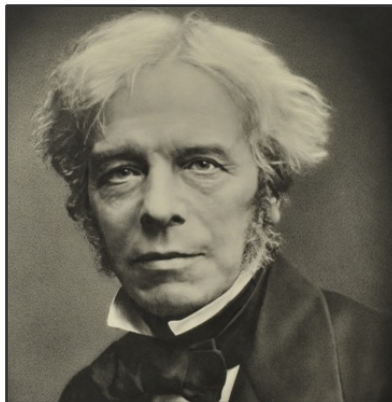
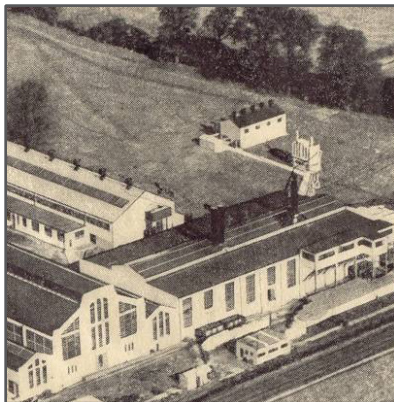
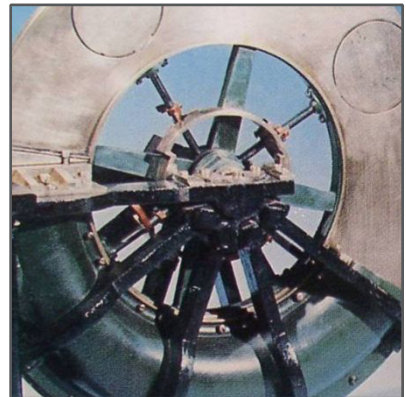
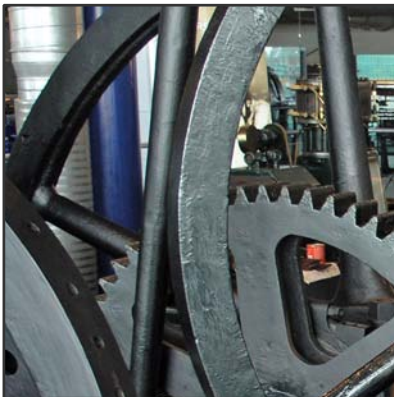


Links

Learning from the Past to Inform the Future



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Writing for Links

Relevant articles may be submitted to be considered for inclusion in Links. They should be a maximum of 700 words and sent in Word format by email. Images should be sent in jpg (digital) format of 300dpi. Copyright issues must be considered and wherever possible permission for publication granted. It is not possible to receive photographs of images in books. **The copy date for the next issue is 14 May.** Please submit articles, information, details of events to:
Deborah Jaffé
editor.links@newcomen.com

Notes on Contributors

John Allen F.I.C.E.; F.Weld.I., E.W.E. has had a long career as an engineer. He is a Past President of the Society and an expert on Thomas Newcomen.

Dr Jim Andrew has worked with Birmingham's Science and Industry Collection since 1974 and is now Thinktank's part-time Collections Advisor. He is Secretary of the Midlands Branch

Frank Armstrong worked at de Havilland Engine Co., National Gas Turbine Establishment, Pyestock, and as Director (Aerospace Vehicles) at RAE Farnborough. Since he retired he has operated as a part-time independent consultant and was Chairman of the RAeS Historical Group.

John Boulter joined C A Parsons & Co Ltd, Newcastle upon Tyne in 1949 and became a design engineer in the Gas Turbine Department. In 1965 he moved to the Steam Turbine Department, later becoming Chief Turbine Engineer, Engineering Manager and Engineering Director, he retired in 1991.

Stephen Brindle read history at Oxford and has worked at English Heritage since 1988 as a historian, an Inspector in the former Crown Buildings Group and Inspector of Ancient Monuments for London. In 2004 he rediscovered Brunel's cast-iron canal bridge at Bishops Road, Paddington.

Rev. Robin Brooks. Following his apprenticeship in heavy electrical engineering at ASEA in Walthamstow, London, Robin Brooks joined the London Electricity Board in 1965 as a distribution engineer. Having taken voluntary severance in 1995, he was later ordained as a Methodist Minister, but is still an engineer at heart.

David Crockett trained at Loughborough Training College and taught in secondary school workshops from 1964 to retirement in 2000. Interests are most things engineering, especially bridges, railways and aeroplanes.

Professor William Fairney is a Chartered Engineer and Company Director and Chairman and Managing Director of FairDiesel Limited.

Richard Hartree is a member of the Society's Midland Branch.

Dr John Hudson is a writer and researcher in the history of chemistry, and has been Secretary of the Society for the History of Alchemy and Chemistry and is a member of the committee of the Historical Group of the Royal Society of Chemistry.

Dr Phil Judkins, M.A. (Cantab), M.Sc., Ph.D. is a Visiting Fellow of Cranfield University, at the UK Defence Academy's College of Management and Technology, Shrivenham and chairs the Defence Electronics History Society, the Communications and Electronics Museum Trust and the Purbeck Radar Museum Trust.

Jack Kirby is Publicity Officer of the Newcomen Midlands Branch and Collections Interpretation Manager at Thinktank, Birmingham Science Museum

Mike Potts is a retired instrument engineer who became interested in steam engines 30 years ago. He is Membership Secretary of the International Stationary Steam Engine Society.

James Sutherland FREng BA FICE FI-StructE is a Past President of the Newcomen Society

Malcolm Tucker is a chartered civil engineer, formerly with Ove Arup and Partners. His interests include the history of building and civil engineering construction and particularly 19th century structural ironwork. He recorded the Bishops Road canal bridge and is collaborating with Stephen Brindle in research upon Brunel's other cast-iron bridges.

David Worth began his working life at British Railways Western Region and has had a lifelong interest in engineering and particularly railways. He is a long time member of the Newcomen Society and was Chairman of the Western Branch.

Robin Wright is the National Trust Engineering Warden at Lord Armstrong's former estate at Craggside, Northumberland.

The Front Cover

The images on the front cover are all details of larger ones within this issue. They are:
Top row left-right: Brass, ivory, ebony and pewter enema syringes. 17th-19th century, image: Wellcome Library, London. © 2011 The Wellcome Trust; James Watt, portrait by Abraham Wivell, 1856, after the 1801 original by Sir William Beechey RA, image: Science Museum, London 10324941; The 2011 Newcomen Fellows' Certificates.

Middle row: The Murray's Hypocycloidal Engine in the Birmingham Science Museum; The Comet 1 prototype in BOAC livery in flight, 4 September 1950, Image: De Havilland, enquiries to Science Museum / SSPL, 10438916; Model of Armstrong's rotary engine at the Discovery Museum, Newcastle upon Tyne.

Bottom row: The Banbury Works in 1933; Michael Faraday, reproduced by courtesy of the Royal Institution of Great Britain; Artificial left arm with shoulder straps, made with leather and aluminium by W R Grossmith, image: Wellcome Library, London. © 2011 The Wellcome Trust.

From the President

It is pleasing to report that at long last we are seeing the green shoots of recruitment of new members, with 19 joining since the beginning of the year. To sustain the subscriptions at the current level, we need over the next two-three years to achieve a large increase in membership. There are three things we have done to encourage and help members persuade their friends and colleagues of the benefits of joining this great Society:

- We sent every member two publicity brochures describing the Society and including a membership form, more are available from the Executive Secretary.
- We have complemented our excellent *Journal* with an improving *Links* newsletter and we have refreshed the Society's website.
- We have made the Archives accessible to full members on a free download basis (four downloads by non-members is the cost of a full subscription!).
- Our next stage in building the Society's membership has three lines of attack:
- We shall establish subject forums on the website which will enable members all over the world to participate in research and discussion on their particular areas of interest.
- We are working up a strategy to increase membership through the professional engineering bodies, in the UK and abroad.
- We shall use the opportunity in 2012 of a programme of events throughout the UK and Ireland to celebrate the Tercentenary of the Newcomen Engine, to give widespread publicity to the Society and to the importance of the history of engineering and technology.

In the past year, four of our members have been mentioned in the Honours Lists for services to some aspect of industrial history or archaeology: Michael Bailey MBE, Geoffrey Challinor MBE, Michael Chrimes MBE and Sonia Rolt OBE. These are truly deserved accolades, which reflect well on the standing of the Society and what it stands for.

Looking forward, I am most pleased to say that we have a full house for the Summer Meeting in Canada in September and we are holding a waiting list. As regards the Piston Engine Conference in April, we are still awaiting members making up their minds and signing up. This Conference promises to be a leading event of its kind so please look at the promotional material in this edition of *Links* and give the event your support.

John Russell

From the Editor

To become editor of *Links* is an exciting challenge, yet daunting when I think of its history and the hard work of all the previous editors. Roger Cline has kindly given me some background on *Links* and its editors. The first issue of 'the bulletin' was titled *The Link* and published in 1939. I hope to continue these editors' tradition of producing – both editing and designing – a newsletter worthy of Newcomen members. Publications like *Links* are vital to societies like Newcomen as they act as a dialogue between members. They now have to operate alongside websites and the internet, which make way for unforeseen and exciting possibilities. The new, Newcomen website went live in January and all members will have received a letter with their unique access number. A website is not static and we will be building it, alongside *Links*, so that both reflect the vibrancy of the Society. *Links* will be available on the website as a PDF download in the Members' Area. This, my first issue, is packed with news, articles, requests for information, events, and book and film suggestions. Details of how to submit articles and images to *Links* are on the facing page. Pages 4 & 5 are devoted to news of Newcomen members. There is a pull out section in the centre that incorporates the Blue Notices, other events and booking forms. A diary of Society and other events is on the back cover. The remaining pages are devoted to news, articles and reports of lectures. It has been a tight squeeze getting everything in, but please, do keep sending me material and suggestions for subjects to be covered. The June issue will include features on how to research, the Newcomen website and how to use it, and other relevant websites. Please send me web addresses of sites that may be of particular interest to other members. We will also be revealing plans for the 300th anniversary celebrations, in 2012, of the first Newcomen Engine. The copy date for the June issue is 14 May.

Deborah Jaffé

Newcomen People

New Year Honours

We congratulate Sonia Rolt and Michael Chrimes on their New Year Honours. James Sutherland writes an appreciation here of Michael Chrimes and Julia Elton's piece on Sonia Rolt will be published in the June issue of Links



Michael Chrimes

Mike Chrimes, 'Mike' to all who know him, is a long-standing Newcomen member who has been awarded an MBE in the recent New Year Honours. Many of our members must know him, but may not be aware of the details of his career. He became an assistant librarian in the Institution of Civil Engineers in 1977, rose to being Head of the library ten years later and is now Director of Engineering Policy & Innovation, as well as continuing to be Head of the Library. He is also a distinguished engineering historian and writer with an amazing memory. On the lighter side he is interested in travel, sport and cycling with, reputedly, a passion for Belgian beer.

It is not certain why he started working for the Institution. He has a BA in mediaeval and modern history and is a Master of Library Studies. That was a good start. He then came into contact with 'Skem' (Professor Sir Alec Skempton) who early on was overheard saying "There is a remarkable young man in the Library who has just unearthed manuscript copies of all Fairbairn's letters to Robert Stephenson about the Britannia Bridge" After that achievement Mike could do no wrong in Skem's eyes.

He gained confidence and has always worked closely with other engineers interested in history. However he is modest and does not push himself forward. I remember, when Dawn Humm, he and I and were editing *Historic Concrete*, I was uncertain on some technical point and asked "What do you think, Mike". He smiled and replied "You are the engineer. I am just the librarian". The trouble was that by then he had amassed so much understanding of engineering that it was difficult not to see him as a qualified engineer as well as a librarian. Mike's studies cover a wide range. As well as writing books, papers and chapters of books, he now contributes a regular feature to *The New Civil Engineer* entitled CHRIMESWATCH which draws attention to anniversaries and items of interest which occur to him. He is the main force behind the Institution's *Biographical Dictionary of Civil Engineers*, now in its third volume (1890-1920). As in earlier volumes he is writing more entries than anyone else and can be relied upon to step in when other authors have to retire.

It may be mostly on history that Newcomen members come in contact with Mike, but his primary job has always been on the transfer of present-day information through a library and website catering particularly for civil engineers and those working with them. He keeps up to date with the latest information technology and is currently working with the publisher Thomas Telford Ltd on a computerised 'Virtual Library'. Mike received the Institution's Garth Watson Medal in 1996 and the Spirit of Telford award in 2007. His historical work was also recognised in 2007 with the History and Heritage Award of the American Society of Civil Engineers. For those who can get there the Institution's actual library in Great George Street with its friendly helpful staff and the subterranean archives, presided over by Carol Morgan - both parts of Mike's empire - are as happy places to work as you can find.

Académie internationale d'histoire

We congratulate Frank A.J.L James, Professor of the History of Science at the Royal Institution and Newcomen Council Member, who has been elected a Corresponding Member of the Académie internationale d'histoire des sciences.

Welcome to members who have recently joined Newcomen:

Reverend David Ayton, Mr John Butler, Miss Charlotte Connelly, Mr Michael Gates, Mr Ivor Lewis, Dr Rachel Maines, Mr Denis Miles, Mr Owen Peake, Mr Robert Pomeroy, Mr Kenneth Rossi, Mr Douglas Sim, Mr Harry Spilman, Mr Peter Stearne, Mr Graeme Vanner, Mr Robert Walker, Mr John Wallis, Mr John Warren, Professor Anthony White, Mr Paul Wood

Profile of a Newcomen Member in Brazil

José Luiz Pereira da Costa Dias lives in Sao Paulo, Brazil. He holds degrees in both Electrical Engineering and in Physics from the Escola Politecnica da Universidade de Sao Paulo and an MBA from the Getulio Vargas Business School, Sao Paulo. He worked in spectroscopy of fast neutrons at the Pelletron Laboratory of the University of Sao Paulo before joining General Electric as a designer of rotating electrical machines (motors & generators). Then he worked for ASEA (now ABB, ASEA-Brow Boveri) and Philips, where his appointment, before retiring last year, was that of Vice President, Human Resources and Social Security, for Latin America. José Luiz is the author of technical papers and of the book 'Selection and Application of Electrical Motors', published (in Portuguese and Spanish) by McGraw Hill in 1986. He spent 1984 in Britain, on a scholarship from the Confederation of British Industry. A member of Newcomen since 2006, José Luiz is interested in the history of the industrial development of Brazil in the 19th century and the role played by his alma mater, the Escola Politecnica de Sao Paulo in this process.



The 2011 Newcomen Fellows

Seventeen members who have made outstanding contributions to the Society have become Newcomen Fellows. They are: John Allen, Jim Andrew, Michael Bailey, John Boyes, Angus Buchanan, E.F.Clark, Neil Cossons, Lance Day, Julia Elton, Frank James, David Perret, Sonia Rolt, Denis Smith, James Sutherland and David Tew.

A celebratory lunch was held at the RAF Club, Piccadilly on 10 February when the President, Dr. John Russell presented fifteen of them with Certificates of Fellowship. He will visit Lance Day and David Tew to present them with their Certificates. Council has agreed that Newcomen Fellows will be appointed once within the term of each President of the Society.



Left to right: The 2011 Newcomen Fellows' Certificates; Angus Buchanan receiving his certificate from John Russell; Neil Cossons and Clive Ellam.



The 2011 Newcomen Fellows with the President. Left-right: Julia Elton, Michael Bailey, James Sutherland, Jim Andrew, John Allen, E.F. Clark, John Boyes, Clive Ellam, John Russell, Frank James, David Perret, Sonia Rolt, Neil Cossons, Peter Meriman, Denis Smith and Angus Buchanan.

The AGM

At the Annual General Meeting in January, attended by 55 members, the Accounts for 2009/10 were approved; some tidying up of the rules of the Society's Articles of Association, including allowing for Council on occasion to extend the President's term of office to three years was agreed; and the following members were elected to serve on Council: Dr Roger Cullis, Mr Michael Grace, Mr John Liffen, Mr Gerard Pakes and Mr Geoff Wallis. Mr Richard Maudslay was introduced as the new Vice President to take up his post on 1 October 2011.

www.newcomen.com

The new Newcomen website went live in January and although there have been a few, inevitable teething problems items will be added frequently. Please, if you have a problem accessing the site or something on it click on Help on the screen and do not phone the office. The website should be able to solve your problem!

Brunel's Bridges

Isambard Kingdom Brunel's Later Cast-Iron Bridges

Steven Brindle and Malcolm Tucker
London

Our previous paper (*Transactions*, Vol. 78 No.1 (2008), pp. 25-45) showed how Brunel had commenced the design of girders for the Great Western Railway's main line from London to Bristol in 1835 using outdated knowledge of cast iron and then experienced failures in a major bridge.

For the more economical lines that followed, he veered away from iron girders to the widespread use of timber, wherever brick or stone could not be used. Yet, when he deemed a more durable material appropriate, he was to use cast iron in some over-line bridges and in aqueducts to the end of his career. His own 1/5-scale model tests around 1840 and the publication of addenda to Tredgold's *Strength of Cast Iron* by Eaton Hodgkinson in 1842 and 1846, must have helped his understanding. While surviving drawings for overbridges, in Berkshire and Oxfordshire, show progressive increases in the size of the bottom flange and refinement in other parts, leading to the beam section with a broad and heavy flange and compact top bulb, that are distinctively 'Brunel'. In 1848 he presented these to the Iron Bridges Inquiry. He further refined this in the 1850s. Several under-line bridges were also designed in the material in the 1840s and early 1850s, with girders paired for greater strength. Wrought iron was sporadically used for major spans from about 1848.

Brunel's designs for iron aqueducts, under five canals and a Welsh mountain stream, show characteristic Brunellian diversity. They include simple bridge beams at Resolven near Neath, brick arches with iron crowns at Trowbridge (Wilts) and Halberton (Devon), and a fully engineered structural trough made from bolted cast-iron plates for the distinctive '3-level' aqueduct on the Brentford branch near London. The underside of the aqueduct at Myton, near Warwick, with arch ribs integrated with the trough on a 45-degree skew, has a visual precociousness recalling his unrealised 1836 scheme for the Cross Post Gate turnpike road bridge near Bath.

Good news for the Newcomen type Beam Engine at Elsecar

The Newcomen type Beam Engine at Elsecar has been given the 'green light' by the Heritage Lottery Fund (HLF) for restoration. Plans to restore the site and establish it as a tourist destination have been enhanced with a development fund of £40,500 from the HLF project. Work will begin on securing a grant of just over £400,000 to support a project for the engine and wider village. This engine is the last remaining example in situ anywhere in the world. It is situated in its original magnificent engine house, where it pumped water out of the Elsecar Colliery from 1795 to 1923, remaining in working order until the 1950s. In July 2010, the engine was put on the Heritage at Risk Register.

Chemists on the Railways

Chemical Research in the re-Grouping Railway Industry and its Impact on Railway Engineering and Practice

John Hudson
London Branch

Many engineers, and a wider audience, are unaware of the vital role played by chemists in the development of the railways. All the large railway companies in existence prior to their amalgamation in 1923 into four groups had well-established chemistry laboratories with a staff of qualified chemists. The principal task of these laboratories was to perform quality control analyses on purchased materials. However, commencing in the 1890s, some of these laboratories were engaged in research projects. The principal areas of investigation were those of metals, lubrication, and water treatment, but the railway chemists also conducted research on a considerable number of other topics. This paper considers the context in which chemical research was conducted in the railway laboratories, describes some of the work that was performed, and discusses its significance for the railway industry.

Early Railway Chemistry and its Legacy by John Hudson and Colin Russell will be published by the Royal Society of Chemistry at the end of the year.

International Year of Chemistry

Events and celebrations are being held around the world during 2011 to mark the International Year of Chemistry.
Information at: www.chemistry2011.org

The Dounreay Sphere

The 1950s fast-breeder reactor at Dounreay in Caithness was housed in a massive blast-proof steel sphere one-inch thick and nearly 200 ft. in diameter. Two Scottish engineering companies were involved in the construction: Motherwell Bridge Engineering for the sphere itself and JW Carruthers for a large crane inside the sphere, known as Goliath, required for the handling of materials. The Dounreay Sphere is the first and largest spherical building in the world and is now being decommissioned. It will remain essentially inaccessible for about thirty years due to residual radioactivity. Robert Carr would like to hear from anyone who worked on or at Dounreay or is familiar with this great Sphere. Contact him at: rjm carr.london@googlemail.com. Further information about the campaign to save the Dounreay Sphere is at www.dounreaydome.org.uk



James Watt

The Rededication of a Plaque

J.S.Allen

On 27 May 1959 the Midlands Branch of the Society was involved in the supply and erection of two bronze memorial plaques on historical sites. One of these was affixed to the works of John Bradley & Co. (Stourbridge) Ltd. It recorded the building, to Raistrick's design, of two famous locomotives. The first, Stourbridge Lion, built in 1828, was sent to America where she was the first steam locomotive to run on rails. Parts have been preserved and are now in the care of the Smithsonian Institute in Washington DC. A replica of it was constructed and is kept in Honesdale, Pennsylvania, where the first run had taken place.

The second, Agenoria, was built in 1829 and ran locally on a mineral line and was in working order until 1884, when she was given to the Science Museum in London. She is now at the National Railway Museum at York. Unfortunately, the Newcomen Agenoria plaque disappeared some years ago when the factory building fell into disrepair but reappeared in a private garage in Hagley. However, apparently it has disappeared again from the site, as the factory building becomes ever more derelict. The second plaque celebrated the construction on a mining site at Bloomfield, Tipton in 1776 of the first commercial steam pumping engine built by James Watt. This is about 1.5 miles from the site of the first successful Newcomen engine built in 1712 at Coneygree, Tipton. In 1959 that land was owned by British Rolling Mills Ltd. The arrangements for the ceremonies in 1959 were made by the two firms involved, in co-operation with J. Francis Parker (Member), a Director of British Rolling Mills and were officiated by Lord Northesk (Member). Between the two events lunch was served at which W.K.V.Gale (Hon.Sec. Midland Branch) expressed his thanks to the two companies involved.

The British Rolling Mills, latterly Corus, closed in 2005 but the plaque was rescued by local Black Country enthusiast and former employee, Margaret Millington. In 2006, when David Wilson Homes submitted a planning application for the redevelopment of the site, Keith Hodgkins of the Tipton Civic Society suggested that the plaque be re-erected within the new housing scheme. With the agreement of the householder the plaque was refixed by David Wilson Homes at a suitable height over the doorway of 2 William Barrows Way, close to its original position in the former works.

The precise location of the James Watt engine was later discovered on a previously unseen canal map of 1777 by John Snape. This showed that the engine, identified by its name Parliament Engine, was very close to the commemorative plaque, albeit on the opposite side of Bloomfield Road from the housing development. As Dr. Jim Andrew, (Hon.Sec. Midlands Branch), an expert on James Watt, has written:

James Watt had his brilliant idea for the separate condenser in about 1764. It was to result in a steam engine twice as powerful and three times as efficient as the contemporary steam engines, but it was over ten years before Boulton and Watt finally had a small experimental engine working properly. With the Act of Parliament extending Watt's patent protection of the separate condenser receiving the Royal Assent in May 1775 and the experimental engine working well by June that year, the partners could at last consider commercial orders for the

engine. The first order to be completed was for a pumping engine for Bloomfield Colliery, Tipton, which with a cylinder three times the diameter of the experimental engine, needed John Wilkinson to rapidly improve his cylinder boring machine to produce an engine cylinder much more accurately machined than any of this size before that date. The

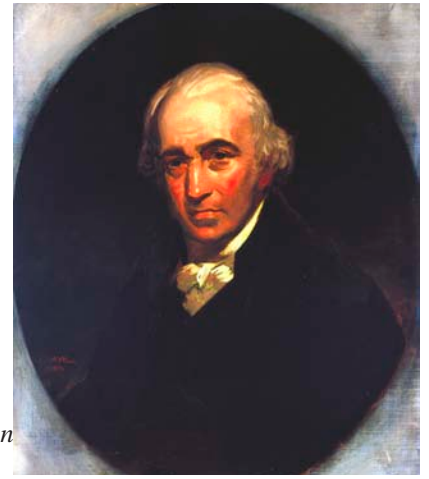
first run of the engine was reported extensively in Aris's Birmingham Gazette, on the 11th March 1776 with glowing comment on the engine and those responsible for its construction. The engine was named "amidst the acclamations of a number of joyous and ingenious workmen." Its performance clearly impressed many of those who saw it but, in common with many early Watt engines, it did have reliability problems and many components were changed to those of the latest design and this improved its performance to Watt's satisfaction by April 1778. Later, Watt was to state that he had probably proceeded too quickly in moving from the eighteen inch experimental engine to the Bloomfield Colliery's fifty inch engine, but there is little doubt that the glowing report in the Birmingham paper would have raised the appreciation of his improved engine design.

There had also been a second plaque, a so called 'blue plaque', on this site supplied by the Tipton Civic Society in 1989 to commemorate Bloomfield Ironworks where Joseph Hall had revolutionised iron production with the development of the pig iron boiling process on this site in the 1830s. This plaque had also survived and was re-erected on 1 William Barrows Way, facing the house bearing the James Watt plaque. A small rededication ceremony hosted by David Wilson Homes was held on 1 October 2010 and attended by those involved. Keith Hodgkins of the Tipton Civic Society commented:

This site is of national and international significance in the development of the industrialised world and illustrates the immense contribution that Tipton and the Black Country made to technological progress in the industrial revolution. The achievements of James Watt and Joseph Hall at Bloomfield deserve to be more widely known and we are very grateful to David Wilson Homes for refixing these plaques which celebrate this heritage.

The Society is most grateful to Keith Hodgkins for organising the event and the re-erection of the plaques.

Watt's Workshop. The attic workshop of James Watt, preserved in its entirety by the Science Museum in 1924 but which has been out of sight for some years, is being redisplayed in the Museum's Energy Hall from 23 March 2011. The workshop itself forms the centrepiece of a new exhibition which examines Watt's life and character and his association with Matthew Boulton in the context of Britain's emergence as an industrial nation.



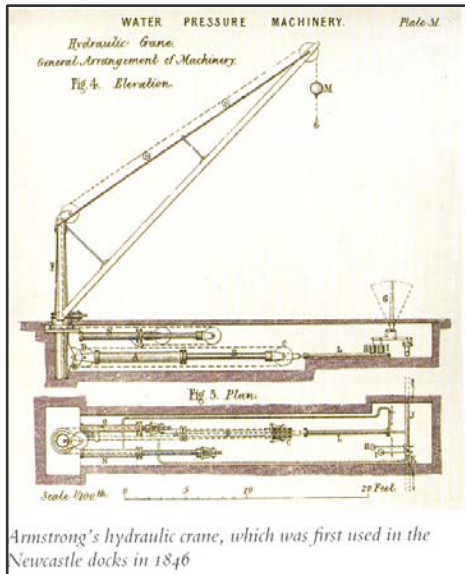
James Watt. Portrait by Abraham Wivell, 1856, after the 1801 original by Sir William Beechey RA. Image: Science Museum, London 10324941



The rededicated plaque

William Armstrong's Hydraulic Machinery

*John Boulter reports on Robin Wright's talk
North Eastern Branch*



Left: Schematic drawing of Lord Armstrong's hydraulic crane from a paper he gave to the IMechE in 1858. Reproduced with permission of Sage Publications

Although William Armstrong trained as a solicitor he was, from the beginning, interested in engineering, and his interest in hydraulics sprang from observing, in 1835, a water wheel in Dentdale which clearly wasted most of the energy in the water. He realised that what was needed was an engine which utilised the full available head of water and, in 1838, devised an ingenious rotary engine, a model of which is in the Discovery Museum. This was not very successful and Armstrong's interest turned to utilising the pressure available in municipal water mains.

The first application was an hydraulic crane installed on Newcastle quayside, which replaced manually operated cranes. This was highly successful and many more were installed in the UK and overseas in docks and railway goods depots, notably A dockside crane in Venice which it is hoped will be restored. The basic principle is that a hydraulic ram or 'jigger' operated a system of pulleys which imparted to a chain a motion several times that of the ram, rather like a pulley block operated in reverse. Additional rams were provided to slew the crane and ingenious valves controlled the motion and prevented overloads.

The first cranes were made by Watsons, a local engineering firm, but in 1847 Armstrong, aided by his former legal partner, Armorer Donkin and others, established a works at Elswick, later to become famous for Armstrong's other products, armaments and ships.

To cover situations where the supply pressure was variable or where no high pressure supply was available, he developed the hydraulic accumulator, in which a heavy weight acting on a piston and cylinder stored water at high pressure. The supply was kept up by a relatively small steam-driven pump, much later replaced by electric pumps.

Other important applications were the operation of lock gates and swing and lifting bridges, notably the swing bridge in Newcastle, which Armstrong built to permit large vessels to visit his Elswick works, and Tower Bridge in London. For these applications he developed 3 cylinder reciprocating

engines, and on several of the bridges the associated hydraulic accumulators were housed in the foundation caissons

His technology led to the establishment of networks of hydraulic mains in major cities such as London and Manchester which these provided power for operating lifts and other machinery. Armstrong made use of his technology at his country estate at Cragside where he built an extensive system of storage reservoirs - pumping clean water up to the house, operating lifts and turning a spit in the kitchen. Cragside was the first house to have hydro-electric light, but for this he used water turbines rather than reciprocating machinery.

The talk was accompanied by many interesting illustrations, including a rare audio-visual clip of the lead mine machinery operating at Allenheads in Northumberland. In the subsequent discussion it was confirmed that Armstrong took care to recruit able staff and that, following his pioneering work, other firms took up the manufacture of very similar machinery. The next day Robin conducted several members on a tour of the "hydraulic circuit" at Cragside.

**Cragside, Rothbury, Morpeth, Northumberland NE65 7PX.
Tel: 01669 620333.**

www.nationaltrust.org.uk/main/w-cragsidehousegar-denandestate

Discovery Museum, Blandford Square, Newcastle upon Tyne. 0191 232 6789. www.twmuseums.org.uk

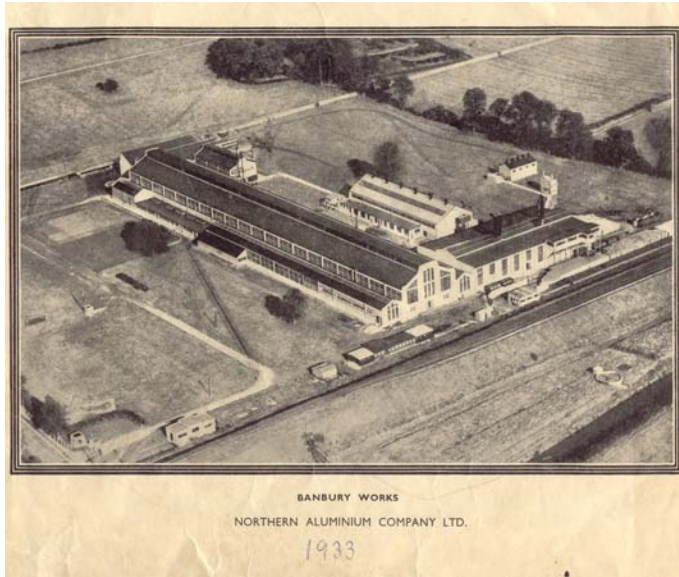


Right: Model of Armstrong's rotary engine at the Discovery Museum, Newcastle upon Tyne.

Below: A crane jigger outside Burnfoot power house at Cragside.



The Aluminium Works at Banbury



The Banbury works in 1933

Richard Hartree
Midlands Branch

In 1929 Alcan, the Canadian parent company gave its UK subsidiary, the Northern Aluminium Company (NACo), the go-ahead to build an aluminium sheet rolling mill in Britain. This would become the largest rolling mill in the Alcan group. The 40 acre site, about 1½ miles north of Banbury, is bordered by the A423 on its east side and on the south, by the Oxford Canal - which was used for cooling water.

Engineering and construction were completed and the Works opened, in the Autumn of 1931 and employed a workforce of around 300 in the following year. In 1933 the small extrusion press was moved from NACo's West Bromwich warehouse, and an aluminium powder and paste plant was built some hundreds of yards to the east of the main buildings because of the associated explosion hazard. The mid 1930s

were when strong aluminium alloy extrusions and sheet started to be used for aircraft structures and skins. To meet this demand a second, larger extrusion press and the facilities for the double heat treatment these alloys required, were installed - separate for sheets and extrusions. The workforce had grown to 700 by 1936.

In 1938 NACo launched a major expansion plan to double production capacity for both sheet and extrusions to meet RAF aircraft demands, which multiplied by five between 1938 and 1940. At the outbreak of WWII, the Banbury plant was the largest manufacturer of aircraft sheet and extrusions in the country. The works was camouflaged and a dummy factory built 1½ miles to the north. On 3 October 1940 a lone Dornier bomber broke through the clouds south of Banbury, flew over the camouflaged works and dropped a stick of bombs on the dummy!

Post-war modernisation came in the 1950s. First, this was in the melting and casting shop and in the sheet mill where emphasis was on mechanisation, increasing lot sizes and reducing the number of machines. Modernisation of extrusion came in the 1960s with the latest presses capable of production for architectural and commercial uses, rather than aircraft extrusions.

Following the merger with James Booth Aluminium in 1970, a rationalisation programme led to the closure of Banbury's sheet operations and halving the workforce with the redundancy of 1200 people. In the 1970s additional modern extrusion presses were installed in the old sheet mill buildings, anodising and painting plants. In 1979 there were 790 in the workforce. By 1993 the anodising and painting plants had closed and the organisation had been downsized to a workforce of 528. As a result of Alcan's worldwide changes the Banbury business was sold to a merchant banking group in 1995, ending Alcan's relationship with the Works.

The Banbury operations were bought by the Aluminium Company of America in 2000 and modernisation and expansion continued. In 2007 the Works came into the ownership of SAPA, an international manufacturer of architectural systems, who closed it at the end of 2008 and demolished the factory buildings.

Wanted: Information about Robert Fourness (1757-1806) steam boat and vehicle pioneer

Neville Flavell is researching the work of Robert Fourness and wonders if any Newcomen members can fill in some gaps. Fourness was a steam boat and vehicle pioneer and patentee registered at Elland with partner James Ashworth in 1788, then based in Rotherhithe in 1788/9 and Sheffield in 1793. A diary of January to April 1793 gives full details of castings made at Sheffield's Park Iron Works and at Sowerby Bridge for a mill engine he was building near Halifax and another to be repaired near Huddersfield. Fourness married in Pontefract in 1799 and soon afterwards became proprietor of an iron foundry in Gainsborough where two sons were born. He was bankrupt

in 1805 and died the following year, which suggests ill-health rather than incompetence was the cause of his downfall.

- Can anyone help with more information?
- Did his steam boat ply for some years between Hull and Beverley or is this no more than hearsay?
- Was he building a version of it for the Prince Regent whilst at Rotherhithe?
- Did his road vehicle ever get past the drawing board?
- Does more of his diary survive?

Please contact Neville Flavell at nflavell@aol.com

Radar

Making Vision into Power:
Technologies and Personalities
in Britain's Development of the
World's First Radar Based
Air Defence System, 1935-41

Dr Phil Judkins
London Branch

There are excellent technological histories of Britain's acquisition of a radar-based system of air defence by both day and night between 1935 and 1941; but too often that story is presented as though it were one of continuous progress, achieved by personalities who pursued as a unitary team a collective course of action which had little contact with such other technologies as civil or chemical engineering.

This paper, which is based on recent research at the UK Defence Academy and represents the first application of a current conceptual model of defence acquisition to analyse an episode of technological history, contrasts the successful acquisition of radar for defence by day, achieved just in time for the Battle of Britain, with the less-successful acquisition of radar for night defence, which arrived too late to prevent significant casualties and devastation in the Night Blitz of 1940-1.

The paper examined how radar's progress was significantly influenced by major disagreements and personality clashes at both policy-making and scientific levels, and by the failure of radar in operational trials. It identified how mistakes in managing the substantial civil engineering involved, in building a national chain of radar stations, delayed its advent and illustrated how the pursuit, at huge cost, of alternatives to radar for night defence at a time when radar development seemed to have failed, diverted both management and scientific attention from their objective. References to original documents showed that scientific memoirs of the development of airborne radar vary considerably from the contemporary records.

Lessons are drawn both for those involved in high-technology acquisition, and for military and technological historians, in gaining new insights from the use of conceptual models of acquisition as an analytical tool.

Gas Turbine Propulsion

The Early
History

F W Armstrong
London Branch

For most of its first half-century, aviation depended for propulsion on the internal combustion reciprocating engine. But today, the gas turbine in various forms is the inevitable choice for powering major military and commercial aircraft. The lecture outlined the incentives for this radical change of prime mover, and summarised the history of its challenging development. The primary focus was on the major part played by the UK, and within an international perspective.

Attention was drawn to the importance of the 'twin track' development that took place in this country, with the Whittle/Power Jets work on centrifugal engines running in parallel with the RAE/Metrovick/Armstrong Siddeley work on axial engines. Although these two streams of innovation originated independently – and were competitive in some respects – the eventual outcome was to place the UK in a very strong position internationally to exploit gas turbine propulsion after World War II. Despite the extremely competitive nature of the current world market, the UK is still in the front rank of aero-engine manufacturing nations.



*Exhibits from the Science Museum Collection.
Top:- A A Griffith's compressor-turbine test rig, 1929 (Inv 1983-231)*

Beneath: 'Anne' (Inv 1983-230) on the left, an axial flow compressor, 1936, with rotor removed for display and. Both are on show in the Flight Gallery at the museum.

Axial Machines

The Barrel Engine comes full-circle

Professor William Fairney
London Branch

Barrel engines, in which the Cylinders lie parallel to the drive shaft and motion is transmitted via a swash-plate, wobble-plate or cams, have a very long history. The first recorded such engine dates back to the mid 19th century. Such

engines have appeared from time to time and had specialist use in applications such as submarines or pumps. In the 1920s and 1930s versions were fitted into cars, aircraft and buses. However they have never achieved great success, owing to their reputation for high friction, high bearing loads and, in some versions, a propensity to instability. The cam versions also require great manufacturing precision. In recent years the advent of CAD-CAM technology and a wide range of new materials have produced a renewed interest in such engines.

The Brabazons

David Crockit
enlightened members of
Newcomen's
North East Branch

Robin Brooks

In his introduction, Stafford Lindsey the Branch Chair, confessed that before speaking to David Crockit, that evening, he had, "not the faintest idea" what the term The Brabazons referred to. Some of those present also shared his ignorance! This was quickly dispelled when David explained that a committee set up by the government in the autumn of 1942 chaired by Lord Brabazon of Tara, was subsequently known as the Brabazon Committee. Its official title however was the Civil Aviation Committee on post War Transport, so then a light began to dawn as to the topic of the evening – post war aeroplanes!

The first meeting of the Brabazon Committee consisting of Lord Brabazon and six other members was held on the day before Christmas Eve 1942. Its terms of reference were:

1a. *To prepare outline specifications of the several aircraft types that would be needed for post war transport.*

1b. *To suggest which firms should be invited, as soon as urgent war work permitted, to prepare tender designs.*

2. *To consider, in consultation with the aircraft firms concerned, which existing military aircraft could usefully be converted to air transport purposes for use whilst new civil types were being produced and to plan for such conversions.*

3. *To prepare a plan for the immediate utilisation, in the interests of post-war air transport, of spare design and production capacity whilst the aircraft industry made its transition from war to peace.*

Following ten meetings during January and February 1943 the committee drew up a first specification which was later to be fine tuned by a second committee set up in May 1943 by the Cabinet. Ultimately in 1944 the final report gave a list of what were to be known as the nine Brabazon types.

The Nine Brabazon Types

1	Trans Atlantic non-stop	Bristol	Brabazon 1
1a	Trans Atlantic non-stop	Bristol	Brabazon 2
1la	European transport	Airspeed	Ambassador
1lb(i)	European transport	Vickers	Viceroy
1lb(ii)	European transport	A-W	Apollo
III	Long range Empire	Avro	693 'XXI'
IV	High speed transport	de Havilland	Comet
Va	Feeder line transport	Miles	Marathon
Vb	Light transport	de Havilland	Dove

David then provided a feast of nearly fifty slides showing various pictures of the 'planes which were developed and produced following the above broad specifications. In addition to the models named above, most of the other passenger aircraft David detailed were familiar to those of us in the meeting



The Comet 1 prototype in BOAC livery in flight, 4 September 1950. Image: De Havilland. Enquiries to Science Museum / SSPL, 10438916

brought up in the 1940s, 50s and 60s; Avro Lancastrian, Short Sunderland, Avro York, Vickers Viscount to name but a few of the nearly twenty aircraft shown. One of the most spectacular was the Bristol Brabazon which was the then largest 'plane ever built – 177ft long with a 230ft wingspan (which is greater than a Boeing 747 Jumbo!), powered by 8 Bristol Centaurus engines driving 4 pairs of propellers.

Space prevents this report from detailing much of David's meticulous research which was disseminated to the meeting. Some questioned the seeming failure of the British aero industry in the post war years against the onslaught of the American market. The profusion of Douglas DC4s, DC7s and Dakotas flooding the market may have had some influence, but some British designs appeared to be too late into the market – for instance the Saunders-Roe Princess Flying boat. Shorts also made a smaller flying boat, but as it needed almost mill pond conditions to land, it also failed to attract sales. The Vickers Warwick was quoted as another aircraft which post war passengers found lacking as they objected to the flapping of the outer canvas fabric skin! It seemed that while the post war British aero engineers were good at design, their lack of commercial expertise led them to design passenger aircraft that did not meet the airline's needs.

Dear Editor,

The report of the Solent meeting (Dec.2010) carried a reference to " the first flight" some hundreds of years ago. This year is the 1000th anniversary of that event by one Eilmer a monk at Malmesbury Abbey. There is a contemporary record by William of Malmesbury which, I understand, has details that only a contemporary would have. Furthermore, as part of the Malmesbury Carnival in 2010, an aeronautical designer carried out an assessment of the practicability of Eilmer's attempt and concluded that, in light of the materials, state of knowledge, height of the Abbey tower from where Eilmer launched himself, likely wind, he would be likely to land somewhere near the spot recorded by William. Having been injured in landing, Eilmer believed that his big mistake was in not providing himself with a tail to augment the 'avian' wings that he used. Just to put the record straight.

Yours

Bob Turner, Malmesbury.

The Wellcome Collection

A collection for the incurably curious

David Worth

A Society visit to the Wellcome Trust Museum, London

Thirteen members and friends assembled at the Wellcome Collection and were greeted by Jess, who introduced Chris who was our guide for the visit. I am sure not one of us knew what we were going to see or learn; we soon were in for a big surprise as we learnt of Henry Wellcome. Henry was a man of exceptional talent - entrepreneur, patron of science, pioneer of aerial photography and above all a philanthropist.

We began the tour in the Historical Gallery and Collection, known as the *Medicine Man*. We were to learn of the site holding the B & W Co collection which, after many take



A 17th century ivory anatomical model of a pregnant female with removable parts possibly used by obstetric specialists or midwives to provide reassurance for pregnant women. Possibly German.

*Image: Wellcome Library, London.
© 2011 The Wellcome Trust.*

overs is now part of GlaxoSmithKline. The gallery covers both art and science, and the exhibits are part of the Wellcome Trust. It shows how Henry set up the first mass produced tablet and medicine factory, which would now be known as a laboratory. The pills' advertisements used the title 'tabloid' for the mass produced pills, not what nowadays we describe or use the word 'tabloid' for! With the advent of motoring Henry presented many well-known personalities of the day with a Free First Aid Kit. Beneficiaries included: Rolls and Lord Brabazon as well as many Dukes and Lords. He supported the expeditions to the South Pole and other destinations of discovery. To show no favouritism he gave sets to both contenders where there was competition. Henry was married to Daisy the daughter of Dr. Barnardo, who after they divorced, met up with Somerset Maugham.



Brass, ivory, ebony and pewter enema syringes. 17th-19th century. Image: Wellcome Library, London. © 2011 The Wellcome Trust.

Some of the more important and valuable items in the collection show the development of medicine from 2200 BC and range from the Greek and Roman Empires and areas now known as Iran, Iraq, Sudan, Saudi Arabia and Egypt and later progressing to other parts of the world. Many ancient items were on display including instruments and allied material. Some revealed what to us now seem barbaric practices. Even in the 16th century a skilled physician could amputate a man's leg in under a minute! It must be borne in mind that, until the 19th century, a barber was usually the medicine man and until the mid 18th century, also practised as a dentist.

Then there were three chairs. A Chinese one of blades, still extremely sharp, its intention was for torture but it is believed that it was never used as such, as the person sitting on it would have been cut to pieces. The second was a late Georgian/early Victorian 'birthing' chair. Finally, a dentist's chair from the late 1800s which bore a resemblance to a modern one, although lacking all the wizardry of the 21st century, but it appears nothing is ever new! Chris then described the valuable works of art in the exhibition. Some covered the theme of the *Medicine Man* gallery and the interpretation given was excellent so that we could link the characters in the paintings.

Moving on, we explored some Sri Lankan, medical related masks and the history behind them - the disease or condition that they were used for. One in particular was much favoured by the males present! Various medical models of the human body were shown. The development of drugs by companies in the USA were discussed and many comments were made on the claims of efficacy on the pills and medicines. Of course many could not be proven to work as they basically contained no medicine at all - hence the use of 'quack doctor' and other derogatory terms.

Some of the other items in the collection include diagnostic dolls, Japanese sex aids, Napoleon's toothbrush which is authenticated by papers, a lock of George III's hair and many



Artificial left arm with shoulder straps. Made with leather and aluminium by W R Grossmith. Image: Wellcome Library, London. © 2011 The Wellcome Trust.

items relating to our own health. Health it appears has fascinated mankind throughout the ages.

We then came to the *Medicine Now* gallery. Here we learnt about DNA, some of its technology and how it is improving day by day as more is found out. The Wellcome Trust has, and still has, an involvement in scientific and medical research. We looked at genes of which we have about 2,500 and the development of Dolly the Sheep. Some of her fleece and droppings are on display. It took 276 attempts to breed her and she was named after the American Country singer, Dolly Parton because she was cloned from the breast of a sheep!

Robotics and how they are used in today's world was covered next. Diets were discussed in the section dealing with Obesity and we were surprised to learn this issue and books dealing with diets have been around for well over 100 years. We continued with exhibits from the late 20th century including: paralysis and the iron lung, the eradication of smallpox and the use of penicillin which latterly has led to the massive rise of MRSA. As many germs have developed resistance to penicillin, other combative drugs have been developed. Malaria was, and still is, a major research area for the drug development laboratories as the varieties of mosquito soon develop resistances to each and every new drug. To finish our guided tour we saw some remarkable exhibits of a slice through a model of the body of a 17 year old female showing the position of the organs both major and minor.

One question that many participants were interested in was the cost of drugs. Basically it can sometimes take in excess of 20 years to develop a new medicine, then with all the costs of time, materials, extensive and thorough testing and licences and patents granted in the UK and worldwide, it is a very expensive procedure indeed.

We expressed our appreciation to Chris for his highly instructional tour and the extremely great assistance that Jess had been in organising the afternoon.

The Wellcome Collection is at:
183 Euston Road, London NW1 2BE.
An online exhibition is at: www.wellcomecollection.org/

Aspects of Steam Power

Three short papers
on aspects of steam power

Midlands Branch *Running engines in museums* *Jack Kirby*

Over 50 UK museums and heritage sites have stationary engines in steam, and a further 25 venues have engines in motion (electrically turned or operated by compressed air). Around 25 sites are run solely by volunteers.

Birmingham pioneered operating engines in the early 1950s and Thinktank, Birmingham Science Museum continues to operate engines daily. Operation meets the desire of enthusiasts to see engines in steam, but also helps the modern family audience, unfamiliar with stationary engines, to understand their purpose and how they worked.

There are ethical considerations in running engines. If too many significant parts are replaced due to wear, there may be very little of the original engine left, and some unique examples are not operated as they preserve important historical evidence. Case studies of stationary engine repairs are provided by two examples at Thinktank. One, a Heinrici-type hot air engine, has had its displacer and piston replaced due to the originals being worn out. As the engine is not a unique example and of no great historical significance, there are few ethical issues involved in the decision to replace parts.

By contrast Matthew Murray's hypocycloidal engine is the third oldest working engine in the world (circa 1802). The transfer casting had to be repaired in 2008, and in 2010 the steam cylinder has cracked. Ceasing to run the engine has been considered, but the presence of a broadly comparable static engine in the Ford Museum, Michigan, USA, helps to justify further work on an engine that has been repaired and modified many times over its two centuries of operation. Nevertheless, the frequency with which the engine operates will be reduced after the forthcoming repair.

Health and safety is a key consideration in running engines. It is sometimes difficult to apply contemporary standards to engines designed in a different age, yet risks to both staff (paid and voluntary) and the public must be properly minimised through programmes of inspection, maintenance and record-keeping. There is potential for sites to work more closely together and share best practice such as the production of operating manuals and maintenance logs.

Preserving the skills needed to operate and maintain engines is another important goal, and examples include Thinktank's recruitment of an apprentice and Heritage Lottery Fund supported training schemes. Nevertheless, it is possible that factors such as declining skills and rising costs will mean that fewer sites operate engines in the future./next page

.....Aspects of Steam Power

Heslop Engine *Mike Potts*

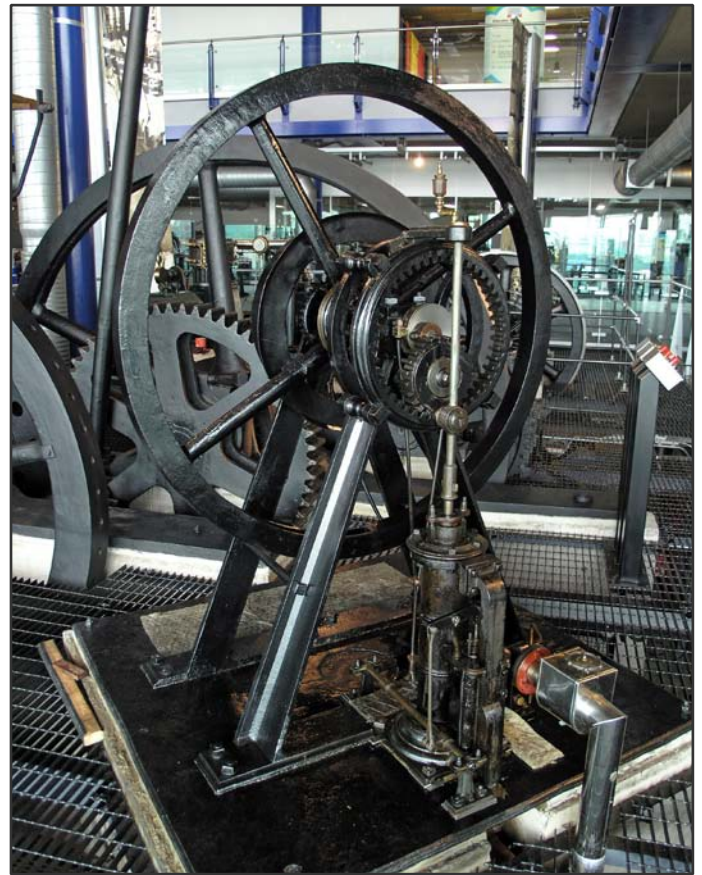
The Heslop engine was one of a number of patent atmospheric engines built throughout the 18th and early 19th centuries. Most were built in very small numbers, if at all. Information about them is very limited. The Heslop engine is unusual in that a paper was read to the Institute of Mechanical Engineers in 1879 when what was thought to be the last survivor was presented to the Science Museum. It was on display for a century until removed in the reorganisation of the late 1970s, and is now in store as a kit of parts. It was not the last, another in Shropshire ran until 1890, and another engine, probably an early rebuild of a Heslop engine, ran until 1940.

The working of the engine has always seemed to present a problem to writers. A manager of Tulk and Ley, the tenants on the Lowca site after Heslop Milward and Johnson, said that he could not explain the working of the engine, and he felt sure that no one else could either. There are at least five different descriptions of its operation, and the only one that matches reality in any way was written in 1808 by J B Longmire, a Whitehaven Colliery viewer. Since he had to keep these engines running in front line service it does seem probable that he knew exactly how they worked. The key is to remember that it is an atmospheric engine. These single acting engines produce power on one stroke, the return stroke absorbs power. Normally these engines were fitted with a heavy connecting rod to store about half of the energy during the power stroke and release it on the return stroke. The Heslop engine used the movement of a piston acting against a vacuum in a cylinder to store energy. By suitably arranging the geometry of the two cylinders and the connecting rod and crankshaft more or less equal effort is applied to the crankshaft on both strokes giving a smooth action to the winding rope. It was a very neat solution towards providing this smooth action giving a lighter construction and a more responsive engine. Using steam pressure to assist the action increased the engine power.

These engines, like many others, had very long lives, many working for nearly a century. Only one Heslop engine survives, along with five atmospheric pumping engines and three rotative winding engines in varying states of preservation in Britain and the USA.

The Sun & Planet Gear *Jim Andrew*

This arrangement of two identical gears, one fixed to the connecting rod and one on the engine's output shaft, was one of several devices used by Boulton & Watt on their rotative engines, which they intended to power factory machinery including textile machines. A common story is that James Watt was prevented from using a simple crank, to achieve rotative motion, because Pickard had "stolen" and patented the crank but that overlooks the problems of designing smooth factory power units at a time when engines still tended to run somewhat erratically. It seems that designing the sun and planet gear was a team effort between James Watt, Matthew Boulton and William Murdock. It had the considerable advantage that the drive shaft rotated twice for each stroke of the engine which quadrupled the flywheel effect of drive gears or flywheels on that shaft.



The Murray's Hypocycloidal Engine in the Birmingham Science Museum

With the sun and planet gear, a double acting cylinder, the parallel motion and the ball governor to reduce speed fluctuations, the Boulton & Watt rotative engine was successfully introduced to many industries from the middle 1780s and about 240 of these engines were commissioned by 1800. The partnership began designing crank engines for factory power from the middle of the 1790s and the speaker looked at why this change was made when the sun and planet gear appeared to be so successful. There seemed to a limitation on the use of the sun and planet gear as engine powers increased. There were problems with breakage and wear of the gears as they attempted to transmit more power and the running together of gears with the same number of teeth has often led to problems as the same teeth meet every revolution. At the same time boilers were becoming more reliable in terms of steady supply of steam and the cast iron for flywheels was becoming cheaper so that there was merit in adopting the crank for many purposes but it is noticeable that geared up flywheels continued to be used on some crank engines where there was a need for particularly smooth running or where driving load variations were expected to cause problems.

The sun and planet was thus a useful stage in the development of steam power for factory machinery and a vital stage for machinery in the textile industry but then it faded from use as other aspects of technology improved and the simpler and more robust crank could be adopted. Like many pieces of study of 18th century engineers, the sun and planet gives us an insight into those engineers intuitive understanding of the performance needed and the problems to be overcome.

**Thinktank, Birmingham Science Museum,
Millennium Point, Curzon Street, Birmingham B4 7XG.
www.thinktank.ac**

Books & Films

Inventing the 21st Century.

Stephen van Dulken, British Library.

Surprise and intrigue fill this history of modern inventions. Stephen van Dulken draws on his experience as a senior researcher in the IP Department at the British Library and introduce us to 50 of the most influential and interesting patents registered in the first decade of this century. These include robots, methods to purify water in flood areas and the iPod MP3 Player. The inventors also reveal what prompted them and the ensuing development process.

Michael Faraday,

A Very Short Introduction.

Frank James, Oxford.

This is a history, not a biography, of Michael Faraday, that looks at his life in the context of the times in which he lived as well as his posthumous reputation. This has become possible through recent historical study. Frank James examines Faraday's persistent attention to detail and the three main themes that his science addressed: research, communication and application.



Michael Faraday, reproduced by courtesy of the Royal Institution of Great Britain

Childhood and Child Labour in the British Industrial Revolution.

Jane Humphries, Cambridge University Press

The economist, Jane Humphries has used recently discovered writings, diaries and poetry of working children and their families, from 1600 to the end of the 19th century. They reveal the details of child labour in the working of the machines and mines of the Industrial Revolution. The children describe their fears including being terrified at working in the dark down coal mines, cleaning out spinning machines and looms, witnessing horrendous industrial accidents and deaths of their peers

Engineering – A beginner's guide

Natasha McCarthy, Oneworld.

This extremely well written book describes the history and evolution of engineering; engineering's place in society; the approaches to engineering; and provides insight into the distinction and relationship between engineering and science. It is replete with examples of innovation and creativity and provides a reassuring and warm feeling to those who have spent a career in engineering. It should be essential reading for those who are concerned for engineering and its role in the future.

Vickers' Master Shipbuilder: Sir Leonard Redshaw.

Leslie Shone, Black Dwarf Press.

Sir Leonard Redshaw was head of Barrow shipyard from the early 1950s until 1976 and is credited with winning it the status of lead yard for British nuclear submarine construction. HMS Dreadnought, Britain's first nuclear submarine was built there under Sir Leonard's watch. In his recent biography, Leslie Shone makes the case for Sir Leonard to be remembered as the most successful British shipbuilder of the period and with leadership skills that were an asset in time of crisis and also commemorates the 50th anniversary of Dreadnought's launch in 1960.

Innovating Women:

Contributions to Technological Advancement.

Edited by Pooran Wynarczyk & Susan Harlow, Emerald

This selection of essays focuses on the innovative scientific and technological activities of women and their contribution, throughout history, as entrepreneurs, to the economy. A historical overview, written by Deborah Jaffé, leads to case studies which include the innovative work of medical researchers, scientists, engineers and those who have developed businesses based on their inventions.

The King's Speech

On general release

Put aside the 1936 abdication crisis, a young man's battle to overcome personal difficulties, Colin Firth, Helena Bonham-Carter and all the awards but do concentrate on the radio transmitters, microphones and the other magnificent paraphernalia of the 1930s BBC studio as it broadcasts momentous speeches to the Empire.

A History of British Coal, Shipbuilding & Steel

The British Film Institute (BFI)

www.bfi.org.uk/shipyard/

One of the BFI National Archive's most ambitious current projects, *This Working Life* is a three-part celebration of Britain's industrial heritage as seen through the eyes of filmmakers from the Victorian era to the present day. Concentrating on coal mining, shipbuilding and the steel industry, *This Working Life* made its debut in 2009 with *King Coal*. Now, the second strand is launched with *Tales from the Shipyard*, which includes several programmes that will play at BFI Southbank, Newcastle's Tyne-side Cinema, Glasgow Film Theatre and Belfast's Queen's Film Theatre. They include features such as Michael Powell's *Red Ensign* (1935) and John Baxter's *The Shipbuilders* (1943), a wealth of documentary material dating back to the ill-fated launch of 'HMS Albion' at Blackwall, London, in 1898, and a rare chance to see the television version of Bill Bryden's astonishing stage production *The Ship* (1990) on the big screen. Many of the films have been recently restored overseen by Curator Ros Cranston who notes that *Tales from the Shipyard* offered new challenges: *With King Coal, we had the advantage that the BFI National Archive preserves the whole of the National Coal Board Film Unit's output, almost 1,000 films, so we had a massive base of material to draw on, and we'd already done extensive research. By contrast, 'Tales from the Shipyard' felt much more like starting from scratch. We knew early on that while the BFI held a great deal of excellent material, ...[but].. shipbuilding has a major advantage over coal mining in that it's a wonderfully visual subject - the climactic scene in Amber Films' 'Launch' always draws gasps from audiences.*

The most surprising discovery was a little-known documentary called *The Bowler and the Bunnet*, which was shown on Scottish Television in 1967, and is of unusual interest because it is the only film that Sean Connery ever directed. There is a companion two-disc DVD set compiled of five hours of documentary about Britain's shipbuilding heritage and is completed by an illustrated booklet of new essays and notes.

Newcomen Diary

- March** **22 March** **Southern**
Thomas Elliott Harrison (1808 – 88)
an Exemplary Victorian Civil Engineer:
Bill Fawcett
- 23 March** **Western**
Visit to Meteorological Office, Exeter
Details in Blue Notices
- 29 March** **North West**
The Motor Vehicle, 1929-2000, Newton
Steeds & Garrett: Robert Steeds. Joint
Meeting with the Institution of Mechanical
Engineers, Gt. Manchester.

- April** **5 April** **North East**
The History of the Industrial Gas
Turbine: Ronald Hunt
- 5 April** **Southern**
The Mills Archive – its Development as
a resource for research and conservation:
Ron Cookson
- 6 April** **Midlands**
The Return of the Vulcan: Dr Robert
Pleming
- 13 April** **London**
Leveson Francis Vernon-Harcourt 1839-
1907: Tony Vernon (member)
- 14 - 17 April** **Manchester**
Conference: The Piston Engine Revolution
at MOSI Manchester. See separate
booking form for details.
- 21 April** **Western**
Bricks and Brickmaking: M J Stone
- May** **11 May** **London**
The Presidential Address. The
Changing Nature of Innovation,
an historical overview: Dr John Russell
(President). See separate booking form
for details.
- 14 May** **Southern**
Challenges in Conserving Britain's Cathedrals:
Michael Underwood. At Avenue Lawn Tennis &
Squash Club, Southleigh Rd. Havant PO9 2RS.
Supper can be booked. Details from Branch Secretary.
- 19 May** **Western**
History of Watermills:
Dr Bryan Lawton (member)
- June** **4 June** **Western**
WSS Naval Meeting, Bristol. Details in Blue Notices
- July** **13 July** **West Kensington, London**
Afternoon visit to Transport for London, West Ashfield Training Centre.
Details in June issue, party limited to 12. Details from: Henry Gunston,
01235 223474; henry.gunston@virgin.net
- September** **6 - 14 September** **Canada**
The Newcomen Summer Meeting, Ontario, Canada. Information at
www.newcomen.com or from the Executive Secretary.

Other Dates

- Call for Papers** **31 May 2011**
7-10 June 2012 **Caernarfon**
Conference
The 5th International Early Railways Conference.
Researchers into the history and archaeology of early railways
(defined as those which were pre-mainline in concept if not necessarily in date) who would like to present their findings are invited to indicate their intention to the organising committee by 31 May 2011. It is also requested that a 300 word synopsis be submitted for consideration by the end of September 2011. Proposals for short (10-15 minute) presentations are also welcome. It is intended to publish the proceedings. Proposals for papers, which may be on economic, business and social history topics as well as technical subjects, should be sent to Dr David Gwyn, Nant y Felin, Ffordd Llanllyfni, Pen y Groes, Caernarfon, Gwynedd LL54 6LY; govannonconsult@hotmail.com. Further information on Early Railways Conferences at www.erc5.org.uk

- June** **2 June** **Woolwich**
The Institution of Mechanical Engineers will award an Engineering Heritage Award to the Royal Arsenal, Woolwich. Members will recall that Sir John Anderson, the subject of Gwilym Roberts' paper *Sir John Anderson, 1814-86: The Unknown Engineer who made the British Empire Possible* which was presented to the Society in December 2007 and published in Volume 78, No.2, was the Arsenal's Chief Engineer and that the paper contained much information about the Arsenal. Further details from Gwilym Roberts at: gwilymroberts@onetel.com; 33 High Hurst Close, Newick, BN8 4NJ.
- November** **13 - 16 November** **Australia**
Engineers Australia Tasmania Division 16th Conference of Engineering Heritage Australia, in Hobart, Tasmania. The Conference will be preceded by a pre-conference tour of historical engineering sites on 10-13 November 2011. Further details from: Clive Ellam at cellam@madasafish.com

2012 Looking Ahead. 300
Plans for events to
celebrate the 300th
anniversary of the first
Newcomen Engine will be
in the June issue of Links.