THE INSTITUTION OF CIVIL ENGINEERS

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Panel for Historical Engineering Works

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KING'S MILL VIADUCT COMMEMORATION

by J K Gardiner

The Institution's Senior Vice-President, Professor George Fleming, visited the East Midlands on 25-26 February, and during a tour of the district he unveiled a plaque that (with the encouragement of PHEW) had been fixed on King's Mill Viaduct at Mansfield by the East Midlands Local Association. The plaque is worded:

KING'S MILL VIADUCT
Built 1817 by the
Mansfield & Pinxton Railway Company
Engineer
JOSIAS JESSOP
1781-1826

The viaduct is believed to be the oldest railway viaduct (as distinct from a single-span bridge) in England, and the fourth oldest railway bridge of any kind in the Kingdom. The three known older ones are Causey Arch (County Durham) (1727), Ticknall Tramway Bridge (Derbyshire) (1802), and Laigh Milton Viaduct (Aryshire) (1811). The engineer of the second and third of these was the famous William Jessop; Josias Jessop of King's Mill Viaduct was his son, who had assisted his father on many works and later was the engineer of the Cromford & High Peak Railway.

King's Mill Viaduct
Professor George Fleming, Vice-President of the Institution of Civil Engineers, unveiling the plaque on 26 February 1999

SK 520 598 - King's Mill Viaduct
Mansfield & Pinxton Railway (HEW 1775)

The Mansfield & Pinxton Railway was built to connect the town of Mansfield with the nearest canal, William Jessop's Cromford Canal which had a branch to Pinxton. An Act of Parliament was passed in 1817, and the 8-mile line was opened as a horse-drawn tramway in 1819. It was laid with cast iron edge rails on stone blocks to a gauge of probably 4ft 4in. It rose 128ft in the first 3 miles from Mansfield to the summit at Kirkby, then fell 240ft to Pinxton at a fairly constant gradient of about 1 in 100. King's Mill Viaduct was the most notable structure on the line, a mile from the Mansfield terminus, crossing a depression and a stream with five 24ft stone arches, and bearing a date stone marked "M & P 1817". It is scheduled as an Ancient Monument.

THE CHAIRMAN'S COLUMN
by Professor Roland Paxton

I consider that one of the most worthwhile applications of the promotion of historical engineering knowledge is teaching undergraduates at university. Most universities running civil engineering courses are lamentably unaware of the very real benefits of following the precedent of Professor Skempton at Imperial College and including some engineering history in their courses. Notable exceptions North of the Border are Dundee and Heriot-Watt Universities where, over the past nine years, I have been encouraged to develop a modest but useful course, a short account of which may interest readers.

Initially the course consisted of ten lectures covering the historical development of the following branches of engineering: public health (water supply, sewerage and sewage disposal), docks and harbours, lighthouses, roads, railways, canals and rivers, suspension, arched and truss bridges, and conservation. At Dundee the lectures were given to 1st Year students and amounted to about 40% of the course work and marks for the course on *Civil Engineering and Communication Skills*. Course work was set on each lecture, e.g., *Prepare a report outlining the evolution of suspension bridge engineering and the main lessons for today's engineer*. At Heriot-Watt the lectures were at first given to 3rd Year, but because of the broad context it was considered more beneficial for the students to receive a simplified version of just four key lectures at the beginning of their degree course. This plan is now followed at both universities.

The present syllabus of the four presentations, with emphasis on *strength of materials* knowledge and problem-solving, is as follows. The first lecture is on the work of a famous engineer, e.g., Smeaton, Telford, Rennie, etc. The second and third are on 2000 years of public health engineering and the evolution of an aspect of bridge engineering. The last lecture is on engineering conservation, e.g., the Laigh Milton Viaduct case study. The course work has been shortened to simply asking each student to provide a paragraph on what they considered the most innovative aspect of each lecture and why. The following extract from the response of a student of this year's intake at Heriot-Watt, gives an indication of what he had learned.

Telford was one of the greatest and most important civil engineers in history ... It is hard to select just one of his many engineering innovations, however probably the most important thing was greatly increasing possible bridge spans ... allowing greater distances to be traversed without numerous piers. Also ... his development of cavities within bridge piers, cutting down on materials and also allowing access to the bridge interior allowing inspection.

With public health being a cornerstone of a civilised society water engineering for supply and removal after use is a vital area for concern. Society could not function as it now does without the great water engineering accomplishments of the past ... Probably the most important engineering innovation presented in this lecture was the flexible joint cast-iron water main designed by James Watt for Glasgow Water Works which allowed water to be pumped across the river Clyde to the city in a main laid to the river bed profile.

... The most innovative aspect of the conservation of Laigh Milton Viaduct was the general design of one of the first multi-span railway structures that was copied throughout the world ... another was the high frequency radar used to build a comprehensive picture of the ground conditions around the viaduct's piers, allowing the conservation team to strengthen the pier foundations without damaging the surviving structure.

The failure of Tacoma Narrows suspension bridge does not so much present an innovative engineering aspect as it does a valuable civil engineering lesson. The failure of the bridge from oscillation due to vortex shedding when the wind passing over the bridge was not taken into account when the deck was designed. This brought the importance of aerodynamically designed and well-rigidified bridge decks to the attention of the civil engineering world.

Feedback from the students indicated that they found the lectures valuable in providing a context for their degree course much of which they considered to be narrowly focused. Parts of two videos shown during the lectures were particularly well received and more will be sought in future. On content, a slight preference was shown towards conservation and on one memorable occasion this lecture actually evoked a round of applause!

PUBLIC ACCESS TO ENGLAND'S PRESERVED INDUSTRIAL HERITAGE
by Peter Stephens

Last year, English Heritage commissioned a survey from PLB Consulting Limited to assess the degree of public awareness of and access to, preserved industrial