

# Links



*In full steam, the replica engine at the Black Country Living Museum; the 2012 celebrations and events; finding Thomas Newcomen's walking stick...*

Links is published four times a year by The Newcomen Society. The views expressed in the articles published in Links are those of the authors and not necessarily those of the Newcomen Society or the Editor of Links. Every effort has been made to gain permission to reproduce the images in this issue and we apologise for any unforeseen errors.

The Newcomen Society for the Study of the History of Engineering and Technology is a company limited by guarantee.

Registered in England No. 691545.

Registered in the UK as a Charity No. 215410.

VAT Reg. No. GB 242 7979 28.

The Newcomen Society,

The Science Museum,

London SW7 2DD.

+44 (0)20 7371 4445

www.newcomen.com

Affiliated to Engineering Heritage Australia

www.engineersaustralia.org.au/engineering-heritage-australia

## Writing for Links

Relevant articles and items of news may be submitted to be considered for inclusion in Links.

**Articles** should be a maximum of 700 words and sent in Word format by email.

**Images** should be sent separately by email in jpg (digital) format of 300dpi. They should **not** be embedded in the text of the Word document,

**Copyright and reproduction** issues on images, including diagrams, 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 5 November 2012**

Please submit articles, information, details of events etc to:

The Editor,

Deborah Jaffé at:

editor.links@newcomen.com

07798 603000

## Notes on Contributors

**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.

**Dr. Michael Bailey** is a Newcomen Fellow, who joined the Society in 1973. He has served as Member of Council for several terms, and President between 1995 and 1997. He is an author and lecturer on early railway and locomotive history, and is a consultant and archaeologist for museums and television companies. Michael was also Consultant to UNESCO regarding the Rhaetian Railway's application in Switzerland/Italy for World Heritage status. He represents the Newcomen Society for the 'International Early Railways' Conference series, and is a co-editor of the Conference publications.

**Fred Barker.** On leaving school he studied chemistry and after obtaining his degree worked for a time as an industrial chemist. He then changed direction and read medicine, eventually pursuing a career in diagnostic pathology. He has always had a spare time interest in electronics and machinery and enjoys the history of mining and railways.

**John Bolter** 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.

**Ian Broom** has been an active member of the Western Branch since it was formed in 1998. He was Secretary for 10 years and is about to start his third year as Branch Chairman. He is also a long standing member of the Crofton Branch of the Kennet and Avon Canal Trust and has presented two papers to the Society on the history of Crofton.

**Dr Robert Carr** was at first involved with the physical sciences. He has since become more of a generalist, interested in a wider context and in making connections.

**Roger Cline** is editor of the Journal and Honorary Secretary of the Society

**Clive Ellam** is a retired aeronautical engineer whose main interest is the history of aeronautical engineering; he is a Past President of the Society.

**Edward Fielder** is a recently retired, general dental practitioner. He has a lifetime interest in civil and mechanical engineering, classic car restoration and the history of transport.

**George Kessler CBE**, is Joint Group Deputy Chairman of The Kesslers Group. He is a Board Member of The Apprentice Ambassadors Network, a Member of the Prince's Trust London Regional Council, an Honorary Fellow of the RCA and an acknowledged expert on the connections between manufacturing and the creative industries.

**Professor David Perrett** is Professor of BioAnalytical Science, William Harvey Research Institute, Barts & the London School of Medicine & Dentistry, Queen Mary University of London. He is a Fellow of the

Royal Society of Chemistry and a Chartered Chemist. He is Immediate Past President of The Newcomen Society, and a member of Council and has served on the Council of the Association for Industrial Archaeology 1986-98. He is actively involved in Industrial Archaeology at local, regional and national levels; lecturing widely and writing on IA, organising regular lecture series, and arranging field visits and conferences.

**Dr Fred Starr** is a metallurgist who has specialised in gas manufacture and electric power generation. He is greatly interested in technical developments in the 20th Century and recently helped set up the Conference on the Piston Engine Revolution. This tied in with his other main interest, the history of aircraft design.

**John Porter.** After degrees in mechanical engineering and naval architecture, John spent all his working life with merchant ships. Sailing on steam driven ships led to an involvement with the preserved Cornish engines at the Kew Bridge Steam Museum. He enjoys travel with NS and AIA, finally having time to see more of the countries he flashed through in his working days.

**Leslie Shore** began his career as a professional mechanical engineer at Hy-Mac. He then took an honours degree in mechanical engineering at what is today Cardiff University and an MBA at Lancaster University. His work has included management posts with Babcock Power, Esso Petroleum, and MAREL (Maritime Technology Exploitation Limited), which brought him into contact with the legacy of Sir Leonard Redshaw. He has had two books published by Black Dwarf 'Lightmoor: 'Vickers' Master Shipbuilder: Sir Leonard Redshaw', and 'Peerless Powell Duffryn of the South Wales Coalfield'.

**Robert Taylor** is a museums and heritage consultant, with a particular interest in the development of industrial heritage sites. A scientist by training, he has worked in a range of cultural organisations, including being director of Amberley Working Museum and the Royal Gunpowder Mills. In recent years he was the director of an ICT company, and is currently a trustee of the National Motor Museum and the Coultershaw Trust in West Sussex.

---

## The Front Cover

*In full steam, the replica engine billows steam through the engine house at Black Country Living Museum. Courtesy of Jim Andrew*

---

## *From the Society's Interim Executive Group*

The Interim Executive Group would like to congratulate the organisers and speakers of all the various Newcomen 300 events held over the summer. Each event was attended by one or more members of the Group and we were all impressed by the quality of what we saw and heard. Dr. Jim Andrew of the Midlands Branch performed the heroic act of stepping in at the last minute to lecture in Dudley in place of Adam Hart-Davis, who was ill. Collectively the summer's events were a great success and the BBC recognised this by placing a page relating to Newcomen 300 on its website at: [www.bbc.co.uk/news/science-environment-18600708](http://www.bbc.co.uk/news/science-environment-18600708). Furthermore, a Newcomen-type engine featured in the opening ceremony of the Olympic Games. We are also pleased to announce that next year the Society will be running two sessions at the 24<sup>th</sup> International Congress for the History of Science, Technology & Medicine in Manchester.

We are now carrying out the badly-needed review and revision of the Memorandum and Articles of Association to bring them into the 21st century. We have been working on the new website throughout the summer but various unexpected snags have occurred, including a long-drawn-out argument with BT about our domain name. This was only resolved after several frustrating months when BT discovered it was their mistake. As a result of this and other problems it is taking longer than we anticipated to set up the new website with its integrated database, which means that it is still not possible for members to access the archive of papers. However, the subscription renewal letters will be going out rather later than usual because we want to make sure that the database is working smoothly and avoid the renewal problems many members encountered last year. We are working extremely hard to complete all this as soon as possible and would ask you to be patient. At present there is a temporary front page with which we are keeping members in touch with development. Do please keep an eye on it at: [www.newcomen.com](http://www.newcomen.com). We anticipate a return to normal governance at the earliest opportunity. Included with this issue of Links is a nomination form for Council and all members are eligible for nomination. At present we are short of practising engineers on Council so if no-one with this set of skills is nominated, Council may co-opt someone suitable to fill this skill gap. Please note that nominations for Council must be received by 1 November.

---

*1 November is the closing  
date for  
Council Nominations*

---

## *From the Editor*

The summer months have been hectic for members of the Society and is reflected in this issue of Links. It contains reports on: some of the tercentenary events held around the country; those on the many visits that constituted the Summer Meeting in Ireland and others from relevant conferences held outside the auspices of the Society. Space has not permitted the publication, in this issue, of all the reports and articles submitted, so the rest will follow in Links 224. Please do not be deterred. If your article has not yet been published, it will be in the already bulging file for consideration in future issues. Equally, please do not hesitate to submit news, ideas and suggestions for the future. The strength of Links is in the material submitted by the Society's members. The copy date for the next issue is 5 November.

*Deborah Jaffé*

---

*Copy date for  
the next Links is  
5 November*

---

# Newcomen Matters

## James Sutherland at 90

*The Institution of Structural Engineers History Study Group is holding an event in honour of James Sutherland. It will consist of contributions from friends and colleagues followed by a dinner in the Institution on Monday, 5 November.*

### **Robert Thorne**

James Sutherland, the Society's President in 1987-1989, is ninety years old this year. No-one has done as much as he to help forge intelligent links between current engineering practice and the understanding and conservation of historic engineering structures.

James started his professional career with Sir William Halcrow and Partners before forming the partnership Harris and Sutherland in 1958. His firm was one of the leaders in the innovative years of the late 1950s and 1960s, working on schools, new universities, civic and industrial buildings: their role in the design of the Commonwealth Institute in Kensington (1960-2) has been highlighted during the recent debates about the future of that building. It was also in the 1960s that James started to write and lecture about the history of engineering, for instance in a lecture to the Society on wrought iron in 1963 and an article about long span bridges in the *Architectural Review*, September 1966. From the outset what he writes is always characterised by its clarity and open-mindedness; an insistence that his is not the last word and that there are always more questions to be answered. His main interest has been the introduction of cast and wrought iron into buildings and structures and the attribution of responsibility for these developments. Avoiding the aridity of much engineering history, he has always stressed the human element- what individuals were really like and how easy they might be to have as colleagues. This approach shines through in his contributions to the *Biographical Dictionary of Civil Engineers* and his Presidential Lecture to the Society in 1989 on dockyard roofs.

Quietly but effectively James has also influenced major conservation decisions, in his general refusal to accept the application of contemporary



**An Evening for James**  
contributions from friends  
and collaborators followed  
by a dinner on  
Monday 5 November  
5.45 for 6.15  
at the Institution of  
Structural Engineers,  
11 Upper Belgrave Street,  
London SW1X 8BH.

*The first part of the evening,  
with contributions from friends  
and colleagues, is open to  
everyone. If you are interested in  
attending  
the dinner please contact  
Julia Elton on 0208 747 0967 or  
books@abutment.co.uk,  
who is making the booking  
arrangements and will  
advise on the cost.*

mathematical models to historic structures and his specific role in disputes such as the campaign- now triumphantly successful- to save Span Four at Paddington Station. James was the engineer member of the Royal Fine Arts Commission 1986-1996. He was Vice-President of the Institution of Structural Engineers 1980-2 and founded that Institution's History Study Group, which today still retains the spirit of congenial debate with which he endowed it.

# Power and Energy: A Season of Conferences

The summer months have been hectic for the Society as events, focussing on power and energy, took place around the country to mark the tercentenary anniversary of Thomas Newcomen's Atmospheric Engine. The July Summer Meeting in Ireland, also followed the theme. The following reports describe some of the events; the rest will follow in December Links.

## The First Newcomen Engine – Why 1712?

*In April Jim Andrew gave a lecture in Birmingham that he had prepared with John Allen. Here, he outlines the origins of Thomas Newcomen's achievement.*

Designed by Thomas Newcomen and erected by his team at Dudley, this, the first recorded steam engine, raised water from a coal mine only about a mile from where the Black Country Museum is today. But a question remains "how certain are we of the date?". The only definitive statement that the year was 1712 is on the Barney engraving dated 1719 but there is circumstantial evidence for the engine being built very close to this date. Although capable of useful work in raising water, Thomas Savery's direct acting steam pump of c1698 did not have the lift required to drain coal mines. It was Newcomen's idea to use a rocking beam to link the steam cylinder with a much smaller diameter pump to solve the problem. With

automatic control by a complex valve gear, the engine erected at Dudley, just a year after Newcomen's team were registered as being in the area, must have been a developed form of the invention. This indicates that earlier engines had been built without documentary account.

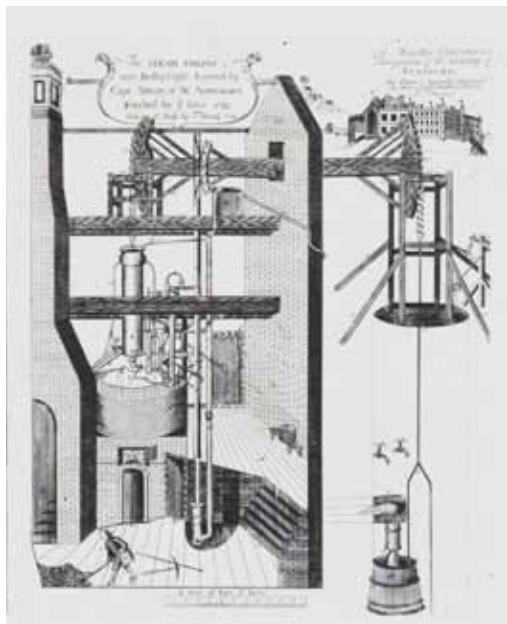
Newcomen was an honest and devout Baptist who, it seems, did not feel the need to leave definitive records of dates and places. Yet his honesty undoubtedly helped the business thrive. The engines were built under the protection of Savery's "dustbin patent" which, while his device was discredited, covered all forms of steam engine at a time when patents could be this lax. The various stories of Newcomen being lucky to manage to design his engine, being but an iron monger, as well as claims that he drew on others' experience should be dismissed as it is almost certain that he had contact with the West Country mining industry with its wealth of experience in pumps and similar devices.

## Relaunch of the Replica Newcomen Engine at the Black Country Living Museum

Thomas Newcomen and his 1712 Dudley Castle Engine received wide acclaim during the Midlands Branch tercentenary celebrations, which centred on the 25 year old, full-scale replica at the Black Country Living Museum. After years of decline and manual operation, the Engine was returned to a 'self-acting' condition by Newcomen member, Geoff Wallis and a team from the Museum. This was part of a £100,000 restoration scheme, funded almost entirely by generous donors. Some stages in the refurbishment and trials were filmed by teams from BBC 2 and Channel 4 with celebrity presenter Guy Martin getting his hands dirty de-silting the mine-shaft, servicing valves, cleaning out the boiler, and repairing brickwork. He also appeared to start the Engine for

the first time after its restoration. In reality the two weeks of 'rehearsals' ensured that, to everyone's amazement, it started almost perfectly first time.

The event included lectures about early atmospheric engines by Jim Andrew, a steam rally at the Museum, and a magnificent lunch complete with a three-tier birthday cake featuring Thomas Barney's 1719 drawing of the Engine on rice-paper, probably another first. Newcomen-devotee, Adam Hart-Davis was unable to officiate, so Julia Elton, Society Past President, stepped in at short notice. Against the background noise of a full head of steam (1/2 psi), Julia delivered an inspiring tribute to Thomas Newcomen, cut the ceremonial ribbon, and confidently started the Engine without getting



**Far Left:** Thomas Barney's 1719 engraving of Newcomen's steam engine at Dudley Catle. Image 10312163 ©Science Museum/SSPL All rights reserved.  
**Left:** In full steam, the replica engine billows steam through the engine house.  
**Below:** A birthday cake decorated with drawings on rice paper of Barney's engraving.





*The Engine now operates automatically but requires supervision as the valve mechanisms occasionally fail to trip, usually due to inevitable slight variations in the supply of steam.*

'knee-capped' by a flailing steam-valve lever which catches most newcomers unawares. In fact, perhaps over-excited by the occasion, the Engine soon developed more than its usual vacuum, over-stroked and dislodged a small timber bearer which came crashing down on the floor, adding to the excitement of the tightly-packed guests, and to the concerns of some already unnerved by the unfamiliar but normal clatterings of the Engine. (It now operates automatically but requires supervision as the valve mechanisms occasionally fail to trip, usually due to inevitable slight variations in the supply of steam). As part of his technical study on atmospheric engines, Cdr Matthew Carr of the US Naval Academy Department of Mechanical Engineering in Annapolis (and a Newcomen Member) came to Dudley specially to instrument the replica with sophisticated equipment from the US. After some technical hitches, and sustained by numerous doughnuts, Cdr Carr obtained pressure, temperature and video data that will enable him to prepare indicator diagrams for the replica, and to carry out a thermodynamic appraisal which may shed light on some of the Engine's eccentricities. We look forward to his paper. Finally a tremendous cacophony developed as the other steam engines assembled on the site whistled and hooted in fitting celebration of the restarting of the Engine and the 300th anniversary of Thomas Newcomen's original. He would have felt humbled and honoured.

**Jim Andrew**  
[www.bclm.co.uk](http://www.bclm.co.uk)

## Thinktank, the Birmingham Science Museum

After the main Midland celebration of Newcomen 300, at the Black Country Museum on Saturday 14 July, half the members and their guests stayed or returned to Birmingham on Sunday 15 July to visit Thinktank, the Birmingham Science Museum where it had been intended that the 1779 Watt engine would be steamed but sadly the 5 year old boiler has cracked up. The day started with a walk to the nearby site of the Ashted canal pumping engine, by Boulton and Watt 1813, which was excavated five years ago. Now sympathetically back-filled, the engine house remains will be exposed and housed when the site is developed as offices. Jim Andrew, Midland Branch Secretary, distributed photos of the excavation and of the engine, now displayed in the Ford Museum in the USA. The group then walked up the canal locks to Dartmouth Circus on the A38M where a large beam blowing engine, c1820 and of unknown make, is displayed. In part this location is because the engine is virtually too large for a museum gallery display.

## Could this be Thomas Newcomen's Walking Stick?



On a visit in May to inspect the Society's Newcomen Engine in Dartmouth, Geoff Wallis and I were told by Angela White of the Museum that a local resident, Terry Turner, had recently brought "Newcomen's walking stick" into Dartmouth Museum. The stick is dated 1677 and Mr Turner had kept it in his wardrobe. It was exhibited at the tercentenary lectures in Dartmouth. With some difficulty the museum staff removed the handle and inside the shaft was the following typewritten note on the provenance of the stick:

*In the days when Thomas Newcomen lived in Lower Street, there was a man named Dodd who was very friendly with Newcomen and who used to visit him and have a game of cards during their leisure hours. When Newcomen died this walking stick was given by Newcomen's family to Dodd. The stick remained in the Dodd family until a Margaret Dodd married a man called Macey as her first husband. Macey died and Margaret again married a man called Coaker. Coaker died and Margaret took unto herself a third husband, one Captain Kellond. Captain Kellond outlived Margaret and so the walking stick was given to Captain Kellond's daughter, who was Mrs Turner, the mother of the present owner.*

It is believed that the stick had been shown in Dartmouth at some time in the past century and at that time the note was concealed. Dodd was certainly a common family name in the Dartmouth area at about the same time and other names can also be traced back to the late 18<sup>th</sup> century giving a ring of truth to its authenticity. A mystery though is the inscription *NN* on its bone handle. The museum suggests that Thomas Newcomen may himself have inherited the stick from a member of the Lincolnshire branch of his family. There were four relatives called Nicholas Newcomen and three died during Thomas's lifetime; one in 1679/80, one in 1703 and one in 1712 so that explanation is possible.

**David Perrett with grateful thanks to Angela White of Dartmouth Museum.**

The return to the Science Museum was made via a local pub, for those who wished to lunch with real ale, others lunched at the museum. The 1779 Watt engine, built to pump water on the canal at Smethwick, was then run on its modern hydraulic animation system while Jim explained the beauty of the system in its gentle treatment of the venerable steam engine, which when it can be steamed is the oldest working steam engine in the world. Conversion from steam to hydraulic takes just a few minutes if the boiler is fired up for other engines but such runs are limited in the interest of conserving the engine for future generations to enjoy. Jim then gave a lecture with a brief history of the engine, details of the excavation of its original engine house in 1984 and the technical aspects of the installation of the engine and its power systems in 2001. Members also spent time during the day looking at the other exhibits in the Museum including steam engines from 1805 to 1924 and John Cobb's 400 mph land speed record car of 1938.

**[www.thinktank.ac](http://www.thinktank.ac)**

## Dartmouth 300

The celebration of the life of Thomas Newcomen was held in Dartmouth on 12 and 13 July. Our base for the two days was the Dartmouth Golf and Country Club and the Dartmouth 300 Committee, who had planned a week of events, were most welcoming and their planning meant that things always ran smoothly. They had laid on a river cruise reception for us on the Thursday evening and we had a very enjoyable time making new friendships with the people of Dartmouth, from the Society and visitors from Holland and the USA.

On Friday we began with a visit to the Memorial Engine. The whole area around the Engine House has been refurbished and a new entrance to the engine house created (Links 222). After seeing the engine in motion we processed to the Newcomen Memorial Stone in the Royal Avenue Gardens. Here Paul Allen, Mayor of Dartmouth and Professor David Perrett laid chaplets to the memory of Thomas Newcomen and each made a short speech. Then we gathered at the Flavel Centre for the lecture programme. The lectures were well supported with about 90 people attending.

The first lecture, *Newcomen – the man*, was given by Brian Corfield. Brian is an industrial pharmacist, has worked in various disciplines within the industry and is a volunteer at the Anson Steam museum at Poynton in Cheshire. Importantly, Brian is a direct descendant of Joseph Hornblower one of Newcomen's associates. In researching his family history Brian stumbled upon his connection to the Hornblowers and so to Newcomen. He had also found a fifth cousin in America and she and her husband had made the trip to Dartmouth and they met Brian for the first time the previous evening.

Second to speak was David Hulse on *The Newcomen Engine*. David was Chief Development Engineer at the Royal Doulton Factory for 20 years and responsible for designing and commissioning automatic machinery that replicated traditional hand processes. He holds 17 patents and is also a model engineer 'extraordinaire' with extensive research to back up his models of historic engines. David has made a detailed model of Newcomen's 1712 engine based on the Barney engraving. He was able to take us through the workings of the engine based on the details of his model. The most remarkable thing about the model is the 42,300 bricks laid to construct the engine house. The model took six years to build.

The final speaker was David Perrett, Immediate Past President of the Newcomen Society who spoke on *The*

### Errata

**Links 221.** The caption supplied by the Science Museum of the photograph of the model Newcomen Engine illustrating John Allen's article (p6) is incorrect. It states that steam pushes up the piston in a Newcomen Engine. This is of course not so it is atmospheric pressure acting against the partial vacuum formed in the cylinder that pushes the piston down. **PII** Windmill End (Cobbs) Rotative Engine. A line towards the end is missing and the paragraph should say that the rotative engine was housed in an engine house adjacent to the surviving beam engine house at Netherton. Most of the original engine house as well as the engine was taken to the Henry Ford Museum in 1928/29. **Links 222.** In the review of *The Chemistry of Tears* by Peter Carey, the name Vaucanson was spelt incorrectly and the automaton referred to in the novel is a silver swan.



Paul Allen, Mayor of Dartmouth and Prof. David Perrett at the Memorial Stone

*Archaeology of the Newcomen Engine*. David is Professor of BioAnalytical Science, William Harvey Research Institute, Barts and the London School of Medicine and Dentistry, Queen Mary University of London. David guided us through the history of the surviving Newcomen engines. A fascinating part of his talk was on the involvement of Henry Ford who gave one of his employees, Herbert Morton, a blank cheque and instructed him to 'buy the 1712 engine'. Naturally, he did not succeed but Morton managed to ship out three Newcomen engines to Henry Ford's Dearborn Museum. They were the Fairbottom Bobs engine of 1760, the 1800 Moira Colliery rotative engine and the Windmill End engine also of 1800. David finally showed pictures of existing Newcomen engine houses that have been converted into dwellings.

The meeting was closed by Ray Bridges, Chairman of the Dartmouth 300 Committee. The Dartmouth event closed with an informal evening meal when we were pleased to welcome as guests Phillip Hosken and Kingsley Rickard from the Trevithick Society. Our grateful thanks go to the Dartmouth 300 Committee, chaired by Ray Bridges, who organised the river cruise, the Friday morning refreshments and made the Flavel Arts Centre available to us.

**Ian Broom**

.....further tercentenary reports will be published in Links 224.....

Thomas Newcomen's  
Achievement & Legacy  
a conference at  
The Black Country Living Museum  
9-10 November 2012  
details on back page

# The Summer Meeting in Ireland Limerick-Shannon Region, 2-6 July

*The Limerick - Shannon region of Ireland has long been of strategic and economic importance to Ireland. The Summer Meeting visits included a steam museum, peat bogs, power stations, a monorail, airport, cement works, alumina refinery, telescope and the manufacturer of the latest orthopaedic implants. We saw the development of Limerick and its dockyard, bridges and tunnel; at Ardnacrusha we discovered the relevance of the Siemens contract to construct a hydro electric power station and went to Charles Parsons' family home at Birr Castle. There were excellent lectures on the social and economic history of the region and impact on the whole of Ireland. The following reports, by different delegates, reflect the breadth and scale of the meeting.*

## The Steam Museum, Straffan, Co. Kildare

The first visit of the summer meeting was to Straffan to see the excellent collection of steam engines and models housed at the country estate of Robert Guinness, a member of the Society. Having been to Robert's home some 25 years earlier to see some of the collection in its pre-museum days, I had been much looking forward to seeing it in its museum setting.

To house the collection, Robert had acquired the disused Victorian Gothic St. Jude's chapel that had formerly served the needs of the railway employees at Inchicore railway workshops in Dublin. The chapel had been dismantled and re-erected at Straffan, retaining its structural

features and fenestration, but adapted to accommodate the seven stationary steam engines retained there in working order, as well as the large collection of models. The party was warmly welcomed by Robert Guinness and by Brendan Delaney, President of the Industrial Heritage Association of Ireland, both of whom acknowledged the importance of the tercentenary of Thomas Newcomen's 1712 pumping engine in the history of engineering. A commemorative display board in the museum highlights this engine's significance as the progenitor of all the engines displayed therein. This fine collection of industrial engines from sites all around Ireland forms an excellent cross-section of those in use in

the 19<sup>th</sup> and 20<sup>th</sup> centuries including:

- Six pillar independent beam engine, c1820, maker unknown. Rowan's patent valve gear was added in c1876 when it was moved from Cork to Middleton, Co. Cork where it was used, in conjunction with a water wheel, at the distillery there.
- Vertical engine, c1830, maker unknown, possibly used in a brewery in West Cork. It is displayed driving line shafting for contemporary laundry equipment.
- Single column beam engine with architectural detail, c1847, maker unknown. It is said to have been purchased from the Manchester Exhibition and was used in Smithwick's brewery at Kilkenny.
- Inverted vertical duplex pumping engine, c1898, built by Frank Pearn & Co. Ltd. in Manchester. It was used to pump water at the Jameson distillery in Dublin.
- Single cylinder mill engine, c1910, built by Victor Coates & Co., Lagan, Belfast, and was used to drive linen manufacturing machinery.
- Triple expansion marine reciprocating engine, c1920, built by Workman Clark & Co. Ltd., Queen's Island in Belfast. It was one of a handed pair on the S.S. Divis operated by Belfast Corporation.
- Open double-acting high speed engine, c1940, built by W.H. Allen, Sons & Co. It drives a continuous current dynamo and was used for degaussing of vessels to counteract magnetic mines.

A fine collection of locomotive and other models is displayed in the Richard Guinness Model Hall. These include Trevithick's third engine model, the first four-wheeled self-propelled vehicle. There are nearly twenty large



*The single-pillar beam engine acquired for the Smithwick brewery in Kilkenny in 1847. Cylinder 12in x 27in; flywheel 10ft 6in diameter; beam length 8ft 6in.*



Top: Some of the exhibits in the chapel  
Below: A Past-President paying homage ... to a Planet-class locomotive model, one of the historic collection at Straffan.

scale locomotive models, a number of which may well be contemporary with the period of the original design. The earliest designs are a Robert Stephenson 2-2-0 Planet of the early 1830s, and a George Forrester 2-2-0 of the mid-1830s, named Colossus, strangely not a name adopted by the Dublin & Kingstown Railway on which three examples of the type operated. The collection has recently expanded to incorporate the Ron Jarvis collection of early road transport and stationary engine models, whilst the Halpin collection includes samples of the first transatlantic telegraph cable laid between Valentia Island and Newfoundland.

The society expressed much appreciation for the hospitality and welcome shown by Mr & Mrs Robert Guinness and Brendan Delaney, together with members of the Industrial Heritage Association of Ireland, and the Railway Preservation Society of Ireland who turned out specially to welcome us.

**Michael R. Bailey**

[www.thesteammuseum.com](http://www.thesteammuseum.com)

## Birr Castle and Demesne, Birr, Co.Offaly

**B**irr Castle and its extensive park is the home of the Parsons family, the Earls of Rosse, the present Earl, Brendan, being the seventh. William, the third Earl, was a distinguished scientist and astronomer and, in the grounds, built two notable reflecting telescopes, the first with a 36 inch diameter mirror and the second with one of 72 inches diameter. The latter was said to be the largest in the world for 75

years. To construct the telescopes, Lord Rosse established workshops and a foundry in the grounds, carried out experiments to determine the best composition of the speculum metal, an alloy of copper and tin, from which the mirrors were made. He also constructed a grinding and polishing machine to produce the parabolic profile of the mirrors. He used the later telescope principally to explore nebulae, and then the fourth Earl, Laurence, used it to make the first accurate measurement of the temperature of the moon. Succeeding earls were not interested in astronomy, so the telescopes were dismantled after Laurence's death. Nothing remains of the first but the massive masonry walls of the 72 inch telescope, and in 1996/7 a replacement tube was fitted and the complicated machinery and viewing platforms were restored.

After lunch we met our guide, John Joyce, who conducted us through a series of rooms in the stable block



Some of the memorabilia devoted to Sir Charles Parsons

devoted to aspects of astronomy, to explaining the workings of the telescope and to photography. Mary, Countess of Rosse, wife of the third Earl, was an accomplished photographer as well as a skilled blacksmith.

The last room was devoted to memorabilia of Sir Charles Parsons, the youngest of William's six sons and the inventor of the first steam turbine capable of development to large powers. This part of the visit was enlivened by the discovery of a statement that William's yacht Titania had been acquired from Robert Stevenson, the lighthouse engineer instead of Robert Stephenson, the railway engineer!

John Joyce then conducted us to the grounds to see the castle, which is not open to the public, and to see an interesting suspension bridge. The visit concluded with an inspection of the restored 72 inch telescope. **John Bolter**

[www.birrcastle.com](http://www.birrcastle.com)



Two views of the massive masonry walls of the 72 inch telescope with the replacement tube and the complicated machinery and viewing platforms that were restored in the 1960s.

## Lartigue Monorail and Museum, Listowel, Co.Kerry



*Above: The replica locomotive with the monorail standing on the A frame  
Below: The track and turntable*

On seeing camels in the North African desert the French engineer, Charles Lartigue, was intrigued by their ability to balance heavy panniers down each side of the body. This gave him the idea to design a single track railway sitting on A shaped trestles with the carriages hanging down each side, much as the panniers did on the camels. In 1881 he built a 90km monorail to carry grass across the Algerian desert.

This was not the first monorail. In 1821 the British engineer, Henry Palmer Robinson patented a monorail in which the carriages were suspended from the raised rail and drawn by horses. Friederich Harkort built a similar, demonstration track at Elberfeld in 1826. Lartigue's Algerian scheme lent itself to the soft sandy desert as the A frame trestles gave the monorail support and the consignments of grass were not too heavy.

In 1886 there were proposals for a railway line from Listowel to Ballybunion and Lartigue's monorail system was chosen. When it opened two years later, the 10 mile line from Listowel to Ballybunion carried a variety of passengers that included schoolchildren,

holidaymakers and farmers taking cattle to market. Balancing these loads was precarious and a great deal of care had to be taken to make sure the weights of the passengers was equal in each opposing carriage. Even so, the line was barely financially viable, and closed in 1922.

A century after its opening there was renewed interest in this intriguing and quirky railway and the Lartigue Restoration Committee was formed. In the intervening years they have carefully replicated the engine, carriages, short track and turntable. Newcomen members enjoyed a morning of activity as its passengers. As with the camel's panniers, the cargo still has to be carefully balanced in the carriages that straddle the monorail and care was taken that we did just that - and with a great deal of hilarity we were assigned to our places before our ride along the track.

*Further reading:*

*Professor D. G. Tucker's paper published in Transactions: 'F.B. Behr's Development of the Lartigue Monorail: From Country Crawler to Electric Express' by Professor D.G. Tucker, Transactions Vol. 55 (1983-4) pp. 131-152.*

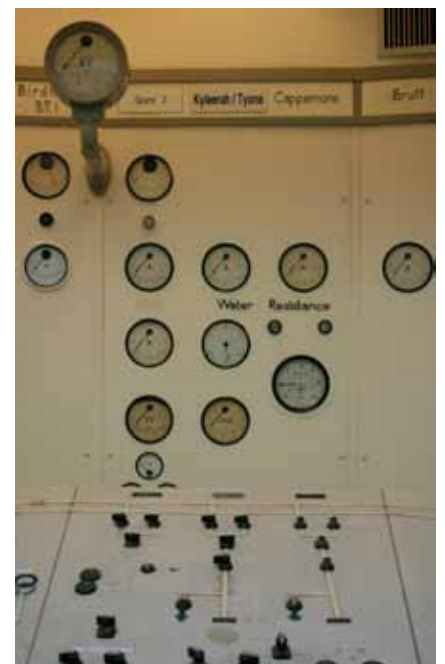
[www.lartiguemonorail.com](http://www.lartiguemonorail.com)

## The Shannon Scheme.....



Although the Shannon is the longest river in Ireland, much of it is unsuitable for large scale power generation as it has a very shallow gradient. However, in the narrow section between Killaloe and Limerick there is a fall of 30 metres in 24 kilometres, and this provides considerable potential. In 1922 an Irish engineer, Dr Thomas Mclaughlin joined the German firm Siemens-Schuckert and there studied hydro-electric generating plant. The following year he presented a scheme for hydro generation on this stretch of the river to Government Ministers. Following this, in 1924, Siemens-Schuckert presented a proposal for a hydro plant there, and in 1925 they were awarded the contract, which included a dam at Parteen, just below Killaloe, to direct water through a headrace 12.6 kilometres long to a power station at Ardnacrusha, from where the water is returned to the river just above Limerick.

Catherine Halpin, the Plant Manager, greeted us at the power station and first showed us the turbine hall. It contains three Francis turbines and a



*Some of the original controls and instrumentation which have been left in the old control room*

..... Ardnacrusha Hydroelectric Station & Parteen Weir, Co. Clare



The power station showing the penstocks which carry water from the headrace to the turbines



A photograph taken immediately after construction in December 1929, showing the first three turbines, the fourth was yet to be installed. Photograph: courtesy of ESB Archives

later, more efficient, Kaplan turbine, driving generators all rated at 30 000 kVA. Then we went to the old control room, which had been left with all the vintage controls and instrumentation in situ, and then went to the machinery controlling the gates admitting water to the penstocks and turbines. A further focus was the navigation lock, necessary because the reduced flow had rendered the waterway unnavigable between Parteen and Limerick, and the fish lift which allows fish to pass the power station.

Our visit to the Parteen, some kilometers upstream, unfortunately coincided with a heavy shower. In spite

of this, we ventured onto the weir to see the discharge into the river. Here, however, the spray and wind were causing water droplets to move upwards as well as downwards, so we did not stay long.

The scheme was a remarkable achievement, both for a fledgling state- it provided 96% of Ireland's electricity by 1931 and only by 1950 was its capability fully utilised. For Siemens-Schuckert, it was a welcome major contract at a difficult time, which influenced the design of hydro plants in other parts of the world.

*John Bolter*

*Further reading:* Andy Bielenberg of the National University of Ireland, Cork has edited a fascinating book on the history of the Ardnacrusha Scheme. It includes the history; its importance to the newly formed Irish Free State and for Siemens; and includes many of the paintings by Sean Keating showing the construction of the site.

*The Shannon Scheme and the Electification of the Irish Free State, Edited by Andy Bielenberg; Lilliput Press, Dublin 2002. Ed.*

[www.esb.ie/main/about-esb/historical-archive.jsp](http://www.esb.ie/main/about-esb/historical-archive.jsp)

[www.siemens.ie/content/aboutus/shannonscheme.asp](http://www.siemens.ie/content/aboutus/shannonscheme.asp)



The navigation lock at Ardnacrusha



Another view of the power station showing the 1959 fish lift in the foreground

## Foynes Flying Boat Museum, Foynes, Co.Limerick

The west coast of Ireland is the closest point in Europe to North America. Foynes is on the south side of the Shannon Estuary on a sheltered bay which gives easy access to a clear stretch of sheltered open water surrounded by relatively flat countryside. The site had been selected by an Irish Government study that had enlisted the help of Charles Lindbergh.

We were welcomed by Joan who showed us an informative film of the history of the flying boat terminal. She then gave us a conducted tour of the museum and their replica of a Boeing B-314 flying boat.

The first service arrived from Southampton in February 1937. Thereafter trial transatlantic flights were made using a Short S.23 and a Sikorsky S42B. These were stripped out and had additional fuel tanks fitted. Attempts were made to improve the range and payload by using inflight refuelling from an aircraft based at a nearby airfield. Subsequently, this airfield became Shannon International Airport. Another experiment was to use two flying boats mounted one top of on another to help with take-off and climb-out before separating. Both these schemes were successful but were only used for mail, as they were too hazardous for passenger carrying services.

Pan American started a commercial service using Boeing B-314 Clippers in April 1939 carrying 35 passengers and a relief crew who had bunk beds in the bow with the anchor for company. Following the outbreak of war, this service ceased in October 1939. A few services operated during the early years of WWII, however following the USA's entry into the war the level of activity at Foynes increased



The museum's full sized replica of Pan American B-314 Yankee Clipper complete with accommodation and flight deck.

rapidly with high-ranking government and military personnel crossing the Atlantic. As Ireland was a neutral country these passengers travelled on false passports and out of uniform. As the war progressed the Irish government relaxed its position and uniforms and real identities started to appear.

Foynes was a vital link in the Allied war effort, handling thousands of flights carrying passengers, mail and freight. The rapid development of long range land planes and airfields with paved runways during the war led to the demise of flying boat services after the war. The last Pan Am flight was in October 1945 with the last flying boat service in October 1949.

The museum has a collection of transatlantic radio transmitters and collections of memorabilia from the flying boat era including airline uniforms, diaries and logs as well as maps and photographs.

The principal exhibit of the museum is a full sized replica of Pan American B-314 Yankee Clipper. We were able to explore the accommodation and the flight deck, all of which

were remarkably spacious by today's standards. At the rear of the fuselage was a 'honeymoon suite' complete with a bottle of champagne and the pilot's jacket hanging in the cupboard!

Following a pleasant lunch in the museum restaurant, Joan gave Professor Frank James a tutorial and practical lesson on the history and technology of the preparation and construction of an – Irish Coffee. Irish Coffee was invented by the chef at the Foynes Terminal to warm up the passengers of a flying boat service that had to turn back to Foynes because of foul weather. We were then all served with a much-appreciated Irish Coffee.



Irish Coffee was invented by the chef at Foynes to warm up the passengers

**Edward Fielder**

[www.flyingboatmuseum.com](http://www.flyingboatmuseum.com)

## Shannon International Airport, Rineanna, Shannon, Co.Clare

At Shannon Airport we were greeted by Niall Maloney, the Operations Manager, who explained that the airport had been created by the Irish Government, for transatlantic passenger services, between 1936 and 1942. Although flat, the site was boggy and construction required installation of some 216 km of drainage pipes. From 1945, the airport was a regular refuelling stop for piston-engined transatlantic airliners until jet airliners flying non-stop entered

service. In a bid to retain business, the original runways were replaced in 1961 by a single 10,000 foot runway; transatlantic flights originating in Ireland are still required to call at Shannon but it now handles mainly short-haul flights. The nearby Shannon Free Zone, which offers customs duty and tax benefits to companies operating there, is an important source of traffic, which reached 3 million passengers and 50,000 tonnes of cargo in 2010. Maria Ryan,

the Airport Duty Manager, then guided us on a tour of the terminal, including a passage through security to allow us 'airside' access. The terminal, opened in 2000, has 40 check-in desks, 5 baggage carousels and 14 boarding gates, six with airbridges, plus the customary retail and catering outlets. Although small, the airport may well play an important part in Ireland's future economic development.

**Clive Ellam**

## Zimmer Orthopaedics, Shannon Free Zone East, Co.Clare

The Zimmer Orthopaedics in Shannon Free Zone is not the company that makes generic walking frames. The Shannon Free Zone was formed, as a customs and reduced tax free area, to attract high tech companies to counteract the area's decline once Shannon Airport (the area's main employer) ceased to be a refuelling stop for transatlantic flights. Zimmer, a US manufacturer of orthopaedic implants, had a need for a European plant to meet several objectives: a marketing base to which clients, such as surgeons, could be invited; to be classified as a European supplier; and for expansion in a growing field. The short list for location for the additional plant included many countries and the incentives offered by the free zone were a major factor in deciding location. In 2009 the plant was opened at Shannon to make knee implants. To be more precise it takes, as raw material, metal castings, made in Indiana and machines them, almost entirely by sophisticated grinding mainly on high quality, German CNC machines which were state of the art when they were manufactured in 2005. Other processes used are robotic grinding, and

polishing. On the factory floor there are 10 identical cells or pods carrying out the process. These use about 50% of the factory floor area, the rest being free presumably for alternative processes and products or for future expansion. Each cell has its own lean manufacturing data and there are boards in the factory and board room giving aggregate statistics. There is an effective suggestion scheme system. There are 24 main types of knee implants (with some small variants within each type) manufactured in Shannon. They are made in batches of 24 in about 4 days – the factory has a target of reducing the batch size to 10 and the *tak* time to one day - using materials like cr steel and tantalum. The dust extraction is impressive with little or no sign of grinding dust (which is a serious carcinogen). The sterilising of the finished implants is out-sourced since the factory has not got the volume to justify the investment required. The plant has the beginnings of a good lean, manufacturing programme which has produced the sort of results one would expect in six months of operation although they claimed it had been running for two years. All R&D is

done in the US and there are no current plans to bring other products here.

The management had the intention to deskill many of the jobs to enable less need for skills and to use that method to increase flexibility. However, other than the robotic deburring (which was very effective) there were little signs of this being implemented. Since labour turnover is very low and the plant is not expanding there is no apprenticeship scheme. The Operations Director gave us a fascinating talk on the history of orthopaedic devices; Ancient Egypt to present day Zimmer. The first hinged, total knee joint was developed by a surgeon in 1968 and progress with new materials and technologies continues. In 1905 Justin Zimmer was a salesman of splints in Indiana. In 1927 formed a company to manufacture polio braces and aluminium splints. Zimmer's company motto: "Made as if intended for my family" is a very clever and effective motivator of employees. A lot of emphasis is put on the stories of how their products have improved lives. Implants is a highly competitive market and the main chooser of supplier tends to be the surgeon.

**George Kessler**

[www.zimmer.com](http://www.zimmer.com)

## Aughinish Alumina Ltd. Askeaton, Co.Limerick.....

The production of alumina from bauxite, using the Bayer process, is a critical step in the treatment of raw materials for smelting of aluminium. The Bayer process came at just the right time, as a year earlier, in 1886, the electrolytic route had been invented, independently, by Heroult in France and Hall in the USA. Here purified alumina is dissolved in a molten bath of cryolite, and the aluminium is obtained using high temperature electrolysis.

The basics of both the Bayer and the Hall-Heroult processes have not changed since. So, most of us were surprised to find that the production of alumina can be carried out independently of the smelting of aluminium, as at the huge Aughinish Alumina plant on the Shannon estuary. However, whereas an aluminium smelter needs massive amounts of cheap electricity, best supplied by hydro or nuclear, the main requirement for an alumina plant is good deep-water facilities for the import of raw bauxite. A kilometre long quay has been built from Aughinish Island allowing the berthing of ships of up to 60,000 tonnes. But unlike other



*An aerial view of the Aughinish Alumina site with the bauxite residue, or red mud in the foreground and the kilometre long quay for the berthing of ships of up to 60,000 tonnes in the distance. Photograph © Brady Shipman Martin*

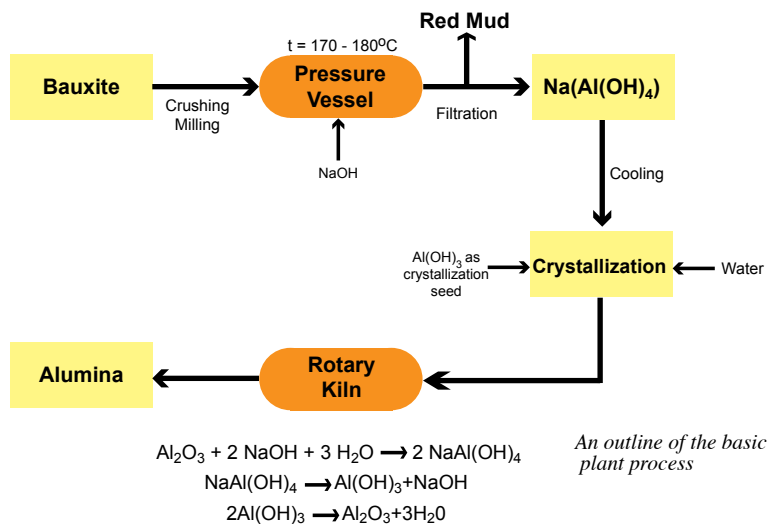
harbours, Aughinish is fairly remote from major population centres, since a key requirement is somewhere to dispose of the bauxite residue, or "red mud", as it is called, which represents more than 50% of the bauxite ore. The predominant colour throughout the plant is, indeed, red! The Bauxite Residue Disposal Area at Aughinish, after 30 years production,

dwarfs the plant itself, but some parts are already being landscaped.

We were taken round the site in our coach by Lorcan Keyes, who is the Wharf and Port Coordinator, being also responsible for much of the site maintenance. The EU had given its support for the construction of Aughinish Alumina, which went



The loaders are part of the conveyor system



One of the digesters



The "columns" are pipes leading from positive displacement pumps through to the final cooling stage

to work in 1983. The original owners were Alcan, who sold it a few years ago to a venture capital company. This company, after making a considerable investment to update the plant, sold it on to Rusal, a Russian aluminium producer. Rusal have vast reserves of bauxite in Siberia. Indeed, as the plant is now regarded as being old, very successful efforts have been made to increase its competitiveness and efficiency and reduce repair and maintenance costs. There were questions about the differences in management style between the Russians and the previous owners.

Much of the improvement, in the past few years in productivity had come from a de-layered management structure and the use of self-directed teams. But not surprisingly, one would guess, due to the distances, languages and different cultures, Rusal require more detailed reporting than previously.

Our first stop was the drive along the quay, which protrudes for over a kilometre into the Shannon estuary. The roadway is good enough for a big truck,

but the quay also supports a long shed covering two conveyor belts. These carry the in-coming bauxite from the ships to the storage buildings and the out-going alumina grit back from the storage silos for transshipment. There was an array of pipes and cables attached to the conveyor shed. Fuel oil is brought by tanker for firing the boilers and calcining the alumina, and a heavy electrical supply is needed for powering the conveyors and cranes for grabbing the ore from the vessels.

The loaders are part of the conveyor system, have been in use for many years. Finite element methods were used to upgrade and redesign the structure and avoid fatigue failure. Lorcan commented that the docking facilities were designed on the basis of the old Panama Canal, to suit "Panamax" ships, where the limit was 50,000 to 80,000 tonnes deadweight. However, newer ships were getting bigger due to recent in view of the plans to improve the Canal. As can be seen in plant process diagram above, the ore is first

crushed and then dissolved in hot sodium hydroxide where the alumina reacts to form sodium aluminate as a soluble species. The iron compounds and other impurities do not react, resulting in the red mud. This is removed by settlement and filtration. The sodium aluminate is cooled, causing the alumina to precipitate in the form of alumina trihydrate (Al<sub>2</sub>O<sub>3</sub>.3H<sub>2</sub>O). The chemically combined water in the hydrate is then driven off (calcined) by heating to high temperature.

All of this looks simple on paper, but the newly introduced sophisticated process control system optimises some of the processes, running them much faster, essentially on the brink of instability. In addition sophisticated monitoring of equipment allows maintenance to be done as required, rather than on a timetabled, preventative basis. In consequence breakdowns have been virtually eliminated and output has been doubled.

Given the size and complexity of the plant and downtime being



The separation of the sodium aluminate solution is done in two stages. First the sand is allowed to drop into large vessels.



Slurry containing the red mud is pumped into one of these wide flat tanks, in which the mud gradually drops out forming a pumpable sludge

significantly reduced, we could only be whisked round in the coach, where there was a stop at major points.

After a two stage crushing process, in which the ore is first broken down to quarter inch size and then ground down to 200 microns, it is then mixed with sodium hydroxide in large tanks. In this state the highly alkaline slurry can be pumped into the tall, high pressure digesters where it is heated, by steam to 250°C at 50 bar. All of the pipework and the vessels are nickel lined to avoid stress corrosion cracking. At any one time, two digesters out of the three are in use, with the other being cleaned with sulphuric acid.

Heating and cooling of the slurry must have given the designer of the heat transfer equipment a few nightmares. In contrast to most fluids, as the solution gets hotter it thickens up, as the sodium aluminate forms, but in addition the mixture contains the insoluble red mud, complicating the heat transfer calculations. After “digestion” the hot sodium aluminate solution goes through a series of pressure reducing steps where steam is flashed at each stage, bringing the temperature down. The steam that is produced is used to help heat up the incoming stream. The column like structures, are actually pipes leading from positive displacement pumps through to the final cooling stage. Along with the improvements to the process control system, computational fluid dynamics (CFD) is being used to maximise the output of the old and somewhat oversized plant.

The heat exchangers in this section of the plant are of the shell and tube type. Originally, a duplex stainless steel, with good resistance to pitting and stress corrosion was used for the tubing, but through careful control of flows

and temperatures, and acid cleaning, mild steel is adequate. One of the main issues in dealing with a highly alkaline solution, containing abrasive particles, is erosion. In this respect the wall thickness of the large diameter transfer pipework around the plant is monitored at critical points. Here again CFD has been used to redesign the pipe work to minimise erosion and build-up of deposits.

The separation of the sodium aluminate solution is done in two stages. First the sand is allowed to drop into large vessels. The mixture of red mud and aluminate is then pumped to some small vessels where the red mud drains to the bottom as a slurry. Once down to room temperature, seed crystals are added to a bath of “lean” sodium hydroxide solution, which results in the precipitation of alumina hydrate. This is essentially the initial dissolution reaction in reverse. It takes about ten days for the crystals to reach an appropriate size. The aluminium smelters require a fairly coarse “sandy” grade, which needs this long precipitation period.

The water is drained off the hydrate crystals, but the chemically combined moisture is removed by calcining the alumina to around 700°C in a series of vessels containing refractory lined gas fired cyclones. The alumina – now as grains of  $\text{Al}_2\text{O}_3$ , is cooled through contact with the incoming combustion air. A final cooling stage is by tubular heat exchangers after which the alumina is conveyed to the storage silos by conveyor belt.

The slurry containing the red mud is pumped into some very wide flat tanks, in which the mud gradually drops out forming a pumpable sludge. The water associated with the mud contains a useful amount of sodium hydroxide which is subsequently concentrated by

evaporation and reused. This treatment minimises any run-off issues from the tip.

It will be apparent that the site is a major user of electrical energy, high grade heat and water. The calcining of the aluminate hydrate will result in a loss of water and accounts for the plume of steam from one of the plant chimneys. Previously, all the heat in the plant was obtained by burning fuel oil, but in the last few years a combined heat and power system, using an industrial type gas turbine, has been installed. There are two 75 MW GE Frame 6AE gas turbines that provide the electric power for the site, the demand being 40MW. The hot exhaust from the gas turbines is used to raise 400 tonnes an hour of steam for plant making the use of energy very efficient. The surplus electricity of over 100 MW is sold to ESB, the owner of the Irish Grid. Note that the original grid based on the Ardnacrusha hydro station was only 75 MW! This has made significant differences to operating costs.

The Newcomen Society, as an organisation dedicated to the history of technology, was shown how the best that the 19<sup>th</sup> century could offer was developed at Aughinish by the engineers of the late 20<sup>th</sup> century. But in the past ten years, at the start of the 21<sup>st</sup> century, output has been doubled using techniques only just imaginable when the plant was conceived in the 1970s. And the plant now genuinely serves the local community; co-generating electricity going to Limerick and beyond. The site is a credit to the works organisation, its operating staff and its past and current owners.

**Fred Starr, George Kessler and Fred Barker**

[www.rusal.ru/en/about/30.aspx](http://www.rusal.ru/en/about/30.aspx)

## Irish Cement Ltd, Castlemungret, Co.Limerick

Irish Cement Limerick occupies a large site on the Shannon Estuary that includes a limestone quarry and the cement works. Cement Ltd was founded here in 1936, later becoming Irish Cement and is now part of the international CRH group. By the 1950s there was increased demand for cement and development of the site so that by 1965 the annual capacity was 725,000 tonnes from 5 wet process kilns. The manufacturing process uses limestone from the on-site quarry with silica and alumina bearing shale sourced elsewhere in Ireland. These raw materials are crushed, ground and homogenised to produce meal which is fed through cyclone chambers and heated, by exhaust fumes from the gigantic kiln, before passing into the kiln itself. In the long kiln, which continuously rotates, a series of chemical reactions and heat of 2000°C turns the meal into cement clinker. This is the basic cement which is cooled and then stored in tall silos. The finished cement is produced by milling clinker to fine powder and adding small quantities of gypsum. The cement is then stored in silos for bulk despatch or packed into bags.

Our guides were the operations manager and chemical engineers who were not deterred by the multitude of question thrown at them. They showed us the entire site and the various processes.

The enormous kiln was spectacular and even from a distance its 2000°C heat could be felt. The limestone quarry has one controlled explosion a week. We were shown the modern control room and the on-site laboratory where the processes and materials are constantly tested to maintain quality and safety. This has been a very busy plant operating at full capacity but now it is running at lower rate due to the downturn in Ireland's construction industry. Hopefully, an upturn will come soon.

[www.irishcement.ie](http://www.irishcement.ie)



*Above: A cyclone chamber in which the raw materials are crushed, ground and homogenised to produce meal.*

*Middle: Even from a distance the kiln's 2000°C heat could be felt*

*Below: A series of chemical reactions and heat of 2000°C turns the meal into cement clinker in the continuously rotating kiln*



## Peat production at Bord na Móna & Edenberry Power Ltd, Clonbullogue, Co Offaly



*A springy peat bog*

The final day of the Summer Meeting, Friday, was concerned with the extraction and use of peat for power generation. Under glooming skies, our coach rendezvoused with a white van before being led on a mystery tour down narrow lanes to the peat-cutting area. We walked on a somewhat springy peat bog to see the production of milled peat by Bord na Móna (the Irish Peat Board), whose bogs identified for peat cutting consist of 6% of the land area of the Republic. Although peat is normally produced from April until September, unfortunately it was too wet during our visit for the peat cutting machines to be operated. However it did mean we were able to have a close up view of the four machines they use.

Milled peat for power generation is normally extracted on a four day cycle using four specially designed machines, towed by agricultural tractors fitted with double sets of wide tyres to avoid them sinking into the bog. First the milling machine breaks up the top 2-3cm of the peat surface using sets of rotating rollers fitted with 'pins'. Then the harrow turns the peat to promote drying. When the peat is dry enough, the ridger forms this harrowed and broken-up material into ridges in the centre of the field. In the final stage, harvesting, the milled peat is stockpiled into long mounds (covered with plastic when we visited) to wait until it is required. The milled peat is transported to the power station using Bord na Móna's own extensive 3ft narrow gauge railway, one of the largest industrial railways in Europe. Temporary railway tracks are laid next to the stockpiles, and peat is



*One of the peat cutting machines*

loaded into wagons to be taken to join the permanent main line to the power station.

As the weather deteriorated, we made our way to Edenderry power station a few miles away to see the peat being used to produce electricity. The power plant was originally built by a private company to burn peat supplied by Bord na Móna, who have since bought the plant. Braving torrential rain, we watched narrow rail wagons completing the unloading of harvested peat as well as wood chip fuel being delivered by lorry. The station, commissioned in 2002, was originally designed for peat but now uses a mixture of peat and biomass, including elephant grass and willow. Co-fuelling with carbon neutral biomass is designed to mitigate CO<sub>2</sub> emissions, with currently about 7% of the fuel being biomass which reduces CO<sub>2</sub> emissions by 60,000 tonnes a year. The station uses a Bubbling Fluidised Bed Boiler with

nominal efficiency of 34% with steam conditions of 140bar and 540°C. About 100 tonnes of sand is added to the bed for fluidisation. Steam is supplied to a two cylinder triple pressure condensing turbine operating at 3,000 RPM with an output of 120 MW, producing about 980 GWh per year. There are seven forced draft cooling towers, being smaller than conventional towers they reduce the visual impact, but use 1MW of power. There is also a separate small plant consisting of two diesel-powered turbines which generate 52MW each and is used for 100 hours a year to support the Irish grid during times of exceptional demand. Although the weather could have been better, it was a splendid visit to see an indigenous fuel being harvested, transported and used to generate power.

*Robert Taylor*

[www.nordnamona.ie](http://www.nordnamona.ie)

[www.heartland.ie](http://www.heartland.ie)



*Edenberry Power Station*

.....and finally, thank you.....

The success of this visit was primarily made possible by Michael Grace's meticulous preparations, his exemplary organisation and the detailed handbook he had written. But there were also the many people who gave their time to explain and show us around the sites, only to then become the recipients of our numerous and varied questions. Michael Leydon, who has recently retired from The Shannon Development Board, accompanied us on the Shannon part of the trip and provided us with relevant background. On two evenings we had lectures by Dr Colin Rynne and Brian

Goggin on the engineering, technological and social history of the entire region. Our coach driver, John, ferried us along motorways, mastered the narrowest country lanes, negotiated three point turns on the ends of jetties - mostly in pouring rain - all the time courteous to his Newcomen cargo. Finally, our 'hosts' Michael and Annette Grace made us most welcome, were patient when we were running late and laughed with us at some of life's absurdities.

We thank them all for a fascinating and interesting week in Ireland.



Far left: Michael hurrying us along at a visit to Irish Cement  
Left: John and Annette waiting for us on the peat at Born Na Móna

## Sewer-gas Destructors and Road Signs have become Heritage Assets

**Roger Cline discovered interesting additions to the National Heritage Register**

The following appeared in Salon, the e-newsletter of the Society of Antiquaries:

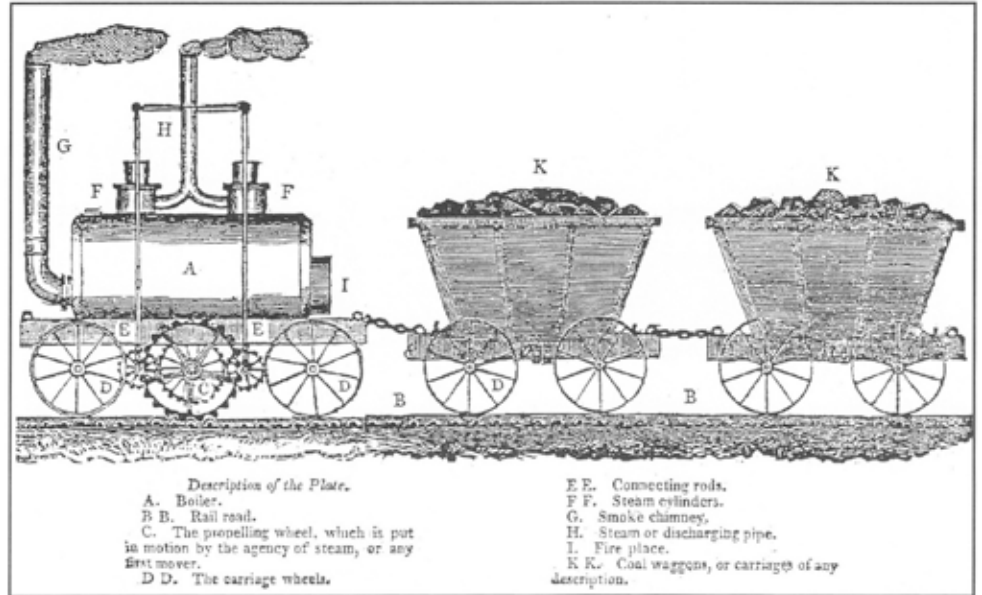
*Sewer-gas destructors and road signs: recently listed heritage assets*

One could hardly call them listed buildings, for among the most recent additions to the National Heritage Register for England are a sewer-gas destructor and a road sign, both of them dating from before the First World War. The sewer-gas destructor lamp has been listed at Grade II because it is a rare and intact example of a type of lamp that was invented in the 1890s to draw methane and other noxious gases from poorly vented sewers and burn them off by means of three mantles, which were rarely extinguished. The system was invented by Joseph Edmund Webb, a builder from Birmingham, who later formed the Webb Engineering Company: this particular example still has its original curved glass lantern and a cast-iron base plate reading: J.E.WEBBS PATENT SEWER GAS DESTRUCTOR.

Another easily overlooked fragment of early social history is the road traffic sign, known as a prohibition disc, that has been designated Grade II, located on Coast Road, Overstrand, Norfolk, dating from between 1904 and 1919. The listing schedule describes it as 'representative of road traffic management on English roads prior to the establishment of the Ministry of Transport'. In fact it was the 1903 Motor Car Act that empowered local authorities to erect red discs, known as 'prohibition discs' (the predecessor of modern 'No entry' signs), banning motor vehicles from passing beyond the sign. In this case, the sign prohibits motor vehicles from passing down the narrow coast road that leads on to the beach. He does not say where the destructor is.

Further details from Salon editor:  
christopher.catling@virgin.net

# The Fifth International Early Railways Conference (ER5), Caernarfon 7-10 June 2012



*A contemporary illustration of one of the Murray/Blenkinsop locomotives hauling coal wagons on the Middleton Colliery railway*

## **Michael R. Bailey**

This series of conferences, which has been held periodically since 1998, continues to grow in its contribution made to an understanding of railway evolution before the introduction of mainline systems. ER5 was held in North Wales in June, co-sponsored by the Newcomen Society, the Institute of Railway Studies and Transport History, and the Railway & Canal Historical Society, whose organising committee is composed of several learned scholars of the subject.

A hundred delegates attended this very successful event, some travelling from Australia, New Zealand, United States, Canada, Denmark, Sweden, the Netherlands, Germany and Ireland, as well as from all parts of Britain. Learned papers were delivered on a wide range of topics varying from studies of early wagon-ways around several parts of Britain to a review of the first mineral routes in Australia. The opening public lecture by Dr. David Gwyn was a review of early railway development in northwest Wales. Some significant new images of the earliest use of railed mineral movements in the Middle Ages in Central Europe were provided by Dr. Ulrich Stanjek from Germany.

The importance of the narrow-gauge Ffestiniog Railway in early railway development was emphasised,

both by a talk given by Professor Layzell Ward and visit to the Gwynedd County Archives. A visit was also made to the railway itself, where delegates had opportunity to experience a ride on the slate wagon 'gravity' train down the line to Porthmadog. Short talks after dinner on the final night emphasised the diversity of the 'Early Railway' topic, covering the short railway employed in the building and maintenance of the Bell Rock lighthouse, the rut-ways of the Bath stone mines and revised interpretations of the working of the Peak Forest Railway.

The papers are to be published in a further edition of the successful 'Early Railways' series. This will again be made possible by the offer of an advanced subscription to interested readers. Details will be circulated to members next year following peer review and editing. The huge success of ER5 was largely due to the co-ordinating role of Dr. David Gwyn, to whom all delegates expressed much appreciation.

The success of the conference series has prompted the endeavour to start up a further series related to the first forty years of mainline railways from 1830. This will similarly focus on business, economic and social studies as well as civil and mechanical engineering progress. The first conference is expected to take place in the summer of 2014.

## Middleton 1812: 200 Years of Commercial Use of Railway Locomotives

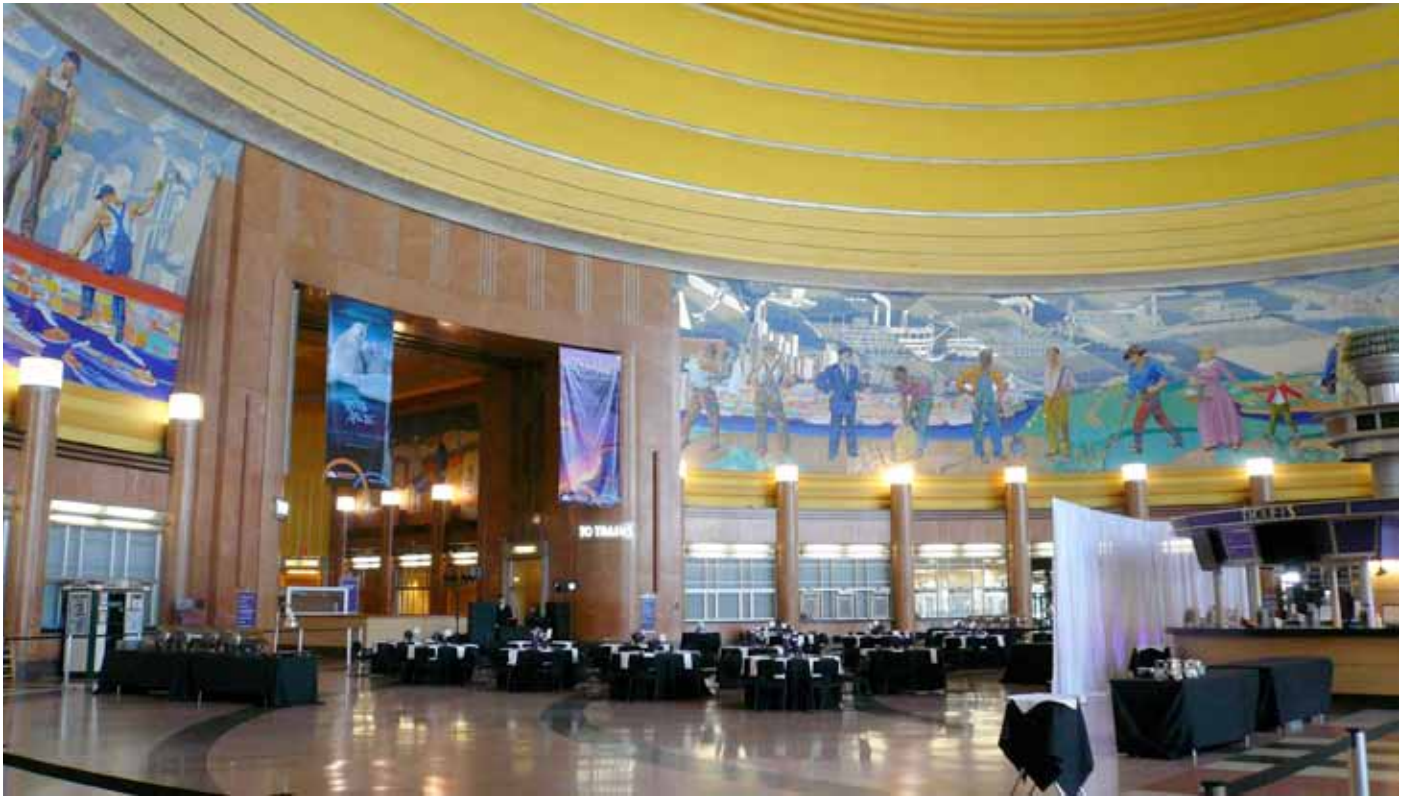
### **Michael R. Bailey**

In June 1812 the world's first commercial use of a steam railway locomotive took place between Middleton Colliery and Leeds. This important 'first' led on to extraordinary progress in the use of railways, in turn stimulating economic development in Britain and the wider world. The manufacturer of the first fleet of four locomotives used on the line was Matthew Murray (c1765-1826), the talented manufacturer of textile machinery and steam engines of the Round Foundry, Leeds. The Middleton Colliery Railway was laid down with rack rails, the locomotives being propelled by pinion wheels, a system devised and patented by John Blenkinsop (1783-1831),

the Middleton Colliery Viewer.

In the recent ER5 conference at Caernarfon (above), Sheila Bye introduced new descriptions of the railway and its locomotives provided by visiting engineers to the line.

*Further reading:* There is more about the railway and its locomotives in: *A History of Railway Locomotives Down to the End of the Year 1831* by C.F. Dendy Marshall (Past-President), London, 1953. This has now been enhanced by significant new evidence in papers published in the first four Early Railway Conference volumes (ER1-ER4).



*The Conference Dinner was held in Union Station, a humble title for this magnificent Art Deco building that opened in 1933*

## The Society for Industrial Archaeology Summer Meeting, Cincinnati

**John Porter**

The American Society for Industrial Archaeology (SIA) holds its Summer Meeting and AGM in a variety of interesting locations. The programme consists of a day of papers, run as several parallel and time-coordinated streams, preceded by a day of excursions, again offering a number of themed choices but with no possibility of skipping between themes as can be done on the papers' day. There is ample opportunity for networking and catching up with old friends. This year there were 126 attendees, including a contingent of 10 from the UK

The event was held in Cincinnati, on the Ohio River. When the river was the main artery of transport, it gave Cincinnati its purpose – a crossing point, an entrepôt and a river boat building and maintenance base. The river was also the danger – floods, followed by insufficient water for ships, being the norm until the river was tamed with dams and locks. The outstanding object of engineering interest is John Roebling's suspension bridge, completed in 1867 after delays caused by the Civil War, and very recognisable as the predecessor of the Brooklyn Bridge.

Bill Barksfield, through his company Heritage of Industry, thought that there would be sufficient interest amongst members of this Society, and the AIA, to justify attending and laying on a pre- and post-conference tour in the mid-west. Members of the SIA gave their enthusiastic support and we are very grateful to Bill McNeice, John Staicer and Charles Hyde for making the arrangements and looking after us on the appropriate segment of our travels. Notes on these will come in a later edition of Links. The SIA offered five different pre-conference day tours, but Tour No 1, with its visit to the famous steam engines at the Cincinnati Waterworks was THE one. The visit was all too short, of course, but we were compensated by

a few other delights in the course of the day. For example, we visited the largest bell foundry in the USA, dating from 1842, and a car restoration specialist with some interesting examples from the UK. The bell foundry treated us to the sight of six bells being cast, but who would have expected to find an MG tourer with Alaskan number plates in a small town in the centre of the USA!

The hospitality at the water pumping station was warm and enthusiastic. The water works company are proud of what they do and it showed in their grand exhibition hall, part of a filter plant, and the condition of the steam engines although they have not turned since 1963. There are four units at right angles to each other, in a 98 feet diameter cylinder sunk below the bed of the river. A horizontal tunnel goes out towards the far shore and terminates at an intake tower rising above water level. This is the source of Cincinnati and district's water supply and has been since 1906. The depth necessary for this intake has resulted in tall, leggy engine/pump units with the pump suction 5½ feet below the lowest water level and the steam cylinders up at ground level. The total height of each unit is 103 feet and its weight is 1400 US tons. Another vital function of the engines is to counter-act the buoyancy of their water-tight cylindrical enclosure. Indeed, an extra 4200 tons of cast iron ballast had to be added during construction and the engines hastily installed to stop the pumping station rising with the river! The only time pumping has been interrupted was in 1937 when the river reached 80 feet above datum and the boiler fires had to be extinguished.

For comparison, the Kempton Park engines are 62 feet tall and weigh 800 tons. The water horse power of the engines is about the same, though the low pressure cylinder on the Cincinnati engines is 82 inches in diameter, 4 inches less than

the Kempton Park engines.

The base for the meeting was the Netherland Hilton Hotel in Cincinnati, built to impress in 1932 and now complete with a National Historic Landmark plaque. Fortune must have smiled because the entrepreneur who financed it, having been turned down by the banks, cashed in all his stocks and shares only months before the Stock Market crash of 1929. The hotel's public rooms certainly provided an historic setting for the parallel series of papers and the AGM. We were given a guided tour of these rooms and the kitchens before finishing on the 49th floor of the skyscraper office building erected as part of the same complex. We learned that Winston Churchill had stayed here in the 1930s while he was re-modelling Chartwell and was so taken by the bathroom in his suite that he telephoned home to stop work until he could get back and incorporate his new ideas. After a two year long renovation in the 80s, the hotel concentrates more on events than accommodation. The logistics of running four weddings in parallel must be challenging!

At the lunch and AGM, members of each chapter stood in turn to be recognised and greeted by their fellows. Finally the British contingent were invited to rise, were welcomed and received the glad news that they had inspired SIA to consider the UK for a tour next year.

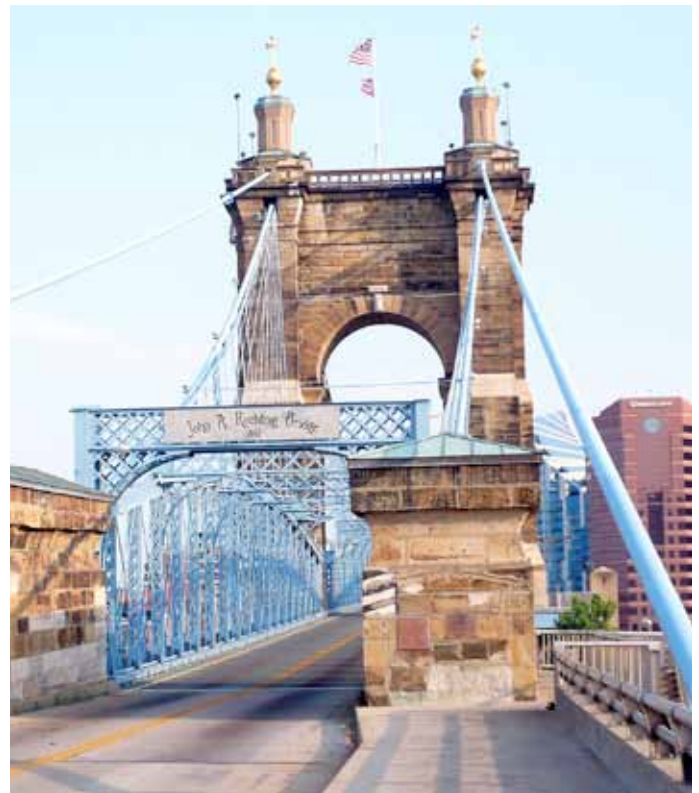
Pre-presentation resumes made it easier to make choices from the three parallel streams of talks in adjacent rooms. There were 34 papers, with subjects ranging from recording and preserving very small mines in Alaska to using the latest computer modelling techniques to recreate long gone plants and machinery in solid 3-D. Most of the speakers had an academic background, specialising in industrial history. All were active in the field in many different ways.

The themes of the three streams were:

- Sites, Structures and Landscapes
- Innovation and Invention
- Documentation and Preservation

Many of the papers discussed developments in civil engineering – bridges, canals, dams, but furniture making and semi-conductor manufacture were also covered. The latter paper was given by an Englishman, now resident in Canada, and was quite thought provoking. Such is the pace of development in this industry that no one is keeping examples of the all-important machines that make these ever-smaller and more powerful devices. One unusual paper discussed the impact of Tesla, and his inventions, on popular fiction. Another strange tale, this one unfortunately true, was of the Cincinnati subway system, nearly completed in the 1920s, but abandoned before it was commissioned.

The Conference Dinner was held in Union Station, a humble title for this magnificent Art Deco building. It was opened in 1933 and, at its peak in World War II, 34,000 passengers a day used it. There is only one passenger train a day now, though freight activity was very visible in the extensive yards outside as we could see from the control tower, now another museum. The main building has been transformed into a museum centre with a number of individual museums and a large concourse. During our visit this was in use by a dance group thus illustrating the flexibility of the concept. Our dinner was in the Cincinnati Museum of History, “al fresco” in a reproduction street circa 1860. We had free access to this fine collection of urban and river history before the meal. In spite of much discussion, we still hadn't cracked the technique of reversing the steam engine driving an Ohio river stern-wheeler before we left!



*The Cincinnati – Covington Bridge*



*Casting a bell at Verdin Foundry*



*The waterworks engines with the steam cylinders in the background*

# Vickers' Master Shipbuilder: Sir Leonard Redshaw

*Leslie Shore's lecture to the NE Branch  
reported by Robin Brooks*

Leslie Shore began his talk by recalling that in 1997, as part of the Engineering Council's 'Year of Engineering Success', he led work that saw nine plaques erected in the Furness District of Cumbria. The plaques celebrated the lives of individuals whose work had had an effect upon engineering in the southern peninsular of the Lake District. Sir Leonard Redshaw's name headed the list due to his illustrious career as a shipbuilder. Although for many of us Leonard Redshaw was unknown, we were to learn that he was the man responsible for Vickers ceasing to build or repair ships on the Tyne. Gifted as Leonard Redshaw was he was also down to earth and some found his manner could sometimes be blunt. But despite this he was a dedicated and practical shipbuilder with great foresight and imagination.

Leonard Redshaw was born in 1911 in Barrow-in-Furness. His father, Joseph Stanley Redshaw (later OBE), was born there in 1888, and rose from being a Vickers' apprentice to become the Vickers-Armstrongs company naval architect. In 1926-27, Vickers merged with Armstrongs to become Vickers-Armstrongs. In Leslie Shore's opinion, Stanley Redshaw's ship designs of the 1930s were especially impressive. Stanley Redshaw successfully persuaded his then 16 year old son to join Vickers-Armstrongs at Barrow as an apprentice. Leonard Redshaw's apprenticeship included time as a shipwright and as a draughtsman in the Ship Drawing Office. In 1931 he went to Liverpool University to read Naval Architecture sponsored by Vickers-Armstrongs and won an open, academic based, competition between the best apprentices in the British shipbuilding industry. He graduated in 1934 with a first class honours degree and opted to carry out research on electric arc welding, which was then a developing technology. However, his research programme was cut short when in 1936 he left the University with a Master of Engineering degree to rejoin

Vickers at Barrow as a junior manager.

Leonard Redshaw's personal mission in his new position was to advance the use of welding in the construction of ships and submarines. The American and German shipbuilders were already using welded construction techniques, but the British yards were reluctant to deviate from their traditional and proven riveted methods. Redshaw, having witnessed welded construction technology himself in Germany in 1935, seized every opportunity he could to advance its use at Vickers. Following the capture of a German U-boat in 1941, changes to British submarine construction methods were introduced at Barrow and by the end of World War II the 'A' class British submarines were all-welded constructions. This revolution embraced the use of welded, prefabricated units. Thirty seven years later, in 1978, the Royal Institution of Naval Architects awarded Redshaw the Froude Medal in recognition that in leading such a change at Barrow he was a pioneer of welded construction in British shipbuilding.

In 1942, Redshaw became Assistant Yard Manager at Barrow and then assistant to William Moss who was in overall charge of Barrow shipbuilding. Unlike some managers, Redshaw defied conventions and was very much a 'hands-on' boss. Leslie Shore showed a picture, taken during the 1940s, of some of Barrow shipyard's management team. Redshaw was shown wearing not a bowler hat like his peers, but a trilby! It wasn't only shipbuilding techniques that Redshaw challenged and changed, but traditional management customs as well.

Immediately after World War II, Vickers-Armstrongs took the initiative in British shipbuilding by investing millions of pounds at its Newcastle and Barrow shipyards. By building a new assembly shop at Barrow, under Leonard Redshaw's direction, the manufacture of large prefabricated welded ship components put Barrow in the forefront of British shipbuilding. Passenger liners launched at Barrow from 1947 onwards show the transition from riveted ships to those of a fully welded construction.

In 1950, Redshaw was promoted to Shipbuilding Manager at Barrow, and so effectively became the boss of the shipyard for the next 26 years. Three years after this promotion, the Barrow yard launched the 28,790 ton Orsova, which was the world's first all-welded passenger liner. In 1955, the 47,000 ton Spyros Niarchos was launched, which was, at the time, the largest tanker in the world. Following experiments at Barrow to prove that an all-welded aluminium superstructure could be used as part of the build of a passenger liner, the shipyard launched the 44,923 ton Oriana in 1959. This was the largest liner ever launched at an English shipyard.

The launch by the Queen of Dreadnought at Barrow in 1960, marked a technical revolution in British shipbuilding: the use of nuclear energy to power submarines. A year after Dreadnought's launch, Redshaw was appointed Deputy Managing Director of Vickers-Armstrongs (Shipbuilders). As such, Redshaw was expected to be based in Tyneside, a prospect, which we were told, he did all in his power to frustrate. The period though saw Redshaw play a role in a joint venture with Swan Hunter (VASH) to build a Cunard liner - the QE2. The Oriana was the technical forerunner of the QE2.

A Government decision, in about 1962, to arm nuclear submarines with Inter-Continental Ballistic Missiles (ICBMs), created the Polaris Class of submarine. The decision was followed by a call from the Admiralty to Vickers to appoint





**Opposite page:** The 28, 790 ton Orsova was the world's first all welded passenger liner. Launched in 1953, at Vickers-Armsrongs' Barrow shipyard, the ship was a milestone in Sir Leonard Redshaw's career as a pioneer of welding technology in British shipbuilding.

**Above:** Sir Leonard Redshaw, on the right, the Builders' Chief Polaris executive, with Commander M. C. Henry, the captain of Britain's first ICBM nuclear submarine, commissioned as HMS Resolution. The submarine, which stands behind them on its Barrow slipway, was launched in 1966 by Her Majesty The Queen Mother.  
Photographs Courtesy of Mike Vallance, BAE Systems, Maritime - Submarines

Leonard Redshaw as Builders' Chief Polaris Executive. Vickers reluctantly agreed to the Admiralty's request, and so Redshaw directed the supply of four Polaris submarines; two built at Barrow, and the others at Cammell Laird in Birkenhead. Redshaw negotiated technical improvements to the original American designs for the Polaris submarine, which was the most technically sophisticated British built engineering product of the 1960s. It was delivered within cost and on time. Around this time, Redshaw was honoured by being appointed the

President of the Institute of Welding.

In the late 1960s Leonard Redshaw became Chairman of the Vickers Shipbuilding Group, and also, in the early 1970s, Deputy Chairman of Vickers Limited. Seeing the way that worldwide shipbuilding was going, notably the activity in Japan, Redshaw made the decision that saw Vickers focus upon the design and manufacture of technically sophisticated merchant and naval vessels. The construction at Barrow of specialised naval vessels for many countries followed, together with the delivery of the Swiftsure Class of nuclear submarine for the Royal Navy.

The late 1960s and 1970s witnessed a battle of wills between Redshaw and Barrow's Trade Unions. His resolve to defend the shipbuilding heritage of Barrow made him a formidable adversary during industrial conflict. Nonetheless, Leonard Redshaw's contribution to the industry that he loved was recognised when he was knighted for services to exports in 1972. Sir Leonard Redshaw retired from the Vickers Shipbuilding Group in 1976. He was the recipient of many honours awarded by professional engineering bodies. He died aged 78 in 1989.

Summing up, Leslie Shore said: *The worlds of both merchant & naval shipping and shipbuilding, greatly respected his [Sir Leonard Redshaw] remarkable technical achievements. Single-minded, brave and determined, he never shirked from confronting issues.* He then proposed that he had made a case for Sir Leonard Redshaw to be ranked among the greatest British shipbuilders of the 20<sup>th</sup> century.

*Further Reading*

1. Shore L. *The Engineers of Furness - A Trail of Success.*

*The Newcomen Bulletin 174, August 1999, p 21-26.*

2. Shore L. *Vickers' Master Shipbuilder: Sir Leonard Redshaw.* Black Dwarf 2011

## Telstar at 50

**Robert Carr**

The first communication satellite, Telstar 1, was launched by a Thor-Delta rocket from Cape Canaveral on 10 July 1962. It successfully relayed the first trans-Atlantic television pictures, also handling telephone calls and fax images. The first publicly-available live transatlantic television broadcast was made on 23 July. The broadcast was facilitated on this side of the Atlantic by Eurovision and there was a commentary by Richard Dimpleby of the BBC, from Brussels. Telstar became a popular topic and in London a prestigious new building was called Telstar House. This 13 storey office block, designed by Richard Seifert, opposite Paddington station, was at the time a considerable landmark. Although no longer functional the satellite Telstar 1 is still in orbit. In the field of popular music, the recording engineer and songwriter Joe Meek (1929 -1967) inspired by the Telstar communications satellite and the new world it was promising, wrote and recorded an instrumental number called Telstar - played by The Tornados. A clavichord was used, a keyboard instrument with a supposedly spacelike electronic sound and there were also novel sound effects, produced by, for example, Meek running a pen round the rim of an ashtray and then playing the tape recording of the sound in reverse. The Telstar record was released on 17 August 1962 and was a decidedly commercial success. It was the first single by a British group to reach number one in the U.S. and was also a number one hit in the UK. Recorded at Meek's flat in London at 304 Holloway Road, Islington, a plaque was placed on the building in 1992.

## Industrial Designers of Tomorrow

Established in 1985, Design Innovation In Plastics is now the longest running student plastics design award in Europe. Organised by the Institute of Materials, Minerals & Mining (IOM3) and the Worshipful Company of Horners, Design Innovation in Plastics is also sponsored and supported by market leaders in the fields of industrial design and innovation. This year's brief was to design a product to help those with physical or cognitive impairments that is also appealing to the mass market. There was a great variety in the ideas and practical solutions. Jamie Mansfield's Flexible Flat-Pack Clothing Hanger (*top*) a hanger with flexible arms that collapse and spring back allowing the user to attach clothing via the neck without taking the hanger from the rail. A patent has been applied for. Rowan Williams designed Pego (*middle*), a kitchen aid that provides grip and stability in food preparation and incorporates kitchen knives and weighing scales. Sense See Remember (*bottom*), by Oliver Brunt, is an organisational memory aid based on a series of textured and coloured adhesive tabs to use as prompts in place of expensive electronic devices.



# THE DIARY

The Newcomen Calendar for the 2012/13 year accompanies this issue of Links. Please refer to it for details of all the London and Branch events.

## THOMAS NEWCOMEN'S ACHIEVEMENT & LEGACY

A CONFERENCE  
9-10 NOVEMBER 2012  
AT THE BLACK COUNTRY LIVING  
MUSEUM

The Black Country Living Museum's programme of activities to mark the Tercentenary of the 'Dudley Castle' Newcomen engine continues with a conference in November supported by the Royal Academy of Engineering. It is preceded by three days for schools. The conference will be held at the Museum on Friday 9th and Saturday 10th. Its aim is to bring together experts on Newcomen and the early history of steam power. The conference is being held in association with the University of Wolverhampton and will explore Newcomen's achievement and his legacy. Speakers include Newcomen Society members, Geoff Wallis, who oversaw and advised on the refurbishment of the Museum's Newcomen engine and Professor David Perrett (immediate past President) speaking on the Archaeology of the Newcomen Engine.

**For further details contact:**  
**David J Eveleigh, Director of Collections, Learning & Research**  
[david.eveleigh@bclm.com](mailto:david.eveleigh@bclm.com) or **Mel Weatherley, Head of Learning**  
[mel.weatherley@bclm.com](mailto:mel.weatherley@bclm.com) at the **Black Country Living Museum.**

THE 24TH INTERNATIONAL  
CONGRESS FOR THE HISTORY  
OF SCIENCE, TECHNOLOGY &  
MEDICINE  
TO BE HELD IN MANCHESTER

MONDAY 22 - SUNDAY 28 JULY 2013  
FURTHER INFORMATION AT  
[HTTP://ICHSTM2013.COM](http://ichstm2013.com)

## AN EVENING FOR JAMES SUTHERLAND AT 90

CONTRIBUTIONS FROM FRIENDS  
AND COLLABORATORS FOLLOWED  
BY A DINNER  
MONDAY 5 NOVEMBER  
5.45 FOR 6.15  
AT THE INSTITUTION OF STRUCTURAL  
ENGINEERS,  
11 UPPER BELGRAVE STREET,  
LONDON SW1X 8BH.

The first part of the evening, with contributions from friends and colleagues, is open to everyone.  
**If you are interested in attending the dinner and for arrangements and cost, please contact: Julia Elton on 0208 747 0967 or [books@abutment.co.uk](mailto:books@abutment.co.uk)**

## THE MUSICAL MUSEUM

A TOUR OF THE MUSEUM  
399 HIGH STREET, BRENTFORD,  
MIDDLESEX TW8 0DU  
SATURDAY 1 DECEMBER 2012  
AT 2.30. COST £7.50

A conducted tour of the Musical Museum, Brentford, is arranged for Saturday 1 December. The museum has a world famous collection of automatic instruments, from tiny musical boxes to a "Mighty Wurlitzer", and includes a comprehensive array of reproducing pianos, orchestrations, orchestrelles, and resident organ and violin players. Tearooms are available for light refreshments. We will meet at 2:15pm at the main entrance and the cost is £7.50 per person, payable on the day. The nearest station is Kew Bridge. Numbers on the conducted tour are limited so registration is necessary.

**For further information and booking please send a SAE to:**  
**Graham Nickson, 2 Barnet Lane,**  
**High Barnet, Herts EN5 2DN.**

## ALMOST FORGOTTEN: THE INTERNATIONAL EXHIBITION OF 1862

A CONFERENCE ORGANISED BY  
THE WILLIAM SHIPLEY GROUP  
FOR RSA HISTORY  
THURSDAY 1 NOVEMBER 2012

AN ALL DAY CONFERENCE AT THE  
MEDICAL SOCIETY OF LONDON,  
LETTSON HOUSE, 11 CHANDOS  
STREET, CAVENDISH SQUARE,  
LONDON W1G 9EB

On the 150th anniversary of the exhibition's closing day we will meet to consider and analyse the contents and significance of the International Exhibition of 1862. The speakers will present new interpretations of this event, overshadowed as it was by the death of the Prince Consort, the struggle for Italian unity, the American Civil War and, unlike the Great Exhibition of 1851, largely ignored by chroniclers of the age. After an architectural evaluation of the building, contributors will consider significant manufacturing advances on show, the displays of fine art, and of the furniture in the Medieval Court, and the collections in the education section. They will also discuss the foreign participation in, and reception, of the event and the evolution of the exhibition medal. There will also be a virtual tour of the exhibition. Speakers: Dr David Allan, John Agnew, Susan Bennett, Anthony Burton, Julius Bryant, John Davis, Dale Dishon and Max Donnelly.

**Tickets: £20 Students: £10**  
**(includes lunch and refreshments)**  
**For further information and to book contact: Susan Bennett, Honorary Secretary, William Shipley Group for RSA History; [susan@bennett.as](mailto:susan@bennett.as); 01895 677705; mob: 0790 5273293**

