. The Academy will host a high-level delegation from the CAE during the coming year.

Other highlights have included a meeting on Europe's innovation challenge, organised by the Spanish Academy and Euro-CASE, at which Dr Mike Howse OBE FREng gave a presentation. Professor Julia King CBE FREng will also visit India in March to present the Academy's work on Educating Engineers for the 21st Century to an international engineering education conference, organised by the Indian Academy, the IIT Madras and CAETS.

Finally, thanks are due to those Fellows who have responded to the international links survey. The results of this survey are feeding into the development of the Academy's first International Strategy and will be circulated to respondents in the near future.

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Peter Saraga FREng and Dr Stephen Bold FREng in Beijing

Education News

Academy opens prestigious competition to all

The Academy is to open up its prestigious Student Engineering Design Poster Competition to all UK engineering departments for the first time. Previously, the competition has only been open to universities involved in its Visiting Professors schemes.

Participating universities are required to hold their own internal competition, for which they can apply to the Academy for a £500 bursary. From their own heat they then enter one or two posters into the national final which will be held at Loughborough University in July, during the 5th International Conference on Design and Manufacture for Sustainable Development.

A declaration of intent to run an internal competition should be communicated to the Academy by 7 May. The final closing date for entries is 4 July 2007.

An overall winner for best poster will be awarded a £1,500 cash prize. Three other prizes of £500 will be awarded to entries judged to be the best examples of: Design for Sustainable Development; Integrated System Design; and Most Innovative Design.

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The mechanics of skeleton bobsleigh

Research Student Development Awards

Five PhD students have won the Academy's prestigious new Research Student Development Awards. Michael Aspinall, Frances Baxter, Bryony Davidson, Bryan Horton and Iain Roberts will each receive a £5,000 grant for personal development projects to broaden their training.

Michael Aspinall of Lancaster University works on the Distinguish Project, a homeland security collaboration between Lancaster, Manchester and Liverpool Universities to detect concealed explosives. The consortium aims to build a system that enables efficient screening of goods in transit, both domestic baggage and international cargo. Using nuclear engineering research suspect items will be exposed to a beam of pulsed neutrons. This will cause the item to emit gamma radiation, which will reveal what elements are inside and whether they are explosive. The award will enable Michael to attend relevant conferences and present the latest results of his work.

Bath University's **Frances Baxter** is studying a range of ceramics with varying electrical properties that might be used as grafts to repair defects in bones. Mimicking natural bone is complex as it has some 'piezoelectric' properties – crystals within the bone generate a voltage when the bone is under stress, this effect may help to trigger bone growth. The award will enable Frances to broaden her experience by attending international conferences, including the Orthopaedic Research Society conference in Hawaii in October.

Edinburgh University has won two awards. **Bryony Davidson** is using non-invasive optical scanning to study live mouse egg cells. The award will enable her to broaden her experience by spending time as a visiting researcher at the University of Michigan and the Babraham Institute in Cambridge. It will also pay for her to take an intensive French course and to present her work at a conference in France in 2007 – the leading gathering of European experts in imaging biological molecules.

At Aberdeen University **Bryan Horton** is developing a new kind of wave power system. Bryan will use his award to broaden his experience while doing his research, including a study visit to his collaborators in Rome and Ancona. He has developed a mathematical model and just built a scale physical model of the wave-power generator and will start testing it on a shaking table soon and hopes to move on to testing it in a wave tank by the summer.

Iain Roberts, also from Edinburgh University, is studying the mechanics of skeleton bobsleigh (see bottom left), at which he competes at international level. Skeleton bobsleigh involves sliding head-first down an ice track at up to 85 miles an hour on a steel sled steered by the slider shifting their weight. The Academy's award will enable him to broaden his experience while doing his research, including a study visit to the Ice Physics laboratory at Grenoble. It will also pay for training to help him prepare an event for the Edinburgh Science Festival in 2008.

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Responses to the UK Government and other bodies

The Academy provides expert advice on a wide range of engineering issues in response to requests from the UK government and other bodies. For example:

The future sustainability of the higher education sector – purpose funding and structure. Submission by The Royal Academy of Engineering's Standing Committee for Education and Training to the House of Commons Education and Select Committee (December 2006).

The Bologna Process. Submission by The Royal Academy of Engineering's Standing Committee for Education and Training to the House of Commons Education and Select Committee (December 2006)

Visit **www.raeng.org.uk/policy/responses/default.htm** to see all responses.

Development News

New Year Reception raffle

The raffle for a remarkable bottle of 1950 Chateau Petrus was drawn by the President at the end of the Academy's New Year Reception in January. Sir Denis Rooke CBE FREng FRS held the winning ticket, and very generously he immediately re-donated the bottle to raise further funds for the academy's Development Appeal. Having already raised almost £1,500 from its first fundraising outing, the bottle is now being safely stored for a future event, and will provide all Fellows with a second opportunity to buy the winning ticket.

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The special bottle of 1950 Chateau Petrus

Christmas concert and art exhibition

Before the very popular Christmas concert at St. John's in December, the Academy held a reception for Fellows and guests. Dr Philip Bulson FREng kindly agreed to set up an exhibition of some 80 of his own paintings. Many were accompanied by beautifully hand-written texts. Fellows and guests were delighted by the diversity and richness of his work, and indeed many inquired if the paintings could be purchased!

The concert was equally appealing – a varied programme prompted by the anniversary of Mozart's death. It was a delightful evening with many requests for something similar this Christmas.

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Dr Philip Bulson FREng among just some of his paintings on show before the concert

New Years Honours 2007

Knights Bachelor (KB)

James Dyson CBE – Founder and Chair, Dyson Ltd. For services to business.

Professor John James O'Reilly – Lately Chief Executive, Engineering and Physical Sciences Research Council. For services to science.

Dames Commander of the Order of the British Empire

Professor Ann Patricia Dowling CBE – Professor of Mechanical Engineering, University of Cambridge. For services to science.

Knight Commander of the Order of the British Empire (KBE)

Professor Richard George Andrew Feacham CBE – Executive Director, The Global Fund for Aids, Tuberculosis and Malaria.

Order of the British Empire Commanders of the Order of the British Empire (CBE)

Professor Andrew Hopper – Professor of Computer Technology, University of Cambridge. For services to the computer industry.

Professor John Douglas Perkins – Vice-President and Dean, Faculty of Engineering and Physical Sciences, University of Manchester. For services to science and engineering.

Peter William Rogers – Director, Stanhope plc. For services to the construction industry.

Professor John Wood – Chief Executive, Central Laboratories of the Research Council. For services to science.

The Best Programme

Matthew Harrison

Research shows that young people have a difficult time narrowing down their career options.

Firstly, they find it hard to relate the subjects they study in class to the world beyond the school gates. Secondly, as the international ROSE study showed, UK students and their counterparts in other developed countries see the relevance of science but feel much less engagement with the science taught in their school.

Research evidence also suggests that students value advice on careers options that comes from a person outside of the school system.

These findings, together with the certain knowledge that the UK economy can absorb many more new engineers than are currently being formed each year, has led to the development of the TriSET variant to the established Year in Industry scheme.

TriSET is delivered by the Engineering Development Trust in partnership with the Academy. It is co-funded by the DfES 'Gateways to the Professions Fund' and by industry.

The Gateways to the Professions Fund was set up in response to the Langlands Report, which identified barriers on entry to all professions for talented young people who come from lower socio-economic backgrounds or certain minority ethic groups. In the case of engineering, there are additional barriers to the participation of women, regardless of their background, because 96% of professional engineers are men. This cannot be right.

TriSET offers talented young people from groups that are under-represented in engineering (most notably women) an extended placement in paid engineering employment, as well as personal guidance on their next educational or training step. Starting with a small pilot group of London Engineering Project students this year, TriSET will seek out students who have achieved highly at school, are open to a career in engineering, but are as yet undecided on what their next step will be.

TriSET works on two of the root causes for under-representation in engineering. Firstly, students can only opt for a career in engineering if they are able to imagine themselves in the profession. This can be difficult when the realities of a vibrant modern profession are often unseen by young people. A period in engineering employment will make these clear. Secondly, young people often struggle to get good quality advice, and the personal mentoring strand of TriSET provides just that.

So, how will we know if TriSET has been successful? The target is to see half of all participants remaining in engineering employment or training, and 30% choosing engineering higher education as their next step. This hard quantitative evidence of impact will be supplemented by an evaluation of how participation in TriSET has changed attitudes and increased confidence. Lessons learnt from the TriSET pilot in London will then be applied nationally.

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Shape the Future directory

One of the first outcomes of the DfES STEM Report was the production of an engineering and technology directory of initiatives, competitions and organisations involved in the promotion of engineering in schools. Published for the Association for Science Education's (ASE) annual conference at the University of Birmingham, the directory was designed for teachers to give them more information on national initiatives that support the enrichment of technology and engineering in the classroom.

An initial mail shot went to 250 schools that have not previously engaged with engineering initiatives but have capability in science and maths at key stage 3 (first three years of secondary education). These schools will be able to seek support from an Access Fund set up by the Academy, to enable them to participate in any of the schemes listed in the directory. If you would like a copy of the directory email Dave Rowley or ring 020 7227 0540.

Contact: dave.rowley@raeng.org.uk

Medieval catapults return to the Tower of London

450 London Engineering Project (LEP) students took part in a week of workshops at the Tower of London during National Enterprise Week. The workshops, which were organised and coordinated by LEP and Smallpeice Trust fieldworker Ahmed Kotb, took place in the vaults of the Royal Armouries and included a trebuchet design competition.

Once the siege engine of choice, the trebuchet was replaced by the cannon after the introduction of gunpowder. A medieval sling weapon seen more recently in the TV series *Lost* and Peter Jackson's film *The Lord of the Rings: The Return of the King*, trebuchets are built these days by hobbyists and are also used in classrooms to illustrate mechanical and physical principles.

The judging criteria for the competition focused on the technical accuracy of the trebuchet designs and the students' ideas on how they would market and distribute their product worldwide. Minister of State for Industry and the Regions at the DTI, the Rt Hon Margaret Hodge MBE MP, participated in a workshop and judged the competition.

Among the schools taking part were The Charter School; Harris Academy Bermondsey; Forest Hill Boys School; St Martin in the Fields High School for Girls; Central Foundation Girls School; Mulberry Girls School; Little Ilford School; Bacon's College; and Lilian Baylis Technology School. Medals, T-shirts and robotic clocks were awarded to the winning teams.

Ms Hodge said: 'I have thoroughly enjoyed watching the students at work – their enthusiasm and ingenuity was heartening. Jobs in engineering and manufacturing are both exciting and well-paid and it is vital for the UK to make sure the UK talent stream keeps coming.'

For more information on school science, technology, engineering and maths (STEM) days and special events such as the Trebuchet Challenge, which will be available again this year, please contact Ahmed Kotb at the LEP: **ahmed@thelep.org.uk**

Contact: heather.hawthorne@raeng.org.uk

The Rt Hon Margaret Hodge MBE MP with Dr Andrew Cave, Chief Executive of The Smallpeice Trust (right), Ahmed Kotb of The London Engineering Project (far left) with the LEP students

Academy medallists reunite

Twenty Academy Silver Medal winners attended a lunch and discussion hosted by members of the Awards Committee in February. The objectives were to inform medallists about the future work of the Academy, to seek their views on how best to utilise them in the work of the Academy and to learn about the progress of attendees in their professional endeavours.

Professor Richard Williams FREng, chairman of the Awards Committee said: 'Guests provided us with welcome advice and ideas on the future development of the award portfolio including updated case studies of their work.'

Since the launch of the Silver Medal in 1995 some 42 medals have been awarded for engineering innovation that has had commercial success. About half of all medallists are Fellows of the Academy. Further information on the medallists will be featured in future Academy publications and other public media. Ideas for development of the awards scheme will be considered by the Awards Committee based on data gathered at the event and with a questionnaire.

Contact: amy.abbott@raeng.org.uk

Past Silver Medallists Dr Ian Mays, Stuart Moran and Professor Albert Rodger

Events

A selection of forthcoming events. For the full events programme visit **www.raeng.org.uk/events**

2007

APRIL

24 April 2007
UK Focus for Biomedical Engineering Briefing Seminar: Integrating Technology with Clinical Practice
29 Great Peter Street, London SW1P
Contact: loredana.santoro@raeng.org.uk

MAY

1 May 2007
Lecture Series in Mobile Telecommunications & Networks: Academy Briefing
Speaker: Professor Lajos Hanzo FREng
29 Great Peter Street, London SW1P
Contact: jacqueline.cox@raeng.org.uk

29 May 2007
Lloyds Register Educational Trust Lecture and Dinner
Speaker: Professor Roderick Smith FREng
7 Carlton House Terrace
Contact: faye.whitnall@raeng.org.uk

JUNE

5 June 2007
Academy Awards Dinner
Christ Church, Spitalfields, London E1
Contact: amy.abbott@raeng.org.uk

27 June 2007
Summer Soirée: Wealth Creation through Partnerships
Queen's University Belfast
Contact: jacqueline.cox@raeng.org.uk

JULY

4 July 2007
Annual General Meeting
The Royal Aeronautical Society, London
Contact: faye.whitnall@raeng.org.uk

Staff News

Angus Dawson has joined the Academy as Assistant Publications Editor. He was previously Publications Assistant at the Society of London Theatre and Assistant Editor with Footprint Handbooks.

Alexandra Pennington has been appointed Assistant Manager, Awards & Events. She previously worked for Concorde Services Ltd as an Assistant Project and Industry Manager.

Faye Whitnall has joined the Academy as Assistant Manager, Events. She has previously worked for the Energy Institute, the Foundation for People with Learning Disabilities and most recently for Euromoney.

Publications Received

Microwave System Design Tools and EW Applications
An ebook by Peter W East OBE FREng
Donated by the author

Neville on Concrete – An Examination of Issues in Concrete Practice
Second Edition by Dr Adam M Neville CBE FREng FRSE
Donated by the author

The Anatomy Of An Engineer
An autobiography by Professor Sir Bernard Crossland CBE FREng FRS
Donated by the author

Wireless Communications: The Future
By Professor William Webb FREng
Donated by the author

From Bouncing Bombs to Concorde – The Authorised Biography of Aviation Pioneer Sir George Edwards OM
By Robert Gardner

Obituaries

James Dawson CBE FREng died on 26 January. Prior to his retirement he was chairman of Zenith Carburetter Company Ltd.

Sir Gareth Roberts KBE FREng FRS died on 6 February. At the time of his death he was chairman of The Engineering and Technology Board and President of Wolfson College, University of Oxford.

News of Fellows

Professor Peter Dowd has been elected Fellow of the Australian Academy of Technological Sciences and Engineering.

Rolls-Royce plc has appointed **Professor Peter Gregson** as a non-executive director.

Andy Inglis has joined the BP Board and has become Head of Exploration and Production.

Dr Sue Ion has been made an honorary professor at the University of Central Lancashire.

Professor Pat McKeown OBE has been awarded the Georg-Schlesinger-Prize, 2006, by the State of Berlin a prize given every three years for "outstanding achievements in the field ofproduction technology".

Dr Norbert Morgenstern has received the Varnes Medal from the International Consortium on Landslides for internationally recognised leadership in the study of landslides.

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