UNIVERSITY OF OXFORD

Department of Engineering Science news

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Welcome

Welcome to the first issue of "Department of Engineering Science News". It will be published once a year to keep friends of the Department up to date with activities here. In it we shall cover engineering science news, research, profiles and events.

I hope that you enjoy reading it and I welcome your comments on the content. Please feel free to send contributions for next year's "Department of Engineering Science News" to: newsletter@eng.ox.ac.uk

Eva Williams
Editor

IN THIS ISSUE:

News this year - 2010/2011

Welcome to the first edition of the Department's annual Newsletter, which will provide an informal means for us to keep in touch with alumni and friends of the Department. This first issue contains a number of news items giving some idea of the breadth of our activities, but is not intended as a comprehensive annual report.

Professor Guy Houlsby,
Head of the Department of Engineering Science

This year has seen the appointment of no fewer than three new Professors in the Department. Professor Peter Ireland rejoined us as the Donald Schultz Professor of Turbomachinery, after a brief spell working for Rolls-Royce in Derby. His appointment is part of the rejuvenation of our research in turbomachinery and heat transfer, with the opening of the new Southwell Laboratory last year being another important step. On page 6 you can read more about the recent activities in this laboratory.

Our Institute for Biomedical Engineering (IBME), opened in 2008, goes from strength to strength. Professor Constantin Coussios (pictured) has been appointed to a Professorship of Biomedical Engineering, with his post generously supported by the Sloane Robinson Foundation. He is an expert on the therapeutic uses of ultrasound, and continues as a Fellow at Magdalen College.

Professor Constantin Coussios

Professor Alison Noble, has been appointed to the Technikos Professorship of Biomedical Engineering, and a profile of her work is given on Page 7.

David Miller joined the Department last Autumn as our new Senior Administrator. He has had a very busy year, with many active projects and changes in the Department. His background in civil engineering, project and financial management is already proving invaluable.

At the end of September Professor Alistair Borthwick leaves us to take up the post of Professor of Civil and Environmental Engineering at University College Cork. Alistair has contributed in countless ways to Engineering Science over many years, both as a University Lecturer and as a Tutor at St Edmund Hall. In his capacity as Deputy Head of Department from 2007 to 2010 he led the Department's centenary celebrations in 2008.

Three of our Departmental Lecturers are moving on to new posts, Vito Tagarielli to Imperial College and both Theodore Karavasilis and Stefano Utili to Warwick University. We are, however, welcoming four new University Lecturers to the Department this October. Professor Robin Cleveland (from Boston University) and Dr Eleanor Stride (from UCL) will both be joining the team at the IBME. Dr David Howey joins us from Imperial College as an electrical engineer, strengthening our activity in electrical power. Dr Ingmar Posner moves from his current position as a Junior Research Fellow at New College to University Lectureship in Information Engineering at Pembroke College.

A highlight this year has been the establishment of the Laing O'Rourke Centre for Construction Engineering, of which you can read more on the opposite page. This marks a new, and very welcome, partnership between the construction industry and academia, and we are looking forward to making new appointments in association with the Centre in the near future.

It would be unrealistic to pretend that everything is rosy in the academic world, and readers must be aware of both the upheaval in the funding of undergraduate courses, and of the constant challenge of securing funds for the excellent research that we undertake. We are fortunate though that we can attract the very best students at both undergraduate and graduate level, and in the following pages you can read a little about their achievements.

I hope you enjoy reading about the Department, and would welcome news and comment for future copies of this Newsletter.

Professor Guy Houlsby

A new construction engineering partnership

In January 2011, Laing O'Rourke and the University of Oxford announced the establishment of a new centre for engineering focusing on interdisciplinary research relevant to the construction industry. The Laing O'Rourke Centre for Construction Engineering will build on existing expertise at Oxford's Department of Engineering Science and other departments around the University, such as the Department of Materials and the Oxford e-Research Centre, to improve construction methods and processes.

The founding of the Centre will lead to the creation of two new academic posts: the Laing O'Rourke Professor of Automation in Construction and the Centre Director.

Oxford's Department of Engineering Science is at the forefront of research in areas such as control engineering, computer vision, and mobile robotics and navigation, with the Professor of Automation in Construction and Centre Director bringing additional expertise in such areas as control, automation, and materials for construction.

The Vice-Chancellor, Professor Andrew Hamilton, is pictured with the Chairman and Chief Executive of Laing O'Rourke, Ray O'Rourke KBE, after signing the Strategic Alliance Agreement between the two organisations.

Laing O'Rourke leads the UK industry in the deployment of 'Design for Manufacture and Assembly' – an approach that uses automated processes to produce construction components offsite for onsite installation, delivering buildings quicker, safer and more sustainably.

Ray O'Rourke KBE, Laing O'Rourke's Chairman and Chief Executive, said: *"The global trends influencing the built environment over the next 25 years will demand new and radical approaches. This new construction engineering centre will provide a 'boundaryless' and dynamic environment, unburdened by the usual corporate distractions that exist in large organisations, providing the brightest engineering minds with the freedom to explore and innovate for the benefit of our industry and society at large"*.

In association with the founding of the Centre, a framework agreement was drawn up for the University to provide professional development services through the Department for Continuing Education, assisting Laing O'Rourke with the development of its staff through accredited programmes and short courses. Isis Innovation, the University's technology transfer company, contributed to the framework agreements covering future access to University consulting expertise and intellectual property.

Support for Headstart

Laing O'Rourke's partnership with the Department extends to supporting the Headstart course, a residential programme of engineering science activities aimed at sixth formers from all over the UK.

The Department's Headstart course includes practical challenges; a design competition; demonstrations; site visits; tours of laboratories; team projects and specialist lectures by academics. Students meet and talk to University staff, postgraduate students and representatives from industry.

In July 2011, over 2,200 sixth formers applied nationally to Headstart, part of the Engineering Development Trust run under the auspices of the Royal Academy of Engineering, with 38 attending the Department's course in Oxford.

Headstart volunteer, Rebecca Threlfall, said: *"Engineering is often misunderstood as it is a subject students often don't know much about. Studying Engineering Science is not just about building things - it is about applying often complex scientific ideas to improve lives... encouraging young, bright people to enter the world of engineering is essential for the future"*.

Leadership role models

The Royal Academy of Engineering's (RAE) "Engineering Leadership Advanced Awards" provide support and motivation to some of the most exceptional engineering undergraduates in UK universities. They are highly prestigious and the Academy awards no more than 30 in any one year. These Awards 'help those who want to become leadership role models for the next generation of engineers to undertake an accelerated personal development programme'.

In 2010, Department of Engineering Science undergraduates James Dolan, from Magdalen College, and Philip Sibson, from Exeter College, were both recipients of this Award. Their Awards will enable them to acquire the skills needed to fulfil their potential and move into an engineering leadership position in UK industry soon after graduation.

They each received £5,000 for their personal development plan over three years. James and Philip will use their Award money to learn a new language and fund industrial and research experience through the holidays. James said: *"The Award encourages you to think both creatively and critically about how best to achieve your engineering goals"*.

Every Engineering Leadership Award holder is also allocated a Sainsbury Management Fellow as a personal mentor. It is their job to offer informal advice to Awardees on their personal development and career options. This scheme enables high-flying Chartered Engineers to study for an MBA at an international business school.

James Dolan & Phillip Sibson

The ‘origami engineer’

> I also realised we could turn the origami concept on its head and look for patterns that would make things hard to fold and crush

Dr Zhong You’s laboratory at Oxford’s Department of Engineering Science is littered with crumpled car cylinders, grocery bags, and cans. On closer inspection, the folded sheets are prototypes of foldable building parts, while the old bags and cans have been carefully collected because of their shape. *“If we treat origami as a deployable structure, the models are all about how to fold up a structure neatly using repeated patterns. This is what I call origami engineering,”* said Dr You.

Dr You confessed that as a child in Shanghai, China, he was not fond of origami. *“It was all about how to fold a frog or something else that was pretty but had no practical engineering use,”* he says. It took several years and a handful of insights before Dr You— by then a civil engineer working in a distant country—would find himself using the folding techniques that irked him in his youth to design emergency housing, energy absorption devices and even medical instruments.

It all started with a can picked up in Tokyo, which once held a vodka and lemon drink. It caught Dr You’s eye because its surface carried a crease pattern of tessellated diamonds. *“The drink is not my favourite but the can is much lighter than a normal coke can, and a crushing experiment revealed that it can carry a much higher compressive load. This drinks can made me think what will happen if other origami patterns are used”*.

At Cambridge University in the 1990s, he met his supervisor Sergio Pellegrino and a fellow student, Simon Guest, who were using the origami folding trick to store kilometres of tubing for deployment on space flights, and realised that origami could do more than help save room. *“Sliding parts can stick, especially when a structure needs to open and close many times. Origami creases are much more reliable”*.

After another decade Dr You began to apply origami seriously. He spent half a year at the Massachusetts Institute of Technology on sabbatical, supported by a global research award from the Royal Academy of Engineering. Here, he became aware of blossoming research into the geometry of folding and realised that it could provide rigorous blueprints for engineering structures.

With this mathematical underpinning, he engaged in redesigning surgical stents (artificial tubes), that are inserted into arteries to remove blockages and repair aneurysms.

Dr Zhong You’s “origami stents,” are made of a single material, folded down so that it can pass through the arteries and then snap open once in position. He plans to put his “origami stents” through animal trials in the near future.

Recently, he has designed a grocery bag made of steel that can be collapsed down as flat as a paper bag. His prototype proves that any rigid package, including open-topped cardboard boxes, can be folded down if it has the right crease pattern; currently, both top and bottom need to be opened for flat packing. *“The packaging industry is the one place people have traditionally thought deeply about paper-folding techniques, and this could really speed up factory assembly lines,”* he says.

“I also realised we could turn the origami concept on its head and look for patterns that would make things hard to fold and crush”. As a result, Dr You and his student, Jiayao Ma, have created a more effective shock absorber for automobiles that can absorb over 50% more energy during a crash.

It has not all been plain sailing for Dr You. The downside to working on a vast range of projects spanning many fields is that with each new invention, Dr Zhong You must establish his reputation afresh and persuade a new group of people to replace standard manufacturing techniques with an origami based alternative. *“It can look like we are reinventing the wheel, so we have to work hard to prove that origami has benefits”*.

In 2006, Dr You’s work received a royal seal of approval when he was asked to show some of his devices at a science exhibition at Buckingham Palace. *“The Duke of Edinburgh came over to me and asked what the function of each piece was. It was quite an honour,”* he says. The origami structures have also been a hit with the public at exhibitions.

Today, Dr Zhong You remains one of a niche group of researchers “exploring uncharted waters” in design and invention. *“Every day, there’s huge potential for an important discovery,”* he says.

This article is based on Dr Zhong You’s interview with “Science Magazine” on 11th July 2011

Vehicles of the future will rely on robot navigation

"We are not condemned to a future of congestion and accidents. We will eventually have cars that can drive themselves..."

In the future, autonomous vehicles will play an important part in our lives. They will come in a variety of shapes and sizes, and undertake a diverse set of tasks on our behalf. We want smart vehicles to carry, transport, labour for and defend us. We want them to be flexible, reliable and safe.

The Oxford Mobile Robotics Group is working on the "Wildcat" a multi-million pound, driverless vehicle research partnership between BAE Systems, Nissan, Guidance Ltd, the Engineering and Physical Sciences Research Council, and the Department of Engineering Science. The Wildcat is a 4x4 off-road production car from Bowler, modified by BAE Systems engineers.

Dr Paul Newman, who leads the Oxford Mobile Robotics Group at the Department, said: *"Wildcat is the result of years of advanced research and development by BAE Systems. It will allow us to advance our own research into autonomous transport, contributing to a future of autonomy on the roads of Oxford, and around the world"*.

James Baker, Managing Director of BAE Systems Advanced Technology Centre, said: *"Over the last five years we've invested over £1million in the Wildcat project, which makes it a unique asset for the testing of autonomous technology"*.

Dr Newman added: *"We are not condemned to a future of congestion and accidents. We will eventually have cars that can drive themselves, interacting safely with other road users and using roads efficiently, thus freeing our precious time. But to do this the machines need life-long infrastructure-free navigation and that is the focus of our work"*.

The mathematics of probability and estimation allow computers in robots to interpret data from sensors like cameras, radars and lasers, aerial photographs and on-the-fly internet queries. Machine learning techniques are used to build and calibrate mathematical models which can explain the robot's view of the world in terms of prior experience (training), prior knowledge (aerial images, road plans and semantics) and automatically generated web queries. The goal is to produce technology which allows robots always to know precisely where they are and what is around them. Robots have a big role to play in our future economy, but underpinning this role will be life-long infrastructure-free navigation.

New research leads to computers recognising human actions and activities

New research within the Department means that human interactions can now be automatically recognised by computers from video footage. This technology can automatically recognise gestures and interactions such as handshakes. It enables computers to analyse the content of the vast amount of video footage generated from sources such as TV, films, YouTube and CCTV.

The method, developed by an Oxford University team including Alonso Patron-Perez and Dr Marcin Marszalek, and led by Professor Ian Reid and Professor Andrew Zisserman, is built on algorithms from computer vision and machine learning.

Alonso Patron-Perez, who is now a Postdoctoral Research Assistant in the Department, said: *"Once a computer can recognise these interactions the applications are numerous: for instance you could automatically search home videos and YouTube for kisses and handshakes or even fast forward CCTV to find incidents".*

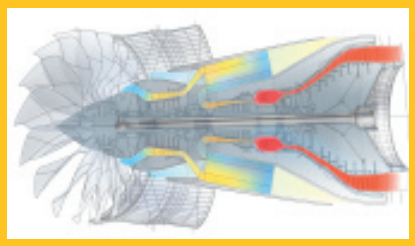
Teaching computers to recognise the interactions involves a number of steps: first, humans are detected and tracked through the video footage; then, once the position of the humans in the video is established, different cues such as head orientation and relative motion of people's bodies are computed to determine if an interaction occurs and, if it does, what kind of interaction it is.

All this information is computed for several examples of each interaction (the team has focused on four interactions so far: handshakes, high fives, hugs and kisses), and machine learning methods are then used to learn a model for each interaction from these examples.

Alonso Patron-Perez said: *"This research enables computers to make sense of how people are behaving in video footage in a way that has simply not been possible before".*

New lab opens to reduce aircraft CO_2 emissions

The Vice-Chancellor (standing on the right) is seen here with Rolls-Royce Chief Scientific Officer, Paul Stein, at the opening of the Southwell Building.



Concept design for a high overall pressure ratio intercooled turbofan engine. Rolls-Royce and the University of Oxford have researched new technologies for intercooling as part of the European Union NEWAC (New Aero Engine Core Cycles) programme. The NEWAC programme, with 40 partners from across Europe, has developed several advanced technologies that will give future aero engines reduced CO_2 and NOx emissions.

The Department's new Osney Thermofluids Research Laboratory was opened by Professor Andrew Hamilton, the Vice-Chancellor of the University of Oxford, in September 2010. In his speech, the Vice-Chancellor highlighted that Osney is 'one of the leading laboratories in the world for turbo-machinery and heat transfer research'. Over 180 guests, including representatives from government, industry, alumni and academia from the UK and abroad, attended the opening ceremony. The new Southwell Building has been named after Professor Sir Richard Southwell, who was Head of the Department of Engineering Science from 1929 to 1942.

During the opening, the Vice-Chancellor announced that Professor Peter Ireland had been appointed to the Donald Schultz Professorship in Turbo-machinery. Professor Ireland was a University Lecturer in the Department of Engineering Science and Fellow of St. Anne's College until 2007, when he joined Rolls-Royce as the Corporate Specialist in Heat Transfer.

The strong association with Rolls-Royce has been central to the development of the new Osney Thermofluids Research Laboratory. Paul Stein, Chief Scientific Officer for Rolls-Royce, said: *"Even today the design of turbine cooling systems remains one of the most challenging processes in engine development. The world class academics and students of the Oxford University Technology Centre team have developed new strategies for laboratory testing which simulate the complex flows in hot turbine parts of jet engines very effectively. The information gained from this research has resulted, over the years, in significant improvements in our engine performance"*.

The efficiency of a modern jet engine depends to a large extent on the design of the hottest part at the heart of the engine. The hotter the gas, the less fuel the engine burns. However, the gas is so hot (above 1600 degrees Celsius) that its temperature exceeds the melting temperature of the turbine blades. New ways of cooling these blades are continuously being developed to improve engine efficiency and reduce fuel burn. The cooling technology developed in the laboratory is also used directly in gas turbines to produce electricity, thereby further reducing CO_2 emissions.

Today, one of the most important pieces of equipment in the Southwell Building is the 'Oxford Turbine Research Facility', which has been acquired from QinetiQ with support from the South East England Development Agency and Rolls-Royce. This flagship facility enables tests to be carried out on blades rotating at realistic speeds, reproducing the flow conditions in a real turbine. The tunnel was successfully commissioned on the 11th of July 2011.

The new laboratory combines wind-tunnels, test facilities, measurement techniques, and computational modelling to understand and improve current jet engines. One technique developed in the lab is used to perform careful measurements of the heat transfer characteristics of new blade designs. In work funded by the European Commission, the Engineering and Physical Sciences Research Council, and the Technology Strategy Board, the Oxford team is measuring heat transfer on the turbine tip in the presence of so-called 'hot-streaks': pockets of excessively hot fluid that form due to partial mixing of the combustion gases.

Professor Ireland said: *"The lab now has not only the means to measure the heat transfer rates in jet engines but also the means to capture the key flow physics with the Computational Fluid Dynamics methods developed by Professor Li He. This puts Oxford in a very strong position to make a real contribution to jet engine technology – and to ultimately reduce CO_2 emissions"*.

The value of an engineering apprenticeship

John Brumfitt with Junior Technician, Dennis Chikwanha

The commitment that the Department, and the University, has made to running apprenticeship schemes over the years has paid off with more and more apprentices being trained and recruited. In 2010, Jonathan Harding became the first apprentice in the Department of Engineering Science and in the University to qualify under the Advanced Apprenticeships scheme. Oxford University's Advanced Apprenticeships are designed to combine work experience and training. Apprentices learn a trade at the University whilst attending college to gain formal qualifications.

Since joining the Department in 2007, Jonathan has passed his BTEC National Certificate in Operations and Maintenance and his National Vocational Qualification Level 3 (NVQ), the final stage of his Advanced Apprenticeship in Electrical Engineering. He was appointed to the role of Electrical Technician within the Department in 2009 and in 2011 was promoted to Principal Technician.

Duncan Blake started his engineering apprenticeship with the Department in 2008. He was appointed to the post of Mechanical Technician in 2010 and from 2011 has been supporting our Thermo-Fluids Laboratory.

John Brumfitt, the Department's Head of Precision & Grinding Workshops, said: *"The value of having a trained apprentice in the Department is that we can produce our own skilled workforce - this maintains the skills-base and stops a trade from dying out"*.

A matter of interpretation

This article first appeared in the May 2011 issue of "Blueprint", the University of Oxford staff magazine.

Applying engineering methods to medical imaging is revolutionising what doctors can deduce from scans, Alison Noble tells Jenny Lunnon.

Photograph: Rob Judges

Biomedical engineering is transforming medicine. What started as the application of mechanical engineering principles to help design artificial joints or model blood flow has now evolved into an armoury of powerful new tools to help doctors with both diagnosis and treatment.

Alison Noble, Oxford's recently appointed Technikos Professor of Biomedical Engineering, specialises in biomedical imaging. Educated at Oxford, she joined the Department of Engineering Science as a lecturer 16 years ago, since when she has been developing new approaches to using images of the human body obtained via X-rays, ultrasound, X-ray Computed Tomography (CT) and MRI (magnetic resonance imaging).

At the start of Professor Noble's career, medical imaging was being used in clinical practice, but the images generated were either stored on video or printed out. The quality of data was therefore quite poor, making it difficult to develop automated image analysis tools for doctors to use. But things have changed. 'Today everything is stored digitally,' she explains, 'and because of the volume of data acquired in clinics, there is a real clinical need for computer-based techniques to assist in image interpretation. A lot of our research deals with developing software algorithms for quantifying disease and assessing change using one or more imaging sources. My particular interest is in ultrasound as an information source – alone or with MRI or CT – and how image analysis software can provide new information for clinical decision-making.'

Professor Noble and her team in the Biomedical Image Analysis (BioMedIA) Laboratory are, for example, currently working with researchers from the Department of Cardiovascular Medicine to develop a more accurate way to measure heart function through stress echocardiography, an existing technique which involves comparing images of the heart at rest and during exercise: *"We're mapping ultrasound images acquired at the same stress state on to MRI images to create a composite movie and to get a better field of view,"* she says.

Other research involves the diagnosis of breast cancer, using ultrasound to ascertain whether suspicious masses are benign cysts, fibroadenomas or invasive cancers. Cancerous tissue is usually stiffer than healthy tissue, so applying force to the mass and measuring the strain using elastography can aid diagnosis. Professor Noble's team is also measuring how much the mass slips, because a cancer generally does not slip around in the same way as a fibroadenoma. Working with breast radiologists, they have shown that combining the measurement of both strain and mobility is improving the accuracy of diagnosis without the need for a biopsy.

An expanding area of research involves monitoring the health of babies in the uterus and after birth. Until now it has been hard to distinguish an in utero baby who happens to be small but is nonetheless healthy from a baby who is not developing normally. New ways of quantifying fetal growth, including measuring soft tissue around the femur (thigh bone) and upper arm, are being investigated to enable doctors to make this distinction and indicate which babies – especially those born prematurely – will need a special feeding regime to get them back to a healthy weight. This is of crucial importance: recent research showed a correlation between poor fetal and new-born development and a greatly increased risk of health problems in adulthood.

Alison Noble's journey to becoming an engineer began with a passion for both medicine and physics. At Oxford she has helped to develop teaching and training in biomedical engineering at all levels and is Director of the RCUK Centre for Doctoral Training in Healthcare Innovation. Her contribution was recognised with a University Teaching Award in 2010. Today every Oxford engineering undergraduate can choose to take an option in this exciting area of research.

For more information, visit: www.ibme.ox.ac.uk/biomedia

Centre for Doctoral Training in Healthcare Innovation

As Director of the RCUK Centre for Doctoral Training in Healthcare Innovation (CDT), Professor Alison Noble has outlined three strategic objectives for the CDT to outreach to industry and encourage new biomedical engineering collaborations with the Department:

- To strengthen links with industry by increasing participation in market research projects, short projects (which lead to DPhils), and exploring opportunities for students to undertake internships in industry
- To pilot an Oxford-India affordable technologies research exchange under the CDT umbrella. Current plans are for a subset of CDT students to spend a period of time in India on work related to their DPhil. Students will learn about challenges in introducing technology into developing countries, and study differences of market need, cost and delivery of services relative to Europe and the USA
- To scope out the viability of offering some of the CDT modules as Continuing Professional Development courses in future years.

We welcome the contributions of industry to the CDT programme, from speakers for the seminar series to developing short research and market research projects.

Securing the success of research

One of our highest priorities is to secure financial support for graduate students, who play an essential role in the vitality of the research in the Department. Several years ago, Mr John Bracken, who in 1935 studied Modern History at Exeter College, Oxford made a bequest to the Department, which we use to support Graduate Bursaries. Several of the Department's graduates benefit from his £250,000 legacy, as well as from other donations. This year, we are also delighted to announce that an anonymous donor has pledged a very generous legacy, expected to approach £2m, to the Department of Engineering Science to support Graduate Bursaries. In the future, the income from this gift will enable many talented young students not just to develop their own skills, but also to contribute to the Department's important research.

Research carried out at the Department is multi-disciplinary and collaborative. With gifts such as these we can continue to attract the very best research students to undertake research programmes that not only have scientific significance but also social and economic impact.

Our thanks go to all individuals who have supported the Department's Graduate Bursary Fund over the years, and who continue to help graduates in financial need.

The Bracken Legacy
The Bracken Legacy is being used to provide immediate help to graduates who have a funding deficit, usually due to unforeseen circumstances. It is used flexibly to supplement other awards that students receive, such as doctoral training grants or overseas scholarships. The legacy funds are available to UK, EU and overseas graduates.

Dr Mark Cannon, Director of Graduate Admissions, said: *"To date the Bracken Legacy has helped six students who were in desperate need. We have provided partial funding during their three-year DPhil (Doctor of Philosophy) studies, so that they can concentrate on their research and not worry about where their next meal is coming from. I believe it's crucial for the Department to have this source of funding to prevent student hardship that can arise from unforeseen shortfalls in funding"*.

Alejandra Albuerne (New College), who is a recipient of the Bracken Legacy, said: *"The Bracken Legacy funding has helped me enormously, before I was struggling to cover all my expenses and constantly on the look-out for suitable paid work. I can now concentrate on my research project, which lies in the field of conservation of architectural heritage… focusing on the performance of masonry structures under earthquakes".*

The benefactor who has made the very generous pledge mentioned above has said: "Engineering Science is the foundation of every material advance of human civilisation. No country has made a greater contribution to Engineering Science than Great Britain, and the well spring of this creativity is our outstanding young people, too often handicapped by lack of funds. Those who have themselves benefited financially from society have a responsibility in their turn to help the rising generation."

If you would like to make a contribution to the Engineering Science Graduate Bursary Fund then please e-mail: eva.williams@eng.ox.ac.uk

Alumni networks

The University of Oxford's Alumni Office provides a range of opportunities for alumni of the University to come together. Throughout the year there is an exciting mix of social and professional networking events, presentations by leading academic speakers, as well as the chance to get involved in student recruitment and outreach activities. To find out more please visit: **www.alumni.ox.ac.uk** or e-mail: **enquiries@alumni.ox.ac.uk**

Dr Daniel Walker tells his story...

Dr Daniel Walker (St Catherine's College 1999, Engineering Science; Magdalen College 2003, DPhil in Engineering Science) works for BP as their Deepwater and Risk Strategy Manager in the USA. In 2010 Dan became one of the youngest Fellows of the Institution of Mechanical Engineers. Here he recounts his journey to Oxford University and how he came to be working in engineering with BP plc...

"I attended a small rural comprehensive school, which seldom produced successful Oxford applicants. Neither of my parents studied at university. My interest in engineering was reinforced at the age of 17 when I was selected to attend a "Headstart" course at the Department of Engineering Science in Oxford. This course provided me with an invaluable insight into the engineering profession, and inspired me to read Engineering Science. The level of detail and rigour with which Oxford courses are taught prepare students very well for research or industry.


Photo courtesy of BP plc

I was recruited by BP to be one of their technical specialists in offshore hydrodynamics. I worked in Azerbaijan, Russia, Alaska, Norway and Trinidad amongst other places, in areas ranging from deep-water oil and gas exploration and production to offshore wind projects. Following this experience, I worked on the delivery of major multi-billion dollar offshore projects in the Gulf of Mexico and Angola.

The broad fundamental grounding provided by the Engineering Science MEng course gives you the time to identify your interests and does not force you to specialise early in your studies. Access to extensive libraries and laboratories and one-on-one guidance from world leading academics, provides unparalleled learning and stimulating challenge.

I began to specialise in civil and mechanical engineering and, more specifically, in offshore engineering. During my final year I was fortunate to undertake a research project which was supervised by Professor Rodney Eatock Taylor, an eminent hydrodynamicist, who introduced me to pioneering research and inspired me to pursue further research beyond my undergraduate studies. He introduced me to the world I now work in at BP.

Since my undergraduate studies I have pursued further research through a DPhil, I have taught at universities in the UK and USA and I have worked in industry on some of the largest engineering projects ever undertaken. In my current job, the breadth of the engineering course at Oxford has given me the confidence I need to lead teams of multi-disciplined engineers (most of whom have much more experience than me) to deliver a first-in-industry project".

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