

The Professional

ENGINEER

Issue 71, Autumn 2010

Kingston Lacy House,
Dorset



The Society of
Professional Engineers
was founded in 1969.

Features in this Issue

3. The Editor Writes
3. The Presidents' Notes
3. Inflation
4. Cathedrals Fabric Survey 2009
4. The Shoreditch Light Bar
5. Arup pushes the envelope in Singapore
6. The Birth of Radar
8. William Sturgeon, British Physicist (1783-1850)
9. Copper's Arctic Role in the Land of the Northern Lights
10. Fetes of Engineering



Council and Officers

PATRON		To be appointed
VICE CHANCELLORS		The Earl of Yarborough Lord Alistair Nelson of Stafford 4th Baron The Earl of Lytton
PRESIDENT		HARDCASTLE, David John, PEng., Hon.F.S.E., F.C.M.I., B.Ing. (Germany) 45 Crossway, Sutton, Surrey SM2 5LD.
IMMEDIATE PAST PRESIDENT		DIXON, Brian R., BA, PEng., A.B.Eng, MCCES, P/PGIS., Hon. FHKIConst.E, Hon.FASI, SASPE, MSPE 1 Scotts Court, 46 Station Road, Alderholt, Fordingbridge, Hampshire SP6 3RB
PAST PRESIDENTS		HARDCASTLE, David John, PEng., Hon.F.S.E., F.C.M.I., B.Ing. (Germany)
	Ing .P. Eur.	PARRATT, David Gordon, LLB., PEng., FRICS., FCI Arb., MAE., FBEng. 18 Orchard Close, New Alresford, Hampshire SO24 9PY
VICE PRESIDENTS		GERRARD, Brian W., BSc(mech), PEng., MIET 6, Pocket Nook Road, Chew Moor, Bolton, BL6 4HN
		PARKER, James Malcolm, PEng., FB.Eng, MRICS, MCI OB 17 South Side, Hutton Rudby, Yarn, Yorkshire, TS15
HON. SECRETARY		WATT, Arthur, PEng, FB.Eng, MSPE, MWOB, CEnv. 1, Farrow Drive, Corpach, Fort William, Scotland, PH33 7JW
HON. TREASURER		WATT, Arthur, PEng, FB.Eng, MSPE, MWOB, CEnv. 1, Farrow Drive, Corpach, Fort William, Scotland, PH33 7JW
MEMBERS OF COUNCIL		WYNNE, Hugh, BSc, MSc, C.Eng., PEng., C.Sci, M.Inst.MC., MBCS., CITP, MIEE, FSPE 103 New City Road, Glasgow, Scotland, G4 9JX
	Ing .P. Eur.	ELDERS, Ray, PEng., F.I.Diag.E, F.E.I., F.I.A.B., M.I.I.E., A.M.I.Mar.Est., A.F.A. 28 Birks Lane, Millhouse Green, Penistone, Sheffield S36 9NB
		HARDY, Barry M.Sc, PEng., I.Eng, MIET, MBIFM, FSPE, FB. Eng, FI.Diag.Eng 3 Baird Garden, Dulwich Wood Park, London SE19 1JH.
NON DIRECTOR MEMBERS OF COUNCIL	Ing .P. Eur.	WRIGHT, Iain Allan Cooper, PEng., F.S.E., M.B.Eng. Guinea Wiggs, Nayland, Colchester, Essex CO6 4NF
	Ing .P. Eur.	TONDEUR, Charles, ipf (France) SNIPF, 3 rue Fortia, BP6004, 13484 MARSEILLE, Cedex 20, France <i>(Société Nationale des Ingénieurs Professionnels de France)</i>
SP Eng, HONG KONG CHAPTER		Brian R. Dixon, BA, PEng., MCCES, Director Cheung Wai Lung, MSc, PEng(UK), MCI OB, MASCE, MAIC, MIO SH, M.HKI Const.E., MHKISA, MHKIM, MCCES, MCASA, RSO, CP, FSPE, Chairman / Director
OVERSEAS CORRESPONDANTS		CANADA Mark El Kadi Christopher West
		USA Ronald Schenk
		AUSTRALIA JA Seegar-Snowden
		HONG KONG The Secretariat H.K.I.Const.E.

PAST PRESIDENTS OF THE SOCIETY

1969/70	F.W. HYDE	1975/76	J.D. BURROWS	1981/83	A.J. BARTER	1991/93	M.J. PREECE	2005/08	BRIAN R. DIXON
1970/71	D.J. AYRES	1976/77	T.M. SCANLON	1983/84	D.J. HARDCASTLE	1993/96	R.J.T. ROLLINGS	2008/	D.J. HARDCASTLE
1971/72	S.N.B. GAIN	1977/78	S.N.B. GAIN	1984/86	J.A. GARDNER	1996/2000	G.K. TURNER		
1972/73	J.D. BURROWS	1978/79	W.E. HUMPHREY	1986/87	D.T. COATES	2000/02	BRIAN R. DIXON		
1973/74	J. MASON	1979/80	R.C. WYKES	1987/90	I.A.C. WRIGHT	2002/03	IAN T. FITZHERBERT		
1974/75	D.J. AYRES	1980/81	V.C. EALEY	1990/91	K.A. STATHAM	2003/05	DAVID PARRATT		



Welcome to the latest publication of the Bulletin which includes a brief notice of the Annual General Meeting and President's Luncheon 2010.

We also feature articles on 'Presentations in Singapore', 'The Birth of Radar', 'Dickens Museum Refurbishment', 'Revamped weir keeps rising tides at bay in Belfast', 'Scotland's Housing Expo will Create Living Village', 'Fetes of

Engineering' and 'The Shoreditch Light Bar'.

I do hope you enjoy reading this issue, and may I remind members that any articles you may have for future issues, particularly from overseas, are always most welcome.

Have a good read.

Brian R. Dixon, BA, P.Eng
Editor

I am well aware that Annual General Meetings are normally calm and perhaps rather boring, relating to the previous year which may be considered history.

However, at our next Annual General Meeting in October your Council will be proposing drastic alterations to our scheme of membership.

The object of this proposal is to make applications by junior, and not necessarily young engineers, more attractive.

I would like to see as many as possible attend this Annual General Meeting and to use their voting rights to what may well be some contentious but important ideas.

It may be that your wife, or partner would enjoy the subsequent Luncheon which is being arranged to give everyone the opportunity to meet the new President.

David Hardcastle, P.Eng
President



Annual General Meeting 2010

Will be held in the Society H.Q.,

Lutyens House, Billing Brook Road, Northampton, NN3 8NW

Monday 18th October 2010 commencing 2.30pm

Open to all Society members • Hope you can attend.

Table 1: How Prices have changed over 10 years

Item	Price in 1999	Price in 2009	% Change
Milk	34p	54p	32.3
White Loaf	51p	£1.26	147
Sugar	61p	88p	44.2
Bottle of Wine	£3.55	£4.18	18
Unleaded Petrol	63.6p	90.4p	60
Ford Focus	£15,500	£16,095	4
House Prices	£73,302	£163,969	123
Average Salary	£17,702	£26,472	13.6
Weekly State Pension	£66.75	£95.25	42.7

Source: www.thisismoney.co.uk (Daily Mail)

To give you an indication of how inflation has attacked the buying power of money, Table 1 shows the changes in some key prices over the past 10 years.

With effect from 4 January 2011 the standard rate of Value Added Tax (VAT) will increase to 20 per cent. The reduced rate, which applies

to some goods and services, including items such as domestic heating fuel and children's car seats, will remain at 5 per cent.

Delaying the increase to 4 January 2011 means that Christmas and New Years Sales will be protected to some extent.

***"Happiness is not a destination in which you arrive, it is your journey there."* Anonymous**

Do you have non-member colleagues? Encourage them to join the Register

A membership information pack is available on request from

The Society of Professional Engineers, Lutyens House, Billing Brook Road, Weston Favell, Northampton NN3 8NW

Tel: 01604 415729 • Fax: 01604 415729 • Email: spe@abe.org.uk

The Presidents' Luncheon 2010



Will be held at

Dunkley's Restaurant,

Castle Ashby Station, Cogenhoe,
Northampton, NN7 1NP

Monday 18th October 2010 at 12.15pm

Prior to the A.G.M at Luytens House,
Northampton, NN3 8NW

Seperate details posted

Hope you can attend.

Cathedrals Fabric Survey 2009

The 2009 Cathedrals Fabric Survey is the third in a series undertaken by English Heritage and partners. Its purpose is to gain an accurate picture of the condition of the 42 Church of England and 19 Roman Catholic cathedrals in England (www.english-heritage.org.uk/cathedrals). The 1991 survey showed that many cathedrals had a significant repair backlog, but by 2001 85per cent of the urgent and necessary repairs had been carried out. The 2009 survey reveals that the amount of work achieved since 1991 is extraordinary;

the majority of cathedrals are now in better condition than they have been for a century.

- More than £250m of repair work has been completed or is underway across 61 buildings.

- English Heritage (including a contribution from the Wolfson Foundation of £3m) has contributed nearly £52m towards these repairs.

- Since 2001, £90m of repair work has been completed or is in progress, as well as more than £90m of development work that has improved the experience for visitors and worshippers alike.

The Shoreditch Light Bar

South Shoreditch was once the heart of London's, if not England's, furniture industry. Today, it is among the best preserved of Victorian manufacturing districts, retaining a distinctive urban landscape that was largely shaped by its dominant trade. The once-dominant furniture industry has left behind a unique legacy of mercantile boulevards lined by commercial warehouses, and industrial side streets of workshops and small factories forming concentrated quarters for manufacturing. The importance of this pattern and overall character of South Shoreditch led to the designation of a conservation area in 1991. The area is now home to a variety of artistic and cultural businesses and is much cherished by local residents and visitors.

On the edge of the area sits a 19th-century, two-storey brick building that was built as a power station to light Liverpool Street Station, immediately to the south. For many years a polite but functional, barely noticed industrial building, this is No. 233 Shoreditch High Street, and is now known locally as the Light Bar, and its proposed demolition recently generated significant

local interest and opposition.

In the summer of 2008, applications for the redevelopment of a vacant site immediately to the south of the Light Bar were submitted to the London Borough of Hackney. Part of the proposals involved the demolition of the Light Bar so that a 60-storey tower could be built- a scheme that had the support of the council's planning officers. In response, the leaseholder of the Light Bar initiated a far-reaching campaign to prevent the loss of the building. By the time the applications went to committee, the campaign had gained significant momentum and large numbers of concerned local residents were active in their objection to the proposals. The difficulty for statutory agencies was that the Light Bar was not included in the original South Shoreditch conservation area and there was therefore no obligation for the owners to keep it.

The pressure on the council was such that it was eventually compelled to release a draft conservation area appraisal for South Shoreditch, which recommended the inclusion of the Light Bar in the conservation area. A decision on the

planning application was in turn deferred until a decision could be made on whether the conservation-area boundary should be formally extended to include the Light Bar. Whatever the motives of the owner, the local community wrote in vast numbers in support of the inclusion of the Light Bar in the conservation area. English Heritage and amenity societies also encouraged its inclusion and the council approved the extension of the conservation area in February 2009.

Since inclusion, the proposals for the development site will be revised to ensure that the majority of the Light Bar has been retained. Planning permission was granted on October 2009



Architects Have Great Expectations for Dickens Museum Refurbishment

With recent appointments including the Lewis Carroll and Elizabeth Gaskell visitor centres, Purcell Miller Tritton is increasingly seen to be the architect of choice for literary related projects. It has been announced that the practice has been appointed by the Dickens House Trust to undertake the renovation and expansion of the Charles Dickens Museum at 48 and 49 Doughty Street, Bloomsbury, the only surviving residence of the famous English author.

The trust has maintained the Grade I listed, five-storey Victorian property at 48 Doughty Street since 1925. Functioning as a museum, the building not only celebrates the work of Charles Dickens but also acts as a working

repository for around 10,000 books and 100,000 other objects such as paintings, photographs and letters associated with the author.

Each year, the museum attracts thousands of visitors and its growing popularity has necessitated an expansion into a similarly sized property at 49 Doughty Street. It is intended that the newly refurbished 49 Doughty Street will become a visitor centre featuring study areas and teaching rooms as well as climate controlled spaces for the National Dickens Library and Archive. The current museum, 48 Doughty Street, will be furnished to create a Victorian experience and the Grade I listed fabric of the property

will be repaired and conserved. Disabled access to the building will also be improved.

The objective is for the work to be completed by 2012 in order to coincide with celebrations surrounding the bicentenary of Charles Dickens' birth. Also with the huge influx of foreign visitors to London expected to be attracted by the Olympics, the Dickens museum will prove a natural place of pilgrimage for those interested in the author.





Arup Pushes the Envelope in Singapore

Completion has been reached on the Arup-engineered Marina Bay Sands Hotel in Singapore - a stunning place to stay, but an even more impressive one to build.

The three curved towers extend to 55 storeys, supporting a 1ha "sky park" perched 200m in the air with a 50m cantilever at one end.

Designed by US architect Moshe Safdie and the local office of UK architect Aedas, the entire complex also has convention facilities, a shopping mall, restaurants, casino and two theatres. An Art-Science

museum is still under construction.

But the pièce de résistance will be the hotel's Sands SkyPark, featuring 900 species of trees and plants and a swimming pool along its entire length.

Cheong Va-Chan, Arup's project director, said: "Arup has had to push engineering boundaries and adopt new and innovative technologies to deliver this spectacular design."



Scotland's Housing Expo will Create Living Village

The Highlands of Scotland hosted Scotland's Housing Expo during August, the first ever Housing Expo in Scotland showcased more than 50 architect-designed houses, set in four zones, featuring innovative construction and cutting-edge sustainable systems plus the very latest in product design, landscaping and interiors.

The future of housing is a key theme with affordability and low running costs a part of the design brief. The 52 homes on view were all winners in a professionally accredited competition.

The show's innovations are targeting consumers, the building industry and design professionals. A programme of events, workshops, stalls, performers, art and activities all took place around the Expo.

One of the show's biggest innovations is that its legacy will be a real, functioning village.

The 52 unique houses that have been designed and built were available for sale or rent after the event leaving a living, breathing, contemporary village over five hectares at Balvonie Braes, south of Inverness, just off the A9. The principal contractor for building the homes was Highland Contractors Consortium and the development is a huge boost to the Scottish construction industry. As a result of the passion for creating safe and open play areas for children, Heminway Design was commissioned to create 12 gardens and a children's play area.

The areas were designed to help promote a better social living environment and forge a greater sense of community in keeping with the ethos of the whole development, which incorporates shared surfaces and remote parking to encourage



One of the house designs on show at the Expo

greater community interaction.

Scotland's Housing Expo showcased the best of the country's architecture and design and placed Scotland firmly at the forefront of European housing design.



MPs to Bat for Industry

A cross-party group of MPs and peers is being put together by the Construction Industry Council to boost the profile of the construction industry within parliament.

The All-Party Parliamentary Group for Excellence in the Built Environment was inaugurated at an annual general meeting on 7th June, at Portcullis House, and formally launched at a reception at the institution of Civil Engineers on 7th July.

It will be chaired by Tony Baldry MP, a fellow of the CIOB and a former construction, housing and planning minister under the last conservative government. Other officers were elected at the parliamentary meeting in June.

The CIC chief executive Graham Watts said he hopes the group will attract between 40 and 50 members from the three main parties within both Houses - including many of the newly-elected MPs in the photo to the right.

"There are plenty of groups focusing on buildings, architecture, plumbing, fire safety, but no one looks at the bigger picture," he told *CM*. "We want parliamentarians to have a broader understanding of the built environment to the economy and to their constituents' lives. At the moment, that influence or knowledge isn't there."

Watts said the group will hold between four and six events a year, including visits to construction sites.

Commenting on the new group, Eddie Tuttle, policy and ambassador manager at the CIOB, said: "It's a welcome way of making the case for industry, particularly given the budgetary constraints at the moment. It's about raising the profile of



construction and making sure we have a voice in parliament.

"The industry has a central role in creating a low-carbon economy, whether through the refurbishment of existing building stock or new infrastructure.

Keep In Touch with The Society

The Society of Professional Engineers

Contact: Teresa McCarrick, Lutyens House, Billing Brook Road, Weston Favell, Northampton NN3 8NW

Tel: 01604 415729 • Fax: 01604 415729 • Email: spe@abe.org.uk • www.professionalengineers-uk.org

The Birth of Radar



Engineering and pure Science are different functions but each is dependent upon the other and together they are a specialisation which is essential for the well-being of the world and which mankind relies on wholly for its continued existence. Engineering is a function which puts science into context and puts theory into practice.

It is with this excuse (if any excuse is necessary), that I write about RADAR which started to be developed in about 1935 and was one of the principal factors which influenced the outcome of the World War of 1939-1945. Engineers of specialisations which do not depend upon electronics may be interested to read of the early days of the development of radar which are recognised for posterity by a memorial to the birth of radar on a stone set up in the corner of a field in Northamptonshire near the little village of Litchborough about ¼ mile to the west of the A5 where the early experiments were undertaken. The plaque records the fact that Robert Watson Watt and Arnold Wilkins conducted experiments by using a radio beam from the existing short-wave transmitter at Daventry and collecting the echoes from an aeroplane which flew

through it. They set out two long-wire dipole aerials in the field and fed the received echoes to a cathode-ray oscilloscope set up in a van. When the spot on the screen jumped, they knew they were on the right track.

Radar has developed considerably since those days but the fundamental principle has not changed. The early ideas about detecting the approach of aeroplanes was by means of listening devices which amplified the sound of their engines but radar went one better by transmitting radio waves and "listening" to the echoes which were reflected back from the approaching aircraft. Since the speed of travel of these radio waves was similar to the speed of light, all that was necessary to determine the distance of the aircraft from the radar device was to measure the time taken for the radio pulse to travel from the transmitter to the aircraft and return to a receiver. As the return echo would be only a very small fraction of the transmitted pulse, for any reflected echo to be detected, the original pulse had to be as strong as possible and the aerial array had to be very directionally sensitive.

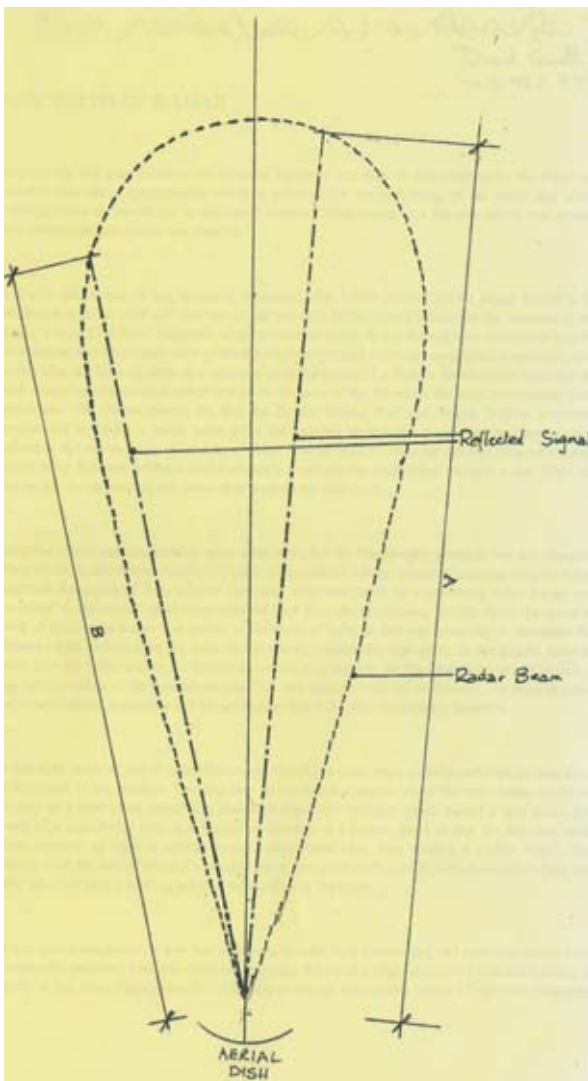
At that early stage, all that they had discovered was that a radio beam could be reflected but that gave no indication of the distance. The next step was to create a system where the radio beam would be initiated by a brief pulse which also started an electronic timebase which moved a spot across the screen of a cathode-ray tube in a horizontal direction at a known speed so that the returning echo would move it up when it arrived several milliseconds later, thus creating a visible "blip". The distance from the start of the spot's passage across the screen then gave an indication of how long the radio wave had been travelling and thus the distance to the target.

As that gave a range only, it was then necessary to make both transmitting and receiving aerials very directionally sensitive. This was achieved by giving the aerial a slight directional bias and rotating it rapidly so that when signals biased 1° left were compared with signals biased 1° right, (see diagram), the aerial array could be adjusted to produce equal return signals. Initially the adjustment of the aerials to equalise the right and left signals was carried out by an operator but later



David G Parratt, PEng

developments created a system where the different right and left signals were used to move the aerial array automatically so that it could lock on to the target and follow it. Repeating the biasing in an up- and-down direction made it possible to produce an indication of the angle of elevation and from this and the range, determine the height of the target. In later developments, the blip on the screen was replaced by a device which altered the intensity of the spot and by a continuously rotating aerial array, a plan position indicator (PPI) was possible and this was particularly useful for naval use where the calculation of height was not necessary. Later the use of an aerial which vibrated horizontally across a narrow band made it possible to show a limited area of ground where targets such as tanks and vehicles could be located together with the bursting of artillery shells so that the radar could be used for spotting for the guns. This type of radar could also be used for the location of guns and mortars because each shell or bomb would pass through the radar beam at two different places and although the firing devices might be in dead ground, their locations could be calculated. The early experiments with radar used



thermionic valves for the transmitting devices but the necessity for very high transmitting power led to the development of magnetrons for this purpose. These required a 40kV supply and since the power was proportional to the square of the voltage, this produced the necessary transmitting power. The present magnetrons as used in microwave ovens may be very different from those used originally but they owe some of their improvement to the work involved in developing radar. Judging by the number of magnetrons I had to replace when I was working on radar, they certainly needed

some improvement because they were most unreliable. My personal experience of radar goes back to only five years after the end of the Second World War. However, it is clear from the information now available about radar during the Battle of Britain, that the systems in use in those days had wavelengths of the order of 10 m and were much more primitive than the 10 cm and 3 cm systems I have outlined above. In one of the older sets which I saw during training, the dish aerial was turned by a motor car steering wheel on the end of a piece of gas pipe secured to a wooden bench with two pipe

clips! In those early days, all the electronic equipment used thermionic valves which had relatively short lives and the work of a radar mechanic such as myself was occupied primarily with finding which valve needed to be replaced when a fault occurred. When the set still didn't work, it was sometimes necessary to replace individual resistors and capacitors or possibly re-solder a "dry" joint. Nowadays I imagine one would simply replace a complete unit or at least plug in a replacement printed circuit board.

David G. Parratt, P.Eng



British Library Opens Automatic Storage Space

The British Library has officially opened its new £26M Additional Storage Building (ASB) at Boston Spa, Yorkshire. Housed within a large steel frame, which required 800t of structural steelwork and was erected by James Killelea, there are 262 linear kilometres of shelf space for the national collection.

The project, managed by Capita Symonds, is the first of its kind to incorporate automated storage and retrieval systems, optimum environmental controls and low oxygen fire prevention technology in a single building.

The ASB, constructed by Allenbuild, is also one of the most air-tight buildings in the UK, with a leakage rate specification of no more than 0.5m³ of air per sq m of wall area per hour.

It will house low-use material including patent specifications, books and newspapers in 144,000 storage containers.



Revamped Weir Keeps Rising Tides at Bay in Belfast

A major refurbishment of the Lagan Weir in Belfast has reached completion.

Built in 1994 by Charles Brand at a cost of £14m, the weirs main function is to control the tidal nature of the river Lagan upstream, keeping it at an artificial but constant level. This is accomplished using a series of steel barriers which are raised as the tide retreats. This improvement to the sewerage system combined with massive dredging of the river by mechanical excavators, an installation of an underwater aeration system, has lead to marked improvement in water quality and the environment around the river. The tides could vary by up to three metres and low tide exposed mudflats which were unsightly and emitted a strong odour, particularly in the summer months.

The transformation of the riverside by the construction of the weir has been a catalyst for development along the riverside.

The revamp began in 2009 and involved new hydraulic rams to control its 32-tonne fish belly gates that rise and fall to control the upstream water levels. Each of the five gates was enclosed and pumped out so that maintenance could be carried out below the river. This included replacement of the seals and repainting at a cost of £2m.

During the whole of the refurbishment the weir has continued to carry out its primary function of controlling the water levels of the Lagan. Only one gate at any one time was out of operation. Other associated work carried out included new power units and telemetry to assist with the control of the river level.



Steel adds Civic Pride



Impression of the new Woolwich Civic Centre with its prominent top floor gallery.

Prince's Trust

More than a million young people are not in employment, education or training, and youth unemployment costs the UK economy £10m a day in lost productivity, while youth crime costs £1bn every year. Three in four young people who go on The Prince's Trust Get Into Construction course go onto work, education or training.

The Courses give 16 to 25 year olds an introduction to construction trades like carpentry and joinery, painting and decorating, plumbing and tiling alongside workplaces skills such as CV writing and interview techniques. Participants also get the chance to gain their Health and Safety CSCS card, a basic entry certification for working on a site.

From Balfour Beatty to Wates, Flamco to Rydon, construction companies across the UK are committed to helping disadvantaged young people into jobs.



Haiti Opens up to Housing Ideas



The Government of Haiti is holding an international competition to find alternative forms of housing for its displaced citizens. The contest is geared towards exemplar designs for transitional housing that can be built quickly and last a generation prior to full reconstruction.

The competition, called Building Back Better Communities, is organised for the government by Malcolm Reading Consultants and based on a concept developed by architect John McAslan.

A shortlist will be drawn up and finalists will

be invited to come to Haiti.

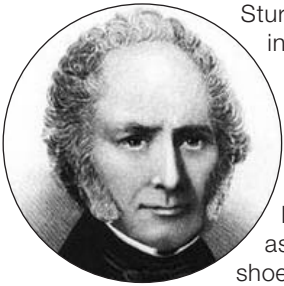
A government-backed expo in October will be held on the site to showcase all the designs - from bespoke community-built to mass-produced housing units. Finalists' schemes will be built on a 2ha plot on the outskirts of the capital, Port-au-Prince. However the competition is also seeking designs for a low-energy, exemplar housing settlement to be built on an adjacent 3ha plot later this year, giving more companies a chance to participate.

The competition will prioritise entries that



engage with local communities, employ Haitian staff, or involve local manufacturing.

William Sturgeon, British Physicist (1783-1850)



Sturgeon was born in Whittington, Lancashire and was apprenticed to a shoemaker /cobbler (his father). Seeing little future as apprentice shoemaker Sturgeon enlisted in the army in 1802.

While serving in Newfoundland his interest in science was aroused while watching a violent thunderstorm. As no one was able to explain to him the cause and nature of lightning he researched by reading all available books. This led him to study mathematics and Latin. When he left the army in 1820, at the age of 37 years, he had acquired considerable scientific knowledge and practical skill. He began to write popular articles, joined the Woolwich Literary Society, so impressing his associates that a move was made to find him a more suitable job than shoemaking, which he had taken up again on leaving the army. Thus in 1824 he



Sturgeon's Electromagnet 1824

was appointed to a lectureship in experimental philosophy at the East India Company College at Addiscombe and in the following year exhibited his first electromagnet. To display its power he wrapped a 200gram piece of iron rod with a number of turns of wire through which a current from a single battery was passed, creating an electromagnet capable of lifting 5 kilograms. In 1825 The Royal Society awarded him their silver medal and thirty guineas for contributions to improving electrical apparatus. In 1828 he put into practice Amperes idea of a solenoid and in 1832 was appointed to the lecturing staff of Adelaide Gallery of Practical Science in London where he first demonstrated the d.c. electric motor incorporating a commutator. In 1836 he established the journal Annals of Electricity, in the same year he invented a suspended coil Galvanometer. Sturgeon with Gassiot and Walker founded the London Electrical Society in 1837. As a prominent intellectual he was appointed superintendent of the Royal Victoria Gallery of Practical Science in Manchester. During these days he formed a friendship with one of the galleries promoters John Davies and Davies' student James Prescott Joule, a circle that extended to include Edward William Binney and John Leigh. The Royal Victoria closed in 1842 due to lack of



Brian Gerrard

support, leaving Sturgeon almost destitute and he resorted to traveling the district of Manchester with a hand cart for his demonstrations. The Manchester Literary and Philosophical Society of which he was a member obtained a grant, for him, of £200 and later an annuity of £50. He died in 1850, aged 67 years and was buried in Prestwich cemetery, Manchester. A plaque to his memory can be seen on the inside South wall of St. Mary's Church at Kirby Lonsdale Cumbria, near to his birthplace. Under more fortunate circumstances he would have probably have left a name unsurpassed in the scientific history of his time.

© B.W. Gerrard. BSc, P.Eng, MIET

Newport Lecturer is First Academic to Receive Award for Outstanding Contribution to Civil Engineering



A lecturer from the University of Wales, Newport, has become the first academic to receive the highly prestigious Chairman's Award for Outstanding Contribution to Civil Engineering. Colin Jones was praised for 'his immense contribution to the Welsh economy and the profession of civil engineering' when he received the award at the dinner held by the Institution of Civil Engineers (ICE).

The annual event was attended by 260 representatives of the leading contractors, consultants, architects and suppliers from the Welsh civil engineering industry.

Colin, who graduated with an honours Degree in Civil Engineering from Dundee University, has been responsible for boosting the number of civil engineering students at Newport's University, transforming it from a

single HNC part-time qualification to the current situation where over 200 students are studying for HNC, HND, BSc (Hons) and a Masters degree in Civil and Construction Engineering.

As well as re-establishing the Business Studies programme he has developed a new Fire Safety Engineering Programme to add to the School's portfolio of courses.

Articles for the Bulletin - We are always looking for news of members and project articles for publication in the bulletin, do you have something of interest, lets hear from you. Please supply articles up to 1000 words.

Copper's Arctic Role in the Land of the Northern Lights

Copper's capabilities have been tested at the Svalbard Science Centre, halfway between mainland Norway and the North Pole. Here, temperatures as low as -50°C are encountered during fierce winter storms, the ground is permanently frozen and mid-November to January is spent in total darkness.

So constructing an 8,500m² extension to a university research building presented some unusual challenges, even before considering the "organic" design featuring sloping facades and shallow pitched roofs.



An insulated copper-clad skin is wrapped around the complex shapes demanded by the brief, creating an outer shell adjusted to the wind and driving snow.

Copper was chosen for its flexibility in adapting to complex shapes, as well as its durability, long life and absence of maintenance. Luvata's mill finish Nordic Standard copper was used throughout.

Roofs are clad with 0.7mm thick copper trays jointed with 50mm high, raised single-lock seams. All the jointing details were preformed in a workshop to minimise work on the roofs themselves.

The project was built by main contractor Skanska and Norwegian company Erling Freitag carried out the copper work. Four sheet metal workers took around a year to install 10,000m² of copper to roofs and facades.

Copper can be worked at all temperatures and unlike metals such as zinc, does not become brittle and break in cold weather.

Work at the Svalbard Science Centre was carried out during biting winter storms, but the copper cladding retained good workability even at these extreme temperatures, thereby extending the construction period into the cold season.

Copper installation contractor Svein Freitag said: "Wind chill was the worst aspect as wearing so many clothes made it difficult to move around and work. But the continuous darkness was never a problem- actually the pale blue Arctic light is very beautiful. The project went well overall and we would do it all again if we could."

In addition to the Nordic Standard copper used at Svalbard, Luvata offers a constantly expanding range of surfaces. Nordic Royal is an alloy of copper using aluminium and zinc to give a permanent, warm golden surface. Pre-patinated Nordic Green Living, meanwhile, offers architects and designers the ability to specify the type and intensity of patina.

Glasgow's £100-a-Year House Could Spell the end of Fuel Poverty

Glasgow Housing Association's (GHA) ambitious plans for an energy efficient home which costs just £100 a year for heating and hot water have reached completion.

GHA teamed up with architects PRP and City Building to build four prototype houses which feature high standards of insulation, coupled with low energy running costs and simple technology.

A typical three-bedroom home normally costs around £1,100 per year to heat but with the target of heating and hot water bills coming to just £100 a year - or £2 a week - the Glasgow homes will tackle fuel poverty head-on and play a key role in reducing the impact on the environment.

The four three-bedroom, semi-detached prototype houses - known as 'The Glasgow House' - were built at City Building's Skills Academy in Laurieston, Glasgow by locally-trained workers and apprentices. The houses were completed in May and once they have been fully tested, it is planned that more will be built for GHA tenants.

Jim Sneddon, GHA's executive director of regeneration, said The Glasgow House is

now a development with a real future. "This simple, cost-effective design for an energy-efficient home will help families enjoy a better quality of life."

Similar in appearance and performance the two blocks of semi-detached homes are built in alternative forms of wall construction. House Type 1 has a thin bed insulating hollow clay block construction with external wall insulation and a render finish.

House Type 2 comprises a highly-insulated, locally sourced timber frame with pre-manufactured floor and roof cassettes, with external walls in facing brick. Key features contributing to the low energy bills include:

- High levels of insulation in both forms of construction
- Windows and sun rooms orientated to capture the energy of the sun, with details to avoid overheating
- Simple forms of construction for ease of construction and to minimise heat loss and use of energy
- Off-site prefabricated roof and floor panels



to speed up production

- Locally-sourced or assembled materials including windows, pre-manufactured floor and roof cassettes, plus timber kits and kitchens from RSBI in Springburn
- Usable insulated roof space to provide room in the attic at minimum cost.
- Efficient heating system and user-friendly controls
- Solar thermal panels on the roof to contribute to water heating
- Educating residents on how best to benefit from special features of their homes.

Presentation of Certificates in Singapore

At the SIET Social Gathering in Singapore on 7th August 2010 at the Professional Activities Centre.

The event was to celebrate Singapore's 45th National Day, certificates of membership were presented to Loo Yong Soon and Ms. Lu Hongwei by Dr. Sam Man Keong, FBE, PEng (UK), C Env, FSPE, President, SIET (2009/2010)

We wish them both well in their future careers.



New Guidance Released for Temporary Roofs/Buildings



Since the publication of the original technical guidance there has been very little up-to-date advice available for the design of temporary roofs and buildings. TG20 does offer some basic advice on temporary buildings and temporary roofs up to 15m in height, but BS EN 12810/12811 specifically excludes these types of structures.

The new guidance is designed to give design and construction information to the suppliers and erectors of temporary roofs and buildings constructed from scaffolding

materials, and intended for use by contractors during the building process.

The guide covers some of the more basic requirements and considerations that should be made to provide an economical, but safe, completed temporary structure, taking into account modern industry practices and legislation.

Sections of the final guide are dedicated to management considerations and safe systems of work which give advice on the requirement to erect and dismantle

temporary roof structures using collective fall prevention measures whenever possible.

The new Eurocode (BS EN1991) has now superseded BS6399 for the assessment of snow and wind loadings and, as a consequence, TG9:10 now includes guidance on the use of these standards for the designer.

The information contained in the new guidance will also be compatible with the data included in the current version of BS55975 - Code of Practice for Falsework.

Fetes of Engineering



Connecting the Ashton under Lyne Canal to the Huddersfield Narrow Canal

In early times trading between Manchester in Lancashire and Huddersfield in Yorkshire was with strings of packhorses through moorland passes. The village of Marsden near to Huddersfield and the source of the River Colne was the meeting of a few of the packhorse routes. As this was the junction of the popular routes a coach road (turnpike) was built in 1759. During the next eighty years three turnpikes had been built through Marsden each an improvement on the former. The last to be built is now the A62 trunk road. The turnpike improved transportation but could not transport bulk items such as coal, stone and corn. As water was plentiful the wealthy of Marsden agreed to build a canal to connect with Aston in Lancashire, near to Manchester. Parliament agreed and the Huddersfield Narrow Canal was started from the existing Huddersfield Broad Canal in 1794 and it would take until 1811 to complete. The biggest obstacle and major works was the tunneling through Standedge Moor from Marsden to Diggle and Diggle to Marsden which caused complications in alignment only resolved with the help of Thomas Telford. The tunnel is 3¼ miles long, 200 metres above sea level, 200 metres below the moor. Shafts were sunk from the moor to help with spoil removal and ventilation. These spoil tips with others may be seen when traveling the A62 across Standedge Moor. On the Yorkshire side the canal has 42 locks and in Lancashire 32. The principal engineers involved in this massive project are John Rooth, Nicholas Brown, Benjamin Outram and in latter stage of construction

Thomas Telford.

The canal and its tunnel enabled large cargoes to be carried but this cost time when compared to the new railways which did not have to close for long periods due to freezing or drought. So in 1846 The Manchester & Huddersfield Railway Canal Company tunneled alongside the canal tunnel. Thirty transverse passages connected with the canal tunnel to enable spoil to be removed by barges. The first rail tunnel was completed in 1849 having taken three years to construct. In 1868 a second tunnel was constructed to the south of the first (alongside) by the London North Western Railway. Twenty Million clay bricks were used and the spoil was removed by barge utilizing spoil chutes from the first construction plus additional. Twenty six barges and four steam tugs worked on spoil removal. It was normal practice for barges to be "walked" through the tunnel (men lying on their sides and walking with their legs against the wall) so steam seemed ideal and speedier. This method using steam barges was not without dangerous problems such as boiler smoke which caused one or two suffocations before completion in 1870. Due to the popularity and speed of rail travel it was decided by the rail company to build a third twin track tunnel to the north slightly higher than the canal. This was commenced in 1890 and completed in 1894. To aid construction several cross passages were constructed to connect with the first tunnels canal spoil chutes to load the barges. Also as an aid to removal of spoil three shafts were sunk from the moor. One of these had to be abandoned due to excessive flooding. As a replacement one of the canal shafts was

towed with electric motored tugs.

Marsden entrance to Standedge Tunnel is a museum site utilising the former canal side buildings to promote the waterways past with additional attractions. Tourist trips are boated into the tunnel daily with guided descriptions showing the adit spoil chutes and large rectangular stones used to ballast unladen barges through.

The Narrow canal and tunnel re-opened in 2001 following a twenty years restoration program costing thirty four million pounds, two of which was used in restoring the tunnel.

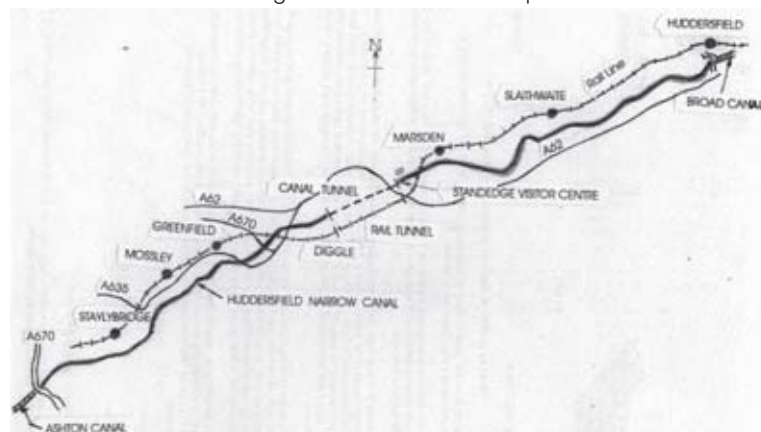
© B.W. Gerrard. BSc, P.Eng, MIET



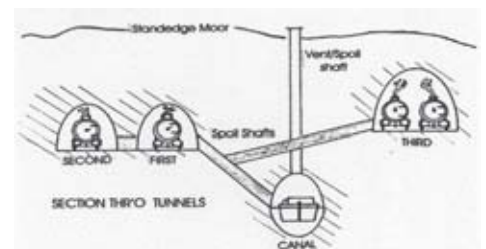
Diggle entrance or exit



Marsden entrance or exit



enlarged. To-day only this latter two track tunnel is in us, the other two rail tunnels exist with the first being used to service the canal and access it in an emergency now that it is used for leisure. Nowadays barges have to book to traverse the tunnel and are



Collaborative and Membership Agreements with other Professional Bodies

Collaborative and Membership agreements are in force with the bodies mentioned below. In every case Members wishing to apply should first contact the Society for an Application Form and/or a letter of recommendation.



National Society of Professional Engineers®

1420 King Street, Alexandria, Virginia, 22314 - 2794, USA
Tel: (703) 684 2800 • Fax: (703) 836 4875 • www.nspe.org

The China Civil Engineering Society (CCES)

Zhang Junqing, Director, Dept. of International Contact
PO Box: 2500, 9, San Li He Rd., Beijing 100835, China
Tel: 00 86 10 58933071 • Fax: 00 8610 58933071 •
www.cces.net.cn



Societe Nationale des Ingénieurs Professionnels de France (ipf)

Charles Tondeur, 3 rue Fortia, BP 60004,
13484 MARSEILLE, Cedex 20, France
Tel: 04 91 59 90 14 • Fax: 04 91 33 13 56

Email: snipf2@wanadoo.fr • Website: www.snipf.org



Hong Kong Institution of Construction Engineers Ltd

The Secretariat,

Unit 1801, Man Shing Industrial Building
307-311, Castle Peak Road, Kwai Chung
Northern Territories, Hong Kong

Tel: 00 852 2387 9477 • Fax: 00 852 2380 9494

Website: www.constructionengineers.org.hk

Email: membership@hkiconste.com



The Institution of Diagnostic Engineers

16 Thistlewood Road, Outwood, Wakefield,
West Yorkshire, WF1 3HH.

Tel: 01924 821000 Fax: 01924 82100

Email: admin@diagnosticengineers.org

Website: www.diagnosticengineers.org



The Association of Building Engineers

The Membership Secretary Association
of Building Engineers

Lutyens House, Billing Brook Road,

Weston Favell, Northampton NN3 8NW

Tel: (01604) 404121 • Fax: (01604) 784220

Website: www.abe.org.uk



The Association of British Engineers in Italy

President: Ing.PEur. Saverio Iuzzolini, PEng (UK),
FSPE, MSE, MBEng, FABEL, FIEng, MIET(UK),
MCIQB(UK), MASCE (USA)

Via Padova No. 127, 20127, Milan, Italy

Tel/Fax: +39 02 6698 8898 • Website www.abei.org

Design Technology and

Management Society International (DTMSI)

PO Box 306, Ladismith, Western Cape, 6655, South Africa

Tel: +27 (0)28 551 2098 • Fax: +27 (0)28 551 1305

Email: info@dtmsi.co.za • Website: www.dtmsi.org

Self Inking Personal Stamps

As Members will be aware the Society has for many years had on offer a Stamp for use on notepaper and drawings containing the name of the Society and the name and Registration Number of the Member. The Firm that supplies the Stamps can now offer a self-inking Stamp which produces an even more finished appearance and is enclosed in an impressive case that will sit well on the office desk. These are now available from the Society at the modest price of £30.00 each which includes VAT, postage and packing.



Lapel Badges

Lapel Badges are now available from the Society at a cost of £3.00 each inclusive of postage. All paid up members are encouraged to purchase a lapel badge to indicate their membership of the Society, and to be proud to wear it among their professional colleagues.



Society Ties

We are pleased to advise members that we now have good quality ties in stock of polyester satin in Silver Grey, Navy and Maroon with the Society Logo picked out in gold. They are very striking and will certainly provoke discussion when worn in the office and at business meetings and training. Support the Society by ordering one now at the modest price of £11.50 (including postage and packing).



The Professional Engineer is Published by The Society of Professional Engineers

Editor: Brian R. Dixon, PEng. Deputy Editor: Arthur Watt, PEng.

All correspondence should be sent to: Lutyens House, Billing Brook Road, Weston Favell, Northampton NN3 8NW

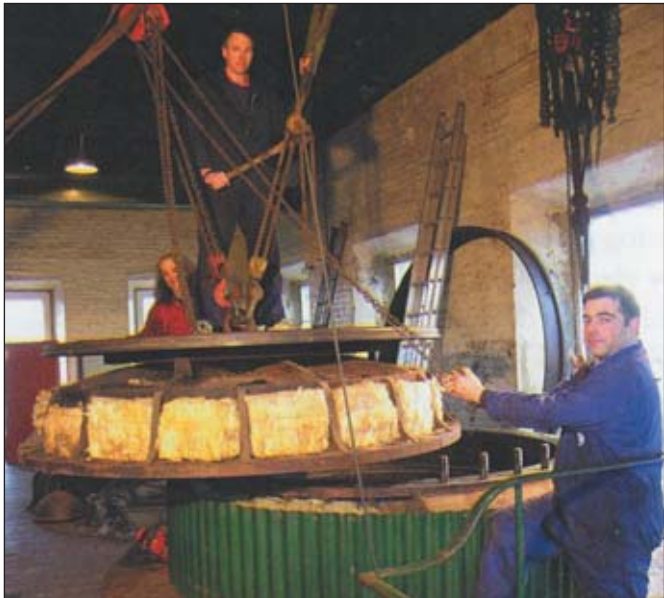
Designed and printed by: Spingold Graphics www.spingold.co.uk

The Society of Professional Engineers, as a body, is not responsible for the statements or opinions expressed in this bulletin.



Kew Bridge Engines Trust

- Put into operation the only working Bull engine in the world after full restoration (and were given two conservation awards for the work)
 - put into operation a replica Kerr Stuart Wren class narrow-gauge locomotive
 - Opened to the public for 300-plus days, of which we were in steam for about 80
 - Held six special events
 - Hosted a number of school trips with tailored learning packages.
- So 2009 was a fairly average year.



Volunteers removing the cylinder head of the 70-inch Bull engine built by Harvey's of Hayle. The restoration of this engine to working order received the Institution of Mechanical Engineers' Engineering Heritage Award and the Association for Industrial Archaeology's Dorothea Award for Conservation.

Royal Exhibition Building - Melbourne



The Royal Exhibition Building in Melbourne. Constructed for a world fair in the late 19th century and at the time the largest building in Australia, this spectacular hall and its surrounding gardens were the first non-Aboriginal cultural site in Australia to win World Heritage listing. More than a hundred years later it continues to be a hugely popular focus for major public exhibitions and events.

"Building our Society"



'Building our Society' illustration by Dermot Flynn