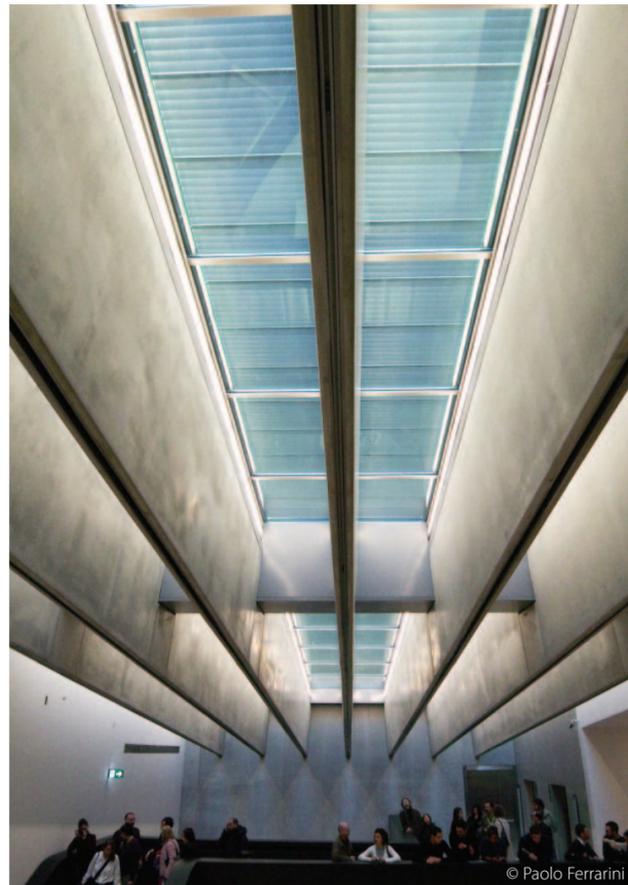


IN BRIEF

RIBA STIRLING PRIZE



MAXXI, the National Museum of 21st century art in Rome, has won the prestigious Stirling Prize for the RIBA Building of the Year and the 2010 World Architecture Festival World Building of the Year. The building was designed by the London based architect, Zaha Hadid, who said in her Stirling Prize acceptance speech that one of the main reasons she stays in the UK is for the quality of the engineers here.

The mechanical and electrical engineering design for MAXXI was carried out by Max Fordham LLP. The RIBA review of the building said: "The whole is bravely day lit with a sinuous roof of controllable skylights, louvres and beams, whilst at the same time conforming to very strict climate control requirements of modern galleries; the skylights both orientate and excite the visitor, but also turn them into uplifting spaces."

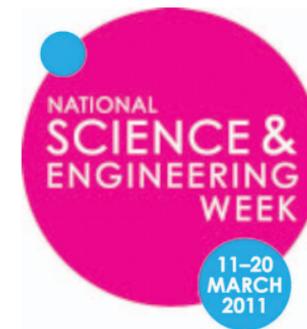
The design's aim was to use as much natural daylight as possible to illuminate the exhibits, which lowers energy usage from lighting, while achieving

controlled gallery conditions. MAXXI was constructed using 2,600 m² of glass, with an intricate array of shading devices and buffer spaces on the roof to manage daylight and heat gain ensuring the museum is kept at a moderate temperature suitable for both artwork and visitors.

At floor level there is a 'shadow gap', which is a recess around the walls creating shade to hide sockets and plugs so they don't distract visually but can be reached easily for maintenance. A high efficiency air-conditioning system is integrated into the fabric of the building, with conditioned air delivered at floor level from grilles hidden by the shadow gap. As the air heats up from people in the building, it rises to be extracted through controlled openings in the buffer zone of the roof glazing. The hidden engineering solutions allow uninterrupted sightlines which helped gain MAXXI its prestigious awards.

Read more about MAXXI at www.maxfordham.com

CELEBRATING SCIENCE AND ENGINEERING



National Science and Engineering Week (NSEW) is a nine-day long celebration that sees people of all ages taking part in, and organising, a wide range of events across the country. Coordinated by the

British Science Association, in partnership with EngineeringUK, with funding from the Department for Business, Innovation and Skills, it aims to inspire and engage people from all walks of life directly with science, engineering and technology.

The theme for NSEW 2011, which runs from 11 to 20 March, is 'Communication'. The subject encompasses a wide variety of different topics and sub-themes from morse code to social media to neurons to body behaviour. There are thousands of events and activities in a variety of venues that aim to illustrate how science and engineering relate to

everyday life. There are intimate café discussions, shopping centre science-busking and city-wide science festivals.

This year's NSEW national school competition 'How do you solve a problem like...?' is an engineering design task challenging school children to invent imaginative technological solutions to some of life's challenges, from climate change to simple cooking issues. There are also several regional festivals taking place, including Newcastle, Cambridge, Oxfordshire, Bangor, Leeds and York.

The Academy is a partner organisation of The Big Bang

Fair, the UK's largest science and engineering fair which launches the NSEW in London. Among the headline shows held at the ICC London ExCel Centre from 10 to 12 March, will be Sky 1's *Brainiac Live!* and the BBC's *Bang Goes the Theory*. The Big Bang Fair expects to attract 25,000 people, the majority of whom will be children. The fair will also host the BBC's Wallace and Gromit 'World of Invention' roadshow over its three-day run.

For more information visit www.nsew.org.uk

GLOBAL ECONOMY DEBATES

Senior engineers, industrialists and academics believe that the government has a role to play in encouraging and developing innovation in the UK, but this should be limited to creating the right economic climate in which innovation and entrepreneurship can flourish.

This was one conclusion from the third and final debate in the *Competing in the Global Economy* series which was organised by The Royal Academy of Engineering across the autumn and winter months. The debate series sought to explore some of the fundamental challenges facing the UK's economy as it emerges from recession into a rapidly changing world.

Previous debates in the series covered the impact of foreign

ownership of UK companies and the degree to which a larger manufacturing sector could lead to sustainable growth for the UK economy.

A report that summarises the three individual debates and points to some common themes that emerged will be published shortly. The report will be circulated widely with the aim of stimulating further discussion and identifying some of the issues where more study and information might be helpful.

One such issue, raised at all three debates, was the degree to which UK routes to raising capital differed from those in competitor countries. This was felt to have an impact on the country's ability to develop entrepreneurial companies and



Speakers at the second *Competing in the Global Economy* debate held at The Royal Academy of Engineering in November 2010

to retain corporate entities in UK ownership in the face of takeover pressures.

The debates were organised by the International Committee of the Academy under the chairmanship of Professor Sir

William Wakeham FREng. A further series of debates on the broad theme of natural resources will be held at the Academy in the spring and summer of this year.

ENGINEERING LEADERSHIP SCHEME

The Engineering Leadership Scheme celebrates its 15th anniversary this year. It was created by The Royal Academy of Engineering with the intention of helping undergraduate engineering students realise their potential and achieve their goals. Last year, it had a record number of applications for its Advanced Award that carries with it a £5,000 grant to enable the holder to carry out their own personal development plan over three years.

Angela Crowther has been one such awardee. With an interest in the engineer's role in international development and the aim of eventually becoming a chartered engineer, she studied a Masters degree in civil and architectural engineering at the University of Bath.

Using the Engineering Leadership Award (ELA) funds, Angela was able to work in Indonesia for nine months for an engineering charity called Architectes de l'Urgence. The charity sends architects, engineers and town planners around the world to give help to the victims of natural, technological and human catastrophes. Being assigned to design and project manage a school that had been destroyed by the 2004 Boxing Day tsunami, Angela drew on experience gained from disaster relief workshops. She was also able to draw on two years' worth of work placements - both onsite and in a design office. Much of this experience, as well as lessons learnt whilst studying a course on architecture in the US, was funded by the Academy.



Angela Crowther with some members of the construction team before a hard day's work on site at the Bintang Hu school, Aceh, Indonesia

During the course of her placement, Angela Crowther aimed to understand more about the engineer's role in helping development and how to take a more sustainable and efficient route to achieve it. Working within a tight construction programme of six months, as well as a limited budget, she saw the school to its completion, doubling its size and adding three more classrooms and other additional facilities.

Angela found that the project process taught her that engineering extends far beyond the mathematical theory that university courses are based around and that before starting work an engineer must first find out the needs of the communities themselves.

Her experience helped her to formulate ideas on how to manage her next project. Since her ELA experience, Angela has gone on to become an employee of Expedition Engineering. This has included work for the Olympic Delivery Authority in their bid for sustainability and www.expeditionworkshed.org an online engineering teaching resource.

Last year she gained an *Ingenious* grant (see *Ingenious* article on page 26) to write a blog that promotes the role of women in engineering. Her blog, is titled *Unexpected Consequences* and has entries such as 'How many hamsters does it take to power New York City' and 'Cut the Carbon!'. Readers can log on to <http://pleasestresspass.wordpress.com>

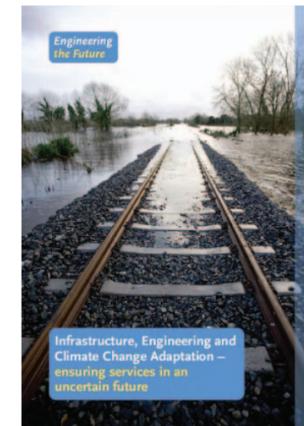
to learn more about Angela Crowther's work and experiences.

The time for applying for engineering undergraduates to apply for either of the Engineering Leadership Schemes will be August for the Standard Award and October for the Advanced Award. The Standard Award enables undergraduates to take short courses to enhance their engineering knowledge and personal skills. The Advanced Award enables people to enhance their studies and personal development throughout their degree after their first year as an undergraduate.

Visit www.engineeringleadershipawards.org.uk for more details.

CLIMATE CHANGE ADAPTATION

The effect of climate change to the UK's infrastructure and what the engineering profession can



do to respond are the subjects of a report published by The Royal Academy of Engineering in February 2011. *Infrastructure, Engineering and Climate Change Adaptation - ensuring services in an uncertain future* was launched by Engineering the Future, an alliance of professional engineering organisations.

The report looks at vulnerabilities across a number of crucial sectors, including energy, transport, communications and water. It also examines 'cascade failures' - when a severe event could cause disruption in one service before impacting on others in a domino-style effect.

As more and more of the UK's infrastructure is being built around ICT systems and mobile communications, this loss of power could disable essential services.

Engineers are central to the process of adaptation to deal with climate change. They will help ensure current assets are protected as well as developing new infrastructure systems fit for changing climate conditions - including both long term effects such as sea level rises or emergencies such as flash floods.

The report presents 20 findings to government covering a range of areas from planning and regulation to

innovation and, crucially, public engagement - there is a need for dialogue between the public, government and engineers on the costs of a resilient infrastructure and acceptable future levels of service.

At the presentation of the report to Sir John Beddington CMG FRS, the government's Chief Scientific Adviser, a panel of engineers from various disciplines warned that to be ready for a changing climate, all sectors needed to work together to plan ahead and regulate effectively.

The report can be downloaded at www.raeng.org.uk/infrastructure

GNSS SECURITY

The Royal Academy of Engineering published a report *Global Navigation Satellite Systems: Reliance and Resilience* in March 2011. The report draws attention to the wide reliance on global navigation satellite systems (GNSS) and the current limited use of GNSS independent backups for positional, navigational and timing (PNT) uses. The vulnerabilities of GNSS to deliberate or accidental interference, both man-made and natural are also highlighted.

GNSS is now used internationally by almost every industry and sector, from aviation to law enforcement as well as by the wider public, and so reliance on it is at an all time high, with safety of life applications becoming widespread. There are currently a number of common mode failures that could affect the Global Positioning System (GPS). This could bring about a

series of consequences ranging from the inconvenient (lost phone connections) to possible loss of life (interference with emergency services communications). The severity of the errors may be so large as to give obviously wrong results for any or all of position, navigation and timing users, but the real threat lies in "dangerously misleading" results which may not seem obviously wrong to operators. As PNT data is used by governments worldwide, there is also a potential threat to global security.

Global Navigation Satellite Systems puts forward a number of recommendations. It looks at security awareness and recommends that critical services include GNSS vulnerabilities in their risk register and that these are reviewed regularly and mitigated effectively.

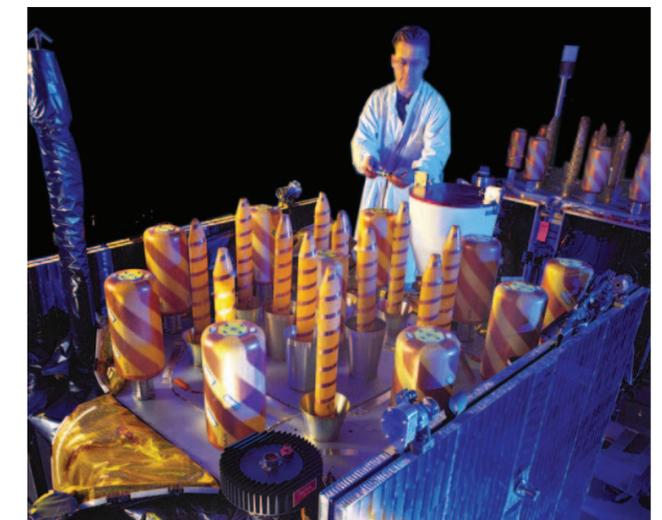
It also suggests policy responses, including the closing of a legal loophole which allows

the import, advertisement and possession of jamming devices.

Finally, it advises the creation of an R&D programme focused on antenna and receiver improvements that would

enhance the resilience of GNSS dependent systems against natural and man-made threats.

The report can be downloaded at www.raeng.org.uk/gnss



A Block IIR 'replenishment' series satellite, developed by Lockheed Martin. Twelve satellites in the series were successfully launched © Lockheed Martin