

## Panel for Historical Engineering Works Newsletter

Number 158 June 2018

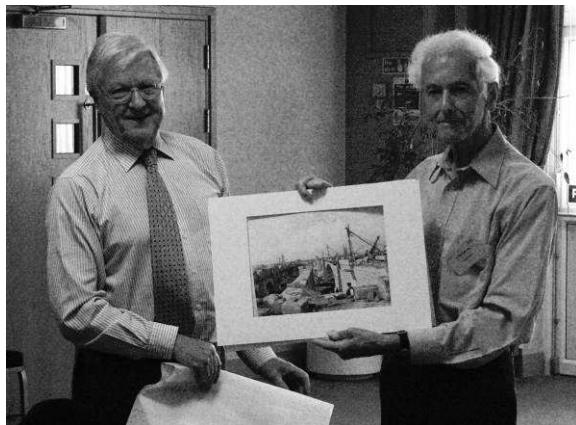
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Editor's Note

### Obituary: Denis Patrick Smith

By David Perrett

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Denis (on the right) on his retirement from PHEW

Historian of technology, industrial archaeologist, engineer, folk musician and a past president of the Newcomen Society are just some of the roles in which Denis was acclaimed.

Denis Smith was born in 1930 at Forest Gate in East London, the second of six children. His father was a skilled metalworker. At the outbreak of WWII, Denis was evacuated to Ipswich and then to South Wales. For a number of reasons, including long term illness, he left

school without formal qualifications and got a job with Plessey in Ilford. Then began the long haul of home study, evening classes and eventual qualifications. He obtained a HNC in 1951, an enhanced HNC three years later and became a chartered engineer in 1955. During this period he was involved in construction work on Blackwell Power Station and the Medway Bridge. Having undertaken a lecturing course from 1956-57, he went on to lecture in mechanical engineering at West Ham College of Technology, which became North London Polytechnic.

He joined The Newcomen Society in 1963-4 session and was regularly on Council from 1971. In February 1971 he read his first paper to the Society, 'The Humphrey Pump' at the Science Museum. There followed, at regular intervals, a further 7 lectures on a variety of civil engineering topics; all are published in Transactions of the Newcomen Society (available in the on-line archive). During the 1970s Denis undertook a part-time Ph.D. in the Department of the History of Science & Technology at Imperial College. His subject was The Role of Structural Models in British Bridge Design 1800-1870. The thesis was submitted in November 1976. Papers, derived from his thesis, are in Newcomen Transactions volume 48 and History of Technology volume 2. He continued to have close links with Imperial College and in the 1980s made a series of videos on Engineering History with the college's media department.

Denis was elected President of the Newcomen Society for the 1997 to 1999 term. His first summer meeting, organised as President, was to his local stamping grounds of East London and Essex followed by a particularly memorable one to Boston and New England in the USA.

In 1968 he was instrumental in calling a meeting at the Science Museum to discuss the idea of an industrial archaeology society in London that led to the formation of Greater London Industrial Archaeology Society (GLIAS) in April the following year. He features in GLIAS's 1971 winning entry for the BBC's Chronicle programme on Industrial Heritage. He chaired GLIAS from 1972 to 2011 and established many adult classes in IA around London, introducing hundreds of people to the subject. In 1972 he established a course at Goldsmith's College, University of London followed by others at Birkbeck College, Morley College and the City Lit. It was at Goldsmiths that I first met Denis in 1974. During this time, he either initiated or was involved in many IA projects like the Docklands History Survey, the establishment of Crossness Engines Trust and, most notably, the preservation of Kirkaldy's Testing and Experimenting Work in Southwark Street, London, which he came across serendipitously in 1975.

He was a stalwart of the Institution of Civil Engineers Panel for Historical Engineering Works and wrote and edited the volume on London in their Civil Engineering Heritage series published in 2001.

Council on Training in Architectural Conservation (COTAC). One of its initiators is Ingvál Maxwell formerly of Historic Environment Scotland (HES). HES has already championed 3D visualisation with its seminal Scottish Ten project <<https://www.engineshed.scot/about-us/the-scottish-ten/>>.

Also in Scotland the Scottish Engineering Hall of Fame <<http://www.engineeringhalloffame.org/>> could be expanded or adapted for other purposes. Another interesting idea comes from Wikipedia: writing new entries is already used by Edinburgh University and elsewhere as a teaching project for undergraduates <[https://en.wikipedia.org/wiki/Wikipedia:University\\_of\\_Edinburgh](https://en.wikipedia.org/wiki/Wikipedia:University_of_Edinburgh)> <[https://media.ed.ac.uk/media/The+Wikimedia+Residency+at+the+University+of+Edinburgh/1\\_h70uinvt](https://media.ed.ac.uk/media/The+Wikimedia+Residency+at+the+University+of+Edinburgh/1_h70uinvt)>.

It was suggested that the traditionally published Biographical Dictionary of Civil Engineers (BDCE) <[http://www.thomastelford.com/books/bookshop\\_main.asp?ISBN=9780727758347%20&BookTitle=Biographical%20Dictionary%20of%20Civil%20Engineers%20in%20Great%20Britain%20and%20Ireland%20-%20Volume%203:%201890-1920](http://www.thomastelford.com/books/bookshop_main.asp?ISBN=9780727758347%20&BookTitle=Biographical%20Dictionary%20of%20Civil%20Engineers%20in%20Great%20Britain%20and%20Ireland%20-%20Volume%203:%201890-1920)> follow the Oxford Dictionary of National Biography (ODNB) by fully digitizing its text.

The Dictionary of Scottish Architects (DSA) could be an Open Access model on how a biographical dictionary and key historic locations could be expanded and integrated <<http://www.scottisharchitects.org.uk/>> DSA has 61003 buildings listed (almost twenty times more than the HEW sites) and 16559 architects (at least five times more than BDCE). An example which I selected was James Miller, the one architect included in BDCE Vol. 3, with the DSA entry for him and one of his many works, the existing ICE headquarters at Great George Street, Westminster: <[http://www.scottisharchitects.org.uk/architect\\_full.php?id=2\\_00001](http://www.scottisharchitects.org.uk/architect_full.php?id=2_00001)> <[http://www.scottisharchitects.org.uk/building\\_full.php?id=21\\_1030](http://www.scottisharchitects.org.uk/building_full.php?id=21_1030)>

Following the end of its "project phase" at St Andrews University under Professor David Walker - DSA is in the care of HES. It remains an example of a Open Access research tool of high potential.

A digital pioneer was Engineering Timelines <<http://www.engineering-timelines.com/timelines.asp>> - which was partly sponsored by ICE and is still increasing its content.

It will be interesting to learn which of these ideas will find champions within ICE's heritage communities. Any Digital Future would require resources and staff time from ICE itself. It is unlikely for the communities to survive without further steps being taken towards a Digital Future beyond the impressive existing PHEW database <<https://www.ice.org.uk/knowledge-and-resources/historical-engineering-works>> The new Open Access digital world perhaps requires suitable partners able to share the ICE's heritage communities' distinctive

perspectives on our special interests in parallel with more traditional activities.

The web links above can be copied from the pdf version of the newsletter available at <https://www.ice.org.uk/about-ice/what-we-do/panel-for-historical-engineering-works>

## Union Chain Suspension Bridge 1820 – Radar Site Investigation of Scottish Anchorages.

By Roland Paxton

Readers may be aware that this historically significant structure, now the world's earliest road suspension bridge still in use [see table], is undergoing an £8m. refurbishment by Northumberland County Council, with support from Borders Council, the HLF, Friends of the Bridge, and others.

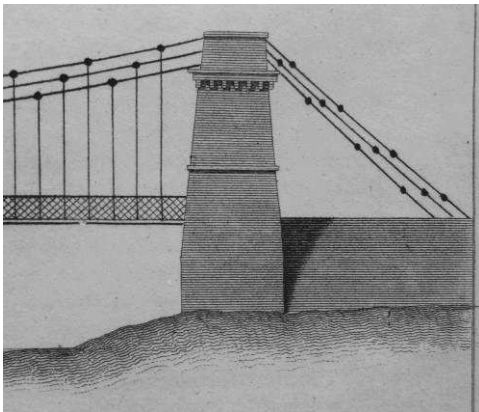
On becoming aware of a shortage of reliable contemporary data relating to the bridge's 1820 Scottish anchorages, Dr Colin Stove, Chief Scientist of Adrok, and I set up this pro-bono project with the aim of remedying this deficiency using state-of-the-art radar technology to scan the anchorage ground and hidden chains to a depth of 12m below road level. This process is a development of Dr. Stove's novel site investigation practice on our former projects at Laigh Milton Viaduct near Kilmarnock, Brunel's Thames Tunnel, Lord Elgin's flooded Broomhall quarry - seeking the 'Duke' Stephenson locomotive, and Loch-nan-Uamh mass concrete Viaduct near Arisaig - seeking the entombed remains of a McAlpine horse and cart.

Our anchorage investigation venture has the potential to inform decision-making on the bridge's refurbishment and conservation, and to provide educational and promotional opportunities for a better understanding of the role of this historic international landmark in suspension bridge development.

Name of Bridge, Engineer, Main Cables, Date	Cable Span (ft/m)
Newburyport, USA (Finley 1810, bar chain, replaced 1909)	244/74
Union, UK (Capt. Brown & Rennie 1820, bar chain, 2t limit)	437/133
Menai, UK (Telford 1826), bar chain, renewed in steel 1940	580/177
Fribourg, Switzerland (Chaley 1835, iron wire, replaced)	c.870/265
Wheeling, Ohio USA (Ellet 1849 – wire)	1010/308
Queenston-Lewiston, USA (Serrell 1851-64 wrecked, wire)	1040/317
Cincinatti-Covington, USA (Roebing 1867 – wire cable)	1057/322
Niagara-Clifton, USA-Canada (1869-89 wrecked wire)	1268/387
Brooklyn, USA (Roebing 1883, wire; bar chain anchorages)	1596/486

Forth, UK (Fowler/Baker/Arrol 1890, steel cantilever type)	1710/521
Quebec (Vautelet et al 1917, zenith span steel cantilever type)	1800/549
Ambassador, USA-Canada (McClintic & Co.192 steel wire)	1850/564
George Washington, USA (Ammann/Gilbert 1931, steel wire)	3500/1067
Golden Gate, USA (Strauss et al 1937, steel wire)	4200/1280
Verrazano Narrows, USA (Ammann/Brumer 1964, steel wire)	4260/1298
Humber, UK (Freeman Fox & Partners 1978, steel wire)	4526/1380
Akashi Straits, Japan (Satoshi Kashima 1998, steel wire)	6532/1991

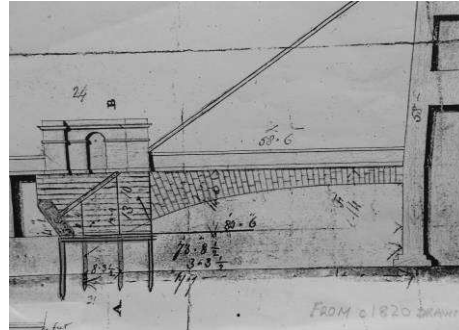
Chronological list of the world's longest bridge spans 1810-2018 ©Paxton



Stevenson's elevation of Scottish Approach Edin. Phil J. X. Oct. 1821. Pl. VIII. ©Paxton

Contemporary images expected to provide anchorage details comprised drawings and plates by its engineer, Capt. Brown (1819 - Taylor 1822), Robert Stevenson (1821), Dupin (1824) and Drewry (1832). None show any detail below roadway. The undated drawing below shows the ballast plate bottom 13ft 10in below the roadway [less to the plate centre].

As to written accounts, Brown wrote to Stevenson on 30 July 1820 (four days after the bridge opening) that the anchor plates 'are 40 feet under the road' [Miller, 2017, 181]. But Stevenson wrote in the Edin. Phil. J. X. Oct. 1821, 250, that the chains 'are sunk to a depth of 24 feet where they pass through great ballast plates of cast iron ... [then] loaded with mound-stones and earthy matters to the level of the roadway'.



Union Bridge Scottish Anchorage. Drawing signed by Brown c.1820. ©Paxton. Not built - fewer chains, masonry not as built, shallow depth to ballast plate. NLS Ms.Acc.10706.



Survey crew led by Dr. Stove scanning on line of bridge chains, 17 May. ©Paxton

Note: Adrok designed transmitter and receiver on frame. High quality data was obtained which is now being analysed and a report with findings is in preparation. It is hoped that a summary of the findings will be included in a future Newsletter.

The writer wishes to thank Northumberland County Council for arranging bridge access, and providing recent drawings and borehole data. Also, Adrok without whose expertise, enthusiasm and generosity the venture would not have been possible, and Edward Cawthorn, Secretary of the Friends of the Union Chain Bridge for his interest and hospitality.

Institute for Infrastructure and Environment, Heriot-Watt University, Edinburgh. 11 June 2018.

## The Chainworks of Brown Lenox By Stephen Jones

The famous Pontypridd chainworks of Brown Lenox began operation in 1818 following the lease by Captain Samuel Brown (1774-1851) of the site. By November 1817 he had taken possession of the site and following building work on site the Newbridge Chainworks opened - sometime in 1818. Although established as Samuel Brown & Co., the company name of the chainworks soon changed to reflect the important input made by Samuel Lenox. A multi-stranded business story, it covered the development of iron chain cables, the