The Information Age Gallery at the Science Museum & the Memorial to Matthew Boulton in Westminster Abbey
The front cover images
Above: On the left is a three-position section of manual telephone exchange switchboard type CB1. On the right is a mock-up of a similar switchboard section. Image: © Science Museum/Science & Society Picture Library 10669853. All Rights Reserved

Writing for Newcomen Links

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

Articles should be a maximum of 1000 words and sent in Word format by email.

Images should be sent separately by email in jpg (digital) format of 300dpi minimum. 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/scans of images in books etc.

The copy date for the next issue is 1 February 2015

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

The Editor,
Deborah Jaffé at: editor.links@newcomen.com. Tel: 07798 603000
From the President,
Geoff Wallis

I need your help. The Society’s income comes mainly from the subscriptions of its members, and we need more members to allow us to continue to improve our services. I would like to see the current numbers increase by at least 50% before the centenary celebrations of the Society in 2020. Therefore, might I suggest that this Christmas or New Year you give a year’s Newcomen Society membership to a member of your family or a friend, as I did last year, and have again this year.

You can find a membership application form on page 30 of this issue of Newcomen Links. I have already sent gift vouchers out by email. I hope very much that you will take up this opportunity.

Why is Membership of the Newcomen Society worthwhile? Members give a number of reasons, which I can summarise as follows:

**Learning** by deepening our existing knowledge through access to the Journal archive, lectures, and visits. The Society offers access to specialised people, places and archives relating to the development of engineering and technology. This is what the marketers call our ‘unique selling point’.

**Social interaction** with people who share our interests in, and enthusiasm for, endlessly diverse engineering and technological developments past and present. Many of our members are recognised experts in their particular field, and the Society provides the opportunity to share pleasurable and productive activities with them.

**To support our aims**. People with a serious interest in our subject recognise that the Newcomen Society provides a vital service as the leading international, long-term repository of peer-reviewed papers on a very wide range of engineering and technological subjects, all accessible now from anywhere in the world on our website.

PLEASE GIVE A FRIEND NEWCOMEN SOCIETY MEMBERSHIP, ACT NOW!

Geoff Wallis

I am often asked who Newcomen Society Members are and what they do. Having pondered on this for some time I have come to the conclusion that there is no typical member. We are a group of people with eclectic interests, which is what makes editing Newcomen Links interesting. I am never sure what articles and news items will be submitted. Hopefully, this issue does not disappoint and reflects the diversity of our interests.

Geoff Wallis, represented the Society at the Service to Dedicate the Memorial to Matthew Boulton in Westminster Abbey and reports on the day. John Liffen guides us, through pictures, around the new Information Age Gallery at the Science Museum. At its opening HM The Queen sent her first tweet. The Corliss Engine will form part of a new suite of science and technology galleries at the National Museum of Scotland. The drawings of it and article, by Darren Cox and Elsa Davidson, show the detail of this machine. I hope that we can look forward to a guide around these galleries, in Newcomen Links, when they open in 2016. The North East report of their lecture, by Brian Newman, on the Swan Hunter Floating Cranes reveals the enormity of these machines. Jonathan Aylen’s lecture on how US strip mill technology came to Wales was to a joint meeting of the Newcomen Society in Association with the Learned Society of Wales and ICE Wales Cymru at Swansea University.

Stephen K Jones navigated the Panama Canal and looks at its future in line with the increasing size of freight ships. Robert Carr describes an intriguing railway exploration probe in Mexico. I enjoyed spending an afternoon at MOSI looking at the machines of industry that brought the cotton wealth to Manchester, before speaking to the NW Branch about Frank Hornby. The construction of the Meccano Bridge would, I am sure, have pleased this entrepreneur. There are also updates on the proposed developments at Enderby’s Wharf and the Union Chain Bridge, both of which are facing uncertain futures.

The four pages of book recommendations are ideal for the long winter evenings and approaching holidays. The Newcomen Diary for 2015 is on the inside back cover. Please, do not forget to look at the website and sign in to the Members’ Area. Maney have informed us of the increase in the numbers of members who have downloaded papers from our archive. The AGM is on 11 February and papers for it are included in this mailing.

So, once again, thank you to everyone for the contributions that make the task of editing Newcomen Links very enjoyable. The next copy date is 1 February 2015 and I look forward to receiving your contributions.

Have a good festive season.

Deborah Jaffé
Newcomen Matters

We welcome the following new members:
John Agnew, Jill Harvey, Paul Thestrup, Derek Whitehead and Paul Wlodkowski

Deaths

The Society is saddened to record the deaths of Past President, EF Clark and Sonia Rolt OBE. An obituary of EF Clark is published on page 22 of this issue. The Society’s obituary of Sonia Rolt will appear in the March issue. Our thoughts are with their families at this time.

Membership Renewals

Thank you to all those who renewed their membership when notified. We would be very grateful if those ‘lapsed’ members could renew as soon as possible, so that they can be assured of receiving future editions of Newcomen Links and other Society matters.

Renewals can be made:
on line at www.newcomen.com/membershipsignup
by Internet Banking, details from: membership@newcomen.com
via the office administrator@newcomen.com
The Newcomen Society, The Science Museum, London SW7 2DD. +44 (0)20 7371 4445

The Eric Lomax Memorial Lecture

The memorial lecture will be given by Past President, Dr Michael R. Bailey MBE, who will talk on Eric Lomax – Railwayman of War and Peace (The Railway Man), at National Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF, on Saturday, 14 March 2015 at 14.00. Further details on page 28.

The Newcomen Society Calendar for 2015 is on page 31

The Newcomen Society AGM will be held on
11 February 2015 at 5.45 in The Director’s Suite, The Science Museum, Exhibition Road, London SW7 2DD

It will be followed by the
Presidential Address to be given by Geoff Wallis on Conservation Ethics in Practice

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There is a membership application form for new members on p 30

Copy date for the next issue of Newcomen Links 1 February 2015 editor.links@newcomen.com www.newcomen.com

Elsecar Beam Engine

As we go to press final plans are being put together for the unveiling and opening of the Elsecar Newcomen Engine in Barnsley, South Yorkshire after its recent restoration. The President has overseen the Engine’s conservation and a number of Members attended the official opening on 21 November. We hope to publish a report in the next issue.
Increased Use of the on-line Archive of Past Papers

The Society’s International Journal for the History of Engineering & Technology is produced by the academic publisher Maney. In December 2013 Maney moved publishing platforms to Maney Online which is a fully integrated system. This now enables users to find the information alongside all published, on-line content for the Journal. This is accessible in the Members’ Area - sign in at www.newcomen.com and follow the direction (see below).

As users will know this is a fantastic resource and now offers advanced searching options to find more content, as well as easier navigability. All the papers, from 1920 onwards are listed and easily accessible.

Usage of the site, by members and non-members has greatly increased this year. This may be attributable to the increased visibility that the Journal has on Maney Online and on search engines as well as the improvements to our own website.

Downloads are free to members. Maney have provided figures that show how the Archive is being used by members and non-members (who pay to download).

In 2012 there were 5587 views of abstracts which increased to 13,774 in 2014. Full text downloads were 651 in 2012 compared to 4995 so far this year.

To access the Maney Online page for the International Journal for the History of Engineering & Technology:

• go to www.newcomen.com
• click on ‘sign in’ in the top right hand corner
• click on ‘Visit the Past Papers Archive’ under Active Resources
• click on ‘Please click here for The Transactions of the Newcomen Society and International Journal for the History of Engineering & Technology’

You will arrive at this page

All the volumes are listed, click on which ever one you want.

The most popular downloads by Society members include:

• The Professional Correspondence of John Smeaton: An eighteenth-century consulting engineering practice
• Vol 47, 1974
• The Parsons-North British Coal-Burning Gas Turbine Locomotive Vol 66.1, 1994
• Some Early Marconi Experimental Apparatus Reappraised Vol 83.2, 2013
• The Mystery of Trevithick’s London Locomotives Vol 1.1, 1920
• Design and Development of Exhaust Valves for Internal Combustion Engines from the Perspective of Modern Thinking: Part 2 1930–90 Vol 84.1, 2014

Lorsch is a small town, between Darmstadt and Worms in Germany, and has a long history based on the building of an abbey there in AD760. The town and its surrounding area is now a UNESCO World Heritage Site. The outline of the foundations of the abbey are clearly visible. Behind the beautiful and recently restored Carolingian Gate is the town’s museum. Much of it is devoted to local history, which includes a large tobacco producing industry. In it are all manner of machines showing: the process of gathering, drying and crushing tobacco; the making of cigars and cigarettes; assembling boxes and packages and printing labels. Then there are the numerous display cases of accoutrements: tobacco jars and pipes made of ceramic, wood and horn. Despite all the health warnings that we are now faced with, it is still fascinating to see the details of the machinery and the wealth that this industry created in this town. DJ

Museumzentrum Lorsch, Nibelungenstrasse 35, Lorsch 64653, Germany www.lorsch.de
Two hundred and five years after his death the life of Matthew Boulton FRS has been honoured with a memorial plaque in Westminster Abbey beside that of his business partner, James Watt.

Matthew Boulton was born in Birmingham in September 1728, the son of a buckle and button maker. After attending a local school, he joined the family business in the early 1740s, taking over when his father died in 1759. The following year he leased land at Handsworth and began the great Soho Manufactory. He soon became what Josiah Wedgwood called ‘the Most compleat Manufacturer in Metals in England’. Jewellery, ‘toys’ (small metal goods), Sheffield plate and sterling silver tableware, ormolu (gilded ornamental wares) and coins all poured out of his workshops and were exported around the world. The Soho Manufactory became a ‘must-see’ for early industrial tourists, who were fascinated by the sight and sounds of its machines and hundreds of employees.

Boulton’s broad interests included: astronomy, meteorology, chemistry, electricity, medicine, the arts, classics, and music. In 1766 he became a founder of the
The Wedgwood Museum is Saved!

This museum, which contains one of the most important industrial archives in the world, has faced an uncertain future. Thankfully, following a campaign spearheaded by the Art Fund and with matching funding, it has been saved for the nation. It includes the archive of Josiah Wedgwood’s recipes and designs and contains over 80,000 works of art, ceramics, manuscripts and letters, pattern books and photographs covering the 250-year history of Wedgwood. It is planned that the Collection will be gifted to the V&A who will then loan it back and for it to remain on display at the Wedgwood Museum in Barlaston, near Stoke-on-Trent.

The Wedgwood Museum, Barlaston, Stoke-on-Trent ST12 9ER, www.wedgwoodmuseum.org.uk

The vision and tenacity of the early engineering greats is needed to tackle future challenges

Professor David Balmforth, 150th President of the Institution of Civil Engineers (ICE) used his inaugural address to examine how history can inform a future. If the engineering community is to rise to the challenges presented by global mega-trends such as climate change, population growth and resource depletion, we will need to “adopt the vision, tenacity and ingenuity of our Victorian forebears”, he said.

He cited how the early civil engineering greats, like Thomas Telford, came together to form a learned society for civil engineers at a point when Britain was “at the threshold of an industrial revolution that would ultimately shape the future of the world – and then went on to lay the foundations of the railways, water supply, sanitation and power systems on which modern society still depends.

As well as wrestling with the embryonic principles of construction, they needed to convince wary investors, persuade uninterested politicians, and accommodate a sceptical public that often viewed their ideas as absurd. Like us, they understood the importance of sharing ideas, of providing a platform for change, and for ensuring that their workforce was fit for the job in hand. But they also had the vision and ingenuity to look forward, see their role in addressing the difficulties that society faced and achieve progress while avoiding disaster. Put simply - they had the vision to step beyond their threshold.

Today, we stand on a new threshold for change, in the same way as our Victorian forebears nearly 200 years ago. We must also rise to the challenge in the same way, and work for the benefit of future generations in shaping our future world.

Professor Balmforth, an Executive Technical Director at MWH where he advises on major flood relief projects, and a national expert and media commentator on flood risk management, said the global mega trends we face, such as climate change, population growth and resource depletion...are of such scale that they stretch our ability to comprehend them. They test our ability to imagine a future where prosperity and sustainability can work in harmony. He added that governments, individually and collectively, have been slow to react because their planning horizons are short, but that civil engineers...do not work to short timeframes – building infrastructure to last for many generations. He called for a more radical approach to the issues of resilience, adaptability and availability - to ensure our already fragile networks can cope with the effects of climate change and population growth; ensure infrastructure can adapt in real time to a range of future pressures; and importantly, ensure that infrastructure is something that is available to all.

Lack of appropriate infrastructure is one of the most divisive factors of modern society - it divides rich from poor, it sets apart the developing world from the developed.” he said. He concluded by asking: “Are we really any different from Thomas Telford and his colleagues when they set out on a journey that transformed society? Is our future any less certain than theirs? Are our opportunities any less than theirs? He suspects not.

Over the generations we have shaped a truly remarkable profession which has proven time and time again, that it is able to respond to the demands of society. I am confident we can prove our profession ‘fit for the future’. We have the skills and capability - and most of all, we know it is our job to make a difference.

ICE
A Model Project: the Return of the Corliss at the National Museum of Scotland

Darren Cox & Elsa Davidson

Here at the National Museum of Scotland we are creating a new suite of science and technology galleries due to open in 2016. We hope that through this development we will champion excellence and innovation, offering an inspirational resource for the scientists and engineers of tomorrow.

This major project has offered us the chance to reassess the material held in store and to reintroduce the very best examples of museum-made working models into the public displays. The use of engineering models at the National Museum of Scotland goes back to its foundation in 1854. Under the stewardship of the first Director George Wilson a collection of almost 10,000 items was formed which represented the rapid technology and scientific progress of the time. By the late 1860s the role of working models in communicating engineering principles was cemented in the museum with the establishment of a dedicated model-making workshop. High quality models, representing the cutting edge technology of the time, were made on the premises using exactly the same processes and materials as in the full-sized examples.

One such working model is a beautiful Corliss engine made in the museum workshop in 1876 from drawings supplied by Messrs Douglas & Grant of Kirkcaldy, one of the most important Scottish makers of steam engines for factory use. The model represents a mill engine built in the 1870s and the museum still holds the original colour-wash drawings supplied by the firm. This 1:6 scale model has the characteristic rocking Corliss valves which controlled the flow of steam. A miniature steam indicator was made separately and fitted to the model at a later date.

The model is destined for the new Energise Gallery which will chart the harnessing of energy through the generation and distribution of power. It will be the first time this object has been on display for more than a decade, as such careful conservation has been carried out to ensure that it is in working condition and that it will be able to operate on a push button mechanism for years to come. The model is made from cast and turned steel with brass bearings and fittings, and wooden panels covering the cylinder, all seated on a large painted base.

An initial conservation survey was conducted in order to check all the acting surfaces and the extent of any breakages, wear and corrosion. The model was found to be very dirty with bearings full of grinding paste-like oil which was wearing away surfaces. The main bearing on the flywheel was worn, two valve springs were broken and two nuts were missing from the governor. There were also a number of fingerprints etched onto the metal surfaces.

Over a period of three weeks the model was completely disassembled and cleaned, new parts made, clean oil applied and reassembled for display. The removal of oil residue proved to be the main focus of the cleaning and bearings were polished to remove oil paste which was wearing away the brass. The wooden panels covering the cylinder...
were found to be in good condition and were treated with renaissance wax, along with the paintwork. During the cleaning process the etched fingerprints were also removed.

As well as cleaning, a number of new parts were made and fitted to the model. Two of the springs for the Corliss valves were broken and replacements were fabricated using examples shown in early photographs of the model as a guide. When the model-making workshop finally closed in the 1970s the lathes and tools were inherited by the engineering conservation team at the museum. It is interesting to note that the model-makers’ hexagonal section bar was used by the conservator to make replacements for two nuts missing from the governor. Many more of the original model-making tools are still in use by the conservation team today.

The next stage of the project will involve fitting an appropriate drive motor, selecting a conservation approved dust free, sealed case and ensuring adequate access to the model while on display to undertake the regular maintenance schedule. This example is of exceptional quality and detail and we hope that it will be at least 10 years before it will require another major overhaul. It is one of several working models, old and new, which are destined for the redeveloped science and technology galleries in 2016. We hope that they will continue to delight our visitors for years to come.

The National Museum of Scotland
Chambers Street, Edinburgh EH1 1JF
0300 123 6789
www.nms.ac.uk
As heralded in Newcomen Links 230 (June 2014), Information Age, the new communications gallery at the Science Museum, London, was formally opened by Her Majesty The Queen on Friday 24 October 2014 and was available to visitors from the following day. The gallery comprises six zones or ‘networks’ looking at different communications technologies. They deal not only with the artefacts themselves but with their users, each told through three or four ‘transforming events’ that illustrate how the existence of the network changed users’ lives. Much use is made of new media to bring alive oral testimony, archive images and films, interactive exhibits and explanatory animations of the science behind the technology. These photographs provide an overview of the new gallery.

Information Age was made possible by the Heritage Lottery Fund, together with BT (lead principal sponsor); ARM (principal sponsor); Bloomberg Philanthropies (principal funder); Google (principal funder); and other funders and supporters.

The Queen was accompanied on her tour of Information Age by Dr Tilly Blyth, the Science Museum’s Keeper of Technologies and Engineering and the driving force behind the conception and development of the new gallery. They are seen here viewing the builder’s model of the SS Great Eastern, which was already on show in South Kensington in 1857, some months before the vessel itself was launched in January 1858. In the centre is Ian Blatchford, Director of the Science Museum.

The Queen opened Information Age, the new gallery at the Science Museum, London, not with a conventional speech but with the sending of her first ‘Twitter’ message.

Image: © Science Museum/Science & Society Picture Library 10669857

Image: © Science Museum/Science & Society Picture Library 10669858
The aerial tuning inductor from the very-low-frequency (VLF) transmitter, callsign GBR, at Rugby Radio Station is a prominent feature of Information Age. GBR was opened in 1926 to provide a channel of communication from the British government to all parts of the British Empire and to ships on the high seas. Twice rebuilt to broadly its original design, the inductor continued in use until GBR was closed down in April 2003. The following year it was dismantled and preserved by the Science Museum, the substantial cost of this being met by BT. Only now has it been reassembled for public display.

Image: © Science Museum/Science & Society Picture Library 10669848

**Left above:** Construction of the casework and fittings of the new gallery began early in 2014. This was the view on 11 August 2014 near the showcase intended for the Marconi House 2LO transmitter of 1922. Science Museum/Science & Society Picture Library 10669849

**Left below:** The scene from almost the same viewpoint on 20 October 2014. The 2LO transmitter, on the left, has had a charmed existence. First assembled in 1922, it was preserved in 1929 by the Chief Engineer of the BBC, Noel Ashbridge, who had it removed to Brookmans Park Regional Transmitter in Hertfordshire to provide a contrast to the latest design of Marconi broadcast transmitter installed there. Dismantled in 1939, it was nearly scrapped altogether in 1954. It was reprieved in stead, and enthusiastic young BBC apprentice engineers carried out a reconstruction. After that the 2LO transmitter appeared sporadically at various commemorative exhibitions for many years until donated to the Science Museum in 2002. It is now on permanent display for the first time.

Image: © Science Museum/Science & Society Picture Library 10669854

Suspended over the showcases is a genuine, un-launched communications satellite. It is the communications module of a Eurostar 3000, built by EADS Astrium Ltd of Stevenage in 2000. The company received an order from a satellite service provider for two satellites of this design but in the event only one was eventually launched, in 2002. The other stayed with the manufacturer, now named Airbus Defence and Space Ltd, until given by them for display in 2014.

Image: © Science Museum/Science & Society Picture Library 10669851
A view across the network zone dealing with the spread of submarine telegraph cables. The globe is inscribed with the world’s principal ocean telegraph routes and dates from 1902 or later. It is believed to have been prepared for display in a cable company’s boardroom. In the foreground is a Lucas cut-and-hold grapnel, developed in the late 19th century for raising damaged cables for repair.

Image: © Science Museum/Science & Society Picture Library 10669850

What is now increasingly being referred to as the ‘landline telephone’ receives comprehensive treatment. This showcase illustrates the development of the telephone instrument for calls switched manually. On the right is a K6 telephone kiosk, the design introduced in Britain in 1935/6. The internal fittings represent one in use in about 1970 and include a pre-decimal Hall prepayment coinbox with A and B buttons. The gallery interpretation relates it to a feature on the founding of Samaritans, the pioneer listening service, in 1953.

Image: © Science Museum/Science & Society Picture Library 10669852
On the left is a three-position section of manual telephone exchange switchboard type CB1. This example is from the Enfield, north London, telephone exchange and was preserved by the Science Museum after the exchange was converted to automatic (Strowger) operation in October 1960. On the right is a mock-up of a similar switchboard section. Visitors can plug the cords into a number of jacks and hear a selection of recordings of reminiscences of former telephonists.

There is probably no part of the world where the mobile phone is making a greater impact in changing peoples' lives than in the African continent. In April 2012 the Science Museum organized a field trip to Cameroon, in central west Africa, to study the growth and use of the mobile phone and to purchase for display various artefacts to represent how users in Cameroon buy and maintain their phones. These include: the complete contents of a roadside workshop where the owner repaired and maintained customers' mobile phones; an example of a simple 'call box' where customers can buy credit for their own phones or make calls; and a more elaborate roadside call box (seen here) which also offered a small range of food and other goods.

The gallery displays a number of key objects relating to the development of the LEO I and LEO II computers, designed and built in Britain in the 1950s by a subsidiary company of the J Lyons & Co catering business (LEO stands for ‘Lyons Electronic Office’). For the first time these objects are displayed alongside the personal experiences of people whose working lives were transformed by the computer. Oral testimony recordings, accessed through headphones at teashop-style tables, reveal fascinating detail about how a small team of Lyons’ employees designed programmes for bakery valuations, tea blending, payroll and more.
Allan Green

Since presenting my paper at a London Meeting three years ago (150 years of Industry & Enterprise at Enderby’s Wharf, NewcomenLinks 220 Dec. 2011 p10) much Thames water has flowed past that site at Greenwich. It had been rumoured over several years that communications giant Alcatel-Lucent, who own the site, would be selling most of it for redevelopment. We now know that this had already taken place in 2008. However, it was only in the summer of 2013, after a number of false starts, that development of the major part of the riverside site, including Enderby House, had been taken up by Barratt, a property development company. This is in a joint venture with Morgan Stanley principally to build 616 apartments in several large blocks. Alcatel-Lucent continues manufacturing on the remaining part of the site.

Because of its listed status, Enderby House must be maintained within conservation guidelines, but Barratt has not yet defined its future use. That is why interested individuals, including some from the submarine cable industry, have set up the Enderby Group, to find a secure, relevant and long-term use for the property that recognises and honours its role in the telecommunications revolution which started at this location over 150 years ago.

In the past few years the building has been vandalised but is currently being conserved and protected by Barratt.

Their architect’s site model shows a pristine and extended Enderby House alongside the proposed Greenwich Cruise Liner Terminal and jetty. To the rear and overshadowing all are the proposed multi-storey apartment blocks which are already being marketed.

The Enderby Wharf site was the Greenwich home of the Telegraph Construction & Maintenance Co (Telcon), who built most of the world’s submarine cables and is the oldest continuously operating telecommunications factory in the world. In 1864 that factory manufactured the first successful Atlantic telegraph cables. From then until the 1975 the factory continued to make subsea telecoms cable, which were loaded...
onto cable-laying ships via cable-handling gear that still survives on the riverside jetty. In its first hundred years the factory made over 400,000 miles (no less than 82%) of the world’s subsea cables. When cable making was transferred to other factories Enderby Wharf turned to the manufacture of subsea repeaters and other systems components under new owners ST&C who took over the site in 1970. In 1994 they in turn were taken over by Alcatel.

The Enderby Group seeks to preserve Enderby House and the riverside cable-handling gear as the birthplace of the international communications revolution. Named after the shipping family that originally owned the site, the house was built on the riverside in the early 1840s. Though it is not an architectural masterpiece, it is of significant historical importance, it became Grade II listed in June 1973 and is the only building on the riverfront site that has survived the re-development.

The Alcatel-Lucent site behind the new development remains the oldest subsea telecommunications manufacturing site in the world and the last in the UK. This industry has been British dominated for over 130 years. Today, the economies of many countries around the world quite literally depend upon access to the internet and its highways of fibre optic subsea cable.

This history and heritage is worthy of recognition and preservation. With this in mind, the Enderby Group has been formed to save Enderby House and its environs for posterity and provide it with a sustainable future. A business plan is currently being developed for presentation to Barratt and Morgan Stanley and to attract investors and other potential sources of funding. Historic archive material and artefacts relating to the site were transferred to the Porthcurno Telegraph Museum almost 10 years ago and an already promising collaboration with them has been sought by the Enderby Group.

Porthcurno Telegraph Museum: www.porthcurno.org.uk
The Enderby Group: www.enderby.org.uk
facebook.com/groups/enderby
twitter.com/EnderbyWharf

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Do you know someone who would like to join the Newcomen Society?
Or would you like to give a year's membership as a gift?
There is a membership application form on p30
or join on-line at www.newcomen.com/membership/signup
Ribbon of Fire: how US strip mill technology came to Wales

A report of a lecture by Jonathan Aylen to the Newcomen Society in Association with the Learned Society of Wales and ICE Wales Cymru at Swansea University on 30 October.

Stephen K Jones

An inspiring presentation by Jonathan Aylen set the standard for the future Newcomen Society meetings in south Wales. The meeting heard of the conflict and drama behind the construction of four giant strip mills for steel built in Wales in a period of just 25 years. Ebbw Vale was built by the drive of William Firth, but the new mill proved his undoing. Richard Summers became Chairman of the family steelmaking firm at Shotton in north Wales at the age of just 30, but led their pre-war hot strip mill project to sustained profitability. Port Talbot was built with the help of American Marshall Aid after World War II. Llanwern pioneered a new generation of strip mill and was global leader in computer control.

Jonathan spoke about his research on Shotton and his new book *Ribbon of Fire*. This initial meeting was a cooperative venture, as Newcomen joined forces with the Learned Society of Wales and the Wales region of the Institution of Civil Engineers (ICE Wales Cymru) to attract a wide audience. It was appropriate the meeting was held in the Robert Recorde room at Swansea University, named after Robert Recorde (c1512–1558), a distinguished Welsh Renaissance writer of books on arithmetic, practical calculation, geometry and astronomy.

Following a vote of thanks to Jonathan for such an entertaining and educational presentation, in which he was joined towards the end, by Bill Summers, of Richard Summers who led the Shotton project commissioned in 1939. Bill gave a moving personal insight into the application of new American technology at the family firm. Bill recounted how the mill was purchased after a generous lunch at the Savoy in London where alcohol fuelled discussions led to a draft contract between Lorenz Iversen representing the American mill builder Mesta and Richard Summers as Chairman and Neville Rollason as Managing Director of John Summers. He said the success of the Shotton project owed much to the personal rapport between Iversen, his father and Neville Rollason. Lorenz Iversen – or “Ivy” as he was known to his friends – was an entrepreneurial engineer of Danish extraction who led Mesta for 35 years.

One of his father’s talents was assembling a gifted team of managers to build the mill. Richard Summers also rejected the conservative voices within the company who saw
A Patent for a Flight Simulator

**Martin Bolton**

The first devices invented to simulate the sensations of flight for the instruction of flyers date from the end of the 19th century. Those whose descriptions survive in patent specifications and press reports were usually either suspended from wires or mounted on rails. The earliest patented invention of this type I know of is a German one dating from 1898. These simulators also served as test rigs for the design of flying machine.

In 1910 a Welsh inventor, Sir William Howell Walters, applied for a patent (No. 9950 of 1910) for a device of a different type. It was a ground-based machine. In conjunction with an instructor, it aimed to teach learner pilots how to maintain a level altitude in flight using control levers like those in a real aeroplane. Another proposed use for this invention was as an amusement device giving the sensations of flying an aeroplane. This was the first of many similar inventions in the pre-World War I period. Some relied on the wind for disturbances, others used manual methods. The one feature they had in common was that they were all essentially balancing devices. The Wright brothers are known to have improvised one in their Dayton school. Many other balancers were built in the next 20 years. The most fully evolved was the pneumatically operated Link Aviation Trainer of 1929, which was promoted as a flight training aid and a fairground ride.

Whether these early devices contributed anything useful to flight training is a debatable point, since piloting even the most simple aeroplane demands a lot more skill than using the sense of balance to maintain straight and level flight. Their most important use would have been to give practice in using the still unstandardized controls in order to learn in which sense they operated.

Sir William Howell Walters (1857-1934) was the son of a wealthy Pembrokeshire banker, William Walters. He held a number of public appointments in Pembrokeshire, including that of High Sheriff from 1898. Apart from his public duties, his recreations at his home in Broad Haven were “lathe and workshop.” Walters was not the only one working on a ground trainer at this time, but he was the first to successfully patent his invention. Those working on similar devices were mostly connected to aeroplane manufacturers or flying schools, like Brooklands but Walters seems to have no such connection. There also seems to be no trace, other than the patents, of Walters' device in contemporary aviation publications which is unusual. Applications were also made, and patents subsequently granted, in France, Germany, Austria and the USA (right). The fact that he went to the expense of applying for patents in foreign countries implies that there was a plan to widely protect and profit from the invention. Possibly, with this lack of connection to aeroplane construction or flying, Walters intended it to be an amusement device.

John Bolter

The lecture began with an explanation of the importance of heavy lifting equipment in fitting out ships after their launch, especially iron and steel ships. To keep the weight down, some equipment can be loaded piecemeal and assembled in situ. Although this is difficult with steam turbines, it is possible to be done with boilers and the gun mountings of warships.

The various types of equipment were described, starting with Sheerhulks, obsolete wooden ships fitted with sheerlegs, and used for handling masts and guns. Land based sheerlegs cannot handle loads behind the face of the quay, so a variant, the Tripod Sheerlegs was developed. Derrick cranes were also used. As vessel sizes and the weights to be lifted, increased, these became inadequate, and the so-called “Hammerhead Crane “ and the floating, or Titan, crane were developed.

The rest of the talk concentrated on the three Titan floating cranes on the Tyne. The construction of the first, TITAN, was precipitated by the award of the contract to build the turbine powered Cunard liner, Mauretania, in 1906, where the size of the ship and the weight of the low-pressure turbine rotors and the boilers dictated the size and capacity of the crane. In fact, it was only just big enough - it had to work from both sides of the ship, and an extension had to be fitted to the jib to mount the funnels. Subsequently, TITAN was used in fitting out many other vessels on the Tyne at a number of shipyards, and for some of the other tasks, including the fitting of dock gates, and the assembly and dismantling of land cranes.

The end of TITAN was dramatic. In 1921 she broke loose from her moorings in a westerly gale, with only a night watchman aboard, causing mayhem as she drifted downstream. Successively, she collided with three vessels, damaged two jetties, sank a tug, and then collided with four colliers, one of which broke loose, causing further chaos. She then sank, later to be salvaged by her successor, TITAN II.

This was one of six similar cranes and was built on spec by the Dutch firm Smulders, whose Works Plates were entitled WERF GUSTO. It was acquired by Swan Hunter in 1922. Although it was much the same size as TITAN, and had similar capability of the main hoist, it was better equipped. Whereas TITAN was wholly steam powered, all functions on TITAN II were powered by electric motors, current being supplied by a steam powered generator.

She continued working on the Tyne until 1978. By this time the hull, damaged by many inevitable mishaps on a crowded and busy river, was distorted and corroded. The crane was therefore transferred to a new hull and became TITAN III. The transfer was accomplished by an arrangement of rails whilst in a graving dock.

TITAN III had a diesel generator to supply electrical power, and also had retractable propellors, which greatly reduced the risk of snagging mooring cables. She continued working on the Tyne until 2009 when, following the decline of shipbuilding on the river, she, and a number of other shipyard cranes, were loaded onto a floating dock and departed for India.

The lecture was illustrated by many excellent and varied photographs, and statistics based on the log books of the cranes, and enhanced by anecdotes about some of the characters who worked on them.
Stephen K. Jones

The majority of today’s consumer goods, from mobile phones and computers to the clothes we wear, are made in Asia. However, is the route that the majority of this traffic takes to get to Britain appreciated? Since the 15 August 1914 sea-borne traffic from the Pacific to the Atlantic oceans has had the option of using the 50 mile long canal and artificial lake crossing of the Isthmus of Panama. This is a saving of up to 8,000 miles compared to going the traditional and perilous sailing route around Cape Horn. The construction of the canal was a long drawn out saga, first attempted by the French under Ferdinand de Lesseps, following his success with the Suez Canal. However, financial troubles and tropical diseases saw the French withdraw from the project after 13 years. They lost an estimated 22,000 lives to accident and disease, in 1894. In 1904 the USA took control and completed the canal 10 years later. Even with more awareness of the risks some 5,600 workers died of disease and accidents to complete the canal.

The system of two lanes of locks allows ships to be raised from sea level to the man-made Gatun Lake, which is 85ft. above sea level, in order to cross through the Continental Divide and then lowered through another system of locks on the other side of the Isthmus. Each of the 12 lock chambers needs 52 million gallons of water to accommodate the nearly 15,000 ships that cross the canal each year.

On 6 October I transited the canal on board the cruise liner Norwegian Jewel. This transit cost NCL, the ship’s owner, some $385,000 (c£240,600). This toll was based on the weight of the ship and is applied to all traffic, including the first person to swim through the canal in 1928 who was charged 36 cents! For more conventional traffic it covers lockage, pilots, line-handlers, stand-by tugs and locomotives - as all vessels are guided though the lock chambers by electric locomotives, known as mulas or mules, running on the lock walls. The mules employ a rack and adhesion system to provide braking control and to ensure that the ships stay in the centre of the lock. A Panamax ship, the term given to the largest ships able to transit the canal, with a beam of 106 ft. has only two feet either side in the narrowest section of the locks, which are 110ft wide.

It was an amazing experience to see how the canal worked, with the lines being thrown by hand to the ship in order to haul up cables which were then secured to the mules. When we first arrived at the Pacific entrance to the Miraflores lock, the first line was brought out to the ship by rowing boat. Watching the three mules at work either side of the ship was also amazing particularly watching them going up and down the steep gradients of 1 in 1 at the changes in lock levels. On the Norwegian Jewel we had an extra six inches to play with (105 ft. beam) in the lock. An interesting question was raised as to whether Titanic would fit through the canal. With its 92 ft. beam it would have had, by comparison, plenty of room. The Queen Mary however, was too wide with its 118-foot beam.

Despite the canal being designed in 1904 it is only in the last 26 years that the biggest container ships have become too wide for the Panama Canal, ships known as ‘Post-Panamax’. Work is underway to allow these larger ships to pass through by the building of new Post Panamax canal locks to access the lakes but with the widening and deepening of ‘pinch points’ in the lakes. A number of the completed lock gates, actually rolling lock gates that allow easier servicing, as opposed to conventional mitre locks, can be seen awaiting installation.

The new entrance locks will use massive culverts that can fill a chamber in as quickly as 10 minutes but the water basin system for each lock will reuse 60% of the water required for each transit. That work is about two years behind schedule but most of the new lock gates are standing on site ready to be fitted when the locks are ready. Sadly, no locomotives will be employed on this, as new tugs have been designed to handle the ships. Container ships using the existing system can carry up to 4,500 twenty foot containers, commonly referred to as 4,500 TEU. The new 180ft. wide rolling lock gates will allow ships of up to 160ft. beam which could carry up to 13,500 containers (TEU). The capacity of the latter is equivalent to about 2 million 29inch colour TVs or 75 million mobile phones!
Frank Hornby: a classic entrepreneur

A report of a lecture by Deborah Jaffé to the Society's North Western Branch on 28 October

Jonathan Aylen

Deborah Jaffé celebrated the pioneer toy maker at a packed meeting in Manchester. Frank Hornby was a classic entrepreneur. The pioneer of Meccano kits, Hornby Trains and Dinky Toys developed innovative products, novel branding, astute marketing and tight cost control - all backed by strong intellectual property protection to grab hold of an emerging toy market before World War I. Like other great entrepreneurs, such as Josiah Wedgwood, Frank Hornby combined the skills of marketing, management and innovation in one person. He started as a clerk in his father’s firm which proved to be great business training for an entrepreneur. He had technical skills for invention. All this was combined with the development of new brand names. Frank Hornby was not slow to patent his novel ideas. The first toy – a kit of steel parts to build a crane - was conceived on a train journey. It was sold as Mechanics Made Easy and put on the market just before Christmas in 1902. The toy trade then, as now, was highly seasonal. It was rebranded as Meccano a few years later.

Hornby may have been an inveterate inventor, but he kept his feet on the ground. He was careful to keep his day job as a book-keeper until his new firm became profitable. He only turned to running Meccano full time in 1907. Larger Meccano kits followed and their educational potential was picked up by schools.

At first, he was up against strong German competition from tin toy manufacturers based in Nuremberg, such as the Bing company. But Deborah Jaffé showed how Frank Hornby was not afraid to use licences, collaboration and multinational production to carve his way into the global market for toys. Overseas subsidiaries in France, Germany and the USA backed up exports to Empire markets. Before World War I he collaborated with Bing who were then replicating the machines of industry as toys for children. These included working miniature lathes, breweries and steam engines as well as circuit boards and train sets.

Hornby built on his success by developing 0-gauge clockwork trains in 1920 and a patent clockwork motor. World War I had been a setback which halved the firm’s exports, but new products followed to rebuild the business after the war, including the first electric train in 1925. Diecast Dinky toy cars –the size of a child’s hand – were an innovation of the 1930s. Competitors arose like Corgi Toy vehicles and Lesney’s Matchbox pocket money toys. The Lines brothers developed Triang OO gauge model electric trains to rival Hornby Dublo. By 1964, competition from innovative plastic toys and high labour costs at its Liverpool factory spelled the end for Hornby. The firm was sold off first to Lines Brothers, and then the individual brands passed to a succession of owners.

Ultimately, Hornby was the victim of competitive forces of “creative destruction” (to coin Joseph Schumpeter’s phrase) as Mattel’s Hot-Wheels swept all before them in 1968. These brightly coloured die-cast cars with low friction wheels performed stunts on special plastic tracks. These spectacular cars made Dinky Toys look dull and traditional by comparison, despite their investment in details such as plastic windows and steering wheels, and opening bonnets and doors. Mattel transformed the playroom with low-friction, go fast wheels. There was even more innovation as plastic moulded Lego swept steel strips of Meccano and its fussy bolts aside.

Discussion after the paper focussed on the way Frank Hornby used education as the basis of his product development – Meccano was “an engineering apprenticeship”, Deborah Jaffé suggested. Discussion also highlighted Meccano as a dominant design among children. Once one child chose Meccano, their friends would follow suit. These networks of enthusiasm were fostered by Hornby’s shrewd idea of a worldwide Meccano Guild with its triangular badge. This brought fast feedback from Meccano users whose designs were featured in the Meccano Magazine. In this fashion, a collecting craze became an enduring hobby, fostered by local competitions. These loyal hobbyists were “locked in” to Meccano products with accessory kits such as gears and motors.

Frank Hornby died in 1936. The question was raised in discussion whether his successors failed to maintain the impetus of the great entrepreneur. Members of the audience who knew Hornby’s Binns Road Factory highlighted a failure to modernise the plant. A picture emerged from Deborah’s talk of a toy sector that differed little from other areas of technology. It is fiercely competitive. Success for Frank Hornby lay in coupling innovative designs with close attention to users – the kids and the parents who played with his toys. Marketing flair and business acumen sustained a growing business, until Hornby too was swept aside by new innovative designs made with fresh materials.

The Meccano Bridge

Whilst I was in Manchester, I was intrigued to hear of the Meccano Bridge. This bridge is a result of the need for a footbridge to replace the old horse bridge at Nob End, Little Lever. The construction of a new bridge at this site was to allow The Canal Society to re-route the footpath and make it possible to restore this section of the Manchester Bolton & Bury Canal. Originally, a piece of public art was suggested and the artist Liam Curtin was briefed. Discussions with local people, the Council, and the Canal Society led to the artwork being based at the canal and becoming a functional bridge. The proposal was for a bridge made from giant plastic strips of Meccano. According to Liam Curtin: ‘Meccano is scaled down engineering; this proposal involves scaling Meccano back up. A giant Meccano set was made by a local fabricator. Each part including the nuts and bolts was scaled up by ten times, ten times longer, ten times thicker and a thousand times heavier. Each part was faithfully rendered at the new scale. The site was fenced off and scaffolded giving a flat plane for the bridge to be assembled. Local volunteers were invited to be trained to help in the assembly. The material is galvanised mild steel. The new bridge simply rests on the refurbished abutments.’ Frank Hornby, would I am sure, be delighted at this application of Meccano. DJ

Liam Curtin: www.liamcurtin.co.uk/meccano-bridge

Email: liam@liamcurtin.co.uk  Tel 07962 783 100
Location: Nob End, Little Lever, Bolton BL3 1AB

www.mbbcs.org.uk

Newcomen Links 232 December 2014
Robert Carr

Two Mexican artists Ivan Puig and Andrés Padilla Domene modified an existing road-rail pickup vehicle to produce a striking silver streamlined ‘railway exploration probe’ they named SEFT-1 (Sonda de Exploración Ferroviaria Tripulada).

Using this machine they explored the abandoned railways of Mexico and Ecuador in 2010-12. Following railway privatisation in Mexico in the 1990s railway freight traffic has flourished but almost all passenger services have come to an end with as much as 10,000 km of route abandoned. Rails and sleepers have been removed in places but in some areas local people maintain the railway as they would like to see the return of a passenger service. The longest continuous section of surviving rails is only about 20 km in length. The road-rail car is for standard gauge and was able to run partly on rails in Mexico but Ecuador is narrow gauge so here only motoring on the trackbed was possible.

This summer, at the Furtherfield Gallery in North London an exhibition presented the results of this exploration by ‘Los, Ferronautas’ in the form of photographs and video, with the SEFT-1 vehicle on public display from time to time. During the course of the exhibition a railway modeller, Neville Reid, built a superb 1:220 scale model of the impressive Metlac railway viaduct and the valley it spans, with the local vegetation accurately reproduced. A diminutive SEFT-1 was displayed on the viaduct.

This model of the Metlac ravine was inspired by a painting, The bridge over the Barranca de Metlac 1881, by José María Velasco Gómez (1840 - 1912). Velasco was an established Mexican painter famous for his views of bucolic natural scenery, wild and unspoilt. This painting of a dramatic valley with detailed depiction of lush natural vegetation but dominated by an intrusive modern viaduct carrying a steam train was considered shockingly modern at the time.

The railway line over the Metlac Bridge was to connect Mexico City with the Atlantic Ocean. The railways of Mexico were largely built by British engineers. William Fairbairn designed a bridge to span the Barranca de Metlac but his design was not proceeded with. Later in 1873 a lattice viaduct was built here, reminiscent of the wrought iron Crumlin viaduct in South Wales, completed in 1857. Even the ironwork for the Mexican bridge came from the Crumlin works. Seeing the date of construction much of this was probably wrought iron made near Blaenavon.

This original Metlac bridge no longer survives. It was rebuilt towards the end of the 19th century. The 1:220 scale model displayed in London is of the current bridge now abandoned and derelict. A later prestressed concrete beam bridge at a higher level was completed in 1984 and now carries the rail traffic.

Many thanks are due to Andrés Padilla Domene for his assistance with this article and for providing the illustrations. The exploration of a decaying transport system like this is reminiscent of LTC Rolt’s exploration of the English canals by narrow boat 70 years ago.

Further information: www.seft1.net/
Also search the internet using SEFT-1.
Edwin Fripp (‘EF’) Clark was born Edwin Fripp Clark in Alverstoke, Hampshire, on 29 August 1927 to Edwin, a Royal Navy officer, and his wife Elspeth. He was the fifth Edwin Clark in the family line and to avoid confusion he was known as ‘EFC’ from an early age: this was shortened to ‘EF’ at University and he was known in this way for the rest of his life. His ancestry included at least two prominent engineers (his great-great-grandfather G P Bidder, an associate of the Stephensons and a major figure in his own right, and his grandfather Lt Col E Kitson Clark, last Managing Director of Kitson & Co Ltd, the Leeds locomotive builders) so it seems hardly surprising that he should have chosen to pursue an engineering career.

In 1940, he was evacuated, with his mother and his sister, to Toronto, Canada, where he attended Toronto University School until he returned, unaccompanied, to England in 1943. He then spent two years at Shrewsbury School, where he learned to row, before again following family tradition by going up to Trinity College, Cambridge, where he read engineering and pursued his interest in rowing. He became University sculling champion and was a member of the college eight which won the Ladies Plate at Henley in 1947. On graduating, he was called up for National Service, which he spent in the (now long gone) Airfield Construction Branch of the Royal Air Force, pouring concrete to create a modern runway on the German island of Sylt.

On demobilisation in 1950, EF began a two-year engineering pupillage with W H Allen, Sons & Co Ltd, the Bedford manufacturers of pumps, turbines and diesel engines, moving in 1952 to Glasgow to join the North British Locomotive Company, then in the throes of the transition from steam to diesel locomotives. By the end of the 1950s, it was clear that North British was in trouble; as EF told the writer ‘When the only suggestion the new Chairman could make to improve the company’s fortunes was to have the Board Room ceiling painted dark blue with silver stars, I knew it was time to jump ship’. He duly left and returned to Allen’s for the rest of his working life, which included ten years with that company’s subsidiary in India. During his time in India, EF married Yvonne, the sister of one of his rowing friends, with whom he had two children, Emma and Edwin.

EF’s interest in his engineering forebears stimulated a more general interest in the history of engineering and he joined the Newcomen Society in 1979. During his membership, he researched, wrote and published ‘George Parker Bidder – The Calculating Boy’, a biography of his great-great-grandfather. He was elected to serve on Council in 1986, becoming a Vice-President in 1989 and President from 1993 to 1995. In 2011, his services to the Society were recognised when he was appointed a Fellow of the Society. He died on 28th September, aged 87 and is survived by Yvonne, Emma and Edwin.

Sonia Rolt OBE

There have been many obituaries to Sonia Rolt OBE who died on 22 October. The Society will publish its tribute in the March issue of Newcomen Links. Details of a memorial service, to be held in the spring, will be announced soon.

Obituaries to Sonia that have already been published and broadcast include:

BBC Radio 4 The Last Word
www.bbc.co.uk/programmes/b04nhytv

The Canal River Trust
www.canalrivertrust.org.uk

The Guardian 31 October
www.theguardian.com/culture/2014/oct/31/sonia-rolt

The Telegraph 7 November
www.telegraph.co.uk/news/obituaries/11216862/Sonia-Rolt-obituary.html

Newcomen Links 232 December 2014
Ken Hawley MBE

The death of Ken Hawley, historian and tool collector, at the age of 87, deprives us of the nation’s single most prolific and inexhaustible source of knowledge and wisdom on the edge tool and cutlery trades of Sheffield. For over thirty years he ran in the city a retail shop as a specialist tool merchant – not an ironmonger - which, in order to distinguish it from ordinary hardware stores, carried the locally renowned sign ‘we sell nowt but tools’.

I first met Ken Hawley in 1969 when we were judges together on the BBC Television Chronicle series of industrial archaeology competitions and we were to become lifelong friends. He had an engaging, limitless and generous capacity to explain, about steel and how it could take and hold an edge. Regularly, he and his wife Emily would drop in to see us in Shropshire, ostensibly for a few words but invariably staying for several hours, to talk about his collection and its future and reminisce about manufacturers, their skills and specialisms.

Sitting at our kitchen table he’d run his thumb along the blade of a table knife with a look of ill-disguised disdain. Fortunately, I have only Sheffield-made tableware otherwise the consequences would have been frightful. It was on one of these visits that he watched while a couple of builders struggled, with lump hammer and cold chisel, to open up a doorway in a stone wall. Taking the cold chisel he told them exactly what he thought, of it and them: ‘Its blunt. You could ride bare-arsed to London on that!’ It was only much later I learnt that Ken took his own knife, with of course a shear steel blade, to restaurants, not least to make clear the insufficiencies of what was usually available but - as he always rightly maintained - because stainless steel was inferior as a cutting edge.

Ken Hawley’s education was cut short at fourteen by the war years which he spent measuring factory machinery and designing safety guards. This inculcated an emphasis on accuracy and detail but, importantly, it brought him into contact with innumerable Sheffield workshops and tradesmen, sparking his curiosity about why and how the city’s cutlers and toolmakers were world famous. On completion of his National Service in 1947 he went into the retail tool business, setting up on his own in 1959. The succeeding twenty years saw Sheffield companies, and the ‘little mesters’ who formed the backbone of the city’s craft tradition, go out of business in their hundreds. Ken established himself as the ultimate source of knowledge about their history, skills and products. This was to become legendary. Part of that legend was based on his enthusiastic collecting and the boundless knowledge that inspired and informed it. Planes, handsaws, files, taps and dies, cutlery, steel rules and micrometers, caliper and vernier gauges, scissors, shears and hammers, filled two garden sheds, then the garage, then a storey added above, as well as the attic of his house. Large items were stored in spaces begged elsewhere.

It was a chance conversation with Janet Barnes, the then Director of Sheffield’s Ruskin Gallery, in 1991, that led to the first public exhibition – The Cutting Edge - drawn from Ken Hawley’s collection. This had two effects. It brought Ken’s endeavours and his collection into the wider public view and it ultimately led - in 1995 - to the setting up of the Ken Hawley Collection Trust with the objective of acquiring the collection and securing its future. Its transfer into university premises in Mappin Street under the wing of ARCUS (Archaeological Research and Consultancy at University of Sheffield) was carried out with the enthusiastic support of the late Professor (later Sir) Gareth Roberts, the then Vice-Chancellor of the University, practical support from David Crossley, and a major award from the Heritage Lottery Fund in December 1998. Ten years later a further and much larger HLF grant led to a building at the Kelham Island premises of the Sheffield Industrial Museum Trust being converted to provide permanent storage and display and this opened in March 2010. At the same time the Trust published a book, The Ken Hawley Experience, illustrating material from the collection and with a text and glossary of terms rich in the mysteries of the edge steel and cutlery trades. A second phase at Kelham Island opened a couple of years later and a third had been proposed by the time of Ken Hawley’s death.

In order to achieve all this Ken encouraged and mentored a team of volunteers, not only to catalogue but also to become experts in their own right on various aspects of Sheffield’s steel products. In addition, Ken Hawley was one of the driving forces – for over forty years – in the preservation of Wortley Top Forge, a former finery forge and ironworks, dating from at least the seventeenth century and widely thought to be the oldest surviving heavy iron forge in the world.

In 1995 Ken Hawley was awarded an Honorary Fellowship by Sheffield Hallam University and in 1998 appointed MBE. His wife, Emily, survives him as do two sons, Duncan and Clive.

In his profound knowledge and unquenchable enthusiasm Ken Hawley’s death leaves an unfilled void. But through his collection there remains an abundant wealth of material evidence, something of which Sheffield and the nation can feel justifiably proud.

Ken Hawley MBE
29 June 1927 – 15 August 2014

Neil Cossons
BECOME A FRIEND OF UNION CHAIN BRIDGE

Stephen K. Jones

Readers may be aware of recent news concerning the condition of the Union Chain Bridge and the threat of its closure. It is estimated that the bridge needs around £5 million of restoration work. Spanning the Tweed between Horncliffe, Northumberland, and Fishwick, Berwickshire the Union Chain Bridge was opened in 1820. It was the longest wrought iron suspension bridge in the world at the time, and the first vehicular bridge of its kind in Great Britain. The bridge is 437 ft (133.2m) in length between the suspension points and 18ft (5.5m) wide. The designer was Captain, later Captain Sir Samuel Brown (1774-1852), a naval man who had seen action against Napoleon. He was to pioneer the development and introduction of iron chain cable as a replacement for hempen cables on ships. As a suspension bridge, the Union Chain Bridge, represented a great leap forward in engineering technology with its wooden deck suspended from round eybar link chains. These were supplied by Browns from their purpose built chainworks at Pontypridd in South Wales.

The bridge is now a Grade I listed building and a Scheduled Ancient Monument. The respective local authorities, Northumberland County Council and Scottish Borders Council, are responsible for the maintenance, repair and restoration of the bridge. They have commissioned consultants to prepare a HLF bid.

Recently more than 70 people attended the formal launch of a new group, the Union Chain Bridge Friends, in Horncliffe Village Hall to campaign for its restoration. All have agreed that the objective is the full restoration of the bridge in time for its bicentenary in 2020. You can support this objective by becoming a friend of an iconic structure that would put the suspension bridge firmly in the public domain as an accepted, safe and economical mode of bridging wide spans.

Individual membership is only £5 per year
More information at: www.unionbridgefriends.com

CROFTON PUMPING STATION WINTER WORK OPEN DAYS

The Historic Crofton Pumping Station will be open, from 10.30 am, on the following days during the winter:
Saturday 13th December 2014
Saturday 7th February 2015
Saturday 7th March 2015

Teams of dedicated volunteers cosset and maintain the two historic beam engines at Crofton. They will give visitors a rare chance to see maintenance works in progress, when parts of the engines normally hidden from view will be dismantled. It is cold inside the Pumping Station during the winter as the boiler is not in steam and drained down but tea, coffee and biscuits will be available at a small charge.

Crofton Pumping Station, Crofton, Marlborough, Wiltshire, SN8 3DW
Once again the Cambridge University Press approach has shown the way and set the standard for digitally reprinted books. This work, originally published in 1938, details the historical development of naval and marine engineering from the birth of the steam boat to just before World War II. Writing in 1938 the author set out the changes that had transformed the maritime world based on his 30 years of research, showing the transformation that had taken place. A book of interest to anyone exploring the history of marine engineering.

Stephen K. Jones


Brunel’s Bridges, ISBN 9781445639956


The first three of these guides uses Bradshaw’s original text with contemporary images and captions on the relevant journeys. This is therefore a mix based on Bradshaw’s Guide and a gazetteer of Brunel’s work but with little new information from either source. There are good illustrations, although some have little bearing on the subject area, and the presentation is similar to Christopher’s other Brunel related books.

Brunel’s Bridges has been published to coincide with the 150th anniversary of Clifton Suspension Bridge which takes up a good third of the book. Other notable bridges are included like the Hungerford Suspension Bridge over the Thames, railway bridges such as at Maidenhead and the iron bowstring bridge at Windsor, his numerous timber viaducts and bridges. It culminates with the tubular iron bridges over the Wye at Chepstow and across the Tamar at Saltash.

A Mere Puff of Wind: The London and Portsmouth Direct Atmospheric Railway


The story of some railways that embraced the atmospheric system as the new motive force, like the South Devon, are well-known. This book looks at some of the forgotten schemes such as the London & Portsmouth Direct Atmospheric Railway. This story, of hopes raised and then dashed in the process of getting support and capital whilst fighting hostile schemes, is a complex one and as such would have benefited from a more coherent structure, closer editing and improved maps. Appendices constitute almost half of the book and there is no index. However, for those who persevere a fascinating insight is revealed into a forgotten schemes and an overlooked aspect of railway history.

The Bristol & South Wales Union Railway and the New Passage Ferry


http://richardsmith.webplus.net/index.html

This year is the 200th anniversary of the birth of the engineer Charles Richardson. So, the timely appearance of these books, written and published by Richard Smith, are most timely. It was while he was working on Brunel’s Bristol & South Wales Union Railway (B&SWUR) in the early 1860s that Richardson seriously considered the problems of tunnelling under the Severn. Richard Smith’s books are well worth searching out for anyone interested in the railway history of the region as well as providing an account of the unique railway ferry that was the B&SWUR. Smith grew up in Portskewett in the 1950s and 60s and was fascinated by the abandoned branch from there to the ferry point at Black Rock. From this grew an interest in the subject. He is to be congratulated on his meticulous research from original records and newspaper reports of this pioneering railway and ferry service between Bristol and south Wales covered by the first title. Portskewett Railways tells the story of how the village entered the railway age in 1850 with a small station on the newly opened South Wales Railway and its railway link with the steamship ferry mentioned. With the opening of the Severn Tunnel this phase ended but the village retained its small country station until 1964.

The Great Western Railway: Bristol to Plymouth: Vol 2: Bristol to Plymouth


In illustrating this major section of the GWR railway empire the book draws attention to the role of allied or subsidiary companies such as the Bristol & Exeter Railway and the South Devon Railway in forming the West of England main line. From the original GWR at Bristol Temple Meads to Plymouth Millbay there is a great selection of old and new images with colour photographs from the authors’ own collections.

SS Great Britain: Transatlantic Liner 1843


The reader cannot fail to be impressed by the high quality of text and photographs illustrating this book, which is an informative and well-illustrated guide suitable for any visitor or researcher interested in Brunel’s Great Britain. With the template set by the book on HMS Warrior it provides a reference for a visit laid out in a superbly illustrated tour of the ship: from bow to stern and deck by deck. This is brought up to date with behind the scenes accounts of the modern problems
of restoration and conservation, and the new technology being employed. All of which give the reader the most complete visual record and explanation of the ship that exists today. SKJ

William Burges and the High Victorian Dream
J Mordaunt Crook
2013 Frances Lincoln HB £45, ISBN 9780711233492

With two of Burges’s masterpiece projects close at hand, Cardiff Castle and Castell Coch, this book was too good to ignore! In terms of the 19th century being shaped by engineers it is good to get an insight into the leading architects of the same period. For William Burges all is revealed in this detailed work and weighty volume. This is a revised reprint of Crook’s scholarly study of the Victorian Gothic architect, romantic and dreamer that first appeared in 1981. Now it is in a larger format and almost twice as heavy but retailing at the same price. A comprehensive treatment of the architect, the wider relationship between architects and engineers, often referred to as a ‘sibling rivalry’, and the quest for a truly Victorian architectural style are all explored in the book. There was some cross-over in this period as Burges himself was the son of a civil engineer, and architects like Matthew Digby Wyatt (whose office Burges entered in 1849) would collaborate with engineers including Brunel. Burges recognised his own era as ‘the real age of iron’ and that the civil engineer was the real 19th century architect. What is clear is that a Victorian style could not be truly Gothic and there would be no singular style of architecture. Polychromatic brickwork did become popular and created its own style. The repeal of the brick tax in 1850 helped to promote its application and it is a style much in evidence in Bristol which, conversely, was greatly facilitated by the engineer, Charles Richardson, when he opened the Cattybrook brickworks. However, this is a diversion from the study of one of the first Victorian architects to emerge from the negative prejudice of the 20th century and whose work went beyond architecture and into interior design and decorative wares. SKJ

The Coming of the Comet: The Rise and Fall of the Paddle Steamer
Nick Robins
2012 Pen & Sword, HB £25, ISBN 9781848321342

In this fresh approach to the subject Nick Robins charts the development of the paddle steamer from the early pioneers in Britain and abroad to the legacy still afloat today. This includes Kingswear Castle, recently restored at Bristol and currently on the river Dart. The latter chapters are revealing in terms of the paddle steamers that continued to be built after screw propulsion had proved, in many but not all cases, to be superior. It seems that the ‘tug of war’ between the Rattler and the Alecto was not quite the like-for-like trial that has gone down in history. As the author points out, the impact of the paddle steamer is difficult to overstate. The influence of the great Mississippi stern wheelers could also be seen on the Murray and Darling rivers in Australia, the Congo and Nile rivers in Africa and the great rivers of Russia. The book will appeal not just to shipping enthusiasts, but to anyone with a wider interest in industrial history. SKJ

Nelson to Vanguard: Warship Design and Development, 1923-1945
David K Brown, RCNC.
PB Seaforth, 2012

No sooner had I written of the special exhibition in the Prague Technical Museum (NLinks 232), which interprets the contribution of the land-locked Czech Republic to the fighting navy of the Hungaro-Austrian empire, than I came across an even more interesting Czech connection with fighting ships – those of the Royal Navy. The publications of the late David K Brown (NS member) give an in-depth coverage of the design, construction and technical performance of Royal Navy ships. In Nelson to Vanguard, Warship Design and Development. 1923 – 1945 (p16), Brown describes the problem faced, in 1938, sourcing enough armour plate to build the ships ordered in the run-up to World War 11. The capacity of British steel companies capable of rolling armour plate had been severely reduced by the recession of the 1920s and 30s. They could not handle the full order for 40,000 tons of plate. Enquiries were made of overseas steelworks, including German producers, but the only offer was received from Skoda, at their plant at Vitkovice. This very impressive site is now preserved and was visited by members on the recent tour of Moravia. In 1938 12,000 tons were ordered and 10,000 tons had been delivered before the war began. The last train-load crossed Germany in August 1939, escorted by a member of the Director of Naval Construction’s staff. It must have been an interesting trip! The steel was formed into the flight decks of the carriers Formidable, Illustrious and Victorious, as well as deck and bulkhead armour in the cruisers Trinidad and Kenya. John Porter

Inventions That Didn’t Change the World
Julie Halls
2014 The National Archives/Thames & Hudson HB
ISBN9780500517628

This book contains a small collection of the millions of registered designs held at the National Archives in Kew. None of these designs ‘changed the world’ but, as reproduced here, in full colour, they are interesting for the imagination of the designer, the detailed drawings and instructions for use. The ideas that emerge from the need to improve never cease to amuse and amaze. Divided into seven chapters these designs include: A Portable Economic Fireproof Building; An Improved Telekophonon; The Duplex Hat and A Design for a Flying or Aerial Machine adapted for the Arctic Regions. Deborah Jaffé

Resources
**Almost Forgotten, The International Exhibition of 1862 Conference Papers.**
Available from the DAS Richard Dennis Publications, The New Chapel, Shepton Beauchamp, Ilminster, Somerset, TA19 0JT.
Tel +44 (0) 1460 240044
E-Mail: books@richarddennispublications.com

This special edition of the Decorative Arts Society Journal has been produced in association with the William Shipley Group (WSG) for RSA History. The WSG is an independent body, which organised a conference in November 2012 on the International Exhibition of 1862. The papers of the conference are now published in this volume for a wider audience. Complemented by a fine range of prints and other illustrations, they remind us of the scale and ambition of this less well-known Exhibition in 1862.

Contents include: The Origins of the 1862 Exhibition and its Place in History - John R. Davis; South Kensington’s Forgotten Palace, The rise and fall of the 1862 Exhibition building - Dale Dishon; Medals for the Great Exhibitions of 1851 and 1862 - Sir Mark Jones; Machinery in Motion: the din and spectacle of progress - John Agnew; Representation, Rivalry and Transfer: the German states and the 1862 Exhibition - John R. Davis.

**The Imitation Game**

**starring:**
Benedict Cumberbatch, Keira Knightley, Charles Dance, Matthew Goode, Mark Strong, Tuppence Middleton, Allen Leech, Tom Goodman-Hill, Rory Kinnear and Steven Waddington

On general release in cinemas

In this recently released film, Benedict Cumberbatch plays Alan Turing whilst working on the code breaking at Bletchley Park, during World War II. Even though small parts have been fictionalised, Cumberbatch conveys well Turing’s brilliance and determination to break the code. Importantly, the film also looks at his personal life and how he was the victim of an unenlightened British establishment and the dreadful consequences. **DJ**

**ON THE WEB**

Nigel Hobden’s update of intriguing websites:

**Looking at 85 years of Machine Design**
www.machinedesign.com/community/85-years-ago-machine-design-s-first-year-part-1?NL=MD-07&Issue=MD-07_20141015_MD-07_582&cl=article_1&YM_RID=CPG0500002140958&YM_MID=290

**Bringing back the first computers: the world’s greatest restoration projects**

**The Hackers Who Recovered NASA’s Lost Lunar Photos**

**Copy date for the next issue of Newcomen Links**

1 February 2015
editor.links@newcomen.com
www.newcomen.com
Eric Lomax – Railwayman of War and Peace, *The Railway Man*  
The Eric Lomax Memorial Lecture  
to be given by  
Dr Michael R. Bailey MBE,  
President of The Stephenson Locomotive Society and Past President of the Newcomen Society  
National Museum of Scotland, Chambers Street, Edinburgh, EH1 1JF  
Saturday, 14 March 2015 at 14.00  

This memorial lecture will be held under the auspices of The Stephenson Locomotive Society of which Eric Lomax was a member for 75 years. He had also been a member of the Newcomen Society since 1952. The lecture has been made possible through the kind collaboration and involvement of National Museums Scotland. There is no charge for visits to the Museum, but donations are welcome.

Alexander Hayward, Keeper of the Department of Science and Technology, and Member of Council of the Newcomen Society will provide introductory remarks about the Museum before introducing the speaker.

The hour-long lecture, which will be attended by Mrs. Patti Lomax, will follow Eric Lomax’s early interests in railways, before during and after the 1939-1945 war. It will be illustrated by examples of his own main line and industrial railway photographs taken in Scotland, together with a few from other parts of Britain, India and post-war Holland.

Members of all societies and interests will be welcome to attend this lecture, together with other members of the public who have an interest in Eric Lomax’s remarkable life story. There will be opportunity for questions and answers at the conclusion of the lecture.

Big Data Comes to Wales  
**The DVLC 1965-1975**  

The National Waterfront Museum, Swansea  
Saturday, 31 January 2015, 14.00-16.00  

In 1965 the decision was taken to centralize licensing of drivers and vehicles. At the time there were 183 divergent local systems and standards and many documents travelled around the country and went missing. The Ministry of Transport created a Computer Licensing Project to accomplish this unification. It was decided to create new computer automated systems in a special purpose centre, the Drivers’ and Vehicles’ Licensing Centre (DVLC), that was to be founded in Swansea.

How did this huge and radically new data processing centre come to be created?

What computing technologies were involved?
What new skills were needed? Who was recruited?
What impact did the DVLC have on the town?

The event will uncover some the history of the DVLC and hear personal accounts by some of the staff that were involved in the creation.

Speakers: John V Tucker, Mike Robinson, Delith Thorpe, Oliver Morley

CALL FOR PAPERS  

Researchers into the history and archaeology of early railways (defined as those which were pre-mainline in concept if not necessarily in date) who would like to present their findings are invited to indicate their intention to the organising committee by the end of May 2015. A 300-word synopsis should be submitted for consideration by the end of September 2015. The standard length of papers is 30 minutes, with shorter presentations and papers welcome. Proposals for papers, which are encouraged on such topics as economic, business and social history as well as on technical subjects, should be sent to: earlyrailways.conference@gmail.com. As before, it is intended to publish the proceedings.

Further details on the Conference can be found at: www.earlyrailways.org.uk

The conference is sponsored by the National Railway Museum  
Newcomen Society  
Beamish Museum  
Railway & Canal Historical Society

Image courtesy of Northumberland Archives, ZMD 78/14, ‘The Coal Waggon’
Do you know someone who would like to join the Newcomen Society?
Or would you like to give a year’s membership as a gift?

There is a membership application form on the next page or join on-line at www.newcomen.com/membership/signup
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• Free access and download facilities to the Society’s Archive of past papers back to 1920
• Membership of local branches and subject groups
• Access to a Members Only page on the website
• Invitations to summer meetings and conferences.

Associate Membership
Cost: £35.00 GBP for each year’s subscription
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• Invitations to summer meetings and conferences

To join
• To pay on line go to www.newcomen.com/membership/signup
• To pay by cheque complete the form below and post it with a cheque for the appropriate amount, made out to The Newcomen Society. Postal address: The Administrator, The Newcomen Society, The Science Museum, London SW7 2DD

Please delete as appropriate:
• I enclose a cheque for £55 in respect of a one year Full Membership
• I enclose a cheque for £35 in respect of a one year Associate Membership
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City................................................................. Postcode or Zip..........................................................

County or State........................................................ Country..............................................................

Phone............................................................................ email .....................................................................
The Newcomen Society Calendar........2015

Please check the Events pages on the website for updated information: www.newcomen.com

**London** Meetings held in the Director’s Suite, The Science Museum, Exhibition Road, London SW7 2DD. Time: 17.45. Visitors welcome, admission free. Members & guests go to a nearby restaurant afterwards.

2014
10 December Martin Gregory: Sewing Machines

2015
14 January John Wilson: Woodworking Machinery
11 February The Society AGM followed by Geoff Wallis: The Presidential Address - Conservation Ethics in Practice
11 March José Luiz Dias: Electric Motor Refurbishment in Brazil tbc
8 April Ian Whittle & Fred Starr: Whittle Jet History
13 May Chris Barker: Model T Innovations

**Midland Branch** Meetings held in the Thinktank Theatre, at the Birmingham Science Museum, at Millennium Point, Curzon Street, Birmingham, B4 7XG. Time: 18.30 for 19.00. Visitors welcome, admission free. There is a pay-bar in the building which may be open before the meeting. A pub in Curzon Street serves meals and afterwards many adjourn there. Parking on-site from Jennens Road is £3 from 6pm or across Jennens Road at £1 from 4.30pm

2015
7 January David Ensor: History of Instrumentation and Testing
4 February John Porter: Engines for the Titanic – insights from a Ship’s Engineer
4 March Geoff Wallis: The Presidential Address - Conservation Ethics in Practice
1 April Stephen K. Jones: Brunel in South Wales

**North West Branch** Meeting at the Museum of Science and Industry, Liverpool Road, Manchester M3 4FP. Time 18.30, visitors welcome, admission free. Members meet at a nearby restaurant from 17.00. Parking is available on site.

2015
20 January With the Computer Conservation Society. Note change of start time 5.30 for 6.00 pm
Dr Elizabeth Bruton (University of Leeds): ‘Radar’ of the First World War: B-stations and wireless direction-finding in World War One
24 February With the Institution of Civil Engineers Richard Byron: William Fairbairn and the Iron Girder Bridge
24th March Julia Elton: The Thames Tunnel

**Southern Branch** Meetings held in Room PO 1-11, Portland Building, University of Portsmouth at 18.30. Some on-street parking is available. There is a charge for use of University car parks.

2014
9 December Henry Gunston: Military Railways in East Africa During WW1

2015
20 January Geoff Smith: Gunpowder Engines; Fact or Fiction
17 February Clive Barham Carter: Phaetons to Phantoms
17 March Carl Brookes: Strength Appraisal of the Iron Bridge
21 April Deborah Jaffé: Frank Hornby and Mechanical Toys – Britain, Germany and the USA, 1880-1950
19 May Geoff Wallis: The Presidential Address - Conservation Ethics in Practice

**Western Branch** Meetings held in Room 1 Bristol Aeroplane Welfare Association (BAWA), 589 Southmead Road, Filton, BS34 7RG from 19:30-21:00 Visitors welcome, admission free

2015
15 January Joint Meeting with BIAS. Four 20 min talks. tbc
19 February Geoff Wallis: The Presidential Address - Conservation Ethics in Practice
19 March Laurence Ince: Neath Abbey Ironworks
16 April Philip Hosken: The Oblivion of Trevithick
21 May John Porter: Titanic’s Engines-Insights from a Ship’s Engineer

**North Eastern Branch** Meetings held at the Discovery Museum, Newcastle upon Tyne NE1 4JA. Times vary.

2014
10 December at 14.00 Geoff Wallis: The Presidential Address - Conservation Ethics in Practice

2015
11 February at 14.00 John Dobson: The Ingenuity of the Seagoing Engineer
22 April at 18.00 Brian Newman: The Titans

Copy date for the next issue of

Newcomen Links

1 February 2015
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www.newcomen.com
Do you know someone who would like to join the Newcomen Society?

Membership details and an application form are on page 30 & online at www.newcomen.com/membership/signup

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Writing for Newcomen Links

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

**Articles** should be a maximum of 1000 words and sent in Word format by email.

**Images** should be sent separately by email in jpg (digital) format of 300dpi minimum. 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/scans of images in books etc.

**The copy date for the next issue is 1 February 2015**
Please submit articles, information, news, details of events etc to:
The Editor, Deborah Jaffé at: editor.links@newcomen.com 07798 603000

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**The Society’s AGM**

**will be held on**

11 **February 2015**

at 5.45

in **The Director’s Suite,**

**The Science Museum,**

**Exhibition Road,**

**London SW7 2DD**

It will be followed by the

**Presidential Address**

to be given by **Geoff Wallis**
on **Conservation Ethics in Practice**

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**Newcomen Links**

1 **February 2015**

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