

NEWCOMEN

Links



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Front Cover

Murgatroyd's brine pumps at Middlewich closed with the end of wild brine pumping in 1977. The workforce abandoned their work shoes and coats and left.
Image ©Jonathan Ayles 2019

Notes on Contributors

Jonathan Ayles is the President of the Newcomen Society. He is Honorary Senior Research Fellow at Manchester Institute of Innovation Research at the University of Manchester.

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

Dr Robert Carr, a university lecturer, joined the Newcomen Society in 1978. He has served on Newcomen Council and is the book reviews editor of the Journal.

Dr Miles Oglethorpe is Head of Industrial Heritage at Historic Environment Scotland. After gaining his PhD at Glasgow University, he joined the Royal Commission on the Ancient and Historical Monuments of Scotland in 1985, moving on to Historic Scotland in 2007 where he fulfilled a number of key roles. More recently, he led the team responsible for preparing the successful World Heritage nomination for the Forth Bridge, and in September 2018 was elected president of the International Committee on the Conservation of the Industrial Heritage (TICCIH).

Andrew Smith is a structural engineer who has worked mostly on the repair of small existing buildings, particularly those with timber structures. He is the present Convenor of the History Study Group of the Institution of Structural Engineers in succession to Lawrence Hurst.

Geoff Wallis is a Past President of the Newcomen Society. He is founder and former managing director of Dorothea Restorations Ltd and has over 30 years of experience as a contractor.

Writing for Newcomen Links

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

Articles should be about 1000 words and sent in Word format by email. Short pieces are also welcome. Longer articles may be submitted after discussion with the editor.

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.

Please, where possible, label each image with its subject rather than by reference number.

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The copy date for the next issue is 1 May 2019

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

The Editor,

Deborah Jaffé at: editor.links@newcomen.com

Tel: 07798 603000

From the President, Jonathan Ayles

I have had the recent good fortune to be given a guided tour of a nuclear power station - Heysham 2, near Morecombe in Lancashire. The power station started up in 1988 and its two Advanced Gas Cooled reactors supply 1,220 MW to the grid. It is scheduled to run until 2030. The Station is on the same site as Heysham 1 which came on line five years earlier.

The AGRs at Heysham are operated by EDF Energy, although they were originally built by the publicly owned Central Electricity Generating Board. EDF have much to be proud of as operators. The housekeeping was immaculate. The impressive tour guides were born communicators and enthusiasts. No technical question was too difficult. The station operated almost silently. We saw the top of the pile, the charging machine and the turbine hall. The high point of the tour was a clear overview of the control room. Its design and décor were redolent of 1980s process plant with all the associated dials and switches and wood and formica control desks. The only hint at modern control techniques were the up-to-date colour display screens and mimics. AGRs have on-load refuelling, and Heysham 2 holds the world record for longest continuous operation of a nuclear generating plant without a shutdown.

The visit was part of a Conference on "Infrastructure" organised by the School of Architecture at Manchester Metropolitan University and backed by the lively Modernist Society. The group of visitors were mostly young architects.

For a while, the owners of Heysham suspended works' tours. No doubt there were security concerns. But the Fukushima disaster in Japan in 2011 persuaded the current operators that openness is the best policy. Surely it is. We were able to see nuclear power at work. It was a superb example of engineering in operation. The comprehensive tour, openness to questions and frank answers could not fail to impress. The equal numbers of female and male staff on the day we were there also spoke volumes. There is a strong case for "industrial tourism" if we are to attract the next generation of engineers and technologists.

From the Editor, Deborah Jaffé

Into another year and already events are planned until the autumn. This year marks the bicentenary of the death of James Watt and events to mark it will take place in Glasgow, Birmingham and other significant venues. The Society will also mark this and hold the summer conference in Birmingham based around the James Watt events. There will be a lot to do. The last six pages of this issue are devoted to information on the many James Watt events, the Newcomen summer conference, the diary and news of other events.

Robin Brooks reports on a fascinating talk given to Newcomen North East, by Miles Oglethorpe, on William Arrol & Co and the many structures the firm fabricated. It is illustrated with magnificent photographs including an unusual vista of the Forth Rail Bridge. The symposium at Lion Salt Works is reported on by Jonathan Ayles. His photograph, on the front cover, of boots and a coat abandoned by workers at Murgatroyd's brine works in 1977, is a poignant reminder of the personal aspect of a site. Ivor Lewis is interested in the minutiae of engineering and technical drawing instruments. Jim Andrew's lecture on John Cobb's land speed record car, revealed he reached 415mph in 1947. Janet and Geoff Wallis make observations on the collecting and restoration of machinery that they found on a trip to New Zealand. Robert Carr suggests that a journey on a hovercraft might now be considered a heritage trip. When, six or so issues ago, I published the first report on an abandoned boiler I had no idea that it would spark a lot of interest - there are more in this issue.

A few weeks ago we launched the new website. The site can now be accessed easily, anywhere, on a phone, tablet, laptop and desk top computer. Access to the archive, past issues of Newcomen Links and events is easier and we now have an on-line shop. Please help us to develop the site, with relevant news, ideas and images. The website is an integral part of the daily running of the Society so, please do check it regularly for updates and news.

Next year marks the centenary of the Newcomen Society and celebratory plans are being finalised. I hope to bring you news of them in the next issue. The copy date is 1 May.

At the AGM

Council

Jonathan Aylen was elected President of the Newcomen Society at the AGM with Robert Taylor becoming Past President and John Suter Vice President. Bob Bowden and Malcolm Dick were elected to Council.

Introducing the President



Jonathan Aylen is Chair of Newcomen North-West and organised the Society's tour to Teesside with Fred Starr in 2017. Jonathan has contributed articles to the Newcomen Journal on the Ferranti Argus control computer which was used on chemical plants and guided missiles at the same time, on the construction of the Shotton strip mill as WW2 broke out, and on the unlikely development of "Blue Danube" – Britain's first atomic bomb – which included a tank engine builder and a hot water bottle supplier. He has spoken frequently on the history of tech-

nology both in North America and in Europe. With colleague, Ruggero Ranieri he co-authored 'Ribbon of Fire', a book on how the wide strip mill for steel came to Europe from the USA

Jonathan is Honorary Senior Research Fellow at Manchester Institute of Innovation Research at the University of Manchester. He is a former Associate Editor of R&D Management and has been acting editor for the International Journal for the History of Engineering and Technology. In 2007 he was winner of the IOM3 Williams Prize. Jonathan is also a past President of Manchester Statistical Society and an interest in statistics led to his involvement in wildfire forecasting and UK policy formation. He has recently published on wildfires with the Royal Society.

As president, Jonathan's main concern is to extend the reach of Newcomen to embrace more 20th century technologies and to cover neglected areas such as service innovation, Cold War technology, modern electronics and technologies in the home. At Newcomen North West his focus has been to broaden the appeal of the society and draw in a bigger audience through novel topics, collaboration with other societies and wider debate, while retaining a place for the traditional papers which have been the bedrock of the Society. Newcomen North West has enjoyed papers on RISC chips, robots, AGR reactors and plastics as well as familiar topics such as early locomotives, iron bridges and builders of Newcomen engines. He believes the Newcomen Society needs

to move forward in line with technology. He has also fostered close working with smaller industrial museums through a series of workshops that are continuing to roll out to more venues.

At the AGM Jonathan paid warm tribute to his predecessor, Robert Taylor, for leaving the Society in such good shape and a sound administrative footing. He also would like to thank the Society's hard working Council and their officers for their truly remarkable support.

From the Treasurer

The Treasurer, Frank James, in presenting the accounts for the year 2017-2018 reported that the Society had made a small operational surplus and that therefore he had not recommended to Council any increase in membership fees for the coming year. He was pleased to note that it was now some years since subscriptions had last been increased. However, the size of the surplus had been steadily decreasing year by year and while he always presented a balanced budget, there would come a time when it would be necessary to increase membership rates.

Two issues that had recently occurred had the potential to appreciably affect the financial stability of the Society. First, the need to find a new office when the Society vacates Blythe House which might necessitate paying rent for a suitable office (Blythe House is occupied rent

free). Investigations into where the Society should locate itself were in hand and it was too early to say what the precise financial implications of the move would be.

The second issue was the future of the Journal within the context of the move by most European research councils (apart from Germany) and charitable funders to make it mandatory for all research publications funded by them to be fully open access at the start of 2020, a scheme known as Plan S. He commented that the Society had signed up to various letters protesting at the implementation of Plan S and the very short notice that had been given of it. At this stage it was impossible to tell what the outcome of these representations would be. At the moment paper copies of the journal are supplied to members at no charge from the publisher (which is a contributory reason why the membership fee has not been increased). The publisher is able to do this because their source of income is derived from a basket of institutional subscribers, bundling and sales of electronic copies. All these sources of income are potentially threatened under Plan S which in turn threatens the long-term finances of the journal, the income from which supports significantly the other activities of the Society.

The Treasurer assured the meeting that he was actively involved in resisting Plan S in a number of fora and would update Council and the membership as matters developed.

The Editor of The Journal



We welcome Dr Brian Price as the new editor of The Journal. He is an academic based at Aston University in the UK,

teaching engineering and product design. Active research areas include ultra low carbon vehicles, systems engineering and engine & powertrain design. With over 25 years' experience in industry working worldwide on engine design consultancy, he brings a pragmatic approach to new product development. Previously chief engineer or technical director at a number of major engineering companies, including Lotus Engineering, Cosworth Technology, Mercury Marine, Harley-Davidson and Ricardo Consulting Engineers, he is also a visiting professor at Loughborough University, UK, University of Wisconsin-Madison, USA and Hanyang University, South Korea.

www.newcomen.com

The new website went live in February and so far has been well received. It is now easy to use on all devices, making it easy to read on a phone and tablet as well as a desk top computer. Importantly, for many members, the archive is still there and now easier to access. There is also the facility to include more images and 'stories' behind them. So, please do let us have any suitable, high res images that might be of interest to other members. We have also added a shop, which is easy to use with an on-line payment facility. But, as in all such ventures, there is always a place for development. So, please do let us have any feedback on the site, what might be added and other ideas.

Transactions

Geoff Wallis is helping to dispose of lots of Newcomen Transactions. They run from 1936-7 to 1997, comprising 49 volumes and three indexes. They would need to be collected from Bristol. Contact: editor.links@newcomen.com if interested.

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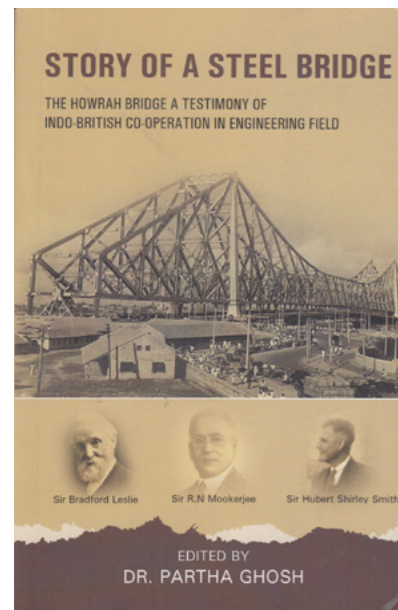
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New Platform at Princes Risborough Station

Robert Carr

Making use of volunteer labour, work to reinstate platform 4 at Princes Risborough was completed in August 2018. This refurbished platform now enables trains from the Chinnor and Princes Risborough Railway (CPRR) to connect with Network Rail. An official opening ceremony was held on Wednesday 15 August 2018. A Chiltern Railways Turbo train carrying VIP guests from London via Princes Risborough was run through to Chinnor for this official launch. Network Rail chairman Sir Peter Hendy said: 'The connection of the CPRR with the National Railway Network is a stunning achievement for a volunteer-operated railway, and will generate environmentally friendly rail-based tourism on the closest preserved railway to London. Network Rail congratulates the railway for this extension, and it will be a privilege to ride on the first public train on it.'



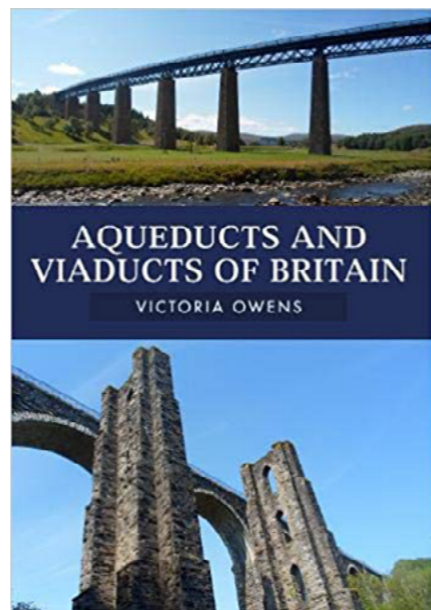
Tritton, of Westminster, London and executed by Cleveland Bridge Company, Darlington. The sub-contractors, who fabricated the steel work, were the famous consortium of three well known engineering firms namely, Braithwaite Burn & Jessop. About 26,500 tons of low-alloy, high tensile steel was consumed for the super structure truss, this new variety of steel was manufactured at TATA iron & steel works at Jamshedpur, India. This new variety of steel revolutionized the field of metallurgical engineering in India. When constructed, it was the third longest cantilever bridge in the world after Quebec bridge of Canada & Firth and the Forth bridge in Scotland. Work on the bridge began in 1936 and it was opened to traffic in February 1943 during World War II. The bridge has been functional since then. It is one of the busiest of bridges some - 100,000 vehicles & 150,000 pedestrians cross it daily. It is a functioning heritage structure.

Story of a Steel Bridge

The Howrah Bridge a Testimony of Indo-British Co-operation in Engineering Field Edited by -Dr. Partha Ghosh, Associate Professor, Construction Engineering Department, Jadavpur University, Salt Lake, Kolkata and co-authored by Mr. Pronoy Roy Chowdhury, Structural Engineer & Ph.D. Scholar, Mr. Falguni Pal, Librarian, R.N Mukherjee, Engineering Information Service Centre and Mr. Partha Sarthi Das, Assistant Librarian & Information Officer, National Library Kolkata.

The book describes the history of construction of the iconic Howrah Bridge between the twin cities of Howrah and Kolkata in India. The bridge is a legacy from the colonial days and a testimony of the co-operation between British and Indian civil engineers. Howrah Bridge is a suspended balance cantilever steel truss bridge and an entirely rivetted construction. The bridge was designed in 1929 by Messers Rendel Palmer and

The book is organized in three chapters. Chapter 1 Technical History of Howrah Bridge construction; Chapter 2 Howrah Bridge-a journey through historical literature; & Chapter 3 Appendix. It draws on authentic documentation such as: Calcutta Gazette published by the then British authorities; Proceedings of Bengal Legislative Council; Proceedings of Bengal Chamber of Commerce; Proceedings of the Institution of Civil Engineers, UK; Proceedings of the Institution of Engineers (Indian); many rare photos obtained from Grace's Guides; and about 100 paper cuttings of newspaper reports of Times of India from 1909.



Aqueducts and Viaducts of Britain
By Victoria Owens
Amberley Publishing
ISBN 9781445683805

Between July 1761, when a navigable aqueduct opened on the Bridgewater Canal at Barton-upon-Irwell, and July 1963, date of the completion of the Thelwall Viaduct on the M6 near Warrington, Britain would see the construction of a great number of aqueducts and viaducts. Emblems of the industrial age, from unassuming arches built to carry canals over streams to immense multi-span structures conveying railways across estuaries or roads above plains, each bridge has its own distinctive history and character. In this book, Victoria Owens examines the fascinating history of some of the most iconic landmarks in the British landscape, charting the ambitions of the engineers who designed them, the endurance of the labourers who built them and their impact. Photographs illustrate the text, and grid references locate the bridges.

Jan van de Veen

Not too long ago I visited Suriname, a former Dutch colony. By 1850 there were over 250 plantations, mostly sugar cane, but also cotton and other tropical crops. There are a few left and now almost the whole area is tropical forest again. Much to my surprise, we made a little detour to find the remains of a steam engine. Little was known about the engine, but I presume it dates back to about 1860 and was probably used for crushing sugar cane. Slavery ended at that time so there was a need for mechanical propulsion on the larger plantations. Hidden between some trees, an egg-ended boiler can clearly be seen, as well as the remains of a beam engine. We did not stay very long as there were lots of mosquitos around. It could even be that there are two engines on the site as I saw another beam on the ground. The fact that the remains of a fly wheel is there too, makes it even more convincing that it was used to drive a crusher. On another site, in Marienburg, there is a Werkspoor steam engine from 1921 to be seen also with a sugar cane crusher. It only stopped working in the 1970s. Unfortunately it is completely vandalised now. So, if a member of the Newcomen Society would ever visit Suriname, do not forget to visit the remains of these engines.



Sorry remains of a beam engine

The Werkspoor engine of 1921 at Marienburg, Suriname



The egg-ended boiler



Derek Chatto

I found another waggon type boiler whilst out walking in Derbyshire. It is not on a public right of way but on waste ground not so far away from the Cromford and High Peak Railway. Map reference SK 2745 5517. As can be seen in the pictures, the boiler is heavily corroded and not a lot is left. Unfortunately, I cannot

supply any information about the boiler but it may be of interest to Members if they are in the area. The Derbyshire Peak District was once heavily mined for lead and other minerals and as a consequence there is a lot of industrial remains to explore. I don't set out to find boilers but by some strange chance I seem to keep coming across the things.



Industry behind Industry

Sir William Arrol & Co Ltd

Report of the lecture by Dr Miles Oglethorpe to Newcomen North East and the Institute of Civil Engineers NE Seniors Discovery Museum, Newcastle upon Tyne on 12 February 2019

Robin Brooks

Members were delighted to welcome Dr Miles Oglethorpe to speak on Sir William Arrol and the civil engineering company he established in Glasgow in the 1870s. The talk was enhanced by the showing of many illustrations of the wide range of structures the company fabricated throughout its long history.

Dr Oglethorpe commenced by explaining his interest and involvement in the topic of his talk. He is a staff member of Historic Environment Scotland (HES), the public body established in 2015 from the merging of Historic Scotland (HS) and the Royal Commission on the Ancient and Historical Monuments of Scotland (RCAHMS). The remit of HES is responsibility for Scotland's properties of historic national importance, together with the collection and management of the records of these properties and Scotland's historic environment.

The company William Arrol founded in 1873 continued its manufacturing interests until the 1980s when it ceased the civil engineering aspect of its work. This part of the company was acquired by Clarke Chapman and then by NEI Thompson Ltd, but not before arranging to gift its archives to the then RCAHMS. Dr Oglethorpe's specific interest in the history of the company, was galvanised into action when news came that the company's engineering works in Dalmarnock, Glasgow

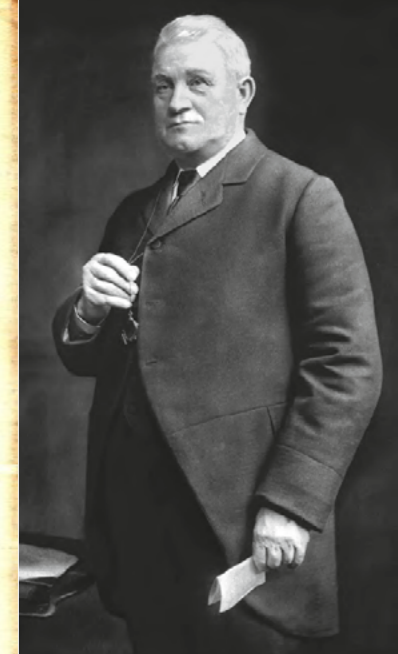
(which closed in 1987) was being demolished. Information was received that the company's archives had been dumped on the floor of the offices by the demolition contractors, who had taken away the cabinets in which they had been stored! Providentially the archives were rescued, but unfortunately only after many of the records and drawings of the company's iconic structures, such as the 1887 Tay Rail Bridge, 1890 Forth (Rail) Bridge and London's 1894 Tower Bridge had already been 'acquired' by persons unknown! However, approximately 4000 photographs and other records were salvaged.

Dr Oglethorpe outlined the vast scope of Arrol & Co's engineering empire which radiated throughout the world from the ever enlarging Dalmarnock Works and Parkhead Crane Works; this expansion coincided with the development of mild steel over the previously widely used wrought iron. The speaker recognised that although Sir William Arrol is little known in the UK, his heritage is much better acknowledged in Scotland. The Opening event of the 2014 Commonwealth Games held in Glasgow, included a replica of a typical Arrol giant cantilever crane and an inflatable Forth Bridge – fame doesn't come any higher than that! Dr Oglethorpe later mentioned that William Arrol's image had been used on the obverse of Clydesdale Bank's first polymer £5 note in 2015, with an image of his Forth Bridge on the reverse.

The speaker then gave a brief resumé of William Arrol's life. He was born in 1839 at Houston in Renfrewshire, the son of a spinner. At nine he left school to work in a cotton mill, then later began training as a blacksmith. Meanwhile at night-school



Sir William Arrol & Co. Letterhead – Feb 1908



Sir William Arrol 1839-1913

he studied mechanics and hydraulics, but then moved to Glasgow in 1863 to work for a company of bridge manufactures. In 1871, when aged 32, he established his own Ironworks business at Dalmarnock, incorporated as William Arrol & Co. On Arrol's later knighthood in 1890, the company was renamed Sir William Arrol & Co.

The company was awarded a contract for the building of a bridge over the River Clyde for the Caledonian Railway Company in 1878 which was the first of Arrol's major undertakings. In 1879, Thomas Bouch's one-year-old railway bridge across the Tay estuary spectacularly collapsed, with the loss of at least 46 lives. Bouch was then currently designing a new railway bridge to cross the Firth of Forth, but with fears

that history might repeat itself, engineers Sir John Fowler and Sir Benjamin Baker were commissioned to design the new Forth estuary bridge. The contract for its construction was awarded to William Arrol in 1882 and it was opened in 1890. Concurrent with this, came a contract to build the replacement Tay Bridge; construction of this started in 1882 and was completed in 1887. Notwithstanding these two works being almost simultaneously undertaken, Arrol was also contracted to construct a twin towered bascule bridge across the Thames in London – the now famous Tower Bridge. This was commenced in 1886 and opened in 1894.

Dr Oglethorpe continued outlining Arrol's outstanding construction and fabrication structures which included the huge

Tay Bridge under construction – 1882-1877

Cartsburn Shipyard, Greenock, showing Arrol cantilever cranes



N 9,57 NEW TAY VIADUCT. 245' GIRDERS, CLOSING THE GAP. 26 FEB 1907.



Construction of the Sasebo 250-ton Giant Cantilever Crane built by Arrol for the Japanese Imperial Navy in 1913, and still in operation

Arrol Gantry at Harland & Wolff's shipyard in Belfast (1908). It was beneath this gantry that SS Titanic and her two sister ships were built. Construction beyond the UK was also actively pursued and included among other commissions, the Nile Bridge in Cairo, and the Hawkesbury River Rail Bridge in Australia.

Kilbowie Swing Bridge over Forth & Clyde Canal



Closer to home in the NE, the original Redheugh Bridge, Newcastle upon Tyne and the Middlesbrough Transporter Bridge were very significant to the audience.

On the personal front, the speaker spoke of Sir William Arrol's home and married life. Arrol and his first wife, Elizabeth, lived local to the works until 1887, after which he took the tenancy of a house on the 45 acre Seafield Estate at Ayr. In 1888 he purchased the estate and replaced the existing house with a grand Italianate mansion built to his specification. He remained at Seafield until his death in 1913. His wife Elizabeth died in 1904 and Arrol remarried in 1905, but his second wife died within five years. At the age of 71 in 1910, Arrol married once again but died at Seafield House three years later without leaving any children. Seafield House remains, but is in poor state of repair; however, a group, the Friends of Seafield House founded in 2012, is seeking to restore it for posterity.

Dr Oglethorpe revisited the construction of the Forth Bridge explaining Arrol's construction methods. Each section was fabricated and assembled at the works in Queensferry



Forth (Rail) Bridge 1882-1890

adjacent to the site using nuts and bolts, dismantled and then re-erected on site using rivets. Details of the innovative hydraulic jacking system used at Tay Bridge was also mentioned.

Although Sir William Arrol & Co were rightly famed for their major bridge works along with their large and small(er) swing & lift bridges, their output embraced any and every form of steel fabrication. Tower cranes made up a major part of their products, notably the swivelling head giant cantilever crane (sometimes mistakenly called 'hammer head' cranes) as used universally at shipyards and other heavy engineering manufacturers. The most famous of these was the 1907 Titan Crane, for John Brown & Company Ltd at Clydebank. The speaker showed several illustrations of these installations, which included two surviving working examples from Japan, each now over 100 years old. Likewise, fish-belly cranes and jib cranes were a hallmark of the Arrol stable. Lock and dock gates were also made and factory workshops were built. Later Arrol & Co.'s work in the 20th century included power stations such as Bankside and Battersea, and innumerable steel fabricated structures.

Summing up, Dr Oglethorpe referred back to the title of his talk – Industry behind Industry. It was Sir William Arrol & Co. which for over 100 years, provided other industries with the resources which enabled them to function and in turn blossom and grow. Road and rail transport were, and still are, also hugely indebted to his company's civil engineering achievements. William Arrol's management and entrepreneurial skills were truly industrious in every sense of the word.

The meeting closed with an energetic and wide-ranging question and answer session followed by a well-deserved vote of thanks to Dr Oglethorpe for his excellent talk; this was given by David Byrom of the Institute of Civil Engineers NE Seniors.

A report like this obviously fails to include the visual information provided by the many illustrations Dr Oglethorpe provided. Although not included in the presentation, an informative source of material about Sir William Arrol can be found at: <https://sirwilliamarrol.wordpress.com>

All pictures supplied from Historic Environment Scotland's collection, Dundee Life and Leisure, and the author himself, and are used with permission.



The White Salt Industry Production, Transport and Impacts

Report on the Symposium at Lion Salt Works, Marston, Cheshire, on 20 October 2018

Jonathan Ayles

Salt is the building block of many chemical processes. It is familiar as a food flavouring and preservative. But humble sodium chloride has been the basis of a range of chemical products, notably chlorine and soda ash, which have ended up in soap, glass, paper, textiles and latterly plastics.

Cheshire is still the heartland of the 2,000 year old salt industry. A one-day symposium, led by Newcomen North-West, set out to explore the history of the white salt industry and gain an insight into its extraction and transport. This Symposium was a collaboration between the Society, the Lion Salt Works Trust, Cheshire West Museums and Middlewich Heritage Trust. It was a sell-out event with participants drawn from all over the UK.

The Saltscape of Cheshire

The story of salt in Cheshire begins with geology. A superbly illustrated and authoritative paper by Ros Todhunter explored “The saltscape – its geology and subsidence.” She explained the origins of the salt beds and the peculiarities of the underground “brine runs”. Some 220 million years ago Cheshire had been covered by shallow salt lakes when the land was 15° north of the equator as part of the land-mass of Pangea. The process of evaporation from these arid, tropical Triassic lakes continued for some 20,000 years giving rise to substantial salt deposits.

This land-mass was to drift northwards to become the Cheshire basin. Today the Cheshire basin extends up to 4,000 metres deep below the surface. The rockhead salt is very susceptible to water and dissolves very quickly. Underground streams become “brine runs” rich in salt. The Cheshire basin is also cut by major faults. These faults deeply affected the fortunes of salt prospectors. George Murgatroyd sunk a shaft at Newton Farm, Middlewich in 1889 which found two salt beds adjacent to a fault. But the fault had broken the continuity of the salt beds. A rival shaft sunk 50 yards away found no salt whatsoever.

In his paper Andrew Fielding covered the history of

The Lion Salt Works before restoration. The restoration of Lion Salt Works was a formidable task as the area is prone to subsidence and the functional buildings were decaying.



The Lion Salt Works was served by a railway spur as well as the canal alongside



white salt extraction. The Romans found that salt welled up to the surface naturally in springs. Salt was extracted from the briney waters using a succession of technologies, starting with open pan saltworks through to modern vacuum evaporators. Andrew’s 3D computer reconstructions of early saltworks brought the evolution of the various stages of salt extraction to life. 3D animations showed the likely appearance of saltworks at the time. Andrew Fielding emphasised that salt extraction was a business. Tax records clearly show fluctuations in the fortunes of the salt trade. At times of shortage new entrepreneurs entered

Brine tanks never stay level



the industry building “pickle pans” and salt pans at opportune coastal sites, such as salt marshes close to tidal estuaries. Coal replaced wood as a fuel to promote evaporation. Peat was also used as a heat source.

Andrew Fielding also leads a community of interest in salt called Ecosal. Its website at www.ecosal-uk.org.uk is dedicated to preserving the history and heritage of traditional salt making.

The market for salt was local, national and global, so improving transport links were a key factor to the growth of the Cheshire salt business from the industrial revolution onwards. Transport was a key issue for the brine industry, both to bring coal into Cheshire for power and salt evaporation and to take the salt away for processing, export and domestic sale.

Mike Nevell, of the University of Salford, outlined the growth of canals, railways and road links taking salt out of the area – and bringing coal in. Roman roads converged on the salt districts. Medieval salt movements relied on packhorse trails and a number of “saltway” roads and bridges survive. One of the author’s favourite pubs, the Cheshire Cheese at Hope in Derbyshire, is on the traditional salt carrying route from Cheshire across the Pennines to Yorkshire through Edale. The alkali industry of the industrial revolution was driven by demand from textiles and the very early Sankey canal in Lancashire brought cheap coal to Widnes and Runcorn where it met salt brought up the River Mersey. The volumes of trade were huge. By the mid 19th century, the Weaver Navigation alone was handling 779,000 tons of cargo in a three year period, of which 500,000 tons was salt.

Wild Brine Pumping

A joint paper by Kerry Kirwan and Steve Broadfoot outlined the remarkable survival of the Murgatroyd’s Brine Pumps at Middlewich. When wild brine pumping ceased as a result of legislation in 1977, the workforce at the Brine Pumps walked out leaving their coats, safety boots and food tins behind. The door was locked and the works was left as a time capsule. The Middlewich Heritage Trust later moved in to and stabilised the building. They now have funds for restoration work from a variety of different sources and a gifted team of volunteer helpers. The works is well documented and researched. Two of the electrically driven beam pumps survive above the open shaft. The Trust plan to open up and interpret the site. Their next task is to remove the wooden gantry above the pump house for conservation work. Although the pump house is currently hemmed in by industrial property and a railway line, future changes in land-use are likely to open up the area for visitors.

A paper discussing the Lion Salt Works itself by Juan Cunliffe was really a detective story on different aspects of the engineering of the works. Salt works engineering was not sophisticated. It was more like vernacular millwork than considered design. The works was subject to substantial corrosion and ground movement so sophisticated technology was not the order of the day. It is clear that a local boat builder at Northwich helped with pump construction. But it is still not clear who supplied the surviving steam pump at the site. There is no nameplate on the engine and no names on the blueprint. Perhaps they were making do with a second-hand engine. Pumps sent the brine to a 30,000 gallon cistern which fed various evaporation pans by gravity. The evaporation pans themselves corroded with the salt and buckled in the face of heat. Salt works were high maintenance facilities. Single phase electricity reached the site in 1934, but eventually high voltage supplies arrived in the 1960s which allowed electric motors to replace steam power.

Controlled Solution Mining

The story of salt in Cheshire continues. The modern salt industry uses “controlled solution mining” - a method of salt extraction that does not cause land subsidence. Jon Whieldon of INOVYN

– a wholly owned subsidiary of the UK based chemical firm INEOS - explained clearly how salt is still being extracted in a controlled way from carefully shaped underground caverns beneath Cheshire. Some 2.8 million tonnes of salt is extracted each year from the 2,500 acre Holford Brine Field using 200 miles of buried pipework. The industry is invisible beneath agricultural land. The underground caverns are carefully shaped with the help of an air blanket and the brine extracted for some 20 to 30 years. The cavities are checked for shape using regular sonar surveys and the land closely monitored to avoid any subsidence. The cavities each yield about 2½ million tonnes of salt. The finished cavities are half the height of the Eiffel Tower and reach up to 1 million cubic metres. The worked out cavities are used for a variety of purposes, notably high pressure natural gas storage for prompt peak use in power stations.

Modern vacuum evaporation is a much more energy efficient process for manufacturing salt from the resulting brine. The wild brine pumped into the Lion Salt Works was not treated before use. The main contaminants were calcium and magnesium salts which were deposited as scale on the open iron evaporation pans. The Lion Salt Works pans were manually descaled early on Monday mornings at the start of the weekly production cycle. Nowadays all “solution mined” brine is treated before use. The “Brine Treatment” plant at Lostock purifies all the brine sourced from the Holford Brine field, for instance

Future Topics

There were inevitable omissions in a day’s packed programme which might find coverage in a future symposium on salt. The brine fields around Fleetwood in Lancashire were exploited by the United Alkali Company to overcome the monopoly of



Salt works are basic engineering. A simple fail-safe connector in the pump rods at Lion Salt Works.

Murgatroyd’s brine pumps at Middlewich closed with the end of wild brine pumping in 1977. The workforce abandoned their work shoes and coats and left.



the Cheshire Salt Union. Fleetwood Public Library has an excellent photo collection, including the brine fields and a salt mine on the east bank of the River Wyre and a multi-volume set of photos of the local Ammonia Soda Works. There are other “halite” deposits too – at Kilroot, in the Isle of Man, at Walney Island in Lancashire and right down the east coast of Yorkshire to Hornsea. Nor was there time for coverage of the giant chemical industry spawned by salt supplies in Cheshire, including the Castner-Kelner chlorine plant at Weston Point, or the soda ash plants of Winnington, or the legacy of local ICI research, including the discovery of PVC.

The symposium was so popular it made an unanticipated profit. The surplus revenue was donated in equal measure to the Lion Salt Works Trust who helped the Society stage the event, to Middlewich Heritage Trust for their scheme to restore the Murgatroyd brine pumps, and to the Newcomen Society itself.

The Conference is best summed up by an e-mail of spontaneous feedback the next day: “This conf (in the spanking-new Conf’ room upstairs in rebuilt ‘Stove House 5’) was outstanding - an entire industry history ‘in your hands’ in only 6 papers, everything from Pre-Roman period to latest 2018, and everything from basic geology (excellent!) to documentary history, to process Chem Eng’, to steam power to salt product transport to the latest modern pumped-water ‘solution-mining’ by Inovyn at Holford (200! created cavities over 2500 acres!!!)”

Our warmest thanks to Philip Ingram and Andrew Cunningham of Newcomen North-West who organised the event; to the Lion Salt Works Trust who supported the idea of a symposium on salt from its inception; and to the enthusiastic local supporters from Cheshire West Museums and Middlewich Heritage Trust. This Symposium was a model of how a learned society can work with a museum and conservation bodies to enhance knowledge of a technology, develop new audiences and



Steve Broadfoot, Trustee, Middlewich Heritage Trust (left) and Kerry Kirwan: Heritage Development Officer, Middlewich Town Council & Middlewich Heritage Trust (right) receive a donation from the Newcomen Society to support restoration of Murgatroyd’s brine pump.(copy-right Tony Leonard)

All images ©Jonathan Ayles 2019

widen the constituency of visitors.

Papers from the Symposium are to be found on Newcomen’s YouTube channel – simply Google Newcomen on YouTube and click on the link. The Lion Salt Works is discussed by Philip Ingram in Newcomen Links 227.

A Heritage Service



Robert Carr

The world’s only remaining, year-round, regular passenger hovercraft service operates between Southsea on the English mainland and Ryde, Isle of Wight - taking just under ten minutes. It has been in operation for 50 years and is now almost a heritage service. Although Hovertravel currently operate two

quite recent Griffon 12000 TD hovercrafts, Solent Flyer and Island Flyer, built in 2016. Powered by a pair of MAN diesel engines they have a maximum speed of 50 knots and can carry 80 passengers. Having just two engines instead of the customary four has resulted in a fuel saving of up to a third. The photograph shows one of these hovercraft about to hit the beach at Ryde.

Newcomen Links 249 March 2019

Drop Compasses

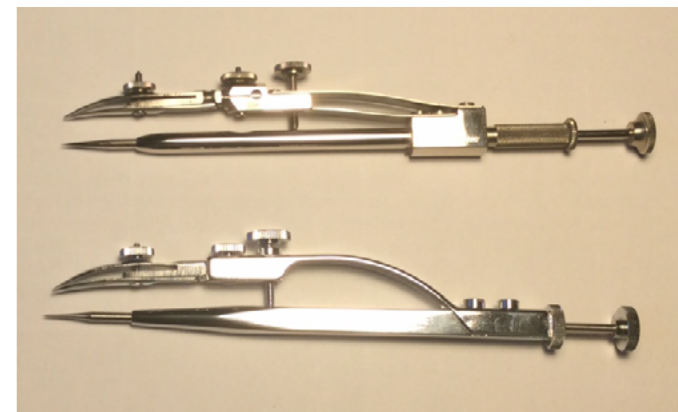
Ivor Lewis

I have given the talk I prepared just over two years ago on the Evolution of the Drawing Office to four Newcomen branches and those present at each one gave me more useful information. Now I am in the process of writing it all up into a paper for the Journal.

Following my talk to Newcomen Midlands in Birmingham, Christopher Hammond contacted me with the following question: *I have a compass made by Kern (Switzerland) called I believe a ‘dropping compass’ - the pen or pencil slides up and down on a slider and circles of radius up to about 10mm max. can be drawn. What (in the drawing Office) was the particular application of this compass? What were its advantages over a spring bow compass?*

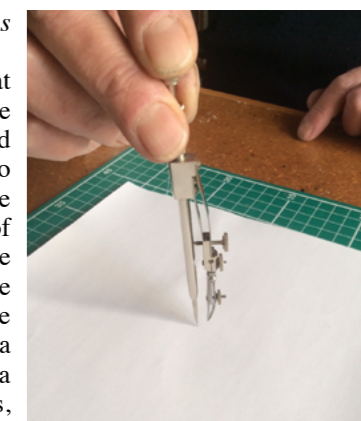
I have to make clear that although I worked closely with draughtsmen and the drawing office in the first part of my career when I was designing computer hardware, I have never been a trained draughtsman. I have a typical drawing instrument set but I had not heard of this one but many of the knowledgeable members of the Society may have. The lecture did not cover draughtsmen’s instruments at all but a past Newcomen paper looked at the common drawing instruments used. This paper covers several different forms of compass but not this type which seems to be more widely known as a ‘drop’ compass.

Some digging on the internet led me to a link with a short outline of the compass and its specific use which I draw to the attention of members. Its design helps the draughtsman create a very small radius arc without any danger of overrun because one can hold the compass still and raise the pen before removing it from the drawing. It was often used for mapping to draw a range of features including roundabouts, circuses and gas holders. The parallel pen attachment, seen clearly in the photograph of the Kern Compass, was used for ink work, the line weight being set with the adjustable blades. Unlike a conventional compass, the drawing arm could be lifted off or lowered onto the drawing material while the point remained in position. It also came with a separate graphite lead attachment. Mr Hammond writes that: *As with you, all this is a complete revelation-I did not know that such a thing as a drop compass existed until a few weeks ago when a friend gave me a rather nice set of drawing instruments which*



Two drop compasses. The top one is German-made ‘Precision’ and the lower one is Kern, Swiss-made.

Drop compass in use showing the sliding pen attachment.



included this mysterious item.

We believe that the 80th anniversary of the Kern Compass mentioned on the website is more to do with the founding of the company than the date of its introduction as the ‘Free Dictionary’ also has an article (Compass) taken from The Great Soviet Encyclopaedia (1979), which includes a drawing of a drop compass, also known in Russia as the Balerinka or Little Ballerina -the reference being we suppose to the fact that the compass can stand on tip-toe! There are drop compasses offered on e-bay (Makers: Alvia, Dietzen, Rotring, Vemco).

Here are 3 photographs supplied by Mr Hammond.

Please send any further information about unusual drawing instruments or about the drop compass to the editor at: editor.links@newcomen.com

References

1. See Dr Dickinson’s paper to the society in 1950. TNS,27, A Brief History of Draughtsmens Instruments
2. Link is: <https://www.az.co.uk/blog/80th-anniversary/drop-compass/>



Case of drawing instruments (German-made ‘Precision’). The drop compass is top left.

All images ©Christopher Hammond 2019

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John Cobb's Land Speed Record Car

Dr Jim Andrew began his lecture on spoke about "John Cobb's Land Speed Record Car" by giving a brief history of the Land Speed Record for land vehicles. It increased from 39 mph to over 300 mph by the early 1930s and was soon established as two runs in opposite directions, within one hour, over a measured mile. By this time British drivers and manufacturers dominated these record breakers and this continued into the 1960s.

In the middle of the 1930s a duel developed between John Cobb and George Eyston, both were well known racing car drivers who had already established other records with a variety of cars. George Eyston took a series of class records in MG cars and had an even faster car, named *The Speed of the Wind*, which was very successful. He designed his own cars including *Thunderbolt* his Land Speed Record contender, which was built at the Bean motor works in Tipton. John Cobb was a fur trader and amateur racing car driver who commissioned Reid Railton, an established record breaking car designer, to build a monster racing car, which established the all time lap record for the Brooklands circuit at 155mph. That car used a 500hp Napier Lion aero engine. An image shows it at speed, with all four wheels off the ground at Brooklands. Cobb's Land Speed Record contender was a Railton design built by Thompson & Taylor (Brooklands) Ltd.

Cobb's Napier Railton car used two 1,250 hp. Napier Lion engines tuned from the 1918 design of aero engine, which had been modified over the years, with output rising from 450 hp. to some 1,350 hp. for high speed seaplanes in the 1930s. Eyston's *Thunderbolt* used two 2,350hp. Rolls Royce aero engines, which had been developed in the 1930s, also for high speed seaplanes. Clearly, there was quite a discrepancy between the 2,500 hp. of Cobb's car and the 4,700hp. of Eyston's yet Cobb's car eventually achieved over 400mph against some 360 mph of Eyston's. Comparing these two vehicles showed how Reid Railton achieved a high level of optimisation compared to Eyston's large and heavy design.

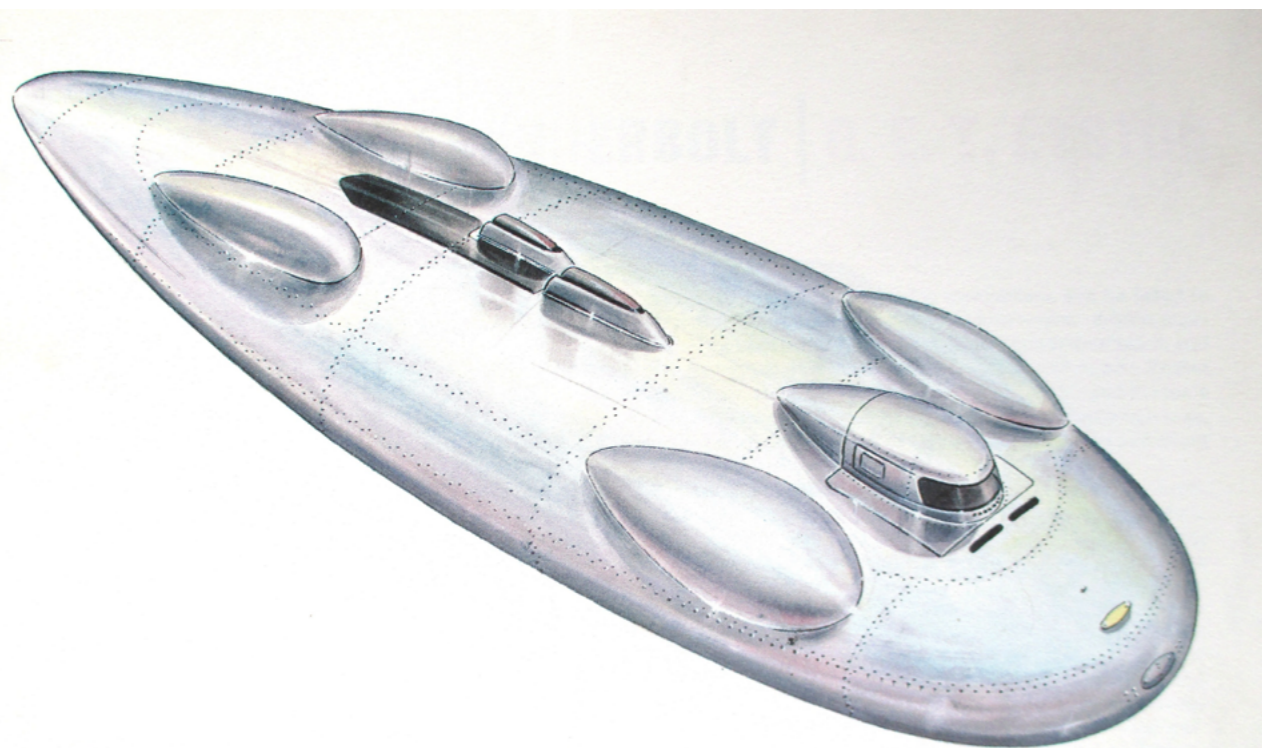
George Eyston's car weighed about seven tons with the power applied to the single rear axle with just two wheels. It had four front wheels on two axles and the engines sat side by side in a conventional vehicle chassis and with conventional water cooling. It had a conventional body with opening panels giving access to the engines for servicing. It first set the record

in November 1937 with 312mph before raising the record to 345 in August 1938. John Cobb's car weighed little more than three tons with an "S" shaped spine chassis and with the two engines hung on opposite sides of the chassis. The rearmost engine drove the two front wheels, with a differential between them, and the front engine drove the rear wheels which were close enough together not to need a differential for the gentle turns envisaged for its record breaking task. The Cobb car was probably only two thirds the height of Eyston's car with a streamlined light weight body which was lifted off for servicing, by a team of sixteen men. The Napier Lion engines were cooled from an ice tank, refilled between runs, rather than a conventional radiator.

Cobb raised the record to 350mph in September 1938 but Eyston raised it to 357mph within days. Cobb returned to site of these high speed runs on Bonneville salt flats in the USA in 1939 and raised the record to 369mph where it stayed through World War II. Cobb took the car there again in 1947 to set the record at 394mph with a 403mph run in one direction. Later analysis showed he reached over 415mph at one point on the faster run.

Cobb's record stood until 1964 when Donald Campbell set a new record at 403mph in Australia and also entered the record books in another way. His father had held both the world land and water speed records but Donald went one stage further by also taking the water speed record in Australia in 1963. Thus the Campbells were the only father and son to hold these records and Donald the only person to hold both in the same year.

Sadly, John Cobb was killed attempting the world water speed record in 1952. The car was bought from Cobb's estate by the Dunlop Rubber Company which used it for promotion at various motor shows before presenting it to Birmingham Museums & Art Gallery in 1954. It was sent for display at various motor shows in the USA and Europe before permanent display at the old Museum of Science and Industry in Newhall Street. It was relocated to Thinktank, the Birmingham Science Museum in 2001 where it remains on display on the ground floor and therefore in the front window. It now has suitably realistic replica wheels and tyres, on the sunlit side to preserve the tyres from bright sunlight. This vehicle held the Land Speed Record from 1939 until 1964 a longer period than any other vehicle and a testimony to the driver and to Reid Railton the designer.



Reid Railton's design of 400mph car for John Cobb

Geoff and Janet Wallis visited fascinating collections in New Zealand

The magnificent scenery, mild climate and friendly people bring visitors to New Zealand. Last autumn (spring in NZ) we had the pleasure of touring the 'Land of the Long White Cloud', inspired to some extent by Professor David and Olwen Perrett's 'tour de force' report in NLinks 241 and 242. Amongst the snow-capped mountains, shimmering lakes, hot springs and lush forests some fascinating technical museums can be found and are a pleasure for anyone interested in engineering heritage. By the 1850s settlers from Britain had brought technology and hardware with them. Much of this is now exhibited in New Zealand's many museums.

The most common manufacturer was Tangye of Birmingham who established offices in Melbourne and Sydney in the late 1870s, and subsequently sold through John Chambers of Auckland who married a Tangye daughter. Sales of these well-constructed, reliable stationary engines were no-doubt stimulated by Tangye winning nine medals at the Sydney exhibition in 1880. We found at least one Tangye engine in every industrial museum we visited, and the steam pumps of J & G Weir of Glasgow were similarly common. Most of the other well-known British manufacturers were well-represented too, together with some lesser-known ones.

Tokomaru Steam Museum, Nr. Palmerston North.

www.tokomarusteam.com
www.uniquelynz.com/tokomaru.htm#part3

Probably the largest collection of steam engines is at Tokomaru Steam Museum near North Palmerston. The Museum was closed and up for sale, but we were keen to see it, so pushed open the driveway gate and ventured in, soon to be met by the owner, Esma, a friendly lady who kindly agreed to unlock the vast building and show us around on payment of an entry fee of £5 each.

On entering the 2,200m² main building we were delighted to see that all the engines were still in place, each lovingly covered with dust-sheets. The museum is the life's work of Esma and Colin Stevenson. Their interest in steam began in 1963 with the purchase of a 1904 Fowler traction engine, which they restored over three years. Colin's horror at the amount of machinery being scrapped drove him to save whatever he could, usually at his own expense. 'If you can shift it you can have it'. As Esma

says 'If we had started five years earlier we could have saved so much more'. With enthusiasm, total dedication, much hard work, and help from friends they collected more than 60 engines, mostly of British origin as shown on the inventory, Figure 1.

The most inaccessible engine Colin saved was a derelict 6 hp traction engine used in a sawmill in Bainham. When the mill acquired a new D2 bulldozer, they took their 'old faithful' to the top of a hill, built up a full head of steam, tied the steering and let her go. Museum visitors told Colin of its final resting place, so after tramping through bush and fording several streams he found her where she landed in the bottom of a gully, barely damaged, a tribute to the strength of her construction.

By far the biggest engine in the collection is a 70T Filer & Stowell Corliss valve steam engine and ammonia compressor supplied in 1916 to the Imlay Freezing Works, Wanganui, where it produced 200 tons of ice a day for the



meat trade. The Works had in fact ordered two big Robey steam compressors which were sent out from England on different ships, but one was torpedoed by a German submarine. Filer & Stowell of Milwaukee were able to offer the earliest delivery of a replacement, which was landed at Wanganui later the same year, for a price of \$US 13,025. The engine's biggest single component is the giant 16ft diameter flywheel weighing 13.3tons. The story goes that when the flywheel arrived at the freezing works one half was painstakingly manoeuvred off the vehicle and lowered to the ground, where it slowly sank out of sight in soft ground and took six weeks of digging to retrieve.

Moving the engine to the museum in 1976 was difficult and costly, requiring large temporary steel gantries to be made specially. Massive parts were dismantled and manoeuvred over wooden floors on steel beams to spread the loads, whilst below pipes carrying ammonia

gas would have given the team only a few seconds to escape the building if damaged.

The flywheel halves are held together by vast bolts and 3 inch thick dumb-bell-shaped inserts set on hot to pull the halves together. These had to be heated to dull red heat and levered out of their recesses, and then four 3 inch diameter 30 inch long hub-bolts each weighing 86 pounds were unbolted and driven out. Dismantling and removal of the whole engine took three men just six weeks.

The earliest engine in the collection is claimed to be the oldest working steam engine in New Zealand. It is an 1869 twin cylinder horizontal winch engine by Appleby Bros. of London which worked at the Patent Slipway, Evans Bay, Wellington where it could haul up ships of 2,000 tonnes.

We live in Bristol so of particular interest to us was a horizontal engine made by the little-known iron foundry of Brown and May nearby in Devizes, Wiltshire. In the 1860s the company advertised portable and traction engines, but this was a stationary engine used in the Manawatu Knitting Mills, running 40 machines from a countershaft.



Another interesting engine was a 1929 Marshall Sons & Co (Gainsborough) road roller with vertical 'coffee pot' boiler and steering engine to turn the front roller. This rare machine, formerly owned by Christchurch City Council for road-making, is still in working order, and is said to be one of only two in existence.





Similarly rare, with pumps lavishly engineered from bronze, is a duplex vertical pump made by Thomas Lamont & Co. of Paisley. Steam for the museum is supplied by a 1956 oil-fired boiler made by Daniel Adamson of Dukinfield, England. A 3ft 6in gauge railway (standard for New Zealand) runs all round the 4.8 hectare property, graced by the local



1886 station building which became redundant, was sold as firewood but saved by the Museum. Numerous models are also on display, including a fine example of Kiwi engineering, a model of the locomotive "Britannia".

The museum has been open for 45 years and the Stevensons were still collecting when in July 2017, sadly, Colin died. So Esma, now a spritely octogenarian, decided it was time to sell. She refused numerous offers for particular engines, and has found a buyer for the entire collection. We wish Esma and the Museum well.

Fiordland Vintage Machinery Museum, Te Anau

www.fiordlandvintagemachinerymuseum.nz/

Initially we drove past Fiordland Museum, not expecting it to be housed in a vast, modern shed on an industrial estate. However, walking through the front door revealed an Aladdin's cave on an industrial scale of thousands of historic items stacked up to the roof, everything from a Moa leg-bone to a mower, tools to tractors, sewing machines to sheep-cages. We were welcomed by Brian Risk, a prime-mover in the museum's development. The Te Anau Vintage Machinery Club was set up in the 1970s to preserve anything historic and the collection soon grew, stored on four acres of donated land. Volunteers got involved to save a derelict steam locomotive made in 1878 by Rogers Locomotive Works of



Paterson, New Jersey. It was dumped in a river in 1928 to stabilize the banks. In 1985 they excavated it, craned it out and restored it to working order. The project nearly bankrupted the club and it had to be sold, but the locomotive is still on display elsewhere in South Island. Then the town's 1838 disused wooden schoolhouse arrived, followed by the complete contents of the local blacksmith's shop, and a number of donated private collections.

As the nearby town of Te Anau grew, land values rose, and the museum's leadership saw an opportunity to provide for the long-term future. They sold half their land and constructed 16,000ft² (approx 1,600m²) of new buildings comprising a general display space, tractor-shed and large conservation workshop for the use of members. Recently further sheds have been added, funded by members buying shares in exchange for use of a bay of the building for 10 years, after which their space reverts to the museum.

With good storage facilities more members now loaned or donated their collections of tools, lamps, cars, motorcycles, tractors, baseball caps, outboard engines, farm equipment, domestic items, and much more. Donations arrive monthly and as Brian remarked 'We have become a heritage dumping ground.'

The volunteers haven't yet catalogued much of the collection, but our list, Figure 2, provides an (incomplete) overview. Several unusual exhibits caught our attention including a clever device made by the US firm Foley. It reproduces accurately human filing action to sharpen saws.



An early 20th century milling attachment for cutting the longitudinal slots in a commutator or armature bore the name of lathe-makers Joseph Weidenhoff of Illinois. There were a couple of tubular devices into which explosive was packed



for the purpose of splitting logs, an axe said to be made of cast iron, and a hand-operated reciprocating saw for cutting through railway lines.

One of the biggest exhibits is a Clayton & Shuttleworth thresher, unrestored but complete and in fair



condition. A photograph on display shows the thresher being hauled by a 1907 Burrell traction engine, accompanied by two living vans. The threshing-contractor's men would live in these for the whole season, so that the vans were unkindly nick-named 'the smellies'.

Storage conditions in New Zealand's mild climate are good so most items are in a stable condition. Volunteers restore their own machines and display them in the museum, and many may eventually be donated to the permanent collection. The museum is an incorporated society and registered charity which holds donated items in trust.

This remarkable set-up has some weaknesses but also considerable strengths. On the downside items are not accessioned or catalogued, there is no professional curatorial oversight, and interpretation is patchy. However, on the

positive side the storage and workshop facilities are of a standard that would be the envy of any national museum, and the property is owned by the club, free of debt. There are no paid staff, yet the site is open daily, manned by a rota of knowledgeable, enthusiastic volunteers. Overheads and hence entry fees are low and so are attractive to visitors. The Museum is sited near the main road to Milford Sound, one of New Zealand's biggest tourist attractions, and well-known in its locality, with space for further development.

The interaction between volunteers and visitors creates interest for both. The vast scale and diversity of the collection are seen as great strengths because new members and visitors can always find something of interest. The leadership believes that this, together with its other strengths, give the museum a bright future. Our thanks go to Allister Hartley, President, Bob Anderson, Secretary & Treasurer, and Brian Risk, Immediate Past President, Life Member.

TSS Earnslaw

www.realjourneys.co.nz/

No steam-buff's visit to South Island would be complete without a trip on the Twin Screw Ship (TSS) *Earnslaw*, the only hand-fired coal-burning ship



working in the southern hemisphere. She was built in 1912 by McGregor and Co. in Dunedin to serve the isolated communities, and included carrying sheep, along the shores of Lake Wakatipu. She was dismantled after construction, the ¼ inch steel hull plates numbered, loaded on to a goods train, and transported across the South Island for reassembly on the Lake. The 340T ship is powered by two triple-expansion, jet-condensing, vertical engines rated at 220 HP each, supplied by two fan-assisted fire-tube boilers working at 160psi, giving a respectable cruising speed of 13 knots.

She was nearly scrapped in 1968 but saved by Real Journeys, the company who now operates her. They refurbished her, covered in the deck to create a passenger saloon, and now operate her 12 hours a day, 11 months of the year. *Earnslaw* is popular with tourists, sailing from Queenstown. On our 90 minute, lake-cruise we sailed serenely through the mountains, whilst enjoying the steamy sights and sounds of an open engine-room. The ship is beautifully maintained and she keeps well to timetable. The twin screws

can rotate on her axis, making docking an apparently effortless operation as efficient as on a modern ship with side-thrusters.

Her re-coaling operation was a pleasure to behold. A coal-truck backs up to the ship alongside and tips onto the side deck from where coal is shovelled through holes into the bunkers below and the whole area washed down, all within 15 minutes. The ship can carry 14 tons of coal in bunkers on either side, so a large concrete block on the foredeck is moved by the ship's derrick as necessary to trim her. The crew were professional, knowledgeable and friendly, whilst continually alert for the call of the traditional mechanical telegraph. Passengers are welcome to stroll around the engine-room on a grating immediately



over the engine throughout the voyage. and experience steam as soon as they embark as warming through the engines fills the saloons. They can see a steam capstan by Emerson, Walker & Thompson Bros. of Gateshead and steam winch by



Robert Roger & Co of Stockton on Tees.

Steam Scene, McLean's Island,



Christchurch

www.steamscene.co.nz/

The Canterbury Steam Preservation Society Inc is on a spacious site with a large steam-powered sawmill, miniature railway, and full-size 'bush-tramway', so-called to avoid legislation governing light railways, such as not running after sunset. The collection includes over 30 steam engines, many of British origin, and most in a steerable condition. A Tangye 'Colonial' Engine can be seen



here. An 1880 Shand Mason stationary fire-pump was originally installed in the Islington Works of the Christchurch Meat Coy Ltd where it fought several fires, and from the Kaiapoi meat freezing works a large horizontal a m o n i u m compressor made by Haslam & Co of Derby.

Unknown to me is the Bumstead and Chandler of Cannock Chase Foundry, Hednesford, Staffordshire who were in business from 1892 to the 1920s. One of their twin-vertical 'High Speed Silent Engines' is on display in working order. Several 20th century electricity generating engines are steamed, including a 1913 vertical single engine by Alexander Shanks & Sons, Arbroath, with a crankshaft mounted governor. The Museum proudly hold two generations of steam-generating sets from the steamer TSS Earnslaw, the original 1912 Sunderland Forge & Engineering Co. vertical single engine and its replacement Belliss & Morcom twin vertical.

A horizontal twin dynamometer engine made by J & H McLaren of Leeds in 1894 is probably unique. It was installed in the School of Engineering at Canterbury University College where it would have been used to teach students how to take and interpret indicator diagrams, (graphs of cylinder pressure vs piston stroke) and compare these with shaft horse-power to assess the engine's power and efficiency. Power was calculated from the crankshaft's speed, and the energy extracted from its two flywheels. These were braked by tensioned ropes which heated

the flywheels. The heat was extracted by running water through channel-shaped rims, collected by small scoops just missing the fly-wheel's arms. Energy was calculated from the water-flow and degree of heating. Obtaining reliable results from this system would be difficult and time-consuming, but such machinery was an important part of steam engine-development, and is now rare.

There are also models from



Canterbury University that demonstrate unusual drives. There are three-dimensional skew hyperbolic drives, rod-couplings, a plate worm, and spur gears that prove that for 1:1 ratios wheels don't have to be circular!

Our thanks go to Peter Boyes and Lindsay Marshall for arranging our special steaming.

Notes

1. Newcomen Links 241 March 2017 North Island and 242 June 2017 South Island
2. See History of Tangyes, Part 1. www.internal-fire.com/tangyebook/tg1.hgm
3. From "The Tokomaru Steam Engine Museum", reproduced by permission of Esma Stevenson

Figure 1 Exhibits at Tokomaru Museum Supplied by Esma Stevenson October 2018, with additions by Geoff Wallis.

1. Filer & Stowell Engine & Compressor 335 h.p. ex Imlay Freezing Works Wanganui.
2. Browett, Lindley Engine 200 h.p. ex Otira Tunnel ex Summit Timbers Kuratau.
3. Marine Engine built by Otago Foundry ex Riverton ex Patea Dredge.
4. Caledonian Horizontal ex Dairy Factory Westmere.
5. Tangye Single cylinder ex NZ Dairies Hamilton ex Summit Timbers Kuratau.
6. Brown & May single cylinder ex Manawatu Knitting Mills Palmerston North.
7. Bellis & Morcom ex Manawatu Knitting Mills Palmerston North.
8. B. W. Sisson 50 h.p. ex Wellington Milk Treatment Otaki, ex Denna Bros Waipukurau.
9. Bellis & Morcom 225 h.p. and generator 150 KVA ex Waingawa Freezing Works Masterton.
10. Tangye Vertical 150 h.p. ex Summit Timbers, Kuratau.

11. Single-acting twin cylinder Berry Engineering Works Palmerston North.
12. Sembow U.S.A. ex Massey University Palmerston North.
13. American make unknown Wellington Technical Institute.
14. Tangye 4 h.p. ex Gardner & Yeoman sawmill Whakarara.
15. W. Allen & Son single cylinder 550 r.p.m. 50 h.p. ex Power House Evans Bay Wellington.
16. Tangye coupled engine 138 b.h.p. ex Gardner & Yeoman Whakarara.
17. Reader & Son single cylinder 1944 ex Auckland Hospital.
18. Bellis & Morcom vertical tandem comp ex Power House Evans Bay Wellington.
19. Browett Lindley 100 h.p. ex Summit Timbers Kuratau.
20. Day Summers Winching Engine ex Patent Slip Wellington.
21. Howden Engine & Generator 1943 (new) ex HM Dockyard Devonport Auckland.
22. W. Sisson single cylinder 1944 ex Auckland hospital Auckland.
23. Steam Hammer (Peter Pilkington) ex Gear Meat Co Workshops Petona.
24. Tandem Compound Horizontal Engine over 100 years old ex sawmill Hastings.
25. Bellis & Morcom V-type valves & generator ex Gear Meat Co Petona.
27. Howden HS Engine & Generator 1953 new ex NZ Navy Devonport Auckland.
28. Log Hauler built Vulcan Foundry Napier NZ ex Gardner & Yeoman Whakarara.
29. Daniel Adamson boiler ex Milk Treatment Plant Palmerston North
30. Vulcan Log Hauler Boiler made Napier ex Taylors Laundry Palmerston North.
31. Cochran Boiler made Scotland 50 h.p. ex Gas Works Palmerston North.
32. Sir William Bailey Steam & Vacuum Pump Engine ex Dairy Co Midhurst.
33. Ingersoll Rand Steam Air Tandem Engine ex Patent Slip Wellington.
34. Bryan Donkin large engine ex Gas Works Miramar Wellington.
35. Bellis & Morcom single cylinder 1944 ex Gas Works Miramar Wellington.
36. Bryan Donkin vertical single cylinder & exhauster ex Gas Works Palmerston North.
37. Bryan Donkin horizontal engine & exhauster (1925) ex Gas Works Palmerston North.
38. Appleby Bros Winching Engine 1869 ex Patent Slip Wellington.
39. W. Sisson large vertical engine ex Gas Works Miramar Wellington.
40. Hercules Compressor over 100 years old ex Freezing Works Ngauranga Wellington.
41. Manning & Wardle Locomotive ex Imlay Freezing Works Wanganui.
42. Fowler Locomotive ex Napier Harbour Board Napier.
43. Price C. Bush Tramway Locomotive ex Taringamotu.
44. Climax 522 Bush Tramway Locomotive 30 tons ex Mangapehi.
45. Fowler Locomotive ex m.o.w. ex Army Camp Linton.
46. Automatic Boiler (Daniel Adamson) 1948 ex Milk Treatment Station Palmerston North.
48. Aveling & Porter 5 h.p. steam roller ex County Council Dannevirke.
49. Marshall 5 h.p. Steam Roller 1929 ex Christchurch.
50. Fowler Traction Engine 1904 No.9890 ex Otane.
51. Aveling & Porter portable 16 h.p. ex Geraldine.

Engines in storage

- Bryan Donkin Co ship winch engine No 6045 ex Summit Timber Kuratau.
 Bryan Donkin Co engine built 1925 ex Gas Works Palmerston North.
 Browett Lindley Ltd No 2913 200hp CMP ex Summit Timber Kuratau.

- Bellis & Morcom Ltd No 6779 90hp ex Power House Evans Bay Wellington.
 Greenwood & Batley Leeds England No C1 731 12hp 144Orpm ex Power House Evans Bay Wellington.
 Tangye Vertical (small) ex Ross South Island.
 Ruston & Hornsby Threshing Mill 1925 4'6" drum ex Hastings.
 Marsh & Sons reciprocating steam saw 7ft blade ex Summit Timber Kuratau.
 The Hardy Patent Pick Co Ltd Sheffield England ex Kaitangata Coal Mine South Island.
 E & G Hall Dartford England vertical No 19395 ex Gas Works Napier (built 1880).
 R G Ross & Sons Nottingham England 1892 No 1049 Steam Hammer ex Kaitangata.
 Andrews & Bevan single bag threshing machine ex Grasslands Division Massey University Palmerston North.
 Weir Turbine 1927 No B8182 ex Power House Evans Bay Wellington.
 Aveling & Porter portable engine 1896 16hp. This engine had to be towed by horses to the job, then used as a stationary engine driving off the large fly wheels. Last used Geraldine South Island. Then purchased by Aveling & Barford Upper Hutt, who donated it to the Museum.
 William Simon & Co. 1904 triple expansion engine from the Murihiku Dredger used by Southland Harbour Board, Bluff. Saved from scrapyard.
 Thomas Lamont & Co. Paisley, duplex feed pump.
 Priestman (Hull) 1947 steam face shovel, and a Priestman crane.
 Several Weir feed pumps and many other historic machines and parts.

Figure 2 Overview of exhibits at Fiordland Vintage Machinery Museum, Te Anau.

- Note: This is not a complete inventory, but provided to illustrate the diversity of the collection.
- Tractors & Crawlers: 65 No examples from around the world, mostly British and American manufacture.
- Cars: 1958 Vanguard saloon converted to a pickup, Renault Frigate car, Morris Minors (2), Austin 7, Morris 8's (1937 & 1942), Austin A30 'baby Austin'. Early Landrover under repair.
- Motorcycles: Velocettes (4), BSA's (3), James, Nortons (2) including a rotary-engine Interpol, and early NZ-made farm bikes.
- Bedford truck
 Caterpillar grader, and a Farmall M tractor converted into grader
 Large collection of early agricultural implements
 R. A. Lister stationary engines (4), including one with multiple sheep-shearing gear.
 Agricultural, forestry and & woodworking hand-tools in several displayed collections.
 Avery weighing machines (4)
 Early manual drill presses (13)
 Petrol-engine chainsaws (11) and small petrol engines, various (8)
 Milk churns (6)
 Paraffin Lamps, various (30)
 Early bottles (80)
 Mowers (4) and rotary hoes (6)
 Trusty walk-behind tractor with plough, discs, cultivator, & trailer seat
 Mogul horizontal engine
 Allis Chalmers "roto bailer" machine
 Chaff cutter and cattle-cake breakers (2)
 Tin threshing mills and flour mill
 Outboard engines (8)
 Early hydraulic and rack-type cart-jacks
 Baseball caps with suppliers' logos. (Estimated over 400 No.)
 Singer sewing machines (4)
 Telephone exchanges, manual operation (2)
 Mechanical cash-registers (3),
 Small pedal-powered organs (2)
 Collections of early domestic utensils, clothing, radios, TVs, tobacco tins, photographs, etc.
 Complete black-smiths shop with hearth, bellows and many tools.

Obituaries

Lawrance Hurst, engineer and construction historian



Lawrance Hurst, one of the most highly respected engineers and engineering historians of his generation, died on 10 November 2018 after a short illness. He was born in 1934 and in 1943 went to Oundle School where he was inspired by their workshops and printing press. He then gained a civil engineering degree at City and Guilds before National Service in the RAF. His first appointment as an engineer was with Andrews Kent and Stone but after 10 years he joined Hurst Peirce and Malcolm (HPM), the consulting engineering practice his father had founded in 1910, eventually becoming senior partner in 1991.

Lawrance contributed significantly to the history of 19th and 20th century engineering and building construction and materials. His study of the development of fire-proof construction showed that it accelerated the introduction of cast, then wrought iron, and eventually steel into floors, and the introduction of reinforced concrete led him to study modern cements and mortars, and later terra-cotta. Once his curiosity had been aroused by a building he worked on, he would then study contemporary documents to broaden his knowledge and give it a context. Over time he built up a substantial library centred on these subjects. This remains with HPM who hope to keep it widely accessible, reflecting his profound conviction and personal practice that engineers have a professional duty to share their knowledge as widely as possible. He wrote a number of articles and book chapters, while many more publications include a note of thanks for his generosity in sharing information and experience. His knowledge and experience, both practical and 'book' learning, combined with his personal qualities, led to him advising the Royal Albert Hall for many years on how best to care for the building.

He gained wide experience and respect as an engineer advising on party walls, being elected as the Pryamus and Thisbe Club's Chairman in 1996 after helping to produce "The Party Wall Act Explained", otherwise known as the "Green Book",

and producing their guidance note 10 on 'The Role of the Advising Engineer'.¹ He continued to assist with party walls for many years after he had nominally retired in 1999. He gave long and broad service to the Institutions of both Structural and Civil Engineers, being awarded the former's Lewis Kent Award. He served on both their Professional Conduct Committees, for which his fairness, integrity and breadth of experience were much valued. He was a founder member of the Antiquarian Horological Society and his passion for clocks and watches led to membership of the Clockworkers Company: the preservation of whose collection of historic timepieces he helped ensure by negotiating its transfer to the Science Museum. For 14 years he was also my precursor as Convenor of the Structural's History Study Group.

Lawrance's father, Bertram Lawrance, began his engineering career at age 15 in 1890, dying in 1943: over one long generation, Hurst Peirce and Malcolm became a leading firm of consulting engineers. Lawrance was proud of his father's and the firm's work and in 1998 gave the Institution of Structural Engineers' annual Sutherland lecture on 'An Iron Lineage', showing how the firm's history was bound up with the development of fire-proof construction and reflected the changing world around it.²

Lawrance's personal integrity, enthusiasm and unstinting work, openness and professional generosity won him not just the respect, but also the trust and affection of his colleagues, clients and fellow professionals. I extend my sympathy to his wife Pam, children Philip and Joanna, and all his family.

The Librarian of the Institution of Structural Engineers, Rob Thomas, has kindly put together a list of Lawrance's published work, as below.

Andrew Smith

- Hurst, B.L. (1984) 'Developments in design codes of practice – draft BS 5950: Part 1. Development and summary of contents'. In National structural steel conference. New developments in steel construction. Part 1: Buildings, London, 11 & 12 December 1984. London: BCSA
- Hurst, L. (1990) 'The Age of Fireproof Flooring'. In Thorne, R. ed. The Iron revolution: architects, engineers and structural innovation 1780-1880. Essays to accompany an exhibition at the RIBA Heinz Gallery, June-July 1990. London: RIBA
- Hurst, L. (1997) 'Early iron and steel beams and the Park Lane Hotel'. National Steel Construction Conference, 1997 London: BCSA
- B. Lawrance Hurst, 'An Iron Lineage', The Structural Engineer, 77.10 (1999), 17–25.
- Hurst, L. (1999) 'If you don't put a date to something you can't even be wrong'. In Doran, D. (ed) Eminent civil engineers: their 20th century life and times. Caithness: Whittles
- Hurst, L. (2000) 'Why the adjoining owner's surveyor needs an engineer', Structural Survey, v18 n5
- Pasley, C.W. (2001) Practical architecture. Shaftesbury: Donhead [reprint of 1862 edition with introduction by Lawrance Hurst]
- Hurst, L. (2002) 'The Properties and uses of Roman

- cement', Construction History. v18
- Smith, P. (2004) Rivington's building construction. Shaftesbury: Donhead [reprint of 1904 edition with introduction by Lawrance Hurst]
- Hurst, L. (2006) 'The Rise and fall of the use of bond timbers in brick buildings in England'. In Dunkeld, M. et al (eds.) Proceedings of the second international congress on construction history: Queens' College, Cambridge University, 29th March-2nd April 2006. Volume 2. Exeter: Construction History Society
- Hurst, L. (2009) 'The London Custom House collapse in 1825 - a new view'. In Neale, B.S. (ed.) Forensic engineering: from failure to understanding. Proceedings of the two day international conference organised by the Institution of Civil Engineers and held in London on 2 to 4 December 2008. London: Telford

- Hurst, L. (2010) 'Spanning tile creasing', Construction History Society Magazine. n86
- Hurst, L. (2014) 'Hurst, Bertram Lawrance'. In McWilliam, R.C. and Chrimes, M. (eds.) Biographical dictionary of civil engineers in Great Britain and Ireland. Volume 3: 1890-1920. London: ICE Publishing
- Hurst, L. and Dutton, A. (2015) 'Conservation compendium. Part 8: Bond timbers in old brickwork'. The Structural Engineer, v93 n7 July

Notes

1. *The Party Wall Etc Act 1996 Explained* (London: Parrot House Press on behalf of Pyramus and Thisbe Club, 1996); (Lawrance Hurst), *The Role of the Advising Engineer*, Guidance Notes (Pyramus and Thisbe Club, 2010) <<https://www.partywalls.org.uk/media/uploads/Guidance%20Note%2010%20-%20Advising%20Engineer.pdf>> [accessed 28 January 2019].
2. B. Lawrance Hurst, 'An Iron Lineage', *The Structural Engineer*, 77.10 (1999), 17-25.

John Kenneth Almond

Born in Colchester, Essex on 12 October 1928, third child to John William, a Methodist minister, and Evelyn May (née Wilton). John Kenneth, known to as Jake, spent his early years in Chelmsford and Hartley Witney. He attended secondary schools in Ramsgate, Southwell and the Holme Valley, before serving in the RAF (1947 to 1949 training as a Leading Aircraftman wireless fitter. He then studied for three years at the Royal School of Mines in London as an undergraduate in Metallurgy, with mineralogy lectures from the legendary Prof H H Read. Vacation work included periods at the Eyre Smelting Company and Fry's Metal Foundries. He won the Nuffield Vacation Scholarship in 1951 and spent time at the Broken Hill Development Company, North Rhodesia and at Stanhope, Co. Durham. He was a postgraduate research student in Mineral Engineering at imperial College with a PhD thesis titled "Applications of high frequency vibrations in mineral dressing".

Jake's professional employment began in 1955 as mill shift boss for Gambian Minerals Ltd (a subsidiary of British Titan Products) commissioning a plant to produce ilmenite, rutile, and zircon from beachsands mainly by magnetic and H-T separations. Whilst there he married Honor Powell with whom he spent the next 47 happy years. From 1957 to 1960, he was technical manager in Kerala, South India for Hopkin and Williams (Travancore) Ltd. Jake designed and commissioned equipment for rutile recovery, implemented a mechanisation programme.

Jake and Honor returned to Africa in 1960 when he joined the Government of Uganda Geological Survey and Mines Department, Entebbe. They returned to the UK in 1969 Jake took a one-year course of technical-teacher training at Garnett College, London, obtaining a distinction in teaching practice during a period spent in the Metallurgy Department of Sir John Cass College. In 1970 Jake took up a post as lecturer in extractive metallurgy at Teesside Polytechnic and in 1971 he was appointed to senior lecturer; a post he held until retirement in 1994. The main thrusts of his teaching work were hydrometallurgy, electrometallurgy, and mineral processing for degree level students, together with iron & steelmaking and raw material resources, for various levels ranging from technician to post-graduate. Jake also undertook teaching work for the OU for over 25 years in subjects as basic earth science, geochemistry and history of technology, participating in summer schools and field trips. During his long career he was elected Member of the Institution of Mining and Metallurgy, and a Chartered Engineer; Member of the American Institute of Mining Engineers; and Member of the Institution of Metallurgists.

In 1982 he was awarded a Master of Education degree for his thesis "Factors influencing education in metallurgy in England and Wales, 1851 to 1950". By then he had become firmly involved in industrial archaeology becoming, including a committee member, chairman and then treasurer of the Teesside, soon to be renamed Cleveland Industrial Archaeology Society (CIAS). He was a member of its editorial board from 1974 until his death. As Editor also of TIAS and CIAS Newsletters he produced 118 editions in total on an antique typewriter until 2011. Jake was a leading light in CIAS and a long-time member and valued contributor to many other societies including the Newcomen Society, the Historical Metallurgy Society, Cleveland Institute of Engineers, Yorkshire Archaeological and Historical Society, Association for Industrial Archaeology, Teesside Ships Society and the National Traction Engine Club.

His papers and scientific articles number over 30, plus many unpublished technical reports. The collection of books, papers and manuscript notes is so large and detailed that it will be conserved and form the basis of a J K Almond archive graciously housed at the Materials Processing Institute, Middlesbrough, where it will be available for researchers. He was passionate about conserving records of past industrial activities and discoveries; and this will be an excellent memorial.

Honor died in 2002 and he is survived by niece Rosalind, and nephews Martin and Colin.

Dr F W Smith with contributions by E Birch, P Jackson, and C Morris

Colin Garratt

It is with regret that we report the death of the railway photographer and writer Colin Garratt (1940 - 2018). He published about a hundred books, most of these are popular photograph albums, generally rather repetitive they depict working steam locomotives. However *Symphony in Steam*, *Iron Dinosaurs*, *China's Railways: Steaming into a New Age*, *Scarecrows and Steam* and *Soot & Rust* are perhaps of more lasting value. He is buried at Newton Harcourt, Leicestershire.

Robert Carr

The Changing Role of Consultants in Industry

1850–2000

Call for Papers & Workshop in Oxford on 10-11 May 2019

Consultants – a neglected group

Consultants have been neglected by historians of engineering and technology. They are one professional group that is overlooked when discussing innovations. With few exceptions, only passing reference is made to their background and training, the circumstances of their engagement, the nature of the work and its success.

Yet it is clear that consultants were often a key resource in knowledge management for firms, especially in emerging sectors making the transition from craft-based traditions to use of scientific knowledge.

As the modern corporation arose during the late 19th century, firms faced a growing problem of managing knowledge. They set up in-house laboratories and began to develop R&D programmes. But, at the same time, consultants played a key role in spreading new technologies across firms, improving operating practices within factories, establishing standards and helping develop key supply industries.

A widely supported conference

To help explore these issues, the Newcomen Society has agreed to support a Conference in 2019 on the "Changing Role of Consultants in Industry, 1850 to 2000. Other supporters include: the British Society for the History of Science, Oxford Brookes University and the Society for the History of Alchemy and Chemistry. The Workshop is to held in Oxford on 10-11 May 2019. The Society would welcome papers on a range of issues.

This workshop will address the role of consultants in various industrial sectors across Europe and in the United States, and attempt to establish evidence on who the consultants were, the market for consultants and their impact. Questions that arise include:

Who are the consultants? Studies of individuals or consultancy firms which illustrate the role of consultants.

Shifting definitions of consultants over time: how has this changed and how has the profession evolved?

What of the emergence of professional service firms and process plant contractors who bundle consultancy with the supply of design, plant or buildings, commissioning, training and start-up?

How did someone become a consultant?

What gave consultants the expertise (and standing) to undertake such work? What networks did consultants operate in to sustain their work? What levels of remuneration were available?

The market for consultants

Who employed consultants? What are the challenges for a business in defining a consultant's project? How readily is the consultant's report utilised by the business? What kind of consultancy work was undertaken? Did it vary over time? At what point was the consultant's work taken inside the business? Did any conflicts arise? If so, how were they resolved? To what extent were patents involved? What about the use of industrial consultants by banks, stockholders, financiers and/or government departments or agencies to evaluate capital schemes and projects?

The impact of consultants

How did consultants contribute to innovation and diffusion of technology? What types of knowledge were transferred? What was their relationship to formal in-house R&D – complement or substitute? Has their influence shifted over time? How has their technical advice influenced government industrial policies?

Organisation of the Workshop on 10-11 May 2019

- The workshop will be based on pre-circulated papers, approx. 5,000 words, with deadline of 30 March 2019. A selection of workshop contributions will be published in an edited volume.
- Workshop to be held at the Maison Française d'Oxford, 2-10 Norham Road, Oxford OX2 6SE, United Kingdom.
- Submission deadline for proposals: 30 January
- Please send proposals (max 300 words) and a short CV to: peterreed.42@gmail.com.
- Organisers: Peter Reed (Independent Researcher), Jonathan Ayles (University of Manchester and the Newcomen Society) and Viviane Quirke (Oxford Brookes University).

The workshop is supported by grants from the British Society for the History of Science, the Newcomen Society, Oxford Brookes University and the Society for the History of Alchemy and Chemistry.



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

LONDON @NewcomenSoc

Lectures are held in the The Dana Studio, Wellcome Wolfson Building, 165 Queens Gate, London SW7 5HD, unless specified otherwise. Time 17.45. Visitors welcome, admission free.

10 April Simon Jump: From Peenemunde to Dortmund via Korea: A history of the Corporal Missile

8 May Richard Byrom: Fairbairn

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from: meetings.north.western@newcomen.com

28 - 30 August Newcomen Society 2019 Summer Visit, Birmingham: Steam, Spitfires and Sustainable Power Generation. Details on p 28

5 November Symposium at Kelham Island Industrial Museum, Sheffield. Precision: Bramah and Maudslay to Advanced Manufacture. See details on these pages

MIDLANDS @Newcomen_Mid

Meetings are held in the Thinktank Lecture Theatre, Level 2, Birmingham Science Museum, Millennium Point, Curzon Street, Birmingham, B4 7XG (for Sat Nav, use postcode B4 7AP) Time 19.00. Visitors welcome, admission free

3 April Mike Potts: The Early History of the Newcomen Engine

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from: meetings.north.western@newcomen.com

28 - 30 August Newcomen Society 2019 Summer Visit, Birmingham: Steam, Spitfires and Sustainable Power Generation. Details on p 28

5 November Symposium at Kelham Island Industrial Museum, Sheffield. Precision: Bramah and Maudslay to Advanced Manufacture. See details on these pages

NORTH EAST

Meetings in the Carpathia Room, Tyne & Wear Discovery Museum, Blanford Street, Newcastle upon Tyne NE1 4JA Times vary. Paid parking available on site.

9 April, 18.00 Jonathan Ayles: Cold War to Coal Trains - TOPS, British Railways' First Computer Based Train Operating System

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from:

meetings.north.western@newcomen.com

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NORTH WEST

Meetings are usually held at the Museum of Science and Industry (MOSI), Liverpool Road, Manchester M3 4FP at 18.30-20.15 unless specified otherwise. Visitors welcome, admission free. Members meet at a nearby restaurant from 17.00.

26 March 18.30, University of Manchester, Renold Building, Altrincham Street, Manchester M1 7JR Joint with the Institution of Structural Engineers. Dr Ralph Harrington, Bulldozers

30 April 18.30, MOSI Dr Victoria Owens: Lady Charlotte Guest at Dowlais, 1833-55: how a pioneering Victorian businesswoman came to head the world's largest ironworks

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from: meetings.north.western@newcomen.com

28 - 30 August Newcomen Society 2019 Summer Visit, Birmingham: Steam, Spitfires and Sustainable Power Generation. Details on p 28

5 November Symposium at Kelham Island Industrial Museum, Sheffield. Precision: Bramah and Maudslay to Advanced Manufacture. See details on these pages

SOUTH YORKSHIRE @NewcomenSY

Meetings usually held at Kelham Island Museum, Alma Road, Sheffield S3 8RY at 18.30-20.15, unless otherwise indicated. Visitors are welcome and lectures are free. Free parking at Kelham Island Museum for up to 40 vehicles. This is split between the onsite parking and the Museum car park next to the Fat Cat pub. There are 3 accessible spaces at Kelham Island Museum.

29 April Region AGM followed by Chris Hodrien: Steam below sea- the Royal Navy K Class steam turbine submarines of WW1.

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details

below on. Further information from: meetings.north.western@newcomen.com

28 - 30 August Newcomen Society 2019 Summer Visit, Birmingham: Steam, Spitfires and Sustainable Power Generation. Details on p 28

5 November Symposium at Kelham Island Industrial Museum, Sheffield. Precision: Bramah and Maudslay to Advanced Manufacture. See details on these pages

SOUTHERN

The meetings Room PO1.11 Portland Building, Portland St, Portsmouth University at 18.30.

30 April Robert Taylor: Presidential Address - From the First to the Third Industrial Revolution

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from: meetings.north.western@newcomen.com

28 - 30 August Newcomen Society 2019 Summer Visit, Birmingham: Steam, Spitfires and Sustainable Power Generation. Details on p 28

5 November Symposium at Kelham Island Industrial Museum, Sheffield. Precision: Bramah and Maudslay to Advanced Manufacture. See details on these pages

WESTERN

Meetings are usually held in Room 1, BAWA, 589 Southmead Road, Bristol, BS34 7RG, 7:30-9:30 pm.

21 March Stephen Jones: Rise and Fall- Steam and the Suspension Bridge

18 April Don Hillman: Severn Bridge

16 May John Anning: SS Xantho and the Penn Engine

21 May All day visit to Rhydymwyn Valley Works, near Mold. See details below on. Further information from: meetings.north.western@newcomen.com

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VISIT TO RHYDYMWYN VALLEY WORKS

TUESDAY 21 MAY

In WW II and the years after, few places in Britain were as secret as the Valley Works at Rhydymwyn, near Mold.

Set up in 1939 as a *Shadow Factory* to produce poison gas, the site had extensive underground storage facilities to keep mustard gas and related materials safe from bombing.

Visits to these tunnels are strictly limited by DEFRA, the site landlord. The Newcomen Society has been able to book a party visit on the morning of Tuesday 21st May.

If you are interested in joining the party, please e-mail:

meetings.north.western@newcomen.com

There will be a small charge to include a buffet lunch on site.

There will be an opportunity during the visit to learn about the site's even more secret role in the development of the atom bomb.

For further information about the Valley Works including how to find the site, see

<https://rhydymwynvalleyhistory.co.uk>

Copy dates for Newcomen Links

1 May
1 August
1 November

editor.links@newcomen.com
www.newcomen.com

A Symposium

Precision: Bramah and Maudslay to Advanced Manufacture

Tuesday 5th November 2019 10:00 – 4:00

Kelham Island Industrial Museum

Ticket £25 including buffet lunch and coffee. Tickets must be pre-booked

Entry to the Bramah Exhibition is included in the price

Programme

10:00	Registration and Coffee	
10:30	Introduction	Keith Crawshaw
10:45	Joseph Bramah	John Bramah
11:45	Henry Maudslay	Richard Maudsley
12:45	Buffet Lunch and Conducted Tour of Bramah Exhibition	
13:45	A History of Interchangeable Manufacture and Precision Engineering	David Eaton
14:45	Coffee Break	
15:00	Modern High Value Added Manufacture	AESSEAL
16:00	Closing Remarks	Jonathan Ayles

Further Information www.newcomen.com

Email: meetings.syorks@newcomen.com

Bookings at <https://www.eventbrite.co.uk/xxxxxxx> Booking Close 14th October 2019

The Symposium is organised by the South Yorkshire Branch of the Newcomen Society, in association with Kelham Island Industrial Museum and The Ken Hawley Collection Trust

The Symposium is a not for profit event with all proceeds going to Kelham Island Industrial Museum and The Ken Hawley Collection Trust

The Newcomen Society is a Registered Charity 215410

Newcomen Society
2019 Summer Visit

STEAM, SPITFIRES AND SUSTAINABLE POWER GENERATION

28 - 30 August in Birmingham

details on page 28





THE SECOND INTERNATIONAL EARLY ENGINES CONFERENCE (IEEC2) PRELIMINARY ANNOUNCEMENT & CALL FOR PAPERS

Building on the success of IEEC 1 at The Ironworks, Elsecar in May 2017, we are delighted to announce that IEEC2 will be held at the Black Country Living Museum (BCLM), Dudley, West Midlands in Mid May 2020 (either 8/9/10 or 15/16/17 May). The event will start at noon on Friday and finish at noon on Sunday and it is our intention that it runs concurrently with the BCLM's "Red by Night" event which involves many of the museums engines being in steam and working into the night. The format will be similar to that of IEEC1, including publication of the Transactions and we are determined that the event will again feel inclusive, friendly and non-elitist for everyone.

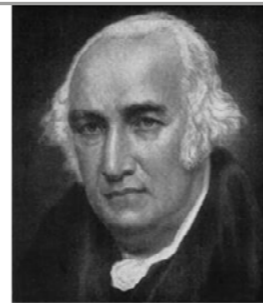
The theme for IEEC2 is "A wider view of early engines and their operating context – beyond valve gear and famous engineers"

We already have a number of papers offered covering topics such as Curr's Attercliffe engines, the world's oldest B&W engine house and early engines around Swansea. Please let us have your proposals for papers as early as possible to admin@earlyengines.org

Costs and booking details will be announced during the summer and in the meantime do please contact us with any questions that you have.



James Watt Bicentenary Commemorated at Etruria Stoke-on-Trent



James Watt, who developed and produced with his business partner Matthew Boulton, the first efficient rotative steam engine died on 25th August 1819 aged 83. A Watt engine was erected at Wedgwood's Etruria factory in 1784. To commemorate his life the Etruria Industrial Museum is organising a series of events. The museum includes Shirley's 1857 Bone & Flint Mill driven by a 1820s Watt pattern rotative beam engine.



Wednesday 31st July at 2.30pm, finish at 4.30pm, a public talk on James Watt's life followed by a guided tour of the mill. £8.00 per person light refreshments included.

Thursday 1st August at 7.00pm, finish at 9.00pm, a public talk on James Watt's life followed by a guided tour of the mill. £8.00 per person light refreshments included.

Friday 2nd August 6.30pm, finish 9.00pm, a prestigious lecture on the achievements of James Watt with an emphasis on his technical innovations and an opportunity to see the engine in steam and running the mill. This will have a significant technical content and will be of interest to engineers and those with a scientific interest. £20.00 per person drinks and buffet included.

Saturday 3rd and Sunday 4th August the mill in steam from 12.30pm to 4.30pm with the engine starting on the hour, and visit the mill. Entry to the mill £4 or £6 to include a guided tour. Children under 16 accompanied by a paying adult free.

Booking essential for the Wednesday, Thursday and Friday talks by
W: www.etruriamuseum.org.uk/fw19 OR info@etruriamuseum.org.uk T: 07900267711

Due to its historic nature limited access to the mill for those with mobility difficulties

Etruria Industrial Museum

Car park: Etruria Vale Road, Etruria, Stoke-on-Trent ST1 4RB

THE MEDIEVAL PORT OF LONDON

A CONFERENCE ORGANISED BY THE DOCKLANDS HISTORY GROUP TO BE HELD ON SATURDAY 18TH MAY 2019 AT THE MUSEUM OF LONDON.

At this conference, a number of people with a long involvement in the history and archaeology of the River Thames and the City of London will present papers on a varied range of subjects relating to the Medieval Port of London.

- Professor Vanessa Harding - City and Port - merchants and overseas trade
- Damian Goodburn - Ships and boats of the medieval port
- John Schofield - Medieval waterfront buildings
- Alderman Alison Gowman - The Hanseatic Steelyard
- Laura Wright - Language and London Bridge
- John Clark - The Medieval Thames:

The following is a list of the speakers and their papers:
Gustav Milne - The Medieval Port of London - an overview

rubbish tip, accident black spot, or sacred river?

Nathalie Cohen - The Fishful Thames: the Anglo-Saxon and medieval periods

For further details and information on how to book a place, please visit the Group's website at www.docklandshistorygroup.org.uk

Events in Glasgow, Birmingham and Stoke-on-Trent will mark the bicentenary of the death of James Watt.

A full listing of events in Glasgow is at: <https://jameswatt.scot/events/>

Details of the Newcomen Summer Visit to Birmingham are on the next page



The Glasgow Incorporation of Hammermen presents:
WATT A CELEBRATION

A light-hearted celebration of the genius of **James Watt (1736-1819)** in aid of funds for Primary Engineer®

The Singers Company, Glasgow will present their tribute to Watt in music and song.

Primary Engineer® will host a 'pop-up' exhibition of the Scottish Engineering Leaders Award entries.

Scottish launch of a new book 'James Watt in 50 Objects' edited by Malcolm Dick, University of Birmingham and much more!

Friday 31st May 2019, 7:30pm-10:00pm
Trades Hall, Glassford Street, Glasgow
Dress code: Smart casual or "Steampunk themed"

Tickets cost £35 inclusive of welcome drink and supper.
Tickets available at eventbrite 'Watt a Celebration' <https://bit.ly/2R7bY9x>

THE SINGERS COMPANY
Primary Engineer Programmes
...the first step®

James Watt
1736-1819
2019



Newcomen Society 2019 Summer Visit

Steam, Spitfires and Sustainable Power Generation

28 - 30 August in Birmingham

The visit is centred on Birmingham, adopted home of James Watt and proud base of both iconic engineering heritage and cutting-edge technology.

In the bi-centenary year of Watt's death, we will visit one of 'his' engines, the Smethwick Steam Engine, the world's oldest working steam engine.

We will also view the exhibition 'The Life and Legacy of James Watt 1736 – 1819' at the Library of Birmingham, with an opportunity to explore this striking building – billed as 'Europe's largest cultural space'.

In the 80th year since the outbreak of World War Two, we can learn about one of that conflict's most famous engineering feats - the Spitfire. We will view a preserved example and learn of Birmingham's key role in its development. We will also visit the factory that produced over 10,000 Spitfires, and which today produces Jaguar sports cars.

The visit to Jaguar Land Rover's Castle Bromwich works will include a guided tour of this modern car assembly plant.

A high-tech theme continues with a visit to the University of Birmingham's Centre for Railway Research, to see developments with hydrogen engines and fuel cell technology.

A number of other activities is planned for our three days in Birmingham, to showcase what this 'City of a thousand trades' offers historians of engineering and technology.

It will be a packed programme, so delegates may wish to join us on Tuesday evening 27th August 2019.

Accommodation and booking details will be published shortly. Please keep watching the website www.newcomen.com

For those wishing to extend their visit beyond our official programme, please note that the University of Birmingham's Conference on James Watt runs from 30 August – 1 September 2019 (separate booking required -see <https://jameswatt.scot/2019/01/30/wattconference/>)

Alternatively, the wider West Midlands has much to offer self-guided visitors, including the Black Country Living Musuem, Severn Valley Railway and Coventry Motor Museum.