



### Purpose

The Ove Arup Foundation is an independent charity, established in 1989 to honour the memory of engineer, designer and philosopher, Sir Ove Arup.

Sir Ove Arup wanted the man-made world to be a better place, and he was deeply concerned about the inability of mankind to make it so. He was saddened by the separations dividing the professions working in the built environment, which so often means that the end result falls far short of its potential.

Ove's enthusiasm for the challenge of design – whether of a chess set or a city centre – was infectious, and it was his delight to work with young people. Ove strongly believed in the multidisciplinary nature of design when engineering architecture, and pioneered this holistic approach to projects throughout his career. In acknowledgement of his contribution to the built environment over many decades, The Ove Arup Foundation aims to promote new thinking and initiatives in the education of the built environment.

The overall objective of The Ove Arup Foundation is the 'the advancement of education directed towards the promotion, furtherance and dissemination of knowledge of matters associated with the built environment'. We pursue these objectives in acknowledgement of Ove's contribution over many decades 'with emphasis on the multi-disciplinary nature of design in engineering and architecture'.

### Chairman's Statement



2008-09 was a very active year for the Foundation.

The majority of our grants are directed towards initiatives with long horizons. Our support of the Royal Academy of Engineering Visiting Professors programme in building physics continued and expanded to enable an appointment at a fourth university. Again, with the Royal Academy of Engineering we are supporting the Arup/RAEng Senior Research Fellow in Structures and

Fire at the University of Edinburgh, centred in the University's Institute for Infrastructure and Environment.

Many of our small grants focussed on school-age children in terms of both supporting explorations into science and providing an insight into careers in engineering. It is pleasing to receive such positive feedback from those who have benefitted.

We are grateful for the continuing financial support of design, engineering and consultancy firm, Arup, which has enabled a high level of activity. In common with all organisations which are reliant upon investments, we have experienced a dramatic reduction in the value of our income. Whilst it is inevitable that this has impacted our grant-making capacity we are committed to a programme of long-term projects and will continue to seek new, small projects to support in the coming year.

**Richard Haryott**  
Chairman of The Ove Arup Foundation

## Activities during 2008/9

### Teaching

#### Fourth Visiting Professor in Building Physics

With three Visiting Professorships in Building Physics established so far, The Ove Arup Foundation, the Royal Academy of Engineering and our co-promoters were pleased to announce the latest appointee to a UK university engineering department.

Doug King, who for a number of years has been contributing to teaching in the University of Bath's Department of Architecture & Civil Engineering, is the fourth Visiting Professor to be appointed using funding from the Foundation and its industry partners. He is a recognised pioneer in the field of sustainability. He has worked on a series of unique and notable buildings, including the Gridshell for the Weald & Downland Museum, the Millennium Superstore for Sainsbury at Greenwich and the Innovate Green Office in Leeds.

The initiative is intended to strengthen those parts of the undergraduate curriculum relating to such matters as building physics, building systems, whole life costing and energy, so that graduates will emerge with a broadened academic base and an ability to apply that knowledge to helping create a sustainable future.

The feedback on the three posts already up and running – at Bristol, Cambridge and Sheffield – is extremely positive. We are delighted that Bath has appointed Doug King and look forward to expanding further as more industry partners come on board.



Sir Ove Arup, Coventry Cathedral

### The Foundation's work

The Ove Arup Foundation works to stimulate new activities that will change the way people think. We want to help people acquire and apply the knowledge needed to improve our natural and built environment. We believe a greater understanding between disciplines is fundamental to this work.

Our efforts can broadly be divided into three areas:

- The promotion and establishment of new teaching, to develop the skills needed for tomorrow's world.
- The commissioning and publication of research to inform and encourage debate
- The provision of contributions to projects initiated by others, particularly where our support helps to attract other sources of funding

### Research

#### Fire Research at the University of Edinburgh

Together with co-sponsors, the Royal Academy of Engineering, we are delighted to announce the appointment of Dr Luke Bisby as Reader and Arup/RAEng Senior Research Fellow in Structures and Fire at the University of Edinburgh, centred in the University's Institute for Infrastructure and Environment.

The aims of this new appointment include:

- establishing a new concept for building safety, fully integrated into the design process
- developing a research and education programme that will help transfer this concept into practice
- generating and educating a core of leaders in the field that will ensure that the outcomes become a fundamental component of knowledge in the built environment.

We seek, in our support to Edinburgh and Luke Bisby, to help modernise the whole subject of Fire Safety Engineering in Building, using the high quality knowledge of the 21st Century to create rational practice and to integrate it with the other components of the total design of buildings. The Foundation will encourage the cascade of the research into teaching, and from then into training, practice and legislation, and administration. Safety, elegance and economy will thereby be improved.

## The Teaching of Structural Analysis

A Report to The Ove Arup Foundation



by Professor Ian M May and Dr David Johnson



The Ove Arup Foundation

Dr Luke Bisby is recognised as an emerging leader in the area of thermal effects on innovative infrastructure materials, on strengthening and rehabilitation systems, and structural systems. He has conducted novel and important research studying the performance in fire of structural systems and materials.

"What my research projects have highlighted", says Dr Bisby, "is a lack of knowledge surrounding the performance of structural materials and systems during fire. There is a pressing need for a more holistic, rational, and pragmatic approach to design, and to experimental and analytical research in structural fire safety engineering."

A major asset to Dr Bisby will be his association with Dr Jose Torero and his colleagues at the BRE Centre for Fire Safety Engineering based at the university. This leading centre will offer both the multidisciplinary intellectual resources and laboratory facilities necessary for his research work and its extensive relationships with stakeholders and industry, enabling the results to be rapidly transferred into enhanced design for improved public safety.

### The Teaching of Structural Analysis

Professor Ian M May & Dr David Johnson approached The Ove Arup Foundation to seek our support for this paper. We were attracted by the proposal because we were already providing funds for a separate paper outlining research into the teaching of design to engineering undergraduates, and structural analysis is one of the essential building blocks for good design in engineering and architecture.

In particular, it enabled us to encourage the authors to think about how the teaching of structural analysis might be framed to encourage students to develop a feel for how structures actually behave. This framing would in turn foster a culture of simplicity and elegance of thought and outcome. Our suggestions were very warmly received, and adopted by the authors. We hope their paper will help both teachers and students to exploit the opportunities that modern analytical techniques provide – including the power of computing – and not to become a servant of them.

The paper (*left*) was launched at the Institution of Structural Engineers in February 2009 and can be downloaded from our website ([www.theovearupfoundation.com](http://www.theovearupfoundation.com))

## Projects

### Industrial Trust careers programmes

During previous year The Ove Arup Foundation awarded a grant to enable the Industrial Trust to give career experiences to over 600 students and teachers, principally in the South West, Yorkshire and South East regions, working on Key Stages 3, 4 and 5 and typically in Years 9 to 12.

This was the Industrial Trust's first major venture into the built environment sector. They subsequently asked every young person and teacher who went on the programmes to complete questionnaires to indicate their level of satisfaction and opinion of the quality of learning gained. There was an 80 per cent response to the questionnaires, in which 85 per cent of students, and 100 per cent of teachers, 'agreed' or 'agreed strongly' that the programmes delivered positive outcomes for them.



Sir Ove Arup, Kingsgate Footbridge, Durham

Following on from this success the Foundation has committed to a second programme which is planned to give a further 300 students experiences in careers in engineering.

### Science and Sport

An initiative that plans to harness the Olympic Games in order to engage and inspire young people in science, engineering and technology (SET) received a grant from The Ove Arup Foundation.

'100 Years of Sport Innovation: Showcasing how science has transformed sport' is an initiative aimed at exploring the ways in which SET can improve sporting achievement, and how it has revolutionised both sports equipment and performance over the years.

The pilot project, organised by Equalitec, part of the Portia organisation, will focus on ten schools in London's Hackney – an area that will be affected strongly by the Olympic Games. The project will draw comparisons between the London Olympics of 1908, 1948 and 2012, combining online resources with real-world events, in a bid to stimulate debate and improve the quality of education in SET.

Dr Elizabeth Pollitzer, director at Portia/Equalitec, declared the award "a godsend... it has been essential in setting up the pilot project. Hackney is one of the most deprived areas in London, and we want to take the Olympics, which the students are already engaged with, and use that to develop an interest in SET.

"We are working with the Institutions of Civil Engineering and Mechanical Engineering to send volunteer engineers into ten schools in Hackney to work with the pupils and encourage them to discuss future innovations. Our initial hope is for the pilot project to be a success, so that we can repurpose it and roll it out across the UK."

Speaking of the direct benefits of The Ove Arup Foundation's award, Dr Pollitzer explained: "One of the most difficult things is to gather the funds to get an idea across in the first place. When you can do that and attract organisations like the ICE and IMechE you can achieve so much more than you would have."

### Benjamin Franklin House Science Day

The 2009 Benjamin Franklin House Science Day has received a grant from The Ove Arup Foundation towards its 2009 Science Day and Science Fair. The annual three-month project culminates in an inter-schools event, involving up to 250 students in the practical application of scientific knowledge. Students are encouraged to devise creative solutions to scientific and engineering challenges that were encountered by Franklin and which remain relevant today – such as how to generate more heat using less fuel.

The Foundation's grant helped to increase the number of participating schools, and will fund more school visits as part of the project, and the development of new teaching materials.

Rob Taylor, Education Manager at Benjamin Franklin House, commented that the award "ensured this event, which engages young people in the relevance of Franklin science, was a great success. We were fortunate to have Arup expert Angela Malynn with us who made the idea of sustainable building compelling; so much so, that several children who participated in our follow-on annual science fair choose this as their theme."



He added: "The award also allowed us to invite scientist Dr Bryson Gore (left) to perform exciting experiments that cracked and fizzled in illustrating themes relevant to electricity and energy. The Ove Arup Foundation understands the importance of Benjamin Franklin House's focus on learning outside the classroom; we are very grateful to have it as a partner."

The Benjamin Franklin House charity occupies the former London home of the 18th Century scientist, inventor and US founding father. It uses the historic building as a platform for enthusing the wider public about science and engineering, through a mix of cutting-edge audio, visual projection and live interpretation.

Its Student Science Centre focuses on education and outreach, supporting the National Curriculum and encouraging young people to become involved and inspired in science and engineering.

### Campaign for Drawing



A grant from The Ove Arup Foundation enabled the Campaign's new Power Drawing professional development programme into built environment education through:

A workshop that took place at the Royal Academy of Engineering for built environment professionals who support education or training, was a major influence on the production of a new publication: 'Drawing: A Tool for Design'. This is an important vehicle for cascading knowledge and skills, primarily for use in educational establishments. It is a further component of the Campaign's series of Power Drawing publications.

### Others

Continuing support of the scholarship scheme administered by the Anglo-Danish Society, which assists Danish students to come to the UK, or UK students to go to Denmark, for the purpose of advanced or postgraduate studies in a subject area relating to the built environment.

Support for the Lighting Education Trust with a grant to help with a range of initiatives including the planning of basic training and CPD programmes, the accreditation and sponsorship of courses, and the monitoring and promotion of research.

A contribution to the Royal Academy of Arts' major exhibition on the work of Andrea Palladio, the 16th century genius who occupies a pivotal place in the development of architecture in the West.

Support for the publication of a book by Jonathan Porritt, 'Globalism and Regionalism', as part of a box-set published by Edge Futures, looking at the challenges facing the built environment.

Over the past 10 years, The Ove Arup Foundation has distributed grants totalling over £2m and it is anticipated that the same level of grant making will continue.